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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* ARCHIBALD WATERSHED \*  
\* 10-YR STUDY \*  
\* AREA 'K' \*  
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FILE NAME: ARCH.DAT  
TIME/DATE OF STUDY: 08:58 08/24/2011

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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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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 GUTTER-GEOMETRIES:			MANNING FACTOR (n)	
	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / SIDE	HEIGHT (FT)	WIDTH (FT)	LIP HIKE (FT)		
1	30.0	20.0	0.018/0.018	0.020	0.67	2.00	0.0312	0.167	0.0150
2	52.0	38.0	0.018/0.018	0.020	0.67	2.00	0.0312	0.167	0.0150
3	65.0	39.0	0.018/0.018	0.020	0.67	2.00	0.0312	0.167	0.0150
4	40.0	32.0	0.018/0.018	0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

AREA-AVERAGED

DURATION	RAINFALL(INCH)
5-MINUTES	0.30
30-MINUTES	0.61
1-HOUR	0.80
3-HOUR	1.38
6-HOUR	1.94
24-HOUR	3.65

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

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FLOW PROCESS FROM NODE 2050.00 TO NODE 2055.00 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) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 740.00 DOWNSTREAM(FEET) = 727.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.686  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.789  
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.)
SCHOOL	A	9.30	0.98	0.600	32	15.69
SCHOOL	C	0.60	0.57	0.600	69	15.69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA RUNOFF(CFS) = 10.86  
TOTAL AREA(ACRES) = 9.90 PEAK FLOW RATE(CFS) = 10.86

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FLOW PROCESS FROM NODE 2055.00 TO NODE 2060.00 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) = 727.50 DOWNSTREAM(FEET) = 718.00  
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.82  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 10.86  
PIPE TRAVEL TIME(MIN.) = 1.34 Tc(MIN.) = 17.03  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2060.00 = 1630.00 FEET.

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FLOW PROCESS FROM NODE 2060.00 TO NODE 2060.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.03
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.703
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
SCHOOL                  A       6.00    0.98     0.600    32
SCHOOL                  C       4.40    0.57     0.600    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 10.40      SUBAREA RUNOFF(CFS) = 11.44
EFFECTIVE AREA(ACRES) = 20.30    AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.87  AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 20.3        PEAK FLOW RATE(CFS) = 21.53

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FLOW PROCESS FROM NODE 2060.00 TO NODE 2065.00 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) = 718.00  DOWNSTREAM(FEET) = 717.50
FLOW LENGTH(FEET) = 140.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.38
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.53
PIPE TRAVEL TIME(MIN.) = 0.43  Tc(MIN.) = 17.46
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2065.00 = 1770.00 FEET.

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FLOW PROCESS FROM NODE 2065.00 TO NODE 2065.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.46
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.678
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A       4.30    0.98     0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 4.30      SUBAREA RUNOFF(CFS) = 6.12
EFFECTIVE AREA(ACRES) = 24.60    AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.88  AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 24.6        PEAK FLOW RATE(CFS) = 27.18

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FLOW PROCESS FROM NODE 2065.00 TO NODE 2065.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.46
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.678

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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
"5-7 DWELLINGS/ACRE"   A       0.40    0.98     0.500    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C      18.40    0.57     0.500    69
PUBLIC PARK             C       0.80    0.57     0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.514
SUBAREA AREA(ACRES) = 19.60      SUBAREA RUNOFF(CFS) = 24.39
EFFECTIVE AREA(ACRES) = 44.20    AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.74  AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 44.2        PEAK FLOW RATE(CFS) = 51.57

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FLOW PROCESS FROM NODE 2065.00 TO NODE 2070.00 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) = 717.50  DOWNSTREAM(FEET) = 695.00
FLOW LENGTH(FEET) = 1160.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.56
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 51.57
PIPE TRAVEL TIME(MIN.) = 1.54  Tc(MIN.) = 19.00
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2070.00 = 2930.00 FEET.

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FLOW PROCESS FROM NODE 2070.00 TO NODE 2070.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.595
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C       3.50    0.57     0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 3.50      SUBAREA RUNOFF(CFS) = 4.85
EFFECTIVE AREA(ACRES) = 47.70    AREA-AVERAGED Fm(INCH/HR) = 0.36
AREA-AVERAGED Fp(INCH/HR) = 0.74  AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 47.7        PEAK FLOW RATE(CFS) = 53.12

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FLOW PROCESS FROM NODE 2070.00 TO NODE 2070.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.595
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					
"5-7 DWELLINGS/ACRE"	C	20.00	0.57	0.500	69
PUBLIC PARK	C	1.30	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.521					
SUBAREA AREA(ACRES) = 21.30		SUBAREA RUNOFF(CFS) = 24.92			
EFFECTIVE AREA(ACRES) = 69.00		AREA-AVERAGED Fm(INCH/HR) = 0.34			
AREA-AVERAGED Fp(INCH/HR) = 0.68		AREA-AVERAGED Ap = 0.49			
TOTAL AREA(ACRES) = 69.0		PEAK FLOW RATE(CFS) = 78.03			

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	9.30	0.57	0.500	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	4.20	0.57	0.200	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407					
SUBAREA AREA(ACRES) = 13.50		SUBAREA RUNOFF(CFS) = 16.43			
EFFECTIVE AREA(ACRES) = 101.50		AREA-AVERAGED Fm(INCH/HR) = 0.32			
AREA-AVERAGED Fp(INCH/HR) = 0.64		AREA-AVERAGED Ap = 0.51			
TOTAL AREA(ACRES) = 101.5		PEAK FLOW RATE(CFS) = 115.06			

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FLOW PROCESS FROM NODE 2070.00 TO NODE 2040.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 693.80  
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.06  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 78.03  
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 19.25  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2040.00 = 3080.00 FEET.

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FLOW PROCESS FROM NODE 2040.00 TO NODE 2040.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.25  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.582  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	7.40	0.57	0.100	69
PUBLIC PARK	C	2.70	0.57	0.850	69
URBAN GOOD COVER					
"TURF"	C	8.90	0.52	1.000	72
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.53					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.628					
SUBAREA AREA(ACRES) = 19.00		SUBAREA RUNOFF(CFS) = 21.36			
EFFECTIVE AREA(ACRES) = 88.00		AREA-AVERAGED Fm(INCH/HR) = 0.34			
AREA-AVERAGED Fp(INCH/HR) = 0.64		AREA-AVERAGED Ap = 0.52			
TOTAL AREA(ACRES) = 88.0		PEAK FLOW RATE(CFS) = 98.63			

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FLOW PROCESS FROM NODE 2040.00 TO NODE 2040.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.25  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.582  
SUBAREA LOSS RATE DATA(AMC II):

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FLOW PROCESS FROM NODE 2040.00 TO NODE 2100.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 693.80 DOWNSTREAM(FEET) = 684.80  
FLOW LENGTH(FEET) = 1130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.01  
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 115.06  
PIPE TRAVEL TIME(MIN.) = 1.71 Tc(MIN.) = 20.96  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2100.00 = 4210.00 FEET.

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FLOW PROCESS FROM NODE 2100.00 TO NODE 2100.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.96  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.504  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	2.90	0.57	0.100	69
PUBLIC PARK	C	2.40	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440					
SUBAREA AREA(ACRES) = 5.30		SUBAREA RUNOFF(CFS) = 5.99			
EFFECTIVE AREA(ACRES) = 106.80		AREA-AVERAGED Fm(INCH/HR) = 0.32			
AREA-AVERAGED Fp(INCH/HR) = 0.63		AREA-AVERAGED Ap = 0.50			
TOTAL AREA(ACRES) = 106.8		PEAK FLOW RATE(CFS) = 115.06			
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE					

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FLOW PROCESS FROM NODE 2100.00 TO NODE 2105.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 684.80 DOWNSTREAM(FEET) = 681.60  
FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.28  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 115.06  
 PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 21.19  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2105.00 = 4410.00 FEET.

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FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 21.19  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.494  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	11.10	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 12.09  
 EFFECTIVE AREA(ACRES) = 117.90 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 117.9 PEAK FLOW RATE(CFS) = 124.98

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FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 21.19  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.494  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.80	0.57	0.100	69
PUBLIC PARK	C	1.20	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400  
 SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 3.42  
 EFFECTIVE AREA(ACRES) = 120.90 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 120.9 PEAK FLOW RATE(CFS) = 128.40

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FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 IS CODE = 10

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

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FLOW PROCESS FROM NODE 2110.00 TO NODE 2115.00 IS CODE = 21

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

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
 ELEVATION DATA: UPSTREAM(FEET) = 717.00 DOWNSTREAM(FEET) = 714.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 19.703  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.561

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 "5-7 DWELLINGS/ACRE"	A	7.70	0.98	0.500	32	19.70

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 7.44  
 TOTAL AREA(ACRES) = 7.70 PEAK FLOW RATE(CFS) = 7.44

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FLOW PROCESS FROM NODE 2115.00 TO NODE 2117.00 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) = 714.00 DOWNSTREAM(FEET) = 691.40  
 FLOW LENGTH(FEET) = 410.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.75  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 7.44  
 PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 20.28  
 LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2117.00 = 1410.00 FEET.

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FLOW PROCESS FROM NODE 2117.00 TO NODE 2117.00 IS CODE = 81

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

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MAINLINE Tc(MIN.) = 20.28  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.534  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.40	0.98	0.100	32
PUBLIC PARK	A	1.70	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.411  
 SUBAREA AREA(ACRES) = 4.10 SUBAREA RUNOFF(CFS) = 4.18  
 EFFECTIVE AREA(ACRES) = 11.80 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 11.8 PEAK FLOW RATE(CFS) = 11.43

\*\*\*\*\*

FLOW PROCESS FROM NODE 2117.00 TO NODE 2118.00 IS CODE = 31

=====

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

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 691.40 DOWNSTREAM(FEET) = 690.50
FLOW LENGTH(FEET) = 470.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.65
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.43
PIPE TRAVEL TIME(MIN.) = 2.14 Tc(MIN.) = 22.43
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2118.00 = 1880.00 FEET.

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*****
FLOW PROCESS FROM NODE 2118.00 TO NODE 2118.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.43
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.444
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            C        2.10    0.57    0.100    69
PUBLIC PARK           C        1.50    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.413
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 3.92
EFFECTIVE AREA(ACRES) = 15.40 AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 15.4 PEAK FLOW RATE(CFS) = 14.40

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*****
FLOW PROCESS FROM NODE 2118.00 TO NODE 2120.00 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) = 690.50 DOWNSTREAM(FEET) = 689.40
FLOW LENGTH(FEET) = 370.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.56
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.40
PIPE TRAVEL TIME(MIN.) = 1.35 Tc(MIN.) = 23.78
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2120.00 = 2250.00 FEET.

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*****
FLOW PROCESS FROM NODE 2120.00 TO NODE 2120.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.78
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.394
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL           C        1.60    0.98    0.500    32

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"5-7 DWELLINGS/ACRE"  A        18.50    0.98    0.500    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C        13.30    0.57    0.500    69
PUBLIC PARK           C        0.80    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.509
SUBAREA AREA(ACRES) = 32.60 SUBAREA RUNOFF(CFS) = 29.05
EFFECTIVE AREA(ACRES) = 48.00 AREA-AVERAGED Fm(INCH/HR) = 0.40
AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 48.0 PEAK FLOW RATE(CFS) = 42.76

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*****
FLOW PROCESS FROM NODE 2120.00 TO NODE 2125.00 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) = 689.40 DOWNSTREAM(FEET) = 684.10
FLOW LENGTH(FEET) = 1090.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.11
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 42.76
PIPE TRAVEL TIME(MIN.) = 2.55 Tc(MIN.) = 26.33
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2125.00 = 3340.00 FEET.

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*****
FLOW PROCESS FROM NODE 2125.00 TO NODE 2125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 26.33
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.311
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            A        1.60    0.98    0.100    32
COMMERCIAL            C        1.60    0.57    0.100    69
PUBLIC PARK           A        1.10    0.98    0.850    32
PUBLIC PARK           C        1.00    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.397
SUBAREA AREA(ACRES) = 5.30 SUBAREA RUNOFF(CFS) = 4.78
EFFECTIVE AREA(ACRES) = 53.30 AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 53.3 PEAK FLOW RATE(CFS) = 43.96

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*****
FLOW PROCESS FROM NODE 2125.00 TO NODE 2125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 26.33
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.311
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"        A            1.30        0.98        0.500      32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE"        C            20.10       0.57        0.500      69  
PUBLIC PARK                    C            0.70        0.57        0.850      69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.59  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.511  
SUBAREA AREA(ACRES) = 22.10        SUBAREA RUNOFF(CFS) = 20.09  
EFFECTIVE AREA(ACRES) = 75.40        AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.75    AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 75.4            PEAK FLOW RATE(CFS) = 64.05

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2125.00 TO NODE 2105.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 684.10    DOWNSTREAM(FEET) = 681.60  
FLOW LENGTH(FEET) = 230.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.63  
ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 64.05  
PIPE TRAVEL TIME(MIN.) = 0.36    Tc(MIN.) = 26.69  
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2105.00 = 3570.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 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        64.05    26.69    1.301    0.75(0.37)    0.49        75.4    2110.00  
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2105.00 = 3570.00 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        128.40    21.19    1.494    0.63(0.31)    0.50        120.9    2050.00  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2105.00 = 4410.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*  
STREAM    Q        Tc    Intensity    Fp(Fm)        Ap        Ae        HEADWATER  
NUMBER    (CFS)    (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE  
1        189.78    21.19    1.494    0.67(0.33)    0.50        180.8    2050.00  
2        171.44    26.69    1.301    0.67(0.33)    0.50        196.3    2110.00  
TOTAL AREA(ACRES) = 196.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 189.78    Tc(MIN.) = 21.194  
EFFECTIVE AREA(ACRES) = 180.76    AREA-AVERAGED Fm(INCH/HR) = 0.33

AREA-AVERAGED Fp(INCH/HR) = 0.67    AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 196.3  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2105.00 = 4410.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2105.00 TO NODE 2130.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 681.60    DOWNSTREAM(FEET) = 674.50  
FLOW LENGTH(FEET) = 780.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.17  
ESTIMATED PIPE DIAMETER(INCH) = 57.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 189.78  
PIPE TRAVEL TIME(MIN.) = 0.99    Tc(MIN.) = 22.18  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2130.00 = 5190.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2130.00 TO NODE 2130.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 22.18  
\* 10 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  
COMMERCIAL                    C            3.30        0.57        0.100      69  
PUBLIC PARK                    C            1.40        0.57        0.850      69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.323  
SUBAREA AREA(ACRES) = 4.70        SUBAREA RUNOFF(CFS) = 5.37  
EFFECTIVE AREA(ACRES) = 185.46    AREA-AVERAGED Fm(INCH/HR) = 0.33  
AREA-AVERAGED Fp(INCH/HR) = 0.66    AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 201.0        PEAK FLOW RATE(CFS) = 189.78  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2130.00 TO NODE 2135.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 674.50    DOWNSTREAM(FEET) = 673.60  
FLOW LENGTH(FEET) = 90.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.72  
ESTIMATED PIPE DIAMETER(INCH) = 57.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 189.78  
PIPE TRAVEL TIME(MIN.) = 0.11    Tc(MIN.) = 22.29  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2135.00 = 5280.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2135.00 TO NODE 2135.00 IS CODE = 81



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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.29
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.449
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A        3.70    0.98      0.100    32
COMMERCIAL              C        7.10    0.57      0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.71
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 10.80      SUBAREA RUNOFF(CFS) = 13.40
EFFECTIVE AREA(ACRES) = 196.26   AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.66  AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 211.8        PEAK FLOW RATE(CFS) = 200.59

*****
FLOW PROCESS FROM NODE 2135.00 TO NODE 2135.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.29
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.449
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"  A        9.60    0.98      0.200    32
RESIDENTIAL
"11+ DWELLINGS/ACRE"  C       11.20    0.57      0.200    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 20.80      SUBAREA RUNOFF(CFS) = 24.30
EFFECTIVE AREA(ACRES) = 217.06   AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.67  AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 232.6        PEAK FLOW RATE(CFS) = 224.89

*****
FLOW PROCESS FROM NODE 2135.00 TO NODE 2140.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 673.60  DOWNSTREAM(FEET) = 666.50
FLOW LENGTH(FEET) = 850.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 49.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.11
ESTIMATED PIPE DIAMETER(INCH) = 60.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 224.89
PIPE TRAVEL TIME(MIN.) = 1.08  Tc(MIN.) = 23.37
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2140.00 = 6130.00 FEET.

*****
FLOW PROCESS FROM NODE 2140.00 TO NODE 2140.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.37
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.409
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C        1.30    0.57      0.100    69
PUBLIC PARK             C        0.90    0.57      0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
SUBAREA AREA(ACRES) = 2.20      SUBAREA RUNOFF(CFS) = 2.33
EFFECTIVE AREA(ACRES) = 219.26   AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.67  AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 234.8        PEAK FLOW RATE(CFS) = 224.89
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 2140.00 TO NODE 2200.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 666.50  DOWNSTREAM(FEET) = 665.70
FLOW LENGTH(FEET) = 100.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 46.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.15
ESTIMATED PIPE DIAMETER(INCH) = 63.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 224.89
PIPE TRAVEL TIME(MIN.) = 0.13  Tc(MIN.) = 23.50
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2200.00 = 6230.00 FEET.

*****
FLOW PROCESS FROM NODE 2200.00 TO NODE 2200.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.404
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
PUBLIC PARK             C        9.50    0.57      0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 9.50      SUBAREA RUNOFF(CFS) = 7.89
EFFECTIVE AREA(ACRES) = 228.76   AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.66  AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 244.3        PEAK FLOW RATE(CFS) = 226.29

*****
FLOW PROCESS FROM NODE 2200.00 TO NODE 2205.00 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) = 665.70 DOWNSTREAM(FEET) = 658.20  
FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 43.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.71  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 226.29  
PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 24.29  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2205.00 = 6930.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2205.00 TO NODE 2205.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 24.29  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.376  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 3.90 0.57 0.100 69  
PUBLIC PARK C 2.90 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.420  
SUBAREA AREA(ACRES) = 6.80 SUBAREA RUNOFF(CFS) = 6.97  
EFFECTIVE AREA(ACRES) = 235.56 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 251.1 PEAK FLOW RATE(CFS) = 227.56

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2205.00 TO NODE 2210.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 658.20 DOWNSTREAM(FEET) = 656.00  
FLOW LENGTH(FEET) = 160.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.14  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 227.56  
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 24.46  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2210.00 = 7090.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2210.00 TO NODE 2210.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 24.46  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.371  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.83 0.57 0.100 69  
PUBLIC PARK C 0.47 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.371  
SUBAREA AREA(ACRES) = 1.30 SUBAREA RUNOFF(CFS) = 1.36  
EFFECTIVE AREA(ACRES) = 236.86 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 252.4 PEAK FLOW RATE(CFS) = 227.73

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2210.00 TO NODE 2210.00 IS CODE = 10  
-----

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2215.00 TO NODE 2220.00 IS CODE = 21  
-----

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

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 715.50 DOWNSTREAM(FEET) = 706.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.571  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.731  
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.)  
SCHOOL A 7.20 0.98 0.600 32 16.57  
SCHOOL C 2.60 0.57 0.600 69 16.57  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.87  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA RUNOFF(CFS) = 10.68  
TOTAL AREA(ACRES) = 9.80 PEAK FLOW RATE(CFS) = 10.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2220.00 TO NODE 2230.00 IS CODE = 62  
-----

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

-----  
UPSTREAM ELEVATION(FEET) = 706.00 DOWNSTREAM ELEVATION(FEET) = 698.00  
STREET LENGTH(FEET) = 810.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

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

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 22.13  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.51



HALFSTREET FLOOD WIDTH(FEET) = 19.41  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.11  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.58  
 STREET FLOW TRAVEL TIME(MIN.) = 4.34 Tc(MIN.) = 20.91  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.506  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
SCHOOL	A	6.90	0.98	0.600	32
SCHOOL	C	16.30	0.57	0.600	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 SUBAREA AREA(ACRES) = 23.20 SUBAREA RUNOFF(CFS) = 22.82  
 EFFECTIVE AREA(ACRES) = 33.00 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.60  
 TOTAL AREA(ACRES) = 33.0 PEAK FLOW RATE(CFS) = 31.52

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.56 HALFSTREET FLOOD WIDTH(FEET) = 22.30  
 FLOW VELOCITY(FEET/SEC.) = 3.40 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.91  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2230.00 = 1810.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2230.00 TO NODE 2235.00 IS CODE = 62  
 -----

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

=====  
 UPSTREAM ELEVATION(FEET) = 698.00 DOWNSTREAM ELEVATION(FEET) = 689.00  
 STREET LENGTH(FEET) = 980.00 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) = 37.92  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.60  
 HALFSTREET FLOOD WIDTH(FEET) = 24.34  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.46  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.07  
 STREET FLOW TRAVEL TIME(MIN.) = 4.72 Tc(MIN.) = 25.64  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.332  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
SCHOOL	A	3.22	0.98	0.600	32
SCHOOL	C	6.72	0.57	0.600	69
PUBLIC PARK	C	5.29	0.57	0.850	69
PUBLIC PARK	A	1.27	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.67  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.699  
 SUBAREA AREA(ACRES) = 16.50 SUBAREA RUNOFF(CFS) = 12.80  
 EFFECTIVE AREA(ACRES) = 49.50 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.63  
 TOTAL AREA(ACRES) = 49.5 PEAK FLOW RATE(CFS) = 39.17

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 24.65  
 FLOW VELOCITY(FEET/SEC.) = 3.49 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.10  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2235.00 = 2790.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2235.00 TO NODE 2235.00 IS CODE = 81  
 -----

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

=====  
 MAINLINE Tc(MIN.) = 25.64  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.332  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	3.85	0.57	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	2.21	0.98	0.200	32
PUBLIC PARK	C	2.91	0.57	0.850	69
PUBLIC PARK	A	7.63	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.613  
 SUBAREA AREA(ACRES) = 16.60 SUBAREA RUNOFF(CFS) = 12.18  
 EFFECTIVE AREA(ACRES) = 66.10 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.63  
 TOTAL AREA(ACRES) = 66.1 PEAK FLOW RATE(CFS) = 51.35

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2235.00 TO NODE 2240.00 IS CODE = 31  
 -----

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

=====  
 ELEVATION DATA: UPSTREAM(FEET) = 689.00 DOWNSTREAM(FEET) = 662.00  
 FLOW LENGTH(FEET) = 870.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.84  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 51.35  
 PIPE TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 26.61  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2240.00 = 3660.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 26.61

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* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.303
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK            A      8.60    0.98   0.850  32
PUBLIC PARK            C     20.80    0.57   0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 29.40    SUBAREA RUNOFF(CFS) = 19.05
EFFECTIVE AREA(ACRES) = 95.50    AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.72    AREA-AVERAGED Ap = 0.70
TOTAL AREA(ACRES) = 95.5    PEAK FLOW RATE(CFS) = 68.64

*****
FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 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.) = 26.61
RAINFALL INTENSITY(INCH/HR) = 1.30
AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.72
AREA-AVERAGED Ap = 0.70
EFFECTIVE STREAM AREA(ACRES) = 95.50
TOTAL STREAM AREA(ACRES) = 95.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 68.64

*****
FLOW PROCESS FROM NODE 2245.00 TO NODE 2250.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 400.00
ELEVATION DATA: UPSTREAM(FEET) = 690.00 DOWNSTREAM(FEET) = 677.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.627
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.000
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            A      0.60    0.98   0.100  32   6.63
PUBLIC PARK            A      0.60    0.98   0.850  32  10.53
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475
SUBAREA RUNOFF(CFS) = 2.74
TOTAL AREA(ACRES) = 1.20    PEAK FLOW RATE(CFS) = 2.74

*****
FLOW PROCESS FROM NODE 2250.00 TO NODE 2240.00 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) = 677.00 DOWNSTREAM(FEET) = 662.00
FLOW LENGTH(FEET) = 810.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.01
ESTIMATED PIPE DIAMETER(INCH) = 18.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.74
PIPE TRAVEL TIME(MIN.) = 2.25    Tc(MIN.) = 8.87
LONGEST FLOWPATH FROM NODE 2245.00 TO NODE 2240.00 = 1210.00 FEET.

*****
FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 8.87
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.519
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            C      2.50    0.57   0.100  69
PUBLIC PARK            C      2.50    0.57   0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475
SUBAREA AREA(ACRES) = 5.00    SUBAREA RUNOFF(CFS) = 10.12
EFFECTIVE AREA(ACRES) = 6.20    AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.65    AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 6.2    PEAK FLOW RATE(CFS) = 12.34

*****
FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 8.87
RAINFALL INTENSITY(INCH/HR) = 2.52
AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.65
AREA-AVERAGED Ap = 0.47
EFFECTIVE STREAM AREA(ACRES) = 6.20
TOTAL STREAM AREA(ACRES) = 6.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 12.34

** CONFLUENCE DATA **
  STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
  NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1          68.64 26.61 1.303 0.72( 0.50) 0.70 95.5 2215.00
2          12.34 8.87 2.519 0.65( 0.31) 0.47 6.2 2245.00

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

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	70.06	8.87	2.519	0.71( 0.47)	0.66	38.0	2245.00
2	74.20	26.61	1.303	0.72( 0.49)	0.68	101.7	2215.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 74.20 Tc(MIN.) = 26.61  
EFFECTIVE AREA(ACRES) = 101.70 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.68  
TOTAL AREA(ACRES) = 101.7  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2240.00 = 3660.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 2240.00 TO NODE 2265.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 662.00 DOWNSTREAM(FEET) = 658.30  
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.90  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 74.20  
PIPE TRAVEL TIME(MIN.) = 1.75 Tc(MIN.) = 28.37  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2265.00 = 4490.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 2265.00 TO NODE 2265.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 28.37  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.254  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.40	0.57	0.100	69
PUBLIC PARK	C	0.40	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 0.71  
EFFECTIVE AREA(ACRES) = 102.50 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.68  
TOTAL AREA(ACRES) = 102.5 PEAK FLOW RATE(CFS) = 74.20  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 2265.00 TO NODE 2270.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 658.30 DOWNSTREAM(FEET) = 657.60  
FLOW LENGTH(FEET) = 110.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 42.0 INCH PIPE IS 33.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.02  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 74.20  
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 28.57  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2270.00 = 4600.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 2270.00 TO NODE 2270.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 28.57  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.249  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	C	24.70	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 24.70 SUBAREA RUNOFF(CFS) = 17.06  
EFFECTIVE AREA(ACRES) = 127.20 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.71  
TOTAL AREA(ACRES) = 127.2 PEAK FLOW RATE(CFS) = 87.01

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	100.69	10.84	2.234	0.65( 0.47)	0.73	63.5	2245.00
2	87.01	28.57	1.249	0.68( 0.49)	0.71	127.2	2215.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 100.69 Tc(MIN.) = 10.84  
AREA-AVERAGED Fm(INCH/HR) = 0.47 AREA-AVERAGED Fp(INCH/HR) = 0.65  
AREA-AVERAGED Ap = 0.73 EFFECTIVE AREA(ACRES) = 63.54

\*\*\*\*\*

FLOW PROCESS FROM NODE 2270.00 TO NODE 2275.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 657.60 DOWNSTREAM(FEET) = 657.20  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 54.0 INCH PIPE IS 43.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.41  
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 100.69  
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 11.13  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2275.00 = 4730.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 2275.00 TO NODE 2275.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 11.13

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.198  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 1.10 0.57 0.100 69  
 PUBLIC PARK C 0.90 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.438  
 SUBAREA AREA(ACRES) = 2.00 SUBAREA RUNOFF(CFS) = 3.51  
 EFFECTIVE AREA(ACRES) = 65.54 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.72  
 TOTAL AREA(ACRES) = 129.2 PEAK FLOW RATE(CFS) = 102.18

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 319.62 Tc(MIN.) = 24.456  
 EFFECTIVE AREA(ACRES) = 348.28 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.67 AREA-AVERAGED Ap = 0.55  
 TOTAL AREA(ACRES) = 381.6  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2210.00 = 7090.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2210.00 TO NODE 2400.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 656.00 DOWNSTREAM(FEET) = 646.80  
 FLOW LENGTH(FEET) = 1190.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 72.0 INCH PIPE IS 53.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.15  
 ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 319.62  
 PIPE TRAVEL TIME(MIN.) = 1.40 Tc(MIN.) = 25.86  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2400.00 = 8280.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2400.00 TO NODE 2400.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 25.86  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.326  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 4.40 0.57 0.100 69  
 PUBLIC PARK C 2.60 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.379  
 SUBAREA AREA(ACRES) = 7.00 SUBAREA RUNOFF(CFS) = 7.00  
 EFFECTIVE AREA(ACRES) = 355.28 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 388.6 PEAK FLOW RATE(CFS) = 319.62  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2400.00 TO NODE 2405.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 646.80 DOWNSTREAM(FEET) = 646.00  
 FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 69.0 INCH PIPE IS 56.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.08  
 ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 319.62  
 PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 25.98

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2275.00 TO NODE 2210.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 657.20 DOWNSTREAM(FEET) = 656.00  
 FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.57  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 102.18  
 PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 11.65  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2210.00 = 5000.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2210.00 TO NODE 2210.00 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	102.18	11.65	2.139	0.64 (0.47)	0.72	65.5	2245.00
2	87.89	29.42	1.227	0.68 (0.48)	0.71	129.2	2215.00

LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2210.00 = 5000.00 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	227.73	24.46	1.371	0.66 (0.30)	0.46	236.9	2050.00
2	205.64	30.04	1.212	0.66 (0.31)	0.46	252.4	2110.00

LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2210.00 = 7090.00 FEET.

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	288.69	11.65	2.139	0.65 (0.36)	0.56	178.4	2245.00
2	319.62	24.46	1.371	0.66 (0.36)	0.54	348.3	2050.00
3	295.98	29.42	1.227	0.67 (0.37)	0.55	379.9	2215.00
4	291.74	30.04	1.212	0.67 (0.37)	0.55	381.6	2110.00

TOTAL AREA(ACRES) = 381.6

LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2405.00 = 8380.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2405.00 IS CODE = 12

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2405.00 IS CODE = 12

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2405.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 25.98  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.322  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 34.10 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 34.10 SUBAREA RUNOFF(CFS) = 31.89  
EFFECTIVE AREA(ACRES) = 389.38 AREA-AVERAGED Fm(INCH/HR) = 0.35  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 422.7 PEAK FLOW RATE(CFS) = 340.67

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2500.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 646.00 DOWNSTREAM(FEET) = 634.90  
FLOW LENGTH(FEET) = 1180.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 69.0 INCH PIPE IS 55.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.27  
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 340.67  
PIPE TRAVEL TIME(MIN.) = 1.29 Tc(MIN.) = 27.26  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2500.00 = 9560.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2500.00 TO NODE 2500.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 27.26  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.284  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 3.90 0.57 0.100 69  
PUBLIC PARK C 2.80 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.413  
SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 6.33  
EFFECTIVE AREA(ACRES) = 396.08 AREA-AVERAGED Fm(INCH/HR) = 0.35  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 429.4 PEAK FLOW RATE(CFS) = 340.67  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2500.00 TO NODE 2505.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 634.90 DOWNSTREAM(FEET) = 634.80  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 108.0 INCH PIPE IS 80.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.67  
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 340.67  
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 27.51  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2505.00 = 9660.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2505.00 TO NODE 2505.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 27.51  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.277  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 24.60 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 24.60 SUBAREA RUNOFF(CFS) = 22.01  
EFFECTIVE AREA(ACRES) = 420.68 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 454.0 PEAK FLOW RATE(CFS) = 353.26

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2505.00 TO NODE 2505.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 27.51  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.277  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL C 1.00 0.57 0.100 69  
PUBLIC PARK C 1.00 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
SUBAREA AREA(ACRES) = 2.00 SUBAREA RUNOFF(CFS) = 1.81  
EFFECTIVE AREA(ACRES) = 422.68 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 456.0 PEAK FLOW RATE(CFS) = 355.07

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2505.00 TO NODE 2520.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 634.80 DOWNSTREAM(FEET) = 633.30  
FLOW LENGTH(FEET) = 1500.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 108.0 INCH PIPE IS 83.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.70  
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 355.07  
PIPE TRAVEL TIME(MIN.) = 3.73 Tc(MIN.) = 31.25  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2520.00 = 11160.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2520.00 TO NODE 2520.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 31.25  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.183  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 6.10 0.57 0.100 69  
PUBLIC PARK C 3.10 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.353  
SUBAREA AREA(ACRES) = 9.20 SUBAREA RUNOFF(CFS) = 8.14  
EFFECTIVE AREA(ACRES) = 431.88 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 465.2 PEAK FLOW RATE(CFS) = 355.07  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2520.00 TO NODE 2530.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 633.30 DOWNSTREAM(FEET) = 633.00  
FLOW LENGTH(FEET) = 350.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 114.0 INCH PIPE IS 83.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.38  
ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 355.07

PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 32.16  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2530.00 = 11510.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2530.00 TO NODE 2530.00 IS CODE = 10  
-----

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2600.00 TO NODE 2605.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 920.00  
ELEVATION DATA: UPSTREAM(FEET) = 689.50 DOWNSTREAM(FEET) = 679.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.588  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.869  
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  
"5-7 DWELLINGS/ACRE" C 3.20 0.57 0.500 69 14.59  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 4.57  
TOTAL AREA(ACRES) = 3.20 PEAK FLOW RATE(CFS) = 4.57

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2605.00 TO NODE 2610.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
-----  
UPSTREAM ELEVATION(FEET) = 679.00 DOWNSTREAM ELEVATION(FEET) = 677.00  
STREET LENGTH(FEET) = 310.00 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) = 6.35  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.39  
HALFSTREET FLOOD WIDTH(FEET) = 12.62  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.96  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.76



STREET FLOW TRAVEL TIME(MIN.) = 2.63 Tc(MIN.) = 17.22  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.692  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 2.80 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 2.80 SUBAREA RUNOFF(CFS) = 3.55  
 EFFECTIVE AREA(ACRES) = 6.00 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 6.0 PEAK FLOW RATE(CFS) = 7.61

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 13.63  
 FLOW VELOCITY(FEET/SEC.) = 2.05 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.83  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2610.00 = 1230.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2610.00 TO NODE 2615.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 -----  
 UPSTREAM ELEVATION(FEET) = 677.00 DOWNSTREAM ELEVATION(FEET) = 673.00  
 STREET LENGTH(FEET) = 570.00 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) = 11.36  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.45  
 HALFSTREET FLOOD WIDTH(FEET) = 15.82  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.34  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.04  
 STREET FLOW TRAVEL TIME(MIN.) = 4.06 Tc(MIN.) = 21.28  
 \* 10 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  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 6.90 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.90 SUBAREA RUNOFF(CFS) = 7.50  
 EFFECTIVE AREA(ACRES) = 12.90 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.50

TOTAL AREA(ACRES) = 12.9 PEAK FLOW RATE(CFS) = 14.01  
 END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 17.30  
 FLOW VELOCITY(FEET/SEC.) = 2.44 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.15  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2615.00 = 1800.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2615.00 TO NODE 2620.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 658.00  
 FLOW LENGTH(FEET) = 490.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.97  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 14.01  
 PIPE TRAVEL TIME(MIN.) = 0.74 Tc(MIN.) = 22.03  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2620.00 = 2290.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2620.00 TO NODE 2620.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 22.03  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.460  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 3.90 0.57 0.500 69  
 COMMERCIAL C 3.40 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.314  
 SUBAREA AREA(ACRES) = 7.30 SUBAREA RUNOFF(CFS) = 8.42  
 EFFECTIVE AREA(ACRES) = 20.20 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 20.2 PEAK FLOW RATE(CFS) = 22.08

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2620.00 TO NODE 2625.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 658.00 DOWNSTREAM(FEET) = 654.00  
 FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 22.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.37  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 22.08  
 PIPE TRAVEL TIME(MIN.) = 1.83 Tc(MIN.) = 23.86  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2625.00 = 2990.00 FEET.

```

*****
FLOW PROCESS FROM NODE 2625.00 TO NODE 2625.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.391
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C        7.20    0.57    0.500    69
COMMERCIAL              C        1.00    0.57    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.451
SUBAREA AREA(ACRES) = 8.20 SUBAREA RUNOFF(CFS) = 8.38
EFFECTIVE AREA(ACRES) = 28.40 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 28.4 PEAK FLOW RATE(CFS) = 29.22

*****
FLOW PROCESS FROM NODE 2625.00 TO NODE 2630.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 654.00 DOWNSTREAM(FEET) = 649.20
FLOW LENGTH(FEET) = 650.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.68
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 29.22
PIPE TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 25.27
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2630.00 = 3640.00 FEET.

*****
FLOW PROCESS FROM NODE 2630.00 TO NODE 2630.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.27
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.344
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              C        1.00    0.57    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.00 SUBAREA RUNOFF(CFS) = 1.16
EFFECTIVE AREA(ACRES) = 29.40 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 29.4 PEAK FLOW RATE(CFS) = 29.22
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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FLOW PROCESS FROM NODE 2630.00 TO NODE 2635.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 649.20 DOWNSTREAM(FEET) = 648.00
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.43
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 29.22
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 25.53
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2635.00 = 3770.00 FEET.

*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 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) = 1.34
AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.57
AREA-AVERAGED Ap = 0.43
EFFECTIVE STREAM AREA(ACRES) = 29.40
TOTAL STREAM AREA(ACRES) = 29.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 29.22

*****
FLOW PROCESS FROM NODE 2638.00 TO NODE 2640.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 600.00
ELEVATION DATA: UPSTREAM(FEET) = 676.10 DOWNSTREAM(FEET) = 665.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.163
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.194
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
"5-7 DWELLINGS/ACRE"    C        5.80    0.57    0.500    69  11.16
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 9.98
TOTAL AREA(ACRES) = 5.80 PEAK FLOW RATE(CFS) = 9.98

*****
FLOW PROCESS FROM NODE 2640.00 TO NODE 2635.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 665.00 DOWNSTREAM(FEET) = 648.00
FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.44
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.98
PIPE TRAVEL TIME(MIN.) = 1.20 Tc(MIN.) = 12.36
LONGEST FLOWPATH FROM NODE 2638.00 TO NODE 2635.00 = 1280.00 FEET.

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*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.36
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.064
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK C 2.30 0.57 0.850 69
COMMERCIAL C 2.40 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 7.61
EFFECTIVE AREA(ACRES) = 10.50 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 16.91

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*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.36
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.064
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.80 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 1.45
EFFECTIVE AREA(ACRES) = 11.30 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 11.3 PEAK FLOW RATE(CFS) = 18.35

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*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 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:

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TIME OF CONCENTRATION(MIN.) = 12.36
RAINFALL INTENSITY(INCH/HR) = 2.06
AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.57
AREA-AVERAGED Ap = 0.46
EFFECTIVE STREAM AREA(ACRES) = 11.30
TOTAL STREAM AREA(ACRES) = 11.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.35

```

```

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 29.22 25.53 1.336 0.57( 0.24) 0.43 29.4 2600.00
2 18.35 12.36 2.064 0.57( 0.26) 0.46 11.3 2638.00

```

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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 41.92 12.36 2.064 0.57( 0.25) 0.44 25.5 2638.00
2 40.17 25.53 1.336 0.57( 0.25) 0.44 40.7 2600.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 41.92 Tc(MIN.) = 12.36
EFFECTIVE AREA(ACRES) = 25.54 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 40.7
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2635.00 = 3770.00 FEET.

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*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2645.00 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) = 648.00 DOWNSTREAM(FEET) = 646.40
FLOW LENGTH(FEET) = 380.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.84
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.92
PIPE TRAVEL TIME(MIN.) = 0.93 Tc(MIN.) = 13.29
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2645.00 = 4150.00 FEET.

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*****
FLOW PROCESS FROM NODE 2645.00 TO NODE 2645.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.29
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.976
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

```

RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 8.80 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 8.80 SUBAREA RUNOFF(CFS) = 13.41  
 EFFECTIVE AREA(ACRES) = 34.34 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA(ACRES) = 49.5 PEAK FLOW RATE(CFS) = 53.11

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2645.00 TO NODE 2650.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 646.40 DOWNSTREAM(FEET) = 641.00  
 FLOW LENGTH(FEET) = 870.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.37  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 53.11  
 PIPE TRAVEL TIME(MIN.) = 1.73 Tc(MIN.) = 15.02  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2650.00 = 5020.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2650.00 TO NODE 2650.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 15.02  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.836  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	13.00	0.57	0.500	69	12.58

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 13.00 SUBAREA RUNOFF(CFS) = 18.17  
 EFFECTIVE AREA(ACRES) = 47.34 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 62.5 PEAK FLOW RATE(CFS) = 66.95

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2650.00 TO NODE 2655.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 641.00 DOWNSTREAM(FEET) = 635.80  
 FLOW LENGTH(FEET) = 880.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.64  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 66.95  
 PIPE TRAVEL TIME(MIN.) = 1.70 Tc(MIN.) = 16.72

LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2655.00 = 5900.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2655.00 TO NODE 2655.00 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.) = 16.72  
 RAINFALL INTENSITY(INCH/HR) = 1.72  
 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.57  
 AREA-AVERAGED Ap = 0.47  
 EFFECTIVE STREAM AREA(ACRES) = 47.34  
 TOTAL STREAM AREA(ACRES) = 62.50  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 66.95

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2660.00 TO NODE 2665.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 =====  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 530.00  
 ELEVATION DATA: UPSTREAM(FEET) = 664.00 DOWNSTREAM(FEET) = 651.60

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.584  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.042  
 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	C	3.40	0.57	0.850	69	12.58

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA RUNOFF(CFS) = 4.78  
 TOTAL AREA(ACRES) = 3.40 PEAK FLOW RATE(CFS) = 4.78

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2665.00 TO NODE 2670.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 651.60 DOWNSTREAM(FEET) = 650.70  
 FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.11  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 4.78  
 PIPE TRAVEL TIME(MIN.) = 0.81 Tc(MIN.) = 13.40  
 LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2670.00 = 730.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2670.00 TO NODE 2670.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 13.40
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.967
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C        3.60    0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 3.60    SUBAREA RUNOFF(CFS) = 5.46
EFFECTIVE AREA(ACRES) = 7.00    AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) = 7.0    PEAK FLOW RATE(CFS) = 10.00

*****
FLOW PROCESS FROM NODE 2670.00 TO NODE 2675.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 650.70 DOWNSTREAM(FEET) = 649.30
FLOW LENGTH(FEET) = 260.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.19
ESTIMATED PIPE DIAMETER(INCH) = 21.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.00
PIPE TRAVEL TIME(MIN.) = 0.83    Tc(MIN.) = 14.23
LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2675.00 = 990.00 FEET.

*****
FLOW PROCESS FROM NODE 2675.00 TO NODE 2675.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 14.23
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.897
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C        7.10    0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 7.10    SUBAREA RUNOFF(CFS) = 10.31
EFFECTIVE AREA(ACRES) = 14.10    AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 14.1    PEAK FLOW RATE(CFS) = 19.88

*****
FLOW PROCESS FROM NODE 2675.00 TO NODE 2680.00 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) = 649.30 DOWNSTREAM(FEET) = 643.90
FLOW LENGTH(FEET) = 810.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.74
ESTIMATED PIPE DIAMETER(INCH) = 27.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.88
PIPE TRAVEL TIME(MIN.) = 2.00    Tc(MIN.) = 16.23
LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2680.00 = 1800.00 FEET.

*****
FLOW PROCESS FROM NODE 2680.00 TO NODE 2680.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 16.23
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.753
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C        11.80    0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.80    SUBAREA RUNOFF(CFS) = 15.61
EFFECTIVE AREA(ACRES) = 25.90    AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 25.9    PEAK FLOW RATE(CFS) = 33.66

*****
FLOW PROCESS FROM NODE 2680.00 TO NODE 2655.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 643.90 DOWNSTREAM(FEET) = 635.80
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.83
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 33.66
PIPE TRAVEL TIME(MIN.) = 1.57    Tc(MIN.) = 17.80
LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2655.00 = 2630.00 FEET.

*****
FLOW PROCESS FROM NODE 2655.00 TO NODE 2655.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 17.80
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.659
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C        18.70    0.57    0.500    69

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 18.70 SUBAREA RUNOFF(CFS) = 23.15  
 EFFECTIVE AREA(ACRES) = 44.60 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 44.6 PEAK FLOW RATE(CFS) = 54.61

DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.69  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 120.69  
 PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 18.42  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2530.00 = 6300.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2655.00 TO NODE 2655.00 IS CODE = 1  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2530.00 TO NODE 2530.00 IS CODE = 11  
 -----

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

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

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 17.80  
 RAINFALL INTENSITY(INCH/HR) = 1.66  
 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.57  
 AREA-AVERAGED Ap = 0.53  
 EFFECTIVE STREAM AREA(ACRES) = 44.60  
 TOTAL STREAM AREA(ACRES) = 44.60  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 54.61

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	120.65	17.34	1.685	0.57( 0.28)	0.50	89.2	2638.00
2	120.69	18.42	1.625	0.57( 0.28)	0.50	93.2	2660.00
3	92.72	30.74	1.195	0.57( 0.28)	0.49	107.1	2600.00

LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2530.00 = 6300.00 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	345.88	19.44	1.573	0.63( 0.33)	0.53	262.0	2245.00
2	355.07	32.16	1.163	0.65( 0.34)	0.53	431.9	2050.00
3	328.66	37.23	1.065	0.65( 0.35)	0.53	463.5	2215.00
4	324.52	37.86	1.055	0.66( 0.35)	0.53	465.2	2110.00

LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2530.00 = 11510.00 FEET.

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	456.93	17.34	1.685	0.61( 0.32)	0.52	323.0	2638.00
2	462.08	18.42	1.625	0.61( 0.32)	0.52	341.5	2660.00
3	464.26	19.44	1.573	0.61( 0.32)	0.52	356.3	2245.00
4	446.76	30.74	1.195	0.63( 0.33)	0.52	520.1	2600.00
5	444.57	32.16	1.163	0.63( 0.33)	0.52	539.0	2050.00
6	408.29	37.23	1.065	0.64( 0.33)	0.52	570.6	2215.00
7	403.08	37.86	1.055	0.64( 0.33)	0.52	572.3	2110.00

TOTAL AREA(ACRES) = 572.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 120.69 Tc(MIN.) = 17.80  
 EFFECTIVE AREA(ACRES) = 93.17 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 107.1  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2655.00 = 5900.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 464.26 Tc(MIN.) = 19.436  
 EFFECTIVE AREA(ACRES) = 356.32 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 572.3  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2530.00 = 11510.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2655.00 TO NODE 2530.00 IS CODE = 31  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2530.00 TO NODE 2530.00 IS CODE = 12  
 -----

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

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

ELEVATION DATA: UPSTREAM(FEET) = 635.80 DOWNSTREAM(FEET) = 633.00  
 FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013

\*\*\*\*\*



FLOW PROCESS FROM NODE 2530.00 TO NODE 2540.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 633.00 DOWNSTREAM(FEET) = 630.60  
FLOW LENGTH(FEET) = 160.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 55.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.79  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 464.26  
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 19.57  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2540.00 = 11670.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 572.3 TC(MIN.) = 19.57  
EFFECTIVE AREA(ACRES) = 356.32 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.519  
PEAK FLOW RATE(CFS) = 464.26

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	456.93	17.48	1.677	0.61( 0.32)	0.52	323.0	2638.00
2	462.08	18.56	1.618	0.61( 0.32)	0.52	341.5	2660.00
3	464.26	19.57	1.567	0.61( 0.32)	0.52	356.3	2245.00
4	446.76	30.88	1.192	0.63( 0.33)	0.52	520.1	2600.00
5	444.57	32.30	1.160	0.63( 0.33)	0.52	539.0	2050.00
6	408.29	37.37	1.063	0.64( 0.33)	0.52	570.6	2215.00
7	403.08	38.00	1.052	0.64( 0.33)	0.52	572.3	2110.00

=====

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* ARCHIBALD WATERSHED \*  
\* 100-YR STUDY \*  
\* AREA 'K' \*  
\*\*\*\*\*

FILE NAME: ARCH.DAT  
TIME/DATE OF STUDY: 08:30 08/03/2011

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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 GUTTER-GEOMETRIES:			MANNING FACTOR (n)	
	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / PARK- WAY	HEIGHT (FT)	WIDTH (FT)	LIP HIKE (FT)		
1	30.0	20.0	0.018/0.018	0.020	0.67	2.00	0.0312	0.167	0.0150
2	52.0	38.0	0.018/0.018	0.020	0.67	2.00	0.0312	0.167	0.0150
3	65.0	39.0	0.018/0.018	0.020	0.67	2.00	0.0312	0.167	0.0150
4	40.0	32.0	0.018/0.018	0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

AREA-AVERAGED

DURATION	RAINFALL(INCH)
5-MINUTES	0.44
30-MINUTES	0.91
1-HOUR	1.20
3-HOUR	2.10
6-HOUR	3.00
24-HOUR	6.00

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\*

FLOW PROCESS FROM NODE 2050.00 TO NODE 2055.00 IS CODE = 21

-----

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 740.00 DOWNSTREAM(FEET) = 727.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.686  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.684  
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.)
SCHOOL	A	9.30	0.98	0.600	32	15.69
SCHOOL	C	0.60	0.57	0.600	69	15.69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA RUNOFF(CFS) = 18.83  
TOTAL AREA(ACRES) = 9.90 PEAK FLOW RATE(CFS) = 18.83

\*\*\*\*\*

FLOW PROCESS FROM NODE 2055.00 TO NODE 2060.00 IS CODE = 31

-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 727.50 DOWNSTREAM(FEET) = 718.00  
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.12  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 18.83  
PIPE TRAVEL TIME(MIN.) = 1.15 Tc(MIN.) = 16.84  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2060.00 = 1630.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 2060.00 TO NODE 2060.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.84
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.572
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
SCHOOL                  A        6.00    0.98    0.600    32
SCHOOL                  C        4.40    0.57    0.600    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 10.40      SUBAREA RUNOFF(CFS) = 19.57
EFFECTIVE AREA(ACRES) = 20.30    AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.87  AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 20.3        PEAK FLOW RATE(CFS) = 37.41

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*****
FLOW PROCESS FROM NODE 2060.00 TO NODE 2065.00 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) = 718.00  DOWNSTREAM(FEET) = 717.50
FLOW LENGTH(FEET) = 140.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.10
ESTIMATED PIPE DIAMETER(INCH) = 36.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 37.41
PIPE TRAVEL TIME(MIN.) = 0.38  Tc(MIN.) = 17.22
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2065.00 = 1770.00 FEET.

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*****
FLOW PROCESS FROM NODE 2065.00 TO NODE 2065.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.22
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.538
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A        4.30    0.98    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 4.30      SUBAREA RUNOFF(CFS) = 9.44
EFFECTIVE AREA(ACRES) = 24.60    AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.88  AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 24.6        PEAK FLOW RATE(CFS) = 46.22

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*****
FLOW PROCESS FROM NODE 2065.00 TO NODE 2065.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.22
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.538

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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
"5-7 DWELLINGS/ACRE"   A        0.40    0.98    0.500    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C        18.40   0.57    0.500    69
PUBLIC PARK             C        0.80    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.514
SUBAREA AREA(ACRES) = 19.60      SUBAREA RUNOFF(CFS) = 39.56
EFFECTIVE AREA(ACRES) = 44.20    AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.74  AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 44.2        PEAK FLOW RATE(CFS) = 85.78

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*****
FLOW PROCESS FROM NODE 2065.00 TO NODE 2070.00 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) = 717.50  DOWNSTREAM(FEET) = 695.00
FLOW LENGTH(FEET) = 1160.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.21
ESTIMATED PIPE DIAMETER(INCH) = 36.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 85.78
PIPE TRAVEL TIME(MIN.) = 1.36  Tc(MIN.) = 18.58
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2070.00 = 2930.00 FEET.

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*****
FLOW PROCESS FROM NODE 2070.00 TO NODE 2070.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.58
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.425
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C        3.50    0.57    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 3.50      SUBAREA RUNOFF(CFS) = 7.46
EFFECTIVE AREA(ACRES) = 47.70    AREA-AVERAGED Fm(INCH/HR) = 0.36
AREA-AVERAGED Fp(INCH/HR) = 0.74  AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 47.7        PEAK FLOW RATE(CFS) = 88.74

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*****
FLOW PROCESS FROM NODE 2070.00 TO NODE 2070.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.58
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.425
SUBAREA LOSS RATE DATA(AMC II):

```

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	20.00	0.57	0.500	69
PUBLIC PARK	C	1.30	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.521					
SUBAREA AREA(ACRES) = 21.30		SUBAREA RUNOFF(CFS) = 40.82			
EFFECTIVE AREA(ACRES) = 69.00		AREA-AVERAGED Fm(INCH/HR) = 0.34			
AREA-AVERAGED Fp(INCH/HR) = 0.68		AREA-AVERAGED Ap = 0.49			
TOTAL AREA(ACRES) = 69.0		PEAK FLOW RATE(CFS) = 129.56			

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	9.30	0.57	0.500	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	4.20	0.57	0.200	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407					
SUBAREA AREA(ACRES) = 13.50		SUBAREA RUNOFF(CFS) = 26.46			
EFFECTIVE AREA(ACRES) = 101.50		AREA-AVERAGED Fm(INCH/HR) = 0.32			
AREA-AVERAGED Fp(INCH/HR) = 0.64		AREA-AVERAGED Ap = 0.51			
TOTAL AREA(ACRES) = 101.5		PEAK FLOW RATE(CFS) = 190.43			

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2070.00 TO NODE 2040.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 693.80  
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.44  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 129.56  
PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 18.80  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2040.00 = 3080.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2040.00 TO NODE 2040.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.80  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.408  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	7.40	0.57	0.100	69
PUBLIC PARK	C	2.70	0.57	0.850	69
URBAN GOOD COVER					
"TURF"	C	8.90	0.52	1.000	72
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.53					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.628					
SUBAREA AREA(ACRES) = 19.00		SUBAREA RUNOFF(CFS) = 35.47			
EFFECTIVE AREA(ACRES) = 88.00		AREA-AVERAGED Fm(INCH/HR) = 0.34			
AREA-AVERAGED Fp(INCH/HR) = 0.64		AREA-AVERAGED Ap = 0.52			
TOTAL AREA(ACRES) = 88.0		PEAK FLOW RATE(CFS) = 163.98			

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2040.00 TO NODE 2040.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.80  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.408  
SUBAREA LOSS RATE DATA(AMC II):

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2040.00 TO NODE 2100.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 693.80 DOWNSTREAM(FEET) = 684.80  
FLOW LENGTH(FEET) = 1130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 46.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.37  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 190.43  
PIPE TRAVEL TIME(MIN.) = 1.52 Tc(MIN.) = 20.32  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2100.00 = 4210.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2100.00 TO NODE 2100.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.32  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.298  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	2.90	0.57	0.100	69
PUBLIC PARK	C	2.40	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440					
SUBAREA AREA(ACRES) = 5.30		SUBAREA RUNOFF(CFS) = 9.77			
EFFECTIVE AREA(ACRES) = 106.80		AREA-AVERAGED Fm(INCH/HR) = 0.32			
AREA-AVERAGED Fp(INCH/HR) = 0.63		AREA-AVERAGED Ap = 0.50			
TOTAL AREA(ACRES) = 106.8		PEAK FLOW RATE(CFS) = 190.43			
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE					

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2100.00 TO NODE 2105.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 684.80 DOWNSTREAM(FEET) = 681.60  
FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.24  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 190.43  
 PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 20.53  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2105.00 = 4410.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.53  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.284  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	11.10	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 19.99  
 EFFECTIVE AREA(ACRES) = 117.90 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 117.9 PEAK FLOW RATE(CFS) = 208.83

\*\*\*\*\*

FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.53  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.284  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.80	0.57	0.100	69
PUBLIC PARK	C	1.20	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400  
 SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 5.56  
 EFFECTIVE AREA(ACRES) = 120.90 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 120.9 PEAK FLOW RATE(CFS) = 214.39

\*\*\*\*\*

FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 IS CODE = 10

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

\*\*\*\*\*

FLOW PROCESS FROM NODE 2110.00 TO NODE 2115.00 IS CODE = 21

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

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
 ELEVATION DATA: UPSTREAM(FEET) = 717.00 DOWNSTREAM(FEET) = 714.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 19.703  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.341  
 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 "5-7 DWELLINGS/ACRE"	A	7.70	0.98	0.500	32	19.70

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 12.84  
 TOTAL AREA(ACRES) = 7.70 PEAK FLOW RATE(CFS) = 12.84

\*\*\*\*\*

FLOW PROCESS FROM NODE 2115.00 TO NODE 2117.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 714.00 DOWNSTREAM(FEET) = 691.40  
 FLOW LENGTH(FEET) = 410.00 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.) = 13.55  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 12.84  
 PIPE TRAVEL TIME(MIN.) = 0.50 Tc(MIN.) = 20.21  
 LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2117.00 = 1410.00 FEET.

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FLOW PROCESS FROM NODE 2117.00 TO NODE 2117.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 20.21  
 \* 100 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	A	2.40	0.98	0.100	32
PUBLIC PARK	A	1.70	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.411  
 SUBAREA AREA(ACRES) = 4.10 SUBAREA RUNOFF(CFS) = 7.03  
 EFFECTIVE AREA(ACRES) = 11.80 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 11.8 PEAK FLOW RATE(CFS) = 19.63

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FLOW PROCESS FROM NODE 2117.00 TO NODE 2118.00 IS CODE = 31

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



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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 691.40 DOWNSTREAM(FEET) = 690.50
FLOW LENGTH(FEET) = 470.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.18
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.63
PIPE TRAVEL TIME(MIN.) = 1.87 Tc(MIN.) = 22.08
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2118.00 = 1880.00 FEET.

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*****
FLOW PROCESS FROM NODE 2118.00 TO NODE 2118.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.08
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.186
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            C        2.10    0.57    0.100    69
PUBLIC PARK           C        1.50    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.413
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 6.33
EFFECTIVE AREA(ACRES) = 15.40 AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 15.4 PEAK FLOW RATE(CFS) = 24.69

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*****
FLOW PROCESS FROM NODE 2118.00 TO NODE 2120.00 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) = 690.50 DOWNSTREAM(FEET) = 689.40
FLOW LENGTH(FEET) = 370.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.21
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.69
PIPE TRAVEL TIME(MIN.) = 1.18 Tc(MIN.) = 23.26
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2120.00 = 2250.00 FEET.

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*****
FLOW PROCESS FROM NODE 2120.00 TO NODE 2120.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.26
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.119
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL           C        1.60    0.98    0.500    32

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"5-7 DWELLINGS/ACRE"  A        18.50    0.98    0.500    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C        13.30    0.57    0.500    69
PUBLIC PARK           C        0.80    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.509
SUBAREA AREA(ACRES) = 32.60 SUBAREA RUNOFF(CFS) = 50.31
EFFECTIVE AREA(ACRES) = 48.00 AREA-AVERAGED Fm(INCH/HR) = 0.40
AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 48.0 PEAK FLOW RATE(CFS) = 74.06

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*****
FLOW PROCESS FROM NODE 2120.00 TO NODE 2125.00 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) = 689.40 DOWNSTREAM(FEET) = 684.10
FLOW LENGTH(FEET) = 1090.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.22
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 74.06
PIPE TRAVEL TIME(MIN.) = 2.21 Tc(MIN.) = 25.47
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2125.00 = 3340.00 FEET.

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*****
FLOW PROCESS FROM NODE 2125.00 TO NODE 2125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.47
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.006
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            A        1.60    0.98    0.100    32
COMMERCIAL            C        1.60    0.57    0.100    69
PUBLIC PARK           A        1.10    0.98    0.850    32
PUBLIC PARK           C        1.00    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.397
SUBAREA AREA(ACRES) = 5.30 SUBAREA RUNOFF(CFS) = 8.10
EFFECTIVE AREA(ACRES) = 53.30 AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 53.3 PEAK FLOW RATE(CFS) = 77.31

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*****
FLOW PROCESS FROM NODE 2125.00 TO NODE 2125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.47
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.006
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  
"5-7 DWELLINGS/ACRE"        A            1.30       0.98       0.500      32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE"        C            20.10      0.57       0.500      69  
PUBLIC PARK                    C            0.70       0.57       0.850      69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.59  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.511  
SUBAREA AREA(ACRES) = 22.10        SUBAREA RUNOFF(CFS) = 33.91  
EFFECTIVE AREA(ACRES) = 75.40      AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.75    AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 75.4            PEAK FLOW RATE(CFS) = 111.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2125.00 TO NODE 2105.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 684.10    DOWNSTREAM(FEET) = 681.60  
FLOW LENGTH(FEET) = 230.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.30  
ESTIMATED PIPE DIAMETER(INCH) = 45.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 111.22  
PIPE TRAVEL TIME(MIN.) = 0.31    Tc(MIN.) = 25.78  
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2105.00 = 3570.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 IS CODE = 11  
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>>>>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        111.22    25.78    1.992    0.75( 0.37)    0.49        75.4      2110.00  
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2105.00 = 3570.00 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        214.39    20.53    2.284    0.63( 0.31)    0.50        120.9     2050.00  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2105.00 = 4410.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*  
STREAM    Q        Tc    Intensity    Fp(Fm)        Ap        Ae        HEADWATER  
NUMBER    (CFS)    (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE  
1        318.85    20.53    2.284    0.67( 0.33)    0.50        180.9     2050.00  
2        293.83    25.78    1.992    0.67( 0.33)    0.50        196.3     2110.00  
TOTAL AREA(ACRES) = 196.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 318.85    Tc(MIN.) = 20.527  
EFFECTIVE AREA(ACRES) = 180.93    AREA-AVERAGED Fm(INCH/HR) = 0.33

AREA-AVERAGED Fp(INCH/HR) = 0.67    AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 196.3  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2105.00 = 4410.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2105.00 TO NODE 2130.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 681.60    DOWNSTREAM(FEET) = 674.50  
FLOW LENGTH(FEET) = 780.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 69.0 INCH PIPE IS 52.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.97  
ESTIMATED PIPE DIAMETER(INCH) = 69.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 318.85  
PIPE TRAVEL TIME(MIN.) = 0.87    Tc(MIN.) = 21.40  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2130.00 = 5190.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2130.00 TO NODE 2130.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 21.40  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.228  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp        Ap        SCS  
LAND USE                    GROUP    (ACRES)   (INCH/HR)   (DECIMAL)   CN  
COMMERCIAL                    C            3.30       0.57       0.100      69  
PUBLIC PARK                    C            1.40       0.57       0.850      69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.323  
SUBAREA AREA(ACRES) = 4.70        SUBAREA RUNOFF(CFS) = 8.65  
EFFECTIVE AREA(ACRES) = 185.63    AREA-AVERAGED Fm(INCH/HR) = 0.33  
AREA-AVERAGED Fp(INCH/HR) = 0.66    AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 201.0        PEAK FLOW RATE(CFS) = 318.85  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2130.00 TO NODE 2135.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 674.50    DOWNSTREAM(FEET) = 673.60  
FLOW LENGTH(FEET) = 90.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 69.0 INCH PIPE IS 50.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.61  
ESTIMATED PIPE DIAMETER(INCH) = 69.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 318.85  
PIPE TRAVEL TIME(MIN.) = 0.10    Tc(MIN.) = 21.49  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2135.00 = 5280.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2135.00 TO NODE 2135.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.222
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A        3.70    0.98    0.100    32
COMMERCIAL              C        7.10    0.57    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.71
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 10.80    SUBAREA RUNOFF(CFS) = 20.91
EFFECTIVE AREA(ACRES) = 196.43    AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.66    AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 211.8    PEAK FLOW RATE(CFS) = 337.35

*****
FLOW PROCESS FROM NODE 2135.00 TO NODE 2135.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.222
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"  A        9.60    0.98    0.200    32
RESIDENTIAL
"11+ DWELLINGS/ACRE"  C       11.20    0.57    0.200    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 20.80    SUBAREA RUNOFF(CFS) = 38.77
EFFECTIVE AREA(ACRES) = 217.23    AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.67    AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 232.6    PEAK FLOW RATE(CFS) = 376.11

*****
FLOW PROCESS FROM NODE 2135.00 TO NODE 2140.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 673.60    DOWNSTREAM(FEET) = 666.50
FLOW LENGTH(FEET) = 850.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.14
ESTIMATED PIPE DIAMETER(INCH) = 75.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 376.11
PIPE TRAVEL TIME(MIN.) = 0.94    Tc(MIN.) = 22.43
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2140.00 = 6130.00 FEET.

*****
FLOW PROCESS FROM NODE 2140.00 TO NODE 2140.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.43
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.166
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C        1.30    0.57    0.100    69
PUBLIC PARK             C        0.90    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
SUBAREA AREA(ACRES) = 2.20    SUBAREA RUNOFF(CFS) = 3.83
EFFECTIVE AREA(ACRES) = 219.43    AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.67    AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 234.8    PEAK FLOW RATE(CFS) = 376.11
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 2140.00 TO NODE 2200.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 666.50    DOWNSTREAM(FEET) = 665.70
FLOW LENGTH(FEET) = 100.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 57.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.85
ESTIMATED PIPE DIAMETER(INCH) = 75.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 376.11
PIPE TRAVEL TIME(MIN.) = 0.11    Tc(MIN.) = 22.54
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2200.00 = 6230.00 FEET.

*****
FLOW PROCESS FROM NODE 2200.00 TO NODE 2200.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.54
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.159
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
PUBLIC PARK             C        9.50    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 9.50    SUBAREA RUNOFF(CFS) = 14.35
EFFECTIVE AREA(ACRES) = 228.93    AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.66    AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 244.3    PEAK FLOW RATE(CFS) = 382.05

*****
FLOW PROCESS FROM NODE 2200.00 TO NODE 2205.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

```

ELEVATION DATA: UPSTREAM(FEET) = 665.70 DOWNSTREAM(FEET) = 658.20  
FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 54.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.69  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 382.05  
PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 23.24  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2205.00 = 6930.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2205.00 TO NODE 2205.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 23.24  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.120  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 3.90 0.57 0.100 69  
PUBLIC PARK C 2.90 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.420  
SUBAREA AREA(ACRES) = 6.80 SUBAREA RUNOFF(CFS) = 11.52  
EFFECTIVE AREA(ACRES) = 235.73 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 251.1 PEAK FLOW RATE(CFS) = 385.49

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2205.00 TO NODE 2210.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 658.20 DOWNSTREAM(FEET) = 656.00  
FLOW LENGTH(FEET) = 160.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 69.0 INCH PIPE IS 52.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.37  
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 385.49  
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 23.38  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2210.00 = 7090.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2210.00 TO NODE 2210.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 23.38  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.112  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.83 0.57 0.100 69  
PUBLIC PARK C 0.47 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.371  
SUBAREA AREA(ACRES) = 1.30 SUBAREA RUNOFF(CFS) = 2.23  
EFFECTIVE AREA(ACRES) = 237.03 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 252.4 PEAK FLOW RATE(CFS) = 386.04

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2210.00 TO NODE 2210.00 IS CODE = 10  
-----

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2215.00 TO NODE 2220.00 IS CODE = 21  
-----

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

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 715.50 DOWNSTREAM(FEET) = 706.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.571  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.597  
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.)  
SCHOOL A 7.20 0.98 0.600 32 16.57  
SCHOOL C 2.60 0.57 0.600 69 16.57  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.87  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA RUNOFF(CFS) = 18.32  
TOTAL AREA(ACRES) = 9.80 PEAK FLOW RATE(CFS) = 18.32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2220.00 TO NODE 2230.00 IS CODE = 62  
-----

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

-----  
UPSTREAM ELEVATION(FEET) = 706.00 DOWNSTREAM ELEVATION(FEET) = 698.00  
STREET LENGTH(FEET) = 810.00 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) = 38.00  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.59

HALFSTREET FLOOD WIDTH(FEET) = 24.02  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.55  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.10  
 STREET FLOW TRAVEL TIME(MIN.) = 3.80 Tc(MIN.) = 20.37  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.294  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
SCHOOL	A	6.90	0.98	0.600	32
SCHOOL	C	16.30	0.57	0.600	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 SUBAREA AREA(ACRES) = 23.20 SUBAREA RUNOFF(CFS) = 39.29  
 EFFECTIVE AREA(ACRES) = 33.00 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.60  
 TOTAL AREA(ACRES) = 33.0 PEAK FLOW RATE(CFS) = 54.94

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.66 HALFSTREET FLOOD WIDTH(FEET) = 27.70  
 FLOW VELOCITY(FEET/SEC.) = 3.90 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.56  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2230.00 = 1810.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2230.00 TO NODE 2235.00 IS CODE = 62  
 -----

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

=====  
 UPSTREAM ELEVATION(FEET) = 698.00 DOWNSTREAM ELEVATION(FEET) = 689.00  
 STREET LENGTH(FEET) = 980.00 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) = 66.72  
 \*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.70  
 HALFSTREET FLOOD WIDTH(FEET) = 31.80  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.98  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.79  
 STREET FLOW TRAVEL TIME(MIN.) = 4.11 Tc(MIN.) = 24.48  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.055  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
SCHOOL	A	3.22	0.98	0.600	32
SCHOOL	C	6.72	0.57	0.600	69
PUBLIC PARK	C	5.29	0.57	0.850	69

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.27	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.67  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.699  
 SUBAREA AREA(ACRES) = 16.50 SUBAREA RUNOFF(CFS) = 23.53  
 EFFECTIVE AREA(ACRES) = 49.50 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.63  
 TOTAL AREA(ACRES) = 49.5 PEAK FLOW RATE(CFS) = 71.36

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.71 HALFSTREET FLOOD WIDTH(FEET) = 32.35  
 FLOW VELOCITY(FEET/SEC.) = 4.08 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.91  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2235.00 = 2790.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2235.00 TO NODE 2235.00 IS CODE = 81  
 -----

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

=====  
 MAINLINE Tc(MIN.) = 24.48  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.055  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	3.85	0.57	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	2.21	0.98	0.200	32
PUBLIC PARK	C	2.91	0.57	0.850	69
PUBLIC PARK	A	7.63	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.613  
 SUBAREA AREA(ACRES) = 16.60 SUBAREA RUNOFF(CFS) = 22.97  
 EFFECTIVE AREA(ACRES) = 66.10 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.63  
 TOTAL AREA(ACRES) = 66.1 PEAK FLOW RATE(CFS) = 94.33

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2235.00 TO NODE 2240.00 IS CODE = 31  
 -----

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

=====  
 ELEVATION DATA: UPSTREAM(FEET) = 689.00 DOWNSTREAM(FEET) = 662.00  
 FLOW LENGTH(FEET) = 870.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.69  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 94.33  
 PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 25.30  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2240.00 = 3660.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 25.30  
 \* 100 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 A 8.60 0.98 0.850 32  
 PUBLIC PARK C 20.80 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 29.40 SUBAREA RUNOFF(CFS) = 37.89  
 EFFECTIVE AREA(ACRES) = 95.50 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.70  
 TOTAL AREA(ACRES) = 95.5 PEAK FLOW RATE(CFS) = 129.83

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 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.) = 25.30  
 RAINFALL INTENSITY(INCH/HR) = 2.01  
 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.72  
 AREA-AVERAGED Ap = 0.70  
 EFFECTIVE STREAM AREA(ACRES) = 95.50  
 TOTAL STREAM AREA(ACRES) = 95.50  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 129.83

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2245.00 TO NODE 2250.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 -----  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 400.00  
 ELEVATION DATA: UPSTREAM(FEET) = 690.00 DOWNSTREAM(FEET) = 677.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.627  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.501  
 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 A 0.60 0.98 0.100 32 6.63  
 PUBLIC PARK A 0.60 0.98 0.850 32 10.53  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
 SUBAREA RUNOFF(CFS) = 4.36  
 TOTAL AREA(ACRES) = 1.20 PEAK FLOW RATE(CFS) = 4.36

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2250.00 TO NODE 2240.00 IS CODE = 31  
 -----

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

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 677.00 DOWNSTREAM(FEET) = 662.00  
 FLOW LENGTH(FEET) = 810.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.83  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 4.36  
 PIPE TRAVEL TIME(MIN.) = 1.98 Tc(MIN.) = 8.60  
 LONGEST FLOWPATH FROM NODE 2245.00 TO NODE 2240.00 = 1210.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 8.60  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.849  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 2.50 0.57 0.100 69  
 PUBLIC PARK C 2.50 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
 SUBAREA AREA(ACRES) = 5.00 SUBAREA RUNOFF(CFS) = 16.11  
 EFFECTIVE AREA(ACRES) = 6.20 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 6.2 PEAK FLOW RATE(CFS) = 19.77

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 IS CODE = 1  
 -----

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

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 8.60  
 RAINFALL INTENSITY(INCH/HR) = 3.85  
 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.65  
 AREA-AVERAGED Ap = 0.47  
 EFFECTIVE STREAM AREA(ACRES) = 6.20  
 TOTAL STREAM AREA(ACRES) = 6.20  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.77

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	129.83	25.30	2.015	0.72( 0.50)	0.70	95.5	2215.00
2	19.77	8.60	3.849	0.65( 0.31)	0.47	6.2	2245.00

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	117.51	8.60	3.849	0.72 ( 0.47)	0.66	38.7	2245.00
2	139.36	25.30	2.015	0.72 ( 0.49)	0.68	101.7	2215.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 139.36 Tc(MIN.) = 25.30  
EFFECTIVE AREA(ACRES) = 101.70 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.68  
TOTAL AREA(ACRES) = 101.7  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2240.00 = 3660.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 2240.00 TO NODE 2265.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 662.00 DOWNSTREAM(FEET) = 658.30  
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 45.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.25  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 139.36  
PIPE TRAVEL TIME(MIN.) = 1.50 Tc(MIN.) = 26.79  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2265.00 = 4490.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 2265.00 TO NODE 2265.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.79  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.946  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.40	0.57	0.100	69
PUBLIC PARK	C	0.40	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 1.21  
EFFECTIVE AREA(ACRES) = 102.50 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.68  
TOTAL AREA(ACRES) = 102.5 PEAK FLOW RATE(CFS) = 139.36  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 2265.00 TO NODE 2270.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 658.30 DOWNSTREAM(FEET) = 657.60

FLOW LENGTH(FEET) = 110.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.64  
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 139.36  
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 26.97  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2270.00 = 4600.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 2270.00 TO NODE 2270.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.97  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.939  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	C	24.70	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 24.70 SUBAREA RUNOFF(CFS) = 32.41  
EFFECTIVE AREA(ACRES) = 127.20 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.71  
TOTAL AREA(ACRES) = 127.2 PEAK FLOW RATE(CFS) = 166.04

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	171.77	10.33	3.447	0.65 ( 0.47)	0.73	64.2	2245.00
2	166.04	26.97	1.939	0.68 ( 0.49)	0.71	127.2	2215.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 171.77 Tc(MIN.) = 10.33  
AREA-AVERAGED Fm(INCH/HR) = 0.47 AREA-AVERAGED Fp(INCH/HR) = 0.65  
AREA-AVERAGED Ap = 0.73 EFFECTIVE AREA(ACRES) = 64.17

\*\*\*\*\*

FLOW PROCESS FROM NODE 2270.00 TO NODE 2275.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 657.60 DOWNSTREAM(FEET) = 657.20  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 52.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.48  
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 171.77  
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 10.59  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2275.00 = 4730.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 2275.00 TO NODE 2275.00 IS CODE = 81

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



MAINLINE Tc(MIN.) = 10.59  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.397  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 1.10 0.57 0.100 69  
 PUBLIC PARK C 0.90 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.438  
 SUBAREA AREA(ACRES) = 2.00 SUBAREA RUNOFF(CFS) = 5.67  
 EFFECTIVE AREA(ACRES) = 66.17 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.72  
 TOTAL AREA(ACRES) = 129.2 PEAK FLOW RATE(CFS) = 174.54

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2275.00 TO NODE 2210.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 657.20 DOWNSTREAM(FEET) = 656.00  
 FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 48.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.84  
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 174.54  
 PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 11.05  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2210.00 = 5000.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2210.00 TO NODE 2210.00 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	174.54	11.05	3.312	0.65( 0.47)	0.72	66.2	2245.00
2	167.81	27.68	1.909	0.68( 0.48)	0.71	129.2	2215.00

 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2210.00 = 5000.00 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	386.04	23.38	2.112	0.66( 0.30)	0.46	237.0	2050.00
2	354.54	28.72	1.867	0.66( 0.31)	0.46	252.4	2110.00

 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2210.00 = 7090.00 FEET.

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	477.86	11.05	3.312	0.65( 0.36)	0.56	178.2	2245.00
2	555.59	23.38	2.112	0.66( 0.36)	0.54	349.9	2050.00
3	528.47	27.68	1.909	0.67( 0.37)	0.55	378.6	2215.00
4	517.45	28.72	1.867	0.67( 0.37)	0.55	381.6	2110.00

TOTAL AREA(ACRES) = 381.6  
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 555.59 Tc(MIN.) = 23.384  
 EFFECTIVE AREA(ACRES) = 349.94 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.67 AREA-AVERAGED Ap = 0.55  
 TOTAL AREA(ACRES) = 381.6  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2210.00 = 7090.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2210.00 TO NODE 2400.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 656.00 DOWNSTREAM(FEET) = 646.80  
 FLOW LENGTH(FEET) = 1190.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 87.0 INCH PIPE IS 67.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.13  
 ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 555.59  
 PIPE TRAVEL TIME(MIN.) = 1.23 Tc(MIN.) = 24.61  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2400.00 = 8280.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2400.00 TO NODE 2400.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 24.61  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.048  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 4.40 0.57 0.100 69  
 PUBLIC PARK C 2.60 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.379  
 SUBAREA AREA(ACRES) = 7.00 SUBAREA RUNOFF(CFS) = 11.55  
 EFFECTIVE AREA(ACRES) = 356.94 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 388.6 PEAK FLOW RATE(CFS) = 555.59  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2400.00 TO NODE 2405.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 646.80 DOWNSTREAM(FEET) = 646.00  
 FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 87.0 INCH PIPE IS 66.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.38  
 ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 555.59

PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 24.72  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2405.00 = 8380.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2405.00 IS CODE = 12

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2405.00 IS CODE = 12

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2405.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 24.72  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.043  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 34.10 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 34.10 SUBAREA RUNOFF(CFS) = 54.02  
EFFECTIVE AREA(ACRES) = 391.04 AREA-AVERAGED Fm(INCH/HR) = 0.35  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.54  
TOTAL AREA(ACRES) = 422.7 PEAK FLOW RATE(CFS) = 595.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2500.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 646.00 DOWNSTREAM(FEET) = 634.90  
FLOW LENGTH(FEET) = 1180.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 87.0 INCH PIPE IS 65.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.74  
ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 595.68  
PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 25.82  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2500.00 = 9560.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2500.00 TO NODE 2500.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 25.82  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.990

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 3.90 0.57 0.100 69  
PUBLIC PARK C 2.80 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.413  
SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 10.59  
EFFECTIVE AREA(ACRES) = 397.74 AREA-AVERAGED Fm(INCH/HR) = 0.35  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 429.4 PEAK FLOW RATE(CFS) = 595.68  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2500.00 TO NODE 2505.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 634.90 DOWNSTREAM(FEET) = 634.80  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 132.0 INCH PIPE IS 100.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.65  
ESTIMATED PIPE DIAMETER(INCH) = 132.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 595.68  
PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 26.04  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2505.00 = 9660.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2505.00 TO NODE 2505.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.04  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.980  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 24.60 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 24.60 SUBAREA RUNOFF(CFS) = 37.57  
EFFECTIVE AREA(ACRES) = 422.34 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 454.0 PEAK FLOW RATE(CFS) = 621.58

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2505.00 TO NODE 2505.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.04  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.980  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

```

LAND USE      GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL    C      1.00   0.57   0.100  69
PUBLIC PARK   C      1.00   0.57   0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475
SUBAREA AREA(ACRES) = 2.00 SUBAREA RUNOFF(CFS) = 3.08
EFFECTIVE AREA(ACRES) = 424.34 AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 456.0 PEAK FLOW RATE(CFS) = 624.66

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PIPE-FLOW(CFS) = 624.66
PIPE TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 30.10
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2530.00 = 11510.00 FEET.

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*****
FLOW PROCESS FROM NODE 2530.00 TO NODE 2530.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
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*****
FLOW PROCESS FROM NODE 2505.00 TO NODE 2520.00 IS CODE = 31
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*****
FLOW PROCESS FROM NODE 2600.00 TO NODE 2605.00 IS CODE = 21
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

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

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=====
ELEVATION DATA: UPSTREAM(FEET) = 634.80 DOWNSTREAM(FEET) = 633.30
FLOW LENGTH(FEET) = 1500.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 132.0 INCH PIPE IS 105.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.67
ESTIMATED PIPE DIAMETER(INCH) = 132.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 624.66
PIPE TRAVEL TIME(MIN.) = 3.26 Tc(MIN.) = 29.30
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2520.00 = 11160.00 FEET.

```

```

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 920.00
ELEVATION DATA: UPSTREAM(FEET) = 689.50 DOWNSTREAM(FEET) = 679.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.588
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.803
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.)
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	3.20	0.57	0.500	69	14.59

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 7.26  
TOTAL AREA(ACRES) = 3.20 PEAK FLOW RATE(CFS) = 7.26

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*****
FLOW PROCESS FROM NODE 2520.00 TO NODE 2520.00 IS CODE = 81
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*****
FLOW PROCESS FROM NODE 2605.00 TO NODE 2610.00 IS CODE = 62
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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

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=====
MAINLINE Tc(MIN.) = 29.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.845
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 6.10 0.57 0.100 69
PUBLIC PARK C 3.10 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.353
SUBAREA AREA(ACRES) = 9.20 SUBAREA RUNOFF(CFS) = 13.62
EFFECTIVE AREA(ACRES) = 433.54 AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 465.2 PEAK FLOW RATE(CFS) = 624.66
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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=====
UPSTREAM ELEVATION(FEET) = 679.00 DOWNSTREAM ELEVATION(FEET) = 677.00
STREET LENGTH(FEET) = 310.00 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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```

*****
FLOW PROCESS FROM NODE 2520.00 TO NODE 2530.00 IS CODE = 31
-----

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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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```

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

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```

*****
**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.13
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.35
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.20

```

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 633.30 DOWNSTREAM(FEET) = 633.00
FLOW LENGTH(FEET) = 350.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 138.0 INCH PIPE IS 106.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.30
ESTIMATED PIPE DIAMETER(INCH) = 138.00 NUMBER OF PIPES = 1

```

PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.96  
 STREET FLOW TRAVEL TIME(MIN.) = 2.34 Tc(MIN.) = 16.93  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.564  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	2.80	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 2.80 SUBAREA RUNOFF(CFS) = 5.75  
 EFFECTIVE AREA(ACRES) = 6.00 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 6.0 PEAK FLOW RATE(CFS) = 12.32

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 16.68  
 FLOW VELOCITY(FEET/SEC.) = 2.30 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.06  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2610.00 = 1230.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2610.00 TO NODE 2615.00 IS CODE = 62

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

=====

UPSTREAM ELEVATION(FEET) = 677.00 DOWNSTREAM ELEVATION(FEET) = 673.00  
 STREET LENGTH(FEET) = 570.00 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) = 18.53  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.51  
 HALFSTREET FLOOD WIDTH(FEET) = 19.34  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.62  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.33  
 STREET FLOW TRAVEL TIME(MIN.) = 3.62 Tc(MIN.) = 20.55  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.282

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	6.90	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.90 SUBAREA RUNOFF(CFS) = 12.41  
 EFFECTIVE AREA(ACRES) = 12.90 AREA-AVERAGED Fm(INCH/HR) = 0.28

AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 12.9 PEAK FLOW RATE(CFS) = 23.21

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 21.13  
 FLOW VELOCITY(FEET/SEC.) = 2.78 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.50  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2615.00 = 1800.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2615.00 TO NODE 2620.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 658.00  
 FLOW LENGTH(FEET) = 490.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.34  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 23.21  
 PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 21.22  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2620.00 = 2290.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2620.00 TO NODE 2620.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 21.22  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.239  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.90	0.57	0.500	69
COMMERCIAL	C	3.40	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.314  
 SUBAREA AREA(ACRES) = 7.30 SUBAREA RUNOFF(CFS) = 13.54  
 EFFECTIVE AREA(ACRES) = 20.20 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 20.2 PEAK FLOW RATE(CFS) = 36.26

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2620.00 TO NODE 2625.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 658.00 DOWNSTREAM(FEET) = 654.00  
 FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.27  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 36.26  
 PIPE TRAVEL TIME(MIN.) = 1.60 Tc(MIN.) = 22.82

LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2625.00 = 2990.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2625.00 TO NODE 2625.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.82  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.143  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 7.20 0.57 0.500 69  
COMMERCIAL C 1.00 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.451  
SUBAREA AREA(ACRES) = 8.20 SUBAREA RUNOFF(CFS) = 13.93  
EFFECTIVE AREA(ACRES) = 28.40 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 28.4 PEAK FLOW RATE(CFS) = 48.45

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2625.00 TO NODE 2630.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 654.00 DOWNSTREAM(FEET) = 649.20  
FLOW LENGTH(FEET) = 650.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.69  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 48.45  
PIPE TRAVEL TIME(MIN.) = 1.25 Tc(MIN.) = 24.07  
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2630.00 = 3640.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2630.00 TO NODE 2630.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 24.07  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.076  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 5.80 0.57 0.500 69 11.16  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 15.70  
TOTAL AREA(ACRES) = 5.80 PEAK FLOW RATE(CFS) = 15.70

\*\*\*\*\*

FLOW PROCESS FROM NODE 2630.00 TO NODE 2635.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 649.20 DOWNSTREAM(FEET) = 648.00  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.55  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 48.54  
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 24.29  
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2635.00 = 3770.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 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.) = 24.29  
RAINFALL INTENSITY(INCH/HR) = 2.06  
AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.57  
AREA-AVERAGED Ap = 0.43  
EFFECTIVE STREAM AREA(ACRES) = 29.40  
TOTAL STREAM AREA(ACRES) = 29.40  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 48.54

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2638.00 TO NODE 2640.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 600.00  
ELEVATION DATA: UPSTREAM(FEET) = 676.10 DOWNSTREAM(FEET) = 665.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.163  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.292  
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  
"5-7 DWELLINGS/ACRE" C 5.80 0.57 0.500 69 11.16  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 15.70  
TOTAL AREA(ACRES) = 5.80 PEAK FLOW RATE(CFS) = 15.70

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2640.00 TO NODE 2635.00 IS CODE = 31

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

```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 665.00 DOWNSTREAM(FEET) = 648.00
FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.16
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.70
PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 12.28
LONGEST FLOWPATH FROM NODE 2638.00 TO NODE 2635.00 = 1280.00 FEET.

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*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.28
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.109
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK C 2.30 0.57 0.850 69
COMMERCIAL C 2.40 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 12.03
EFFECTIVE AREA(ACRES) = 10.50 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 26.78

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*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.28
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.109
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.80 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 2.20
EFFECTIVE AREA(ACRES) = 11.30 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 11.3 PEAK FLOW RATE(CFS) = 28.98

```

```

*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 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:

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```

TIME OF CONCENTRATION(MIN.) = 12.28
RAINFALL INTENSITY(INCH/HR) = 3.11
AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.57
AREA-AVERAGED Ap = 0.46
EFFECTIVE STREAM AREA(ACRES) = 11.30
TOTAL STREAM AREA(ACRES) = 11.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 28.98

```

```

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 48.54 24.29 2.064 0.57( 0.24) 0.43 29.4 2600.00
2 28.98 12.28 3.109 0.57( 0.26) 0.46 11.3 2638.00

```

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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 67.57 12.28 3.109 0.57( 0.25) 0.44 26.2 2638.00
2 66.90 24.29 2.064 0.57( 0.25) 0.44 40.7 2600.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 67.57 Tc(MIN.) = 12.28
EFFECTIVE AREA(ACRES) = 26.16 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 40.7
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2635.00 = 3770.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2645.00 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) = 648.00 DOWNSTREAM(FEET) = 646.40
FLOW LENGTH(FEET) = 380.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.64
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 67.57
PIPE TRAVEL TIME(MIN.) = 0.83 Tc(MIN.) = 13.11
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2645.00 = 4150.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 2645.00 TO NODE 2645.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.11
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.989
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

```



RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 8.80 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 8.80 SUBAREA RUNOFF(CFS) = 21.43  
 EFFECTIVE AREA(ACRES) = 34.96 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA(ACRES) = 49.5 PEAK FLOW RATE(CFS) = 85.94

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2645.00 TO NODE 2650.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 646.40 DOWNSTREAM(FEET) = 641.00  
 FLOW LENGTH(FEET) = 870.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.31  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 85.94  
 PIPE TRAVEL TIME(MIN.) = 1.56 Tc(MIN.) = 14.66  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2650.00 = 5020.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2650.00 TO NODE 2650.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 14.66  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.795  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 13.00 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 13.00 SUBAREA RUNOFF(CFS) = 29.39  
 EFFECTIVE AREA(ACRES) = 47.96 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 62.5 PEAK FLOW RATE(CFS) = 109.21

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2650.00 TO NODE 2655.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 641.00 DOWNSTREAM(FEET) = 635.80  
 FLOW LENGTH(FEET) = 880.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.80  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 109.21  
 PIPE TRAVEL TIME(MIN.) = 1.50 Tc(MIN.) = 16.16

LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2655.00 = 5900.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2655.00 TO NODE 2655.00 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.) = 16.16  
 RAINFALL INTENSITY(INCH/HR) = 2.64  
 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.57  
 AREA-AVERAGED Ap = 0.47  
 EFFECTIVE STREAM AREA(ACRES) = 47.96  
 TOTAL STREAM AREA(ACRES) = 62.50  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 109.21

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2660.00 TO NODE 2665.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 =====  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 530.00  
 ELEVATION DATA: UPSTREAM(FEET) = 664.00 DOWNSTREAM(FEET) = 651.60

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.584  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.063  
 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 C 3.40 0.57 0.850 69 12.58  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA RUNOFF(CFS) = 7.90  
 TOTAL AREA(ACRES) = 3.40 PEAK FLOW RATE(CFS) = 7.90

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2665.00 TO NODE 2670.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 651.60 DOWNSTREAM(FEET) = 650.70  
 FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.64  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 7.90  
 PIPE TRAVEL TIME(MIN.) = 0.72 Tc(MIN.) = 13.30  
 LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2670.00 = 730.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2670.00 TO NODE 2670.00 IS CODE = 81

```

-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 13.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.963
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE            GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C          3.60    0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 3.60    SUBAREA RUNOFF(CFS) = 8.68
EFFECTIVE AREA(ACRES) = 7.00    AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) = 7.0    PEAK FLOW RATE(CFS) = 16.28

*****
FLOW PROCESS FROM NODE 2670.00 TO NODE 2675.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 650.70 DOWNSTREAM(FEET) = 649.30
FLOW LENGTH(FEET) = 260.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.96
ESTIMATED PIPE DIAMETER(INCH) = 27.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.28
PIPE TRAVEL TIME(MIN.) = 0.73    Tc(MIN.) = 14.03
LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2675.00 = 990.00 FEET.

*****
FLOW PROCESS FROM NODE 2675.00 TO NODE 2675.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 14.03
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.870
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE            GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C          7.10    0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 7.10    SUBAREA RUNOFF(CFS) = 16.53
EFFECTIVE AREA(ACRES) = 14.10    AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 14.1    PEAK FLOW RATE(CFS) = 32.22

*****
FLOW PROCESS FROM NODE 2675.00 TO NODE 2680.00 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) = 649.30 DOWNSTREAM(FEET) = 643.90
FLOW LENGTH(FEET) = 810.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.64
ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 32.22
PIPE TRAVEL TIME(MIN.) = 1.77    Tc(MIN.) = 15.80
LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2680.00 = 1800.00 FEET.

*****
FLOW PROCESS FROM NODE 2680.00 TO NODE 2680.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 15.80
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.673
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE            GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C          11.80    0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.80    SUBAREA RUNOFF(CFS) = 25.38
EFFECTIVE AREA(ACRES) = 25.90    AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 25.9    PEAK FLOW RATE(CFS) = 55.09

*****
FLOW PROCESS FROM NODE 2680.00 TO NODE 2655.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 643.90 DOWNSTREAM(FEET) = 635.80
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.98
ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 55.09
PIPE TRAVEL TIME(MIN.) = 1.39    Tc(MIN.) = 17.18
LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2655.00 = 2630.00 FEET.

*****
FLOW PROCESS FROM NODE 2655.00 TO NODE 2655.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 17.18
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.541
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE            GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C          18.70    0.57    0.500    69

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 18.70 SUBAREA RUNOFF(CFS) = 38.00  
 EFFECTIVE AREA(ACRES) = 44.60 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 44.6 PEAK FLOW RATE(CFS) = 90.03

DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.99  
 ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 198.04  
 PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 17.74  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2530.00 = 6300.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2655.00 TO NODE 2655.00 IS CODE = 1  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2530.00 TO NODE 2530.00 IS CODE = 11  
 -----

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

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

-----  
 TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 17.18  
 RAINFALL INTENSITY(INCH/HR) = 2.54  
 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.57  
 AREA-AVERAGED Ap = 0.53  
 EFFECTIVE STREAM AREA(ACRES) = 44.60  
 TOTAL STREAM AREA(ACRES) = 44.60  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 90.03

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	197.47	16.72	2.583	0.57( 0.28)	0.50	89.9	2638.00
2	198.04	17.74	2.493	0.57( 0.28)	0.50	93.8	2660.00
3	158.88	28.83	1.863	0.57( 0.28)	0.49	107.1	2600.00

LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2530.00 = 6300.00 FEET.

\*\* CONFLUENCE DATA \*\*  

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	109.21	16.16	2.636	0.57( 0.26)	0.47	48.0	2638.00
1	95.15	28.25	1.886	0.57( 0.26)	0.46	62.5	2600.00
2	90.03	17.18	2.541	0.57( 0.30)	0.53	44.6	2660.00

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	582.30	17.90	2.480	0.63( 0.33)	0.53	261.8	2245.00
2	624.66	30.10	1.815	0.65( 0.34)	0.53	433.5	2050.00
3	592.63	34.47	1.674	0.65( 0.35)	0.53	462.2	2215.00
4	581.65	35.53	1.643	0.66( 0.35)	0.53	465.2	2110.00

LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2530.00 = 11510.00 FEET.

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	767.58	16.72	2.583	0.61( 0.32)	0.52	334.4	2638.00
2	778.74	17.74	2.493	0.61( 0.32)	0.52	353.2	2660.00
3	779.78	17.90	2.480	0.61( 0.32)	0.52	355.7	2245.00
4	779.13	28.83	1.863	0.63( 0.33)	0.52	522.8	2600.00
5	778.78	30.10	1.815	0.63( 0.33)	0.52	540.6	2050.00
6	732.57	34.47	1.674	0.64( 0.33)	0.52	569.3	2215.00
7	718.55	35.53	1.643	0.64( 0.33)	0.52	572.3	2110.00

TOTAL AREA(ACRES) = 572.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 198.04 Tc(MIN.) = 17.18  
 EFFECTIVE AREA(ACRES) = 93.79 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 107.1  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2655.00 = 5900.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 779.78 Tc(MIN.) = 17.899  
 EFFECTIVE AREA(ACRES) = 355.73 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 572.3  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2530.00 = 11510.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2655.00 TO NODE 2530.00 IS CODE = 31  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2530.00 TO NODE 2530.00 IS CODE = 12  
 -----

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

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

-----  
 ELEVATION DATA: UPSTREAM(FEET) = 635.80 DOWNSTREAM(FEET) = 633.00  
 FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013

\*\*\*\*\*

FLOW PROCESS FROM NODE 2530.00 TO NODE 2540.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 633.00 DOWNSTREAM(FEET) = 630.60  
FLOW LENGTH(FEET) = 160.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 87.0 INCH PIPE IS 68.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.48  
ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 779.78  
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 18.02  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2540.00 = 11670.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 572.3 TC(MIN.) = 18.02  
EFFECTIVE AREA(ACRES) = 355.73 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.520  
PEAK FLOW RATE(CFS) = 779.78

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	767.58	16.84	2.572	0.61( 0.32)	0.52	334.4	2638.00
2	778.74	17.86	2.483	0.61( 0.32)	0.52	353.2	2660.00
3	779.78	18.02	2.470	0.61( 0.32)	0.52	355.7	2245.00
4	779.13	28.95	1.858	0.63( 0.33)	0.52	522.8	2600.00
5	778.78	30.22	1.811	0.63( 0.33)	0.52	540.6	2050.00
6	732.57	34.59	1.670	0.64( 0.33)	0.52	569.3	2215.00
7	718.55	35.65	1.640	0.64( 0.33)	0.52	572.3	2110.00

=====

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* ARCHIBALD WATERSHED \*  
\* 25-YR STUDY \*  
\* AREA 'K' \*  
\*\*\*\*\*

FILE NAME: ARCH.DAT  
TIME/DATE OF STUDY: 09:03 08/24/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT- / PARK- SIDE / SIDE / WAY	HEIGHT (FT)	CURB 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	52.0	38.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
3	65.0	39.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
4	40.0	32.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.35
30-MINUTES	0.71
1-HOUR	0.94
3-HOUR	1.64
6-HOUR	2.32
24-HOUR	4.49

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2050.00 TO NODE 2055.00 IS CODE = 21  
-----

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

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 740.00 DOWNSTREAM(FEET) = 727.50

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.686  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.103  
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.)
SCHOOL	A	9.30	0.98	0.600	32	15.69
SCHOOL	C	0.60	0.57	0.600	69	15.69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA RUNOFF(CFS) = 13.66  
TOTAL AREA(ACRES) = 9.90 PEAK FLOW RATE(CFS) = 13.66

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2055.00 TO NODE 2060.00 IS CODE = 31  
-----

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

===== ELEVATION DATA: UPSTREAM(FEET) = 727.50 DOWNSTREAM(FEET) = 718.00  
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.40  
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 13.66  
PIPE TRAVEL TIME(MIN.) = 1.25 Tc(MIN.) = 16.94  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2060.00 = 1630.00 FEET.

\*\*\*\*\*



FLOW PROCESS FROM NODE 2060.00 TO NODE 2060.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 16.94  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.009  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 SCHOOL A 6.00 0.98 0.600 32  
 SCHOOL C 4.40 0.57 0.600 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 14.30  
 EFFECTIVE AREA(ACRES) = 20.30 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.60  
 TOTAL AREA(ACRES) = 20.3 PEAK FLOW RATE(CFS) = 27.12

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2060.00 TO NODE 2065.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 718.00 DOWNSTREAM(FEET) = 717.50  
 FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.72  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 27.12  
 PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 17.34  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2065.00 = 1770.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2065.00 TO NODE 2065.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 17.34  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.980  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 4.30 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 4.30 SUBAREA RUNOFF(CFS) = 7.29  
 EFFECTIVE AREA(ACRES) = 24.60 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 24.6 PEAK FLOW RATE(CFS) = 33.88

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2065.00 TO NODE 2065.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 17.34  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.980  
 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" A 0.40 0.98 0.500 32  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 18.40 0.57 0.500 69  
 PUBLIC PARK C 0.80 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.514  
 SUBAREA AREA(ACRES) = 19.60 SUBAREA RUNOFF(CFS) = 29.72  
 EFFECTIVE AREA(ACRES) = 44.20 AREA-AVERAGED Fm(INCH/HR) = 0.38  
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 44.2 PEAK FLOW RATE(CFS) = 63.60

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2065.00 TO NODE 2070.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 717.50 DOWNSTREAM(FEET) = 695.00  
 FLOW LENGTH(FEET) = 1160.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.33  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 63.60  
 PIPE TRAVEL TIME(MIN.) = 1.45 Tc(MIN.) = 18.79  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2070.00 = 2930.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2070.00 TO NODE 2070.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 18.79  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.887  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 3.50 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 3.50 SUBAREA RUNOFF(CFS) = 5.77  
 EFFECTIVE AREA(ACRES) = 47.70 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 47.7 PEAK FLOW RATE(CFS) = 65.67

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2070.00 TO NODE 2070.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 18.79

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.887  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 20.00 0.57 0.500 69  
PUBLIC PARK C 1.30 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.521  
SUBAREA AREA(ACRES) = 21.30 SUBAREA RUNOFF(CFS) = 30.52  
EFFECTIVE AREA(ACRES) = 69.00 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 69.0 PEAK FLOW RATE(CFS) = 96.18

\* 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  
"5-7 DWELLINGS/ACRE" C 9.30 0.57 0.500 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 4.20 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407  
SUBAREA AREA(ACRES) = 13.50 SUBAREA RUNOFF(CFS) = 19.96  
EFFECTIVE AREA(ACRES) = 101.50 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.51  
TOTAL AREA(ACRES) = 101.5 PEAK FLOW RATE(CFS) = 141.60

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2070.00 TO NODE 2040.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 693.80  
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.56  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 96.18  
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 19.03  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2040.00 = 3080.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2040.00 TO NODE 2040.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 19.03  
\* 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  
COMMERCIAL C 7.40 0.57 0.100 69  
PUBLIC PARK C 2.70 0.57 0.850 69  
URBAN GOOD COVER  
"TURF" C 8.90 0.52 1.000 72  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.53  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.628  
SUBAREA AREA(ACRES) = 19.00 SUBAREA RUNOFF(CFS) = 26.33  
EFFECTIVE AREA(ACRES) = 88.00 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 88.0 PEAK FLOW RATE(CFS) = 121.64

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2040.00 TO NODE 2040.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 19.03

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2040.00 TO NODE 2100.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 693.80 DOWNSTREAM(FEET) = 684.80  
FLOW LENGTH(FEET) = 1130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 41.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.49  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 141.60  
PIPE TRAVEL TIME(MIN.) = 1.64 Tc(MIN.) = 20.67  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2100.00 = 4210.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2100.00 TO NODE 2100.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 20.67  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.782  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 2.90 0.57 0.100 69  
PUBLIC PARK C 2.40 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440  
SUBAREA AREA(ACRES) = 5.30 SUBAREA RUNOFF(CFS) = 7.32  
EFFECTIVE AREA(ACRES) = 106.80 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 106.8 PEAK FLOW RATE(CFS) = 141.60  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2100.00 TO NODE 2105.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 684.80 DOWNSTREAM(FEET) = 681.60  
FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.97  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 141.60  
PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 20.89  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2105.00 = 4410.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 20.89  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.771  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 11.10 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 14.86  
EFFECTIVE AREA(ACRES) = 117.90 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 117.9 PEAK FLOW RATE(CFS) = 154.41

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 20.89  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.771  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 1.80 0.57 0.100 69  
PUBLIC PARK C 1.20 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400  
SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 4.17  
EFFECTIVE AREA(ACRES) = 120.90 AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 120.9 PEAK FLOW RATE(CFS) = 158.58

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 IS CODE = 10  
-----

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

-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2110.00 TO NODE 2115.00 IS CODE = 21  
-----

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 717.00 DOWNSTREAM(FEET) = 714.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 19.703  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.834  
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  
"5-7 DWELLINGS/ACRE" A 7.70 0.98 0.500 32 19.70  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 9.33  
TOTAL AREA(ACRES) = 7.70 PEAK FLOW RATE(CFS) = 9.33

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2115.00 TO NODE 2117.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 714.00 DOWNSTREAM(FEET) = 691.40  
FLOW LENGTH(FEET) = 410.00 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.) = 12.49  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 9.33  
PIPE TRAVEL TIME(MIN.) = 0.55 Tc(MIN.) = 20.25  
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2117.00 = 1410.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2117.00 TO NODE 2117.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 20.25  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.805  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 2.40 0.98 0.100 32  
PUBLIC PARK A 1.70 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.411  
SUBAREA AREA(ACRES) = 4.10 SUBAREA RUNOFF(CFS) = 5.18  
EFFECTIVE AREA(ACRES) = 11.80 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.47  
TOTAL AREA(ACRES) = 11.8 PEAK FLOW RATE(CFS) = 14.31

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2117.00 TO NODE 2118.00 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) = 691.40 DOWNSTREAM(FEET) = 690.50
FLOW LENGTH(FEET) = 470.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.89
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.31
PIPE TRAVEL TIME(MIN.) = 2.02 Tc(MIN.) = 22.27
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2118.00 = 1880.00 FEET.

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*****
FLOW PROCESS FROM NODE 2118.00 TO NODE 2118.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.27
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.705
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 2.10 0.57 0.100 69
PUBLIC PARK C 1.50 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.413
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 4.77
EFFECTIVE AREA(ACRES) = 15.40 AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 15.4 PEAK FLOW RATE(CFS) = 18.01

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*****
FLOW PROCESS FROM NODE 2118.00 TO NODE 2120.00 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) = 690.50 DOWNSTREAM(FEET) = 689.40
FLOW LENGTH(FEET) = 370.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.85
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 18.01
PIPE TRAVEL TIME(MIN.) = 1.27 Tc(MIN.) = 23.54
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2120.00 = 2250.00 FEET.

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*****
FLOW PROCESS FROM NODE 2120.00 TO NODE 2120.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.54
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.649
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
"5-7 DWELLINGS/ACRE" A 18.50 0.98 0.500 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 13.30 0.57 0.500 69
PUBLIC PARK C 0.80 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.509
SUBAREA AREA(ACRES) = 32.60 SUBAREA RUNOFF(CFS) = 36.52
EFFECTIVE AREA(ACRES) = 48.00 AREA-AVERAGED Fm(INCH/HR) = 0.40
AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 48.0 PEAK FLOW RATE(CFS) = 53.76

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*****
FLOW PROCESS FROM NODE 2120.00 TO NODE 2125.00 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) = 689.40 DOWNSTREAM(FEET) = 684.10
FLOW LENGTH(FEET) = 1090.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.51
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 53.76
PIPE TRAVEL TIME(MIN.) = 2.42 Tc(MIN.) = 25.96
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2125.00 = 3340.00 FEET.

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*****
FLOW PROCESS FROM NODE 2125.00 TO NODE 2125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.96
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.555
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.60 0.98 0.100 32
COMMERCIAL C 1.60 0.57 0.100 69
PUBLIC PARK A 1.10 0.98 0.850 32
PUBLIC PARK C 1.00 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.397
SUBAREA AREA(ACRES) = 5.30 SUBAREA RUNOFF(CFS) = 5.94
EFFECTIVE AREA(ACRES) = 53.30 AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 53.3 PEAK FLOW RATE(CFS) = 55.64

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*****
FLOW PROCESS FROM NODE 2125.00 TO NODE 2125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.96
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.555

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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					
"5-7 DWELLINGS/ACRE"	A	1.30	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	20.10	0.57	0.500	69
PUBLIC PARK	C	0.70	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.59  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.511  
SUBAREA AREA(ACRES) = 22.10 SUBAREA RUNOFF(CFS) = 24.93  
EFFECTIVE AREA(ACRES) = 75.40 AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 75.4 PEAK FLOW RATE(CFS) = 80.57

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2125.00 TO NODE 2105.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 684.10 DOWNSTREAM(FEET) = 681.60  
FLOW LENGTH(FEET) = 230.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.22  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 80.57  
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 26.30  
LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2105.00 = 3570.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2105.00 TO NODE 2105.00 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	80.57	26.30	1.543	0.75( 0.37)	0.49	75.4	2110.00

LONGEST FLOWPATH FROM NODE 2110.00 TO NODE 2105.00 = 3570.00 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	158.58	20.89	1.771	0.63( 0.31)	0.50	120.9	2050.00

LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2105.00 = 4410.00 FEET.

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	235.03	20.89	1.771	0.67( 0.33)	0.50	180.8	2050.00
2	214.30	26.30	1.543	0.67( 0.33)	0.50	196.3	2110.00

TOTAL AREA(ACRES) = 196.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 235.03 Tc(MIN.) = 20.893  
EFFECTIVE AREA(ACRES) = 180.80 AREA-AVERAGED Fm(INCH/HR) = 0.33  
AREA-AVERAGED Fp(INCH/HR) = 0.67 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 196.3  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2105.00 = 4410.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2105.00 TO NODE 2130.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 681.60 DOWNSTREAM(FEET) = 674.50  
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 49.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.69  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 235.03  
PIPE TRAVEL TIME(MIN.) = 0.95 Tc(MIN.) = 21.84  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2130.00 = 5190.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2130.00 TO NODE 2130.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 21.84  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.724  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	3.30	0.57	0.100	69
PUBLIC PARK	C	1.40	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.323  
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 6.52  
EFFECTIVE AREA(ACRES) = 185.50 AREA-AVERAGED Fm(INCH/HR) = 0.33  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 201.0 PEAK FLOW RATE(CFS) = 235.03  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2130.00 TO NODE 2135.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 674.50 DOWNSTREAM(FEET) = 673.60  
FLOW LENGTH(FEET) = 90.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 46.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.32  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 235.03  
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 21.95  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2135.00 = 5280.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2135.00 TO NODE 2135.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 21.95  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 3.70 0.98 0.100 32  
COMMERCIAL C 7.10 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.71  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.80 SUBAREA RUNOFF(CFS) = 16.03  
EFFECTIVE AREA(ACRES) = 196.30 AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.47  
TOTAL AREA(ACRES) = 211.8 PEAK FLOW RATE(CFS) = 248.38

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2135.00 TO NODE 2135.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 21.95  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719  
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" A 9.60 0.98 0.200 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 11.20 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 20.80 SUBAREA RUNOFF(CFS) = 29.36  
EFFECTIVE AREA(ACRES) = 217.10 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.67 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 232.6 PEAK FLOW RATE(CFS) = 277.74

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2135.00 TO NODE 2140.00 IS CODE = 31  
-----

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

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 673.60 DOWNSTREAM(FEET) = 666.50  
FLOW LENGTH(FEET) = 850.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 51.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.95  
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 277.74  
PIPE TRAVEL TIME(MIN.) = 1.02 Tc(MIN.) = 22.96  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2140.00 = 6130.00 FEET.

FLOW PROCESS FROM NODE 2140.00 TO NODE 2140.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 22.96  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.673  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 1.30 0.57 0.100 69  
PUBLIC PARK C 0.90 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407  
SUBAREA AREA(ACRES) = 2.20 SUBAREA RUNOFF(CFS) = 2.86  
EFFECTIVE AREA(ACRES) = 219.30 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.67 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 234.8 PEAK FLOW RATE(CFS) = 277.74  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2140.00 TO NODE 2200.00 IS CODE = 31  
-----

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

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 666.50 DOWNSTREAM(FEET) = 665.70  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 52.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.67  
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 277.74  
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 23.09  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2200.00 = 6230.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2200.00 TO NODE 2200.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 23.09  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.668  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK C 9.50 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 9.50 SUBAREA RUNOFF(CFS) = 10.15  
EFFECTIVE AREA(ACRES) = 228.80 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 244.3 PEAK FLOW RATE(CFS) = 280.70

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2200.00 TO NODE 2205.00 IS CODE = 31  
-----

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



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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 665.70 DOWNSTREAM(FEET) = 658.20
FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 49.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.33
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 280.70
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 23.85
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2205.00 = 6930.00 FEET.

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*****
FLOW PROCESS FROM NODE 2205.00 TO NODE 2205.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.85
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.636
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         3.90   0.57 0.100 69
PUBLIC PARK         C         2.90   0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.420
SUBAREA AREA(ACRES) = 6.80 SUBAREA RUNOFF(CFS) = 8.56
EFFECTIVE AREA(ACRES) = 235.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 251.1 PEAK FLOW RATE(CFS) = 282.64

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*****
FLOW PROCESS FROM NODE 2205.00 TO NODE 2210.00 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) = 658.20 DOWNSTREAM(FEET) = 656.00
FLOW LENGTH(FEET) = 160.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.82
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 282.64
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 24.01
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2210.00 = 7090.00 FEET.

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*****
FLOW PROCESS FROM NODE 2210.00 TO NODE 2210.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.01
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.629
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         0.83   0.57 0.100 69

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PUBLIC PARK          C         0.47   0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.371
SUBAREA AREA(ACRES) = 1.30 SUBAREA RUNOFF(CFS) = 1.66
EFFECTIVE AREA(ACRES) = 236.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 252.4 PEAK FLOW RATE(CFS) = 282.92

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*****
FLOW PROCESS FROM NODE 2210.00 TO NODE 2210.00 IS CODE = 10
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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
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*****
FLOW PROCESS FROM NODE 2215.00 TO NODE 2220.00 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) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 715.50 DOWNSTREAM(FEET) = 706.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.571
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.035
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.)
SCHOOL              A         7.20   0.98 0.600 32 16.57
SCHOOL              C         2.60   0.57 0.600 69 16.57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.87
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA RUNOFF(CFS) = 13.36
TOTAL AREA(ACRES) = 9.80 PEAK FLOW RATE(CFS) = 13.36

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*****
FLOW PROCESS FROM NODE 2220.00 TO NODE 2230.00 IS CODE = 62
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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 706.00 DOWNSTREAM ELEVATION(FEET) = 698.00
STREET LENGTH(FEET) = 810.00 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) = 27.69

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STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.54  
 HALFSTREET FLOOD WIDTH(FEET) = 21.21  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.29  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.78  
 STREET FLOW TRAVEL TIME(MIN.) = 4.11 Tc(MIN.) = 20.68  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.782  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
SCHOOL	A	6.90	0.98	0.600	32
SCHOOL	C	16.30	0.57	0.600	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 SUBAREA AREA(ACRES) = 23.20 SUBAREA RUNOFF(CFS) = 28.59  
 EFFECTIVE AREA(ACRES) = 33.00 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.60  
 TOTAL AREA(ACRES) = 33.0 PEAK FLOW RATE(CFS) = 39.72

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 24.41  
 FLOW VELOCITY(FEET/SEC.) = 3.60 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.16  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2230.00 = 1810.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2230.00 TO NODE 2235.00 IS CODE = 62  
 -----

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

=====

UPSTREAM ELEVATION(FEET) = 698.00 DOWNSTREAM ELEVATION(FEET) = 689.00  
 STREET LENGTH(FEET) = 980.00 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) = 48.01  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.64  
 HALFSTREET FLOOD WIDTH(FEET) = 26.68  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.66  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.34  
 STREET FLOW TRAVEL TIME(MIN.) = 4.46 Tc(MIN.) = 25.14  
 \* 25 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
SCHOOL	A	3.22	0.98	0.600	32
SCHOOL	C	6.72	0.57	0.600	69

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	C	5.29	0.57	0.850	69
PUBLIC PARK	A	1.27	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.67  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.699  
 SUBAREA AREA(ACRES) = 16.50 SUBAREA RUNOFF(CFS) = 16.55  
 EFFECTIVE AREA(ACRES) = 49.50 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.63  
 TOTAL AREA(ACRES) = 49.5 PEAK FLOW RATE(CFS) = 50.43

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.65 HALFSTREET FLOOD WIDTH(FEET) = 27.23  
 FLOW VELOCITY(FEET/SEC.) = 3.70 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.40  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2235.00 = 2790.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2235.00 TO NODE 2235.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 25.14  
 \* 25 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 "11+ DWELLINGS/ACRE"	C	3.85	0.57	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	2.21	0.98	0.200	32
PUBLIC PARK	C	2.91	0.57	0.850	69
PUBLIC PARK	A	7.63	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.613  
 SUBAREA AREA(ACRES) = 16.60 SUBAREA RUNOFF(CFS) = 15.95  
 EFFECTIVE AREA(ACRES) = 66.10 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.63  
 TOTAL AREA(ACRES) = 66.1 PEAK FLOW RATE(CFS) = 66.38

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2235.00 TO NODE 2240.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 689.00 DOWNSTREAM(FEET) = 662.00  
 FLOW LENGTH(FEET) = 870.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.91  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 66.38  
 PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 26.05  
 LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2240.00 = 3660.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 IS CODE = 81  
 -----

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

```

=====
MAINLINE Tc(MIN.) = 26.05
* 25 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
PUBLIC PARK         A         8.60     0.98    0.850   32
PUBLIC PARK         C        20.80     0.57    0.850   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 29.40     SUBAREA RUNOFF(CFS) = 25.63
EFFECTIVE AREA(ACRES) = 95.50     AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.72     AREA-AVERAGED Ap = 0.70
TOTAL AREA(ACRES) = 95.5     PEAK FLOW RATE(CFS) = 90.02

*****
FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 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.) = 26.05
RAINFALL INTENSITY(INCH/HR) = 1.55
AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.72
AREA-AVERAGED Ap = 0.70
EFFECTIVE STREAM AREA(ACRES) = 95.50
TOTAL STREAM AREA(ACRES) = 95.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 90.02

*****
FLOW PROCESS FROM NODE 2245.00 TO NODE 2250.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 400.00
ELEVATION DATA: UPSTREAM(FEET) = 690.00 DOWNSTREAM(FEET) = 677.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.627
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.527
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         A         0.60     0.98    0.100   32    6.63
PUBLIC PARK         A         0.60     0.98    0.850   32   10.53
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475
SUBAREA RUNOFF(CFS) = 3.31
TOTAL AREA(ACRES) = 1.20     PEAK FLOW RATE(CFS) = 3.31

*****
FLOW PROCESS FROM NODE 2250.00 TO NODE 2240.00 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) = 677.00 DOWNSTREAM(FEET) = 662.00
FLOW LENGTH(FEET) = 810.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.34
ESTIMATED PIPE DIAMETER(INCH) = 18.00     NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.31
PIPE TRAVEL TIME(MIN.) = 2.13     Tc(MIN.) = 8.76
LONGEST FLOWPATH FROM NODE 2245.00 TO NODE 2240.00 = 1210.00 FEET.

*****
FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 8.76
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.984
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL         C         2.50     0.57    0.100   69
PUBLIC PARK         C         2.50     0.57    0.850   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475
SUBAREA AREA(ACRES) = 5.00     SUBAREA RUNOFF(CFS) = 12.22
EFFECTIVE AREA(ACRES) = 6.20     AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.65     AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 6.2     PEAK FLOW RATE(CFS) = 14.94

*****
FLOW PROCESS FROM NODE 2240.00 TO NODE 2240.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 8.76
RAINFALL INTENSITY(INCH/HR) = 2.98
AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.65
AREA-AVERAGED Ap = 0.47
EFFECTIVE STREAM AREA(ACRES) = 6.20
TOTAL STREAM AREA(ACRES) = 6.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.94

** CONFLUENCE DATA **
STREAM   Q      Tc   Intensity   Fp(Fm)   Ap   Ae   HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1       90.02 26.05 1.552 0.72(0.50) 0.70 95.5 2215.00
2       14.94 8.76  2.984 0.65(0.31) 0.47 6.2  2245.00

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	86.60	8.76	2.984	0.71 ( 0.47)	0.66	38.3	2245.00
2	96.96	26.05	1.552	0.72 ( 0.49)	0.68	101.7	2215.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 96.96 Tc(MIN.) = 26.05  
EFFECTIVE AREA(ACRES) = 101.70 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.68  
TOTAL AREA(ACRES) = 101.7  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2240.00 = 3660.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2240.00 TO NODE 2265.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 662.00 DOWNSTREAM(FEET) = 658.30  
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.54  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 96.96  
PIPE TRAVEL TIME(MIN.) = 1.62 Tc(MIN.) = 27.67  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2265.00 = 4490.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2265.00 TO NODE 2265.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 27.67  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.496  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.40 0.57 0.100 69  
PUBLIC PARK C 0.40 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 0.88  
EFFECTIVE AREA(ACRES) = 102.50 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.68  
TOTAL AREA(ACRES) = 102.5 PEAK FLOW RATE(CFS) = 96.96  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2265.00 TO NODE 2270.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 658.30 DOWNSTREAM(FEET) = 657.60  
FLOW LENGTH(FEET) = 110.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.78  
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 96.96  
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 27.85  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2270.00 = 4600.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2270.00 TO NODE 2270.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 27.85  
\* 25 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  
PUBLIC PARK C 24.70 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 24.70 SUBAREA RUNOFF(CFS) = 22.44  
EFFECTIVE AREA(ACRES) = 127.20 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.71  
TOTAL AREA(ACRES) = 127.2 PEAK FLOW RATE(CFS) = 114.67

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	125.38	10.63	2.656	0.65 ( 0.47)	0.73	63.8	2245.00
2	114.67	27.85	1.490	0.68 ( 0.49)	0.71	127.2	2215.00

NEW PEAK FLOW DATA ARE:  
PEAK FLOW RATE(CFS) = 125.38 Tc(MIN.) = 10.63  
AREA-AVERAGED Fm(INCH/HR) = 0.47 AREA-AVERAGED Fp(INCH/HR) = 0.65  
AREA-AVERAGED Ap = 0.73 EFFECTIVE AREA(ACRES) = 63.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2270.00 TO NODE 2275.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 657.60 DOWNSTREAM(FEET) = 657.20  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 45.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.91  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 125.38  
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 10.90  
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2275.00 = 4730.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2275.00 TO NODE 2275.00 IS CODE = 81  
-----

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

```

=====
MAINLINE Tc(MIN.) = 10.90
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.616
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C        1.10     0.57     0.100    69
PUBLIC PARK         C        0.90     0.57     0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.438
SUBAREA AREA(ACRES) = 2.00      SUBAREA RUNOFF(CFS) = 4.26
EFFECTIVE AREA(ACRES) = 65.80   AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 129.2      PEAK FLOW RATE(CFS) = 127.33

*****
FLOW PROCESS FROM NODE 2275.00 TO NODE 2210.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 657.20 DOWNSTREAM(FEET) = 656.00
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.16
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 127.33
PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 11.39
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2210.00 = 5000.00 FEET.

*****
FLOW PROCESS FROM NODE 2210.00 TO NODE 2210.00 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      127.33  11.39  2.548  0.65( 0.47) 0.72  65.8  2245.00
2      115.87  28.64  1.466  0.68( 0.48) 0.71  129.2 2215.00
LONGEST FLOWPATH FROM NODE 2215.00 TO NODE 2210.00 = 5000.00 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      282.92  24.01  1.629  0.66( 0.30) 0.46  236.9 2050.00
2      257.62  29.48  1.441  0.66( 0.31) 0.46  252.4 2110.00
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2210.00 = 7090.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM   Q      Tc  Intensity  Fp(Fm)  Ap  Ae  HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR)  (ACRES)  NODE
1      354.59  11.39  2.548  0.65( 0.36) 0.56  178.3 2245.00
2      401.87  24.01  1.629  0.66( 0.36) 0.54  349.1 2050.00
3      377.35  28.64  1.466  0.67( 0.37) 0.55  379.2 2215.00

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4      370.52  29.48  1.441  0.67( 0.37) 0.55  381.6 2110.00
TOTAL AREA(ACRES) = 381.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 401.87 Tc(MIN.) = 24.005
EFFECTIVE AREA(ACRES) = 349.06 AREA-AVERAGED Fm(INCH/HR) = 0.36
AREA-AVERAGED Fp(INCH/HR) = 0.67 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 381.6
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2210.00 = 7090.00 FEET.

*****
FLOW PROCESS FROM NODE 2210.00 TO NODE 2400.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 656.00 DOWNSTREAM(FEET) = 646.80
FLOW LENGTH(FEET) = 1190.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.95
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 401.87
PIPE TRAVEL TIME(MIN.) = 1.33 Tc(MIN.) = 25.33
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2400.00 = 8280.00 FEET.

*****
FLOW PROCESS FROM NODE 2400.00 TO NODE 2400.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.33
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.578
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C        4.40     0.57     0.100    69
PUBLIC PARK         C        2.60     0.57     0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.379
SUBAREA AREA(ACRES) = 7.00      SUBAREA RUNOFF(CFS) = 8.59
EFFECTIVE AREA(ACRES) = 356.06   AREA-AVERAGED Fm(INCH/HR) = 0.36
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 388.6      PEAK FLOW RATE(CFS) = 401.87
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 2400.00 TO NODE 2405.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 646.80 DOWNSTREAM(FEET) = 646.00
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.18
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1

```

PIPE-FLOW(CFS) = 401.87  
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 25.44  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2405.00 = 8380.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2405.00 IS CODE = 12

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2405.00 IS CODE = 12

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2405.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 25.44

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.574  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 34.10 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 34.10 SUBAREA RUNOFF(CFS) = 39.61  
EFFECTIVE AREA(ACRES) = 390.16 AREA-AVERAGED Fm(INCH/HR) = 0.35  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.54  
TOTAL AREA(ACRES) = 422.7 PEAK FLOW RATE(CFS) = 429.58

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2405.00 TO NODE 2500.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 646.00 DOWNSTREAM(FEET) = 634.90  
FLOW LENGTH(FEET) = 1180.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 75.0 INCH PIPE IS 60.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.14  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 429.58  
PIPE TRAVEL TIME(MIN.) = 1.22 Tc(MIN.) = 26.66  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2500.00 = 9560.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2500.00 TO NODE 2500.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.66

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.530  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 3.90 0.57 0.100 69  
PUBLIC PARK C 2.80 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.413  
SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 7.82  
EFFECTIVE AREA(ACRES) = 396.86 AREA-AVERAGED Fm(INCH/HR) = 0.35  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 429.4 PEAK FLOW RATE(CFS) = 429.58  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2500.00 TO NODE 2505.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 634.90 DOWNSTREAM(FEET) = 634.80  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 114.0 INCH PIPE IS 92.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.96  
ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 429.58  
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 26.90  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2505.00 = 9660.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2505.00 TO NODE 2505.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.90

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.522  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 24.60 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 24.60 SUBAREA RUNOFF(CFS) = 27.43  
EFFECTIVE AREA(ACRES) = 421.46 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 454.0 PEAK FLOW RATE(CFS) = 446.61

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2505.00 TO NODE 2505.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.90

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.522  
SUBAREA LOSS RATE DATA(AMC II):



DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 1.00 0.57 0.100 69  
PUBLIC PARK C 1.00 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
SUBAREA AREA(ACRES) = 2.00 SUBAREA RUNOFF(CFS) = 2.26  
EFFECTIVE AREA(ACRES) = 423.46 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 456.0 PEAK FLOW RATE(CFS) = 448.86

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2505.00 TO NODE 2520.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 634.80 DOWNSTREAM(FEET) = 633.30  
FLOW LENGTH(FEET) = 1500.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 120.0 INCH PIPE IS 89.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.15  
ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 448.86  
PIPE TRAVEL TIME(MIN.) = 3.50 Tc(MIN.) = 30.39  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2520.00 = 11160.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2520.00 TO NODE 2520.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 30.39  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.414  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 6.10 0.57 0.100 69  
PUBLIC PARK C 3.10 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.353  
SUBAREA AREA(ACRES) = 9.20 SUBAREA RUNOFF(CFS) = 10.06  
EFFECTIVE AREA(ACRES) = 432.66 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 465.2 PEAK FLOW RATE(CFS) = 448.86  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2520.00 TO NODE 2530.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 633.30 DOWNSTREAM(FEET) = 633.00  
FLOW LENGTH(FEET) = 350.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 120.0 INCH PIPE IS 96.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.66

ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 448.86  
PIPE TRAVEL TIME(MIN.) = 0.88 Tc(MIN.) = 31.27  
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2530.00 = 11510.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2530.00 TO NODE 2530.00 IS CODE = 10  
-----

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2600.00 TO NODE 2605.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 920.00  
ELEVATION DATA: UPSTREAM(FEET) = 689.50 DOWNSTREAM(FEET) = 679.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.588  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.197

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  
"5-7 DWELLINGS/ACRE" C 3.20 0.57 0.500 69 14.59  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 5.51  
TOTAL AREA(ACRES) = 3.20 PEAK FLOW RATE(CFS) = 5.51

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2605.00 TO NODE 2610.00 IS CODE = 62  
-----

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

UPSTREAM ELEVATION(FEET) = 679.00 DOWNSTREAM ELEVATION(FEET) = 677.00  
STREET LENGTH(FEET) = 310.00 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) = 7.67  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.41  
HALFSTREET FLOOD WIDTH(FEET) = 13.63

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.07  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.84  
 STREET FLOW TRAVEL TIME(MIN.) = 2.50 Tc(MIN.) = 17.08  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.998  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 2.80 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 2.80 SUBAREA RUNOFF(CFS) = 4.32  
 EFFECTIVE AREA(ACRES) = 6.00 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 6.0 PEAK FLOW RATE(CFS) = 9.26

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 14.80  
 FLOW VELOCITY(FEET/SEC.) = 2.15 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.92  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2610.00 = 1230.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2610.00 TO NODE 2615.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 =====  
 UPSTREAM ELEVATION(FEET) = 677.00 DOWNSTREAM ELEVATION(FEET) = 673.00  
 STREET LENGTH(FEET) = 570.00 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) = 13.88  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.47  
 HALFSTREET FLOOD WIDTH(FEET) = 17.23  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.44  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.15  
 STREET FLOW TRAVEL TIME(MIN.) = 3.89 Tc(MIN.) = 20.98  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.767

SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 6.90 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.90 SUBAREA RUNOFF(CFS) = 9.21

EFFECTIVE AREA(ACRES) = 12.90 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 12.9 PEAK FLOW RATE(CFS) = 17.23

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 18.79  
 FLOW VELOCITY(FEET/SEC.) = 2.57 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.28  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2615.00 = 1800.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2615.00 TO NODE 2620.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 658.00  
 FLOW LENGTH(FEET) = 490.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.25  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 17.23  
 PIPE TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 21.70  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2620.00 = 2290.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2620.00 TO NODE 2620.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 21.70  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.731  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 3.90 0.57 0.500 69  
 COMMERCIAL C 3.40 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.314  
 SUBAREA AREA(ACRES) = 7.30 SUBAREA RUNOFF(CFS) = 10.21  
 EFFECTIVE AREA(ACRES) = 20.20 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 20.2 PEAK FLOW RATE(CFS) = 27.02

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2620.00 TO NODE 2625.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 658.00 DOWNSTREAM(FEET) = 654.00  
 FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.80  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 27.02

PIPE TRAVEL TIME(MIN.) = 1.72 Tc(MIN.) = 23.42  
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2625.00 = 2990.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2625.00 TO NODE 2625.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 23.42  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.654  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	7.20	0.57	0.500	69
COMMERCIAL	C	1.00	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.451  
SUBAREA AREA(ACRES) = 8.20 SUBAREA RUNOFF(CFS) = 10.32  
EFFECTIVE AREA(ACRES) = 28.40 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 28.4 PEAK FLOW RATE(CFS) = 35.93

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2625.00 TO NODE 2630.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 654.00 DOWNSTREAM(FEET) = 649.20  
FLOW LENGTH(FEET) = 650.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.12  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 35.93  
PIPE TRAVEL TIME(MIN.) = 1.33 Tc(MIN.) = 24.75  
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2630.00 = 3640.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2630.00 TO NODE 2630.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 24.75  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.600  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	5.80	0.57	0.500	69
COMMERCIAL	C	1.00	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 1.00 SUBAREA RUNOFF(CFS) = 1.39  
EFFECTIVE AREA(ACRES) = 29.40 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.43  
TOTAL AREA(ACRES) = 29.4 PEAK FLOW RATE(CFS) = 35.94

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2630.00 TO NODE 2635.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 649.20 DOWNSTREAM(FEET) = 648.00  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.67  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 35.94  
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 25.00  
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2635.00 = 3770.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 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.) = 25.00  
RAINFALL INTENSITY(INCH/HR) = 1.59  
AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.57  
AREA-AVERAGED Ap = 0.43  
EFFECTIVE STREAM AREA(ACRES) = 29.40  
TOTAL STREAM AREA(ACRES) = 29.40  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.94

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2638.00 TO NODE 2640.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 600.00  
ELEVATION DATA: UPSTREAM(FEET) = 676.10 DOWNSTREAM(FEET) = 665.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.163  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.580  
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						
"5-7 DWELLINGS/ACRE"	C	5.80	0.57	0.500	69	11.16

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 11.99  
TOTAL AREA(ACRES) = 5.80 PEAK FLOW RATE(CFS) = 11.99

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2640.00 TO NODE 2635.00 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) = 665.00 DOWNSTREAM(FEET) = 648.00
FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.81
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.99
PIPE TRAVEL TIME(MIN.) = 1.16 Tc(MIN.) = 12.32
LONGEST FLOWPATH FROM NODE 2638.00 TO NODE 2635.00 = 1280.00 FEET.

*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.32
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.432
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK C 2.30 0.57 0.850 69
COMMERCIAL C 2.40 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 9.17
EFFECTIVE AREA(ACRES) = 10.50 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 20.38

*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.32
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.432
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.80 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 1.71
EFFECTIVE AREA(ACRES) = 11.30 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 11.3 PEAK FLOW RATE(CFS) = 22.09

*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2635.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2

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CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 12.32
RAINFALL INTENSITY(INCH/HR) = 2.43
AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.57
AREA-AVERAGED Ap = 0.46
EFFECTIVE STREAM AREA(ACRES) = 11.30
TOTAL STREAM AREA(ACRES) = 11.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 22.09

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 35.94 25.00 1.590 0.57( 0.24) 0.43 29.4 2600.00
2 22.09 12.32 2.432 0.57( 0.26) 0.46 11.3 2638.00

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 50.85 12.32 2.432 0.57( 0.25) 0.44 25.8 2638.00
2 49.48 25.00 1.590 0.57( 0.25) 0.44 40.7 2600.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 50.85 Tc(MIN.) = 12.32
EFFECTIVE AREA(ACRES) = 25.78 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 40.7
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2635.00 = 3770.00 FEET.

*****
FLOW PROCESS FROM NODE 2635.00 TO NODE 2645.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 648.00 DOWNSTREAM(FEET) = 646.40
FLOW LENGTH(FEET) = 380.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.18
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 50.85
PIPE TRAVEL TIME(MIN.) = 0.88 Tc(MIN.) = 13.20
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2645.00 = 4150.00 FEET.

*****
FLOW PROCESS FROM NODE 2645.00 TO NODE 2645.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.333
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

```

LAND USE                    GROUP    (ACRES)   (INCH/HR)   (DECIMAL)   CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE"        C           8.80       0.57       0.500      69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) =       8.80        SUBAREA RUNOFF(CFS) =    16.23  
EFFECTIVE AREA(ACRES) =     34.58      AREA-AVERAGED Fm(INCH/HR) = 0.26  
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) =        49.5        PEAK FLOW RATE(CFS) =    64.59

\*\*\*\*\*  
FLOW PROCESS FROM NODE    2645.00 TO NODE    2650.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 646.40    DOWNSTREAM(FEET) = 641.00  
FLOW LENGTH(FEET) = 870.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.79  
ESTIMATED PIPE DIAMETER(INCH) = 42.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 64.59  
PIPE TRAVEL TIME(MIN.) = 1.65    Tc(MIN.) = 14.85  
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2650.00 = 5020.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE    2650.00 TO NODE    2650.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 14.85  
\* 25 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  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE"        C           13.00       0.57       0.500      69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) =       13.00        SUBAREA RUNOFF(CFS) =    22.12  
EFFECTIVE AREA(ACRES) =     47.58      AREA-AVERAGED Fm(INCH/HR) = 0.26  
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.47  
TOTAL AREA(ACRES) =        62.5        PEAK FLOW RATE(CFS) =    81.75

\*\*\*\*\*  
FLOW PROCESS FROM NODE    2650.00 TO NODE    2655.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 641.00    DOWNSTREAM(FEET) = 635.80  
FLOW LENGTH(FEET) = 880.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.07  
ESTIMATED PIPE DIAMETER(INCH) = 45.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 81.75

PIPE TRAVEL TIME(MIN.) = 1.62    Tc(MIN.) = 16.47  
LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2655.00 = 5900.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE    2655.00 TO NODE    2655.00 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.) = 16.47  
RAINFALL INTENSITY(INCH/HR) = 2.04  
AREA-AVERAGED Fm(INCH/HR) = 0.26  
AREA-AVERAGED Fp(INCH/HR) = 0.57  
AREA-AVERAGED Ap = 0.47  
EFFECTIVE STREAM AREA(ACRES) = 47.58  
TOTAL STREAM AREA(ACRES) = 62.50  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 81.75

\*\*\*\*\*  
FLOW PROCESS FROM NODE    2660.00 TO NODE    2665.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 530.00  
ELEVATION DATA: UPSTREAM(FEET) = 664.00    DOWNSTREAM(FEET) = 651.60

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.584  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.401  
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                    C           3.40       0.57       0.850      69    12.58  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA RUNOFF(CFS) = 5.87  
TOTAL AREA(ACRES) = 3.40    PEAK FLOW RATE(CFS) = 5.87

\*\*\*\*\*  
FLOW PROCESS FROM NODE    2665.00 TO NODE    2670.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 651.60    DOWNSTREAM(FEET) = 650.70  
FLOW LENGTH(FEET) = 200.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.26  
ESTIMATED PIPE DIAMETER(INCH) = 18.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 5.87  
PIPE TRAVEL TIME(MIN.) = 0.78    Tc(MIN.) = 13.37  
LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2670.00 = 730.00 FEET.

\*\*\*\*\*

```

FLOW PROCESS FROM NODE 2670.00 TO NODE 2670.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.37
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.315
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE           GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C        3.60    0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 3.60    SUBAREA RUNOFF(CFS) = 6.58
EFFECTIVE AREA(ACRES) = 7.00    AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) = 7.0    PEAK FLOW RATE(CFS) = 12.20

*****
FLOW PROCESS FROM NODE 2670.00 TO NODE 2675.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 650.70    DOWNSTREAM(FEET) = 649.30
FLOW LENGTH(FEET) = 260.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.54
ESTIMATED PIPE DIAMETER(INCH) = 24.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.20
PIPE TRAVEL TIME(MIN.) = 0.78    Tc(MIN.) = 14.15
LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2675.00 = 990.00 FEET.

*****
FLOW PROCESS FROM NODE 2675.00 TO NODE 2675.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.15
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.238
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE           GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C        7.10    0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 7.10    SUBAREA RUNOFF(CFS) = 12.49
EFFECTIVE AREA(ACRES) = 14.10    AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 14.1    PEAK FLOW RATE(CFS) = 24.20

*****
FLOW PROCESS FROM NODE 2675.00 TO NODE 2680.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

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```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 649.30    DOWNSTREAM(FEET) = 643.90
FLOW LENGTH(FEET) = 810.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.12
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.20
PIPE TRAVEL TIME(MIN.) = 1.89    Tc(MIN.) = 16.04
LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2680.00 = 1800.00 FEET.

*****
FLOW PROCESS FROM NODE 2680.00 TO NODE 2680.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.04
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.075
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE           GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C        11.80   0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.80    SUBAREA RUNOFF(CFS) = 19.03
EFFECTIVE AREA(ACRES) = 25.90    AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.57    AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 25.9    PEAK FLOW RATE(CFS) = 41.17

*****
FLOW PROCESS FROM NODE 2680.00 TO NODE 2655.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 643.90    DOWNSTREAM(FEET) = 635.80
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.) = 9.33
ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.17
PIPE TRAVEL TIME(MIN.) = 1.48    Tc(MIN.) = 17.53
LONGEST FLOWPATH FROM NODE 2660.00 TO NODE 2655.00 = 2630.00 FEET.

*****
FLOW PROCESS FROM NODE 2655.00 TO NODE 2655.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.53
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.968
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE           GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL

```



"5-7 DWELLINGS/ACRE" C 18.70 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 18.70 SUBAREA RUNOFF(CFS) = 28.36  
 EFFECTIVE AREA(ACRES) = 44.60 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 44.6 PEAK FLOW RATE(CFS) = 67.03

FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.16  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 147.78  
 PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 18.12  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2530.00 = 6300.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2655.00 TO NODE 2655.00 IS CODE = 1

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2530.00 TO NODE 2530.00 IS CODE = 11

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

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

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 17.53  
 RAINFALL INTENSITY(INCH/HR) = 1.97  
 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.57  
 AREA-AVERAGED Ap = 0.53  
 EFFECTIVE STREAM AREA(ACRES) = 44.60  
 TOTAL STREAM AREA(ACRES) = 44.60  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 67.03

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	147.56	17.06	2.000	0.57( 0.28)	0.50	89.5	2638.00
2	147.78	18.12	1.929	0.57( 0.28)	0.50	93.4	2660.00
3	115.72	29.94	1.427	0.57( 0.28)	0.49	107.1	2600.00

LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2530.00 = 6300.00 FEET.

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	81.75	16.47	2.043	0.57( 0.26)	0.47	47.6	2638.00
1	69.67	29.31	1.445	0.57( 0.26)	0.46	62.5	2600.00
2	67.03	17.53	1.968	0.57( 0.30)	0.53	44.6	2660.00

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	428.32	18.81	1.886	0.63( 0.33)	0.53	261.9	2245.00
2	448.86	31.27	1.390	0.65( 0.34)	0.53	432.7	2050.00
3	420.96	36.05	1.277	0.65( 0.35)	0.53	462.8	2215.00
4	414.25	36.89	1.259	0.66( 0.35)	0.53	465.2	2110.00

LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2530.00 = 11510.00 FEET.

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	564.50	17.06	2.000	0.61( 0.32)	0.52	327.0	2638.00
2	571.76	18.12	1.929	0.61( 0.32)	0.52	345.7	2660.00
3	574.24	18.81	1.886	0.61( 0.32)	0.52	356.1	2245.00
4	562.39	29.94	1.427	0.63( 0.33)	0.52	521.5	2600.00
5	560.90	31.27	1.390	0.63( 0.33)	0.52	539.8	2050.00
6	521.57	36.05	1.277	0.64( 0.33)	0.52	569.9	2215.00
7	513.09	36.89	1.259	0.64( 0.33)	0.52	572.3	2110.00

TOTAL AREA(ACRES) = 572.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 147.78 Tc(MIN.) = 17.53  
 EFFECTIVE AREA(ACRES) = 93.41 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 107.1  
 LONGEST FLOWPATH FROM NODE 2600.00 TO NODE 2655.00 = 5900.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 574.24 Tc(MIN.) = 18.810  
 EFFECTIVE AREA(ACRES) = 356.07 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 572.3  
 LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2530.00 = 11510.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2655.00 TO NODE 2530.00 IS CODE = 31

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2530.00 TO NODE 2530.00 IS CODE = 12

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 635.80 DOWNSTREAM(FEET) = 633.00

\*\*\*\*\*

FLOW PROCESS FROM NODE 2530.00 TO NODE 2540.00 IS CODE = 31

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

=====
ELEVATION DATA: UPSTREAM(FEET) = 633.00 DOWNSTREAM(FEET) = 630.60
FLOW LENGTH(FEET) = 160.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 60.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.88
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 574.24
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 18.94
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2540.00 = 11670.00 FEET.
=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 572.3 TC(MIN.) = 18.94
EFFECTIVE AREA(ACRES) = 356.07 AREA-AVERAGED Fm(INCH/HR)= 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.519
PEAK FLOW RATE(CFS) = 574.24

\*\* 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. It lists 7 data rows corresponding to different stream numbers.

=====
END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* COUNTY LINE CHANNEL \*  
\* LAKE AREAS TO HAVEN & MILL CREEK \*  
\* 100-YR STUDY \*  
\*\*\*\*\*

FILE NAME: CHANNEL.DAT  
TIME/DATE OF STUDY: 09:12 11/11/2011

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

NO.	WIDTH (FT)	CROWN CROSSFALL (FT)	STREET-CROSSFALL SIDE / SIDE/ WAY	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

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

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH  
FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.44
30-MINUTES	0.91
1-HOUR	1.20
3-HOUR	2.10
6-HOUR	3.00
24-HOUR	6.00

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

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FLOW PROCESS FROM NODE 6000.00 TO NODE 6130.00 IS CODE = 15.1

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>>>>DEFINE MEMORY BANK # 1 <<<<<
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PEAK FLOWRATE TABLE FILE NAME: MILLIKEN.DNA
MEMORY BANK # 1 DEFINED AS FOLLOWS:
  STREAM      Q      Tc      Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER      (CFS) (MIN.) (INCH/HR)      (ACRES)      NODE
    1      172.14  27.82  0.65( 0.20) 0.31      110.5      6080.00
    2      171.75  29.40  0.65( 0.20) 0.31      114.4      6110.00
    3      161.71  36.89  0.66( 0.19) 0.30      126.0      6000.00
  TOTAL AREA(ACRES) =      126.0
  LONGEST FLOWPATH FROM NODE      6000.00 TO NODE      6130.00 =      12690.00 FEET.

*****
FLOW PROCESS FROM NODE      6130.00 TO NODE      6130.00 IS CODE = 14.0
-----
>>>>MEMORY BANK # 1 COPIED ONTO MAIN-STREAM MEMORY<<<<<
=====
MAIN-STREAM MEMORY DEFINED AS FOLLOWS:
  STREAM      Q      Tc      Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER      (CFS) (MIN.) (INCH/HR)      (ACRES)      NODE
    1      172.14  27.82  0.65( 0.20) 0.31      110.5      6080.00
    2      171.75  29.40  0.65( 0.20) 0.31      114.4      6110.00
    3      161.71  36.89  0.66( 0.19) 0.30      126.0      6000.00
  TOTAL AREA(ACRES) =      126.0
  LONGEST FLOWPATH FROM NODE      6000.00 TO NODE      6130.00 =      12690.00 FEET.

*****
FLOW PROCESS FROM NODE      6130.00 TO NODE      6130.00 IS CODE = 16
-----
>>>>USER SPECIFIED CONSTANT SOURCE FLOW AT NODE<<<<<
=====
USER-SPECIFIED CONSTANT SOURCE FLOW =      524.00(CFS)
USER-SPECIFIED AREA ASSOCIATED TO SOURCE FLOW =      716.18(ACRES)
* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =      524.00 AREA(AC.) =      716.18
* SUMMED DATA: FLOW(CFS) =      696.14 TOTAL AREA(ACRES) =      842.18

*****
FLOW PROCESS FROM NODE      6130.00 TO NODE      6200.00 IS CODE = 48
-----
>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =      673.60 DOWNSTREAM(FEET) =      672.60
FLOW LENGTH(FEET) =      374.00 MANNING'S N =      0.015
GIVEN BOX BASEWIDTH(FEET) =      10.00 GIVEN BOX HEIGHT(FEET) =      10.00
FLOWDEPTH IN BOX IS 6.73 FEET BOX-FLOW VELOCITY(FEET/SEC.) =      10.34
BOX-FLOW(CFS) =      696.14
BOX-FLOW TRAVEL TIME(MIN.) =      0.60 Tc(MIN.) =      28.43
* TOTAL SOURCE FLOW(CFS) =      524.00
LONGEST FLOWPATH FROM NODE      6000.00 TO NODE      6200.00 =      13064.00 FEET.

*****
FLOW PROCESS FROM NODE      6200.00 TO NODE      6200.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) =      28.43
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =      1.879
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE      GROUP      (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"      C      17.10      0.57      0.500      69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =      0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =      0.500
SUBAREA AREA(ACRES) =      17.10 SUBAREA RUNOFF(CFS) =      24.56
EFFECTIVE AREA(ACRES) =      127.61 AREA-AVERAGED Fm(INCH/HR) =      0.21
AREA-AVERAGED Fp(INCH/HR) =      0.63 AREA-AVERAGED Ap =      0.34
TOTAL AREA(ACRES) =      143.1 PEAK FLOW RATE(CFS) =      191.30

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\* SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(ACRES) = 716.2  
 \* SUMMED DATA: FLOW(CFS) = 715.30 TOTAL AREA(ACRES) = 859.3

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE	SOURCE FLOW
1	191.41	28.40	1.880	0.63( 0.21)	0.34	127.6	6080.00	524.0
2	190.26	29.95	1.821	0.63( 0.21)	0.34	131.5	6110.00	0.0
3	178.71	37.43	1.593	0.64( 0.21)	0.32	143.1	6000.00	0.0

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 191.41 Tc(MIN.) = 28.40  
 AREA-AVERAGED Fm(INCH/HR) = 0.21 AREA-AVERAGED Fp(INCH/HR) = 0.63  
 AREA-AVERAGED Ap = 0.34 EFFECTIVE AREA(ACRES) = 127.61

\* CUMULATIVE SOURCE FLOW DATA:

FLOW(CFS) = 524.00 AREA(ACRES) = 716.2  
 \* SUMMED DATA:  
 FLOW(CFS) = 715.41 TOTAL AREA(ACRES) = 843.8

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6200.00 TO NODE 6300.00 IS CODE = 48

>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 672.60 DOWNSTREAM(FEET) = 669.40  
 FLOW LENGTH(FEET) = 1140.00 MANNING'S N = 0.015  
 GIVEN BOX BASEWIDTH(FEET) = 10.00 GIVEN BOX HEIGHT(FEET) = 10.00  
 FLOWDEPTH IN BOX IS 6.75 FEET BOX-FLOW VELOCITY(FEET/SEC.) = 10.60  
 BOX-FLOW(CFS) = 715.41  
 BOX-FLOW TRAVEL TIME(MIN.) = 1.79 Tc(MIN.) = 30.19  
 \* TOTAL SOURCE FLOW(CFS) = 524.00  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6300.00 = 14204.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6300.00 TO NODE 6300.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 30.19  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.812  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	9.40	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 9.40 SUBAREA RUNOFF(CFS) = 12.93  
 EFFECTIVE AREA(ACRES) = 137.01 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.35  
 TOTAL AREA(ACRES) = 152.5 PEAK FLOW RATE(CFS) = 196.56

\* SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(ACRES) = 716.2  
 \* SUMMED DATA: FLOW(CFS) = 720.56 TOTAL AREA(ACRES) = 868.7

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE	SOURCE FLOW
1	196.89	30.12	1.814	0.62( 0.22)	0.35	137.0	6080.00	524.0
2	195.96	31.60	1.763	0.63( 0.22)	0.35	140.9	6110.00	0.0
3	184.39	39.02	1.553	0.63( 0.21)	0.33	152.5	6000.00	0.0

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 196.89 Tc(MIN.) = 30.12  
 AREA-AVERAGED Fm(INCH/HR) = 0.22 AREA-AVERAGED Fp(INCH/HR) = 0.62  
 AREA-AVERAGED Ap = 0.35 EFFECTIVE AREA(ACRES) = 137.01

\* CUMULATIVE SOURCE FLOW DATA:

FLOW(CFS) = 524.00 AREA(ACRES) = 716.2  
 \* SUMMED DATA:



FLOW(CFS) = 720.89 TOTAL AREA(ACRES) = 853.2

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6300.00 TO NODE 6400.00 IS CODE = 48

-----  
>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 669.40 DOWNSTREAM(FEET) = 668.60  
FLOW LENGTH(FEET) = 293.00 MANNING'S N = 0.015  
GIVEN BOX BASEWIDTH(FEET) = 10.00 GIVEN BOX HEIGHT(FEET) = 10.00  
FLOWDEPTH IN BOX IS 6.86 FEET BOX-FLOW VELOCITY(FEET/SEC.) = 10.51  
BOX-FLOW(CFS) = 720.89  
BOX-FLOW TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 30.59  
\* TOTAL SOURCE FLOW(CFS) = 524.00  
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6400.00 = 14497.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6400.00 TO NODE 6400.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 30.59  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	12.30	0.57	0.500	69
PUBLIC PARK	C	1.00	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.526  
SUBAREA AREA(ACRES) = 13.30 SUBAREA RUNOFF(CFS) = 17.95  
EFFECTIVE AREA(ACRES) = 150.31 AREA-AVERAGED Fm(INCH/HR) = 0.22  
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.36  
TOTAL AREA(ACRES) = 165.8 PEAK FLOW RATE(CFS) = 212.79

\* SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(ACRES) = 716.2  
\* SUMMED DATA: FLOW(CFS) = 736.79 TOTAL AREA(ACRES) = 882.0

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE	SOURCE FLOW
1	212.88	30.57	1.798	0.62( 0.22)	0.36	150.3	6080.00	524.0
2	211.53	32.03	1.749	0.62( 0.22)	0.36	154.2	6110.00	0.0
3	197.96	39.43	1.544	0.63( 0.22)	0.35	165.8	6000.00	0.0

NEW PEAK FLOW DATA ARE:  
PEAK FLOW RATE(CFS) = 212.88 Tc(MIN.) = 30.57  
AREA-AVERAGED Fm(INCH/HR) = 0.22 AREA-AVERAGED Fp(INCH/HR) = 0.62  
AREA-AVERAGED Ap = 0.36 EFFECTIVE AREA(ACRES) = 150.31

\* CUMULATIVE SOURCE FLOW DATA:  
FLOW(CFS) = 524.00 AREA(ACRES) = 716.2  
\* SUMMED DATA:  
FLOW(CFS) = 736.88 TOTAL AREA(ACRES) = 866.5

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6400.00 TO NODE 5470.00 IS CODE = 48

-----  
>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 668.60 DOWNSTREAM(FEET) = 666.10  
FLOW LENGTH(FEET) = 990.00 MANNING'S N = 0.015  
GIVEN BOX BASEWIDTH(FEET) = 10.00 GIVEN BOX HEIGHT(FEET) = 10.00  
FLOWDEPTH IN BOX IS 7.20 FEET BOX-FLOW VELOCITY(FEET/SEC.) = 10.24  
BOX-FLOW(CFS) = 736.88  
BOX-FLOW TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 32.18  
\* TOTAL SOURCE FLOW(CFS) = 524.00  
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 5470.00 = 15487.00 FEET.

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*****
FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 IS CODE = 15.1
-----
>>>>DEFINE MEMORY BANK # 2 <<<<<
=====
PEAK FLOWRATE TABLE FILE NAME: MCREEK_M.DNA
MEMORY BANK # 2 DEFINED AS FOLLOWS:
PEAK FLOW RATE(CFS) = 1153.54 Tc(MIN.) = 39.35
AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.25
TOTAL AREA(ACRES) = 886.1
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.
*****
FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 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 SOURCE
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE FLOW
1 212.88 32.11 1.746 0.62( 0.22) 0.36 150.3 6080.00 524.0
2 211.53 33.52 1.702 0.62( 0.22) 0.36 154.2 6110.00 524.0
3 197.96 40.86 1.511 0.63( 0.22) 0.35 165.8 6000.00 524.0
* SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(ACRES) = 716.18
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 5470.00 = 15487.00 FEET.
** MEMORY BANK # 2 CONFLUENCE DATA **
PEAK FLOW RATE(CFS) = 1153.54 Tc(MIN.) = 39.35
AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.25
TOTAL AREA(ACRES) = 886.1
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.66; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1051.9
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0298; Lca/L=0.4,n=.0267; Lca/L=0.5,n=.0246;Lca/L=0.6,n=.0229
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 404.81
PEAK FLOW RATE(CFS) = 1359.19
* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(AC.) = 716.2
* SUMMED DATA: FLOW(CFS) = 1883.19 TOTAL AREA(ACRES) = 1768.1
*****
FLOW PROCESS FROM NODE 5470.00 TO NODE 4325.00 IS CODE = 48
-----
>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 666.10 DOWNSTREAM(FEET) = 658.00
FLOW LENGTH(FEET) = 2835.00 MANNING'S N = 0.015
GIVEN BOX BASEWIDTH(FEET) = 16.00 GIVEN BOX HEIGHT(FEET) = 10.00
*GIVEN BOX HEIGHT(FEET) = 10.00 ESTIMATED BOX BASEWIDTH(FEET) = 17.36
ASSUME FULL-FLOWING BOX BOX-FLOW VELOCITY(FEET/SEC.) = 10.85
BOX-FLOW(CFS) = 1883.19
BOX-FLOW TRAVEL TIME(MIN.) = 4.36 Tc(MIN.) = 43.70
* TOTAL SOURCE FLOW(CFS) = 524.00
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 4325.00 = 19473.00 FEET.
*****
FLOW PROCESS FROM NODE 4325.00 TO NODE 4325.00 IS CODE = 12
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>>>>CLEAR MEMORY BANK # 1 <<<<<  
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\*\*\*\*\*  
FLOW PROCESS FROM NODE 4325.00 TO NODE 4325.00 IS CODE = 12  
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>>>>CLEAR MEMORY BANK # 2 <<<<<  
=====

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4325.00 TO NODE 4325.00 IS CODE = 15.1  
-----

>>>>DEFINE MEMORY BANK # 1 <<<<<  
=====

PEAK FLOWRATE TABLE FILE NAME: HAVEN\_M.DNA  
MEMORY BANK # 1 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	744.50	18.97	0.95( 0.34)	0.36	402.2	4175.00
2	754.97	22.69	0.95( 0.34)	0.36	463.4	4210.00
3	733.94	32.17	0.95( 0.35)	0.37	584.6	4020.00
4	727.00	33.00	0.95( 0.35)	0.37	591.0	1.00
5	726.70	33.03	0.95( 0.35)	0.37	591.1	4000.00
6	718.96	33.57	0.95( 0.35)	0.37	592.1	4045.00

TOTAL AREA(ACRES) = 592.1  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4325.00 = 15596.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4325.00 TO NODE 4325.00 IS CODE = 11  
-----

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

\*\* MAIN STREAM CONFLUENCE DATA \*\*  
PEAK FLOW RATE(CFS) = 1359.19 Tc(MIN.) = 43.70  
AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.25  
TOTAL AREA(ACRES) = 1051.9

\* SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(ACRES) = 716.18  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 4325.00 = 19473.00 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	744.50	18.97	2.395	0.95( 0.34)	0.36	402.2	4175.00
2	754.97	22.69	2.150	0.95( 0.34)	0.36	463.4	4210.00
3	733.94	32.17	1.744	0.95( 0.35)	0.37	584.6	4020.00
4	727.00	33.00	1.718	0.95( 0.35)	0.37	591.0	1.00
5	726.70	33.03	1.717	0.95( 0.35)	0.37	591.1	4000.00
6	718.96	33.57	1.700	0.95( 0.35)	0.37	592.1	4045.00

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4325.00 = 15596.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)= 99.9%;VALLEY(UNDEV.)/DESERT= 0.1%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.73; LAG(HR) = 0.58; Fm(INCH/HR) = 0.27; Ybar = 0.29  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.93; 30M = 0.93; 1HR = 0.93;  
3HR = 0.99; 6HR = 0.99; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1644.0  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 4325.00 = 19473.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0288; Lca/L=0.4,n=.0259; Lca/L=0.5,n=.0238;Lca/L=0.6,n=.0222  
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 595.16  
PEAK FLOW RATE(CFS) = 1861.14  
\* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(AC.) = 716.2  
\* SUMMED DATA: FLOW(CFS) = 2385.14 TOTAL AREA(ACRES) = 2360.2

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FLOW PROCESS FROM NODE 4325.00 TO NODE 3630.00 IS CODE = 48
-----
>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 658.00 DOWNSTREAM(FEET) = 654.30
FLOW LENGTH(FEET) = 1530.00 MANNING'S N = 0.015
GIVEN BOX BASEWIDTH(FEET) = 20.00 GIVEN BOX HEIGHT(FEET) = 10.00
*GIVEN BOX HEIGHT(FEET) = 10.00 ESTIMATED BOX BASEWIDTH(FEET) = 22.54
ASSUME FULL-FLOWING BOX BOX-FLOW VELOCITY(FEET/SEC.) = 10.58
BOX-FLOW(CFS) = 2385.14
BOX-FLOW TRAVEL TIME(MIN.) = 2.41 Tc(MIN.) = 46.11
* TOTAL SOURCE FLOW(CFS) = 524.00
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 3630.00 = 21003.00 FEET.

*****
FLOW PROCESS FROM NODE 3630.00 TO NODE 3630.00 IS CODE = 15.1
-----
>>>>DEFINE MEMORY BANK # 3 <<<<<
=====
PEAK FLOWRATE TABLE FILE NAME: TURN-E.DNA
MEMORY BANK # 3 DEFINED AS FOLLOWS:
STREAM Q Tc Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (ACRES) NODE
1 112.72 25.40 0.97( 0.51) 0.53 83.7 3600.00
TOTAL AREA(ACRES) = 83.7
LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3630.00 = 4590.00 FEET.

*****
FLOW PROCESS FROM NODE 3630.00 TO NODE 3630.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
PEAK FLOW RATE(CFS) = 1861.14 Tc(MIN.) = 46.11
AREA-AVERAGED Fm(INCH/HR) = 0.27 Ybar = 0.29
TOTAL AREA(ACRES) = 1644.0

* SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(ACRES) = 716.18
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 3630.00 = 21003.00 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 112.72 25.40 2.010 0.97( 0.51) 0.53 83.7 3600.00
LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3630.00 = 4590.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)= 99.9%;VALLEY(UNDEV.)/DESERT= 0.1%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.77; LAG(HR) = 0.61; Fm(INCH/HR) = 0.28; Ybar = 0.31
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.92; 30M = 0.92; 1HR = 0.92;
3HR = 0.99; 6HR = 0.99; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1727.7
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 3630.00 = 21003.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0285; Lca/L=0.4,n=.0255; Lca/L=0.5,n=.0234;Lca/L=0.6,n=.0219
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 615.81
PEAK FLOW RATE(CFS) = 1899.26
* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(AC.) = 716.2
* SUMMED DATA: FLOW(CFS) = 2423.26 TOTAL AREA(ACRES) = 2443.9

*****
FLOW PROCESS FROM NODE 3630.00 TO NODE 3700.00 IS CODE = 48
-----
>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<

```

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 654.30 DOWNSTREAM(FEET) = 653.70
FLOW LENGTH(FEET) = 227.00 MANNING'S N = 0.015
GIVEN BOX BASEWIDTH(FEET) = 20.00 GIVEN BOX HEIGHT(FEET) = 10.00
*GIVEN BOX HEIGHT(FEET) = 10.00 ESTIMATED BOX BASEWIDTH(FEET) = 22.02
ASSUME FULL-FLOWING BOX BOX-FLOW VELOCITY(FEET/SEC.) = 11.01
BOX-FLOW(CFS) = 2423.26
BOX-FLOW TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 46.46
* TOTAL SOURCE FLOW(CFS) = 524.00
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 3700.00 = 21230.00 FEET.

*****
FLOW PROCESS FROM NODE 3700.00 TO NODE 3540.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 653.70 DOWNSTREAM(FEET) = 647.17
CHANNEL LENGTH THRU SUBAREA(FEET) = 1115.00 CHANNEL SLOPE = 0.0059
CHANNEL BASE(FEET) = 16.00 "Z" FACTOR = 0.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 10.00
CHANNEL FLOW THRU SUBAREA(CFS) = 2423.26
FLOW VELOCITY(FEET/SEC.) = 19.06 FLOW DEPTH(FEET) = 7.95
TRAVEL TIME(MIN.) = 0.97 Tc(MIN.) = 47.43
* TOTAL SOURCE FLOW(CFS) = 524.00
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 3540.00 = 22345.00 FEET.

*****
FLOW PROCESS FROM NODE 3540.00 TO NODE 3540.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 3540.00 TO NODE 3540.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 3 <<<<
=====

*****
FLOW PROCESS FROM NODE 3540.00 TO NODE 3540.00 IS CODE = 15.1
-----
>>>>DEFINE MEMORY BANK # 1 <<<<
=====
PEAK FLOWRATE TABLE FILE NAME: TURN.DNA
MEMORY BANK # 1 DEFINED AS FOLLOWS:
  STREAM      Q      Tc      Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER      (CFS) (MIN.) (INCH/HR)      (ACRES)      NODE
    1      582.87  23.83  0.96( 0.47)  0.49      390.7      3300.00
    2      588.46  30.02  0.96( 0.47)  0.49      475.4      3085.00
    3      588.12  30.07  0.96( 0.47)  0.49      475.8      3500.00
    4      520.61  42.17  0.96( 0.48)  0.50      565.3      3056.00
    5      485.77  47.44  0.96( 0.48)  0.50      588.4      3000.00
    6      406.33  57.50  0.96( 0.48)  0.50      593.5      3021.00
  TOTAL AREA(ACRES) = 593.5
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3540.00 = 16891.00 FEET.

*****
FLOW PROCESS FROM NODE 3540.00 TO NODE 3540.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
PEAK FLOW RATE(CFS) = 1899.26 Tc(MIN.) = 47.43
AREA-AVERAGED Fm(INCH/HR) = 0.28 Ybar = 0.31
TOTAL AREA(ACRES) = 1727.7

* SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(ACRES) = 716.18
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 3540.00 = 22345.00 FEET.

```

```

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)    (MIN.) (INCH/HR) (INCH/HR)
1          582.87  23.83   2.089  0.96( 0.47) 0.49    390.7   3300.00
2          588.46  30.02   1.818  0.96( 0.47) 0.49    475.4   3085.00
3          588.12  30.07   1.816  0.96( 0.47) 0.49    475.8   3500.00
4          520.61  42.17   1.483  0.96( 0.48) 0.50    565.3   3056.00
5          485.77  47.44   1.382  0.96( 0.48) 0.50    588.4   3000.00
6          406.33  57.50   1.231  0.96( 0.48) 0.50    593.5   3021.00
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3540.00 = 16891.00 FEET.

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```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAH: VALLEY(DEV.)= 99.9%;VALLEY(UNDEV.)/DESERT= 0.1%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.79; LAG(HR) = 0.63; Fm(INCH/HR) = 0.33; Ybar = 0.36
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.90; 30M = 0.90; 1HR = 0.90;
3HR = 0.98; 6HR = 0.99; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 2321.1
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 3540.00 = 22345.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0278; Lca/L=0.4,n=.0249; Lca/L=0.5,n=.0229;Lca/L=0.6,n=.0214
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 770.36
PEAK FLOW RATE(CFS) = 2342.65
* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(AC.) = 716.2
* SUMMED DATA: FLOW(CFS) = 2866.65 TOTAL AREA(ACRES) = 3037.3

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*****
FLOW PROCESS FROM NODE 3540.00 TO NODE 2550.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 647.17 DOWNSTREAM(FEET) = 634.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 2391.00 CHANNEL SLOPE = 0.0055
CHANNEL BASE(FEET) = 18.00 "Z" FACTOR = 0.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 10.00
CHANNEL FLOW THRU SUBAREA(CFS) = 2866.65
FLOW VELOCITY(FEET/SEC.) = 19.41 FLOW DEPTH(FEET) = 8.20
TRAVEL TIME(MIN.) = 2.05 Tc(MIN.) = 49.48
* TOTAL SOURCE FLOW(CFS) = 524.00
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2550.00 = 24736.00 FEET.

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*****
FLOW PROCESS FROM NODE 2550.00 TO NODE 2540.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 634.00 DOWNSTREAM(FEET) = 630.51
CHANNEL LENGTH THRU SUBAREA(FEET) = 470.00 CHANNEL SLOPE = 0.0074
CHANNEL BASE(FEET) = 18.00 "Z" FACTOR = 0.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 10.00
CHANNEL FLOW THRU SUBAREA(CFS) = 2866.65
FLOW VELOCITY(FEET/SEC.) = 21.67 FLOW DEPTH(FEET) = 7.35
TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 49.84
* TOTAL SOURCE FLOW(CFS) = 524.00
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2540.00 = 25206.00 FEET.

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*****
FLOW PROCESS FROM NODE 2540.00 TO NODE 2540.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

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*****
FLOW PROCESS FROM NODE 2540.00 TO NODE 2540.00 IS CODE = 15.1
-----
>>>>DEFINE MEMORY BANK # 1 <<<<

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=====
PEAK FLOWRATE TABLE FILE NAME: ARCH.DNA
MEMORY BANK # 1 DEFINED AS FOLLOWS:
STREAM      Q      Tc      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR)      (ACRES)      NODE
1          767.58  16.84  0.61( 0.32) 0.52      334.4      2638.00
2          778.74  17.86  0.61( 0.32) 0.52      353.2      2660.00
3          779.78  18.02  0.61( 0.32) 0.52      355.7      2245.00
4          779.13  28.95  0.63( 0.33) 0.52      522.8      2600.00
5          778.78  30.22  0.63( 0.33) 0.52      540.6      2050.00
6          732.57  34.59  0.64( 0.33) 0.52      569.3      2215.00
7          718.55  35.65  0.64( 0.33) 0.52      572.3      2110.00
TOTAL AREA(ACRES) =      572.3
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2540.00 = 11670.00 FEET.

*****
FLOW PROCESS FROM NODE 2540.00 TO NODE 2540.00 IS CODE = 11
-----
>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
PEAK FLOW RATE(CFS) = 2342.65      Tc(MIN.) = 49.84
AREA-AVERAGED Fm(INCH/HR) = 0.33      Ybar = 0.36
TOTAL AREA(ACRES) = 2321.1

* SOURCE FLOW DATA: FLOW(CFS) = 524.00      AREA(ACRES) = 716.18
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2540.00 = 25206.00 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          767.58  16.84  2.572  0.61( 0.32) 0.52      334.4      2638.00
2          778.74  17.86  2.483  0.61( 0.32) 0.52      353.2      2660.00
3          779.78  18.02  2.470  0.61( 0.32) 0.52      355.7      2245.00
4          779.13  28.95  1.858  0.63( 0.33) 0.52      522.8      2600.00
5          778.78  30.22  1.811  0.63( 0.33) 0.52      540.6      2050.00
6          732.57  34.59  1.670  0.64( 0.33) 0.52      569.3      2215.00
7          718.55  35.65  1.640  0.64( 0.33) 0.52      572.3      2110.00
LONGEST FLOWPATH FROM NODE 2050.00 TO NODE 2540.00 = 11670.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)= 99.6%;VALLEY(UNDEV.)/DESERT= 0.4%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.83; LAG(HR) = 0.66; Fm(INCH/HR) = 0.33; Ybar = 0.35
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.87; 30M = 0.87; 1HR = 0.87;
3HR = 0.98; 6HR = 0.99; 24HR= 0.99
UNIT-INTERVAL(MIN) = 5.00      TOTAL AREA(ACRES) = 2893.4
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2540.00 = 25206.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0266; Lca/L=0.4,n=.0238; Lca/L=0.5,n=.0219;Lca/L=0.6,n=.0204
TIME OF PEAK FLOW(HR) = 16.75      RUNOFF VOLUME(AF) = 960.36
PEAK FLOW RATE(CFS) = 2716.75
* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 524.00      AREA(AC.) = 716.2
* SUMMED DATA: FLOW(CFS) = 3240.75      TOTAL AREA(ACRES) = 3609.6

*****
FLOW PROCESS FROM NODE 2540.00 TO NODE 2541.00 IS CODE = 51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 630.51      DOWNSTREAM(FEET) = 629.63
CHANNEL LENGTH THRU SUBAREA(FEET) = 410.00      CHANNEL SLOPE = 0.0021
CHANNEL BASE(FEET) = 22.00      "Z" FACTOR = 0.000
MANNING'S FACTOR = 0.015      MAXIMUM DEPTH(FEET) = 14.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.333
SUBAREA LOSS RATE DATA(AMC II):

```

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 15.80 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3249.83  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 14.07  
AVERAGE FLOW DEPTH(FEET) = 10.50 TRAVEL TIME(MIN.) = 0.49  
Tc(MIN.) = 50.33  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)= 99.6%;VALLEY(UNDEV.)/DESERT= 0.4%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.84; LAG(HR) = 0.67; Fm(INCH/HR) = 0.33; Ybar = 0.35  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.87; 30M = 0.87; 1HR = 0.87;  
3HR = 0.98; 6HR = 0.99; 24HR= 0.99  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 2909.2  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2541.00 = 25206.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0269; Lca/L=0.4,n=.0241; Lca/L=0.5,n=.0221;Lca/L=0.6,n=.0206  
TIME OF PEAK FLOW(HR) = 16.75 RUNOFF VOLUME(AF) = 967.48  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 2741.50  
TOTAL AREA(ACRES) = 2909.2 PEAK FLOW RATE(CFS) = 2741.50

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 10.53 FLOW VELOCITY(FEET/SEC.) = 14.09  
\* TOTAL SOURCE FLOW(CFS) = 524.00  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2541.00 = 25616.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 2541.00 TO NODE 2542.00 IS CODE = 51  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 629.63 DOWNSTREAM(FEET) = 628.53  
CHANNEL LENGTH THRU SUBAREA(FEET) = 500.00 CHANNEL SLOPE = 0.0022  
CHANNEL BASE(FEET) = 22.00 "Z" FACTOR = 0.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 14.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.324  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 21.83 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3277.96  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 14.24  
AVERAGE FLOW DEPTH(FEET) = 10.46 TRAVEL TIME(MIN.) = 0.59  
Tc(MIN.) = 50.92  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)= 99.6%;VALLEY(UNDEV.)/DESERT= 0.4%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.85; LAG(HR) = 0.68; Fm(INCH/HR) = 0.33; Ybar = 0.35  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.87; 30M = 0.87; 1HR = 0.87;  
3HR = 0.98; 6HR = 0.99; 24HR= 0.99  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 2931.1  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2542.00 = 25616.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0268; Lca/L=0.4,n=.0240; Lca/L=0.5,n=.0221;Lca/L=0.6,n=.0206  
TIME OF PEAK FLOW(HR) = 16.75 RUNOFF VOLUME(AF) = 977.31  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 2764.84  
TOTAL AREA(ACRES) = 2931.1 PEAK FLOW RATE(CFS) = 2764.84

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 10.49 FLOW VELOCITY(FEET/SEC.) = 14.25  
\* TOTAL SOURCE FLOW(CFS) = 524.00  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2542.00 = 26116.00 FEET.

```

*****
FLOW PROCESS FROM NODE 2542.00 TO NODE 2543.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 628.53 DOWNSTREAM(FEET) = 627.45
CHANNEL LENGTH THRU SUBAREA(FEET) = 490.00 CHANNEL SLOPE = 0.0022
CHANNEL BASE(FEET) = 22.00 "Z" FACTOR = 0.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 14.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.315
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 23.54 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3302.17
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 14.27
AVERAGE FLOW DEPTH(FEET) = 10.52 TRAVEL TIME(MIN.) = 0.57
Tc(MIN.) = 51.49
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)= 99.6%;VALLEY(UNDEV.)/DESERT= 0.4%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.86; LAG(HR) = 0.69; Fm(INCH/HR) = 0.32; Ybar = 0.35
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.87; 30M = 0.87; 1HR = 0.87;
3HR = 0.98; 6HR = 0.99; 24HR= 0.99
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 2954.6
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2543.00 = 26116.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0266; Lca/L=0.4,n=.0239; Lca/L=0.5,n=.0219;Lca/L=0.6,n=.0205
TIME OF PEAK FLOW(HR) = 16.75 RUNOFF VOLUME(AF) = 987.90
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 2781.42
TOTAL AREA(ACRES) = 2954.6 PEAK FLOW RATE(CFS) = 2781.42

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 10.52 FLOW VELOCITY(FEET/SEC.) = 14.28
* TOTAL SOURCE FLOW(CFS) = 524.00
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2543.00 = 26606.00 FEET.

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*****
FLOW PROCESS FROM NODE 2543.00 TO NODE 2544.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 627.45 DOWNSTREAM(FEET) = 626.42
CHANNEL LENGTH THRU SUBAREA(FEET) = 470.00 CHANNEL SLOPE = 0.0022
CHANNEL BASE(FEET) = 22.00 "Z" FACTOR = 0.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 14.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.307
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 29.88 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3322.24
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 14.27
AVERAGE FLOW DEPTH(FEET) = 10.58 TRAVEL TIME(MIN.) = 0.55
Tc(MIN.) = 52.04
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)= 99.6%;VALLEY(UNDEV.)/DESERT= 0.4%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.87; LAG(HR) = 0.69; Fm(INCH/HR) = 0.32; Ybar = 0.35
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.87; 30M = 0.87; 1HR = 0.87;

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3HR = 0.98; 6HR = 0.99; 24HR= 0.99  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 2984.5  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2544.00 = 26606.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0265; Lca/L=0.4,n=.0237; Lca/L=0.5,n=.0218;Lca/L=0.6,n=.0203  
TIME OF PEAK FLOW(HR) = 16.75 RUNOFF VOLUME(AF) = 1001.35  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 2798.19  
TOTAL AREA(ACRES) = 2984.5 PEAK FLOW RATE(CFS) = 2798.19

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 10.58 FLOW VELOCITY(FEET/SEC.) = 14.27  
\* TOTAL SOURCE FLOW(CFS) = 524.00  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 2544.00 = 27076.00 FEET.

=====  
END OF STUDY SUMMARY:  
TOTAL AREA(ACRES) = 2984.5 TC(MIN.) = 52.04  
AREA-AVERAGED Fm(INCH/HR)= 0.32 Ybar = 0.35  
PEAK FLOW RATE(CFS) = 2798.19  
\* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 524.00 AREA(AC.) = 716.2  
\* SUMMED DATA: FLOW(CFS) = 3322.19 TOTAL AREA(ACRES) = 3700.7  
=====

=====  
END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* NMC-CHINO-EAST \*  
\* 10-YR STUDY \*  
\* AREA 'E' \*  
\*\*\*\*\*

FILE NAME: CHINO.DAT  
TIME/DATE OF STUDY: 17:25 10/16/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
  
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB GUTTER-GEOMETRIES:			MANNING FACTOR (n)	
	WIDTH (FT)	CROSSFALL (FT)		HEIGHT (FT)	WIDTH (FT)	LIP (FT)		HIKE (FT)
1	20.0	15.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
2	32.0	27.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1100.00 TO NODE 1102.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 850.00  
ELEVATION DATA: UPSTREAM(FEET) = 777.06 DOWNSTREAM(FEET) = 769.79

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.972  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.840  
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  
"5-7 DWELLINGS/ACRE" A 5.60 0.98 0.500 32 14.97  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 6.82  
TOTAL AREA(ACRES) = 5.60 PEAK FLOW RATE(CFS) = 6.82

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1102.00 TO NODE 1104.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 762.04 DOWNSTREAM(FEET) = 760.46  
FLOW LENGTH(FEET) = 100.00 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.) = 7.24  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 6.82  
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 15.20  
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1104.00 = 950.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1104.00 TO NODE 1104.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 15.20  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.823  
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" A 3.11 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 3.11 SUBAREA RUNOFF(CFS) = 3.74  
EFFECTIVE AREA(ACRES) = 8.71 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 10.47

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1104.00 TO NODE 1106.00 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) = 760.46 DOWNSTREAM(FEET) = 757.11
FLOW LENGTH(FEET) = 260.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.27
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.47
PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 15.80
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1106.00 = 1210.00 FEET.

*****
FLOW PROCESS FROM NODE 1106.00 TO NODE 1106.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.80
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.782
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" A 1.72 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 1.72 SUBAREA RUNOFF(CFS) = 2.00
EFFECTIVE AREA(ACRES) = 10.43 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 10.4 PEAK FLOW RATE(CFS) = 12.15

*****
FLOW PROCESS FROM NODE 1106.00 TO NODE 1110.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 757.11 DOWNSTREAM(FEET) = 751.92
FLOW LENGTH(FEET) = 340.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.94
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.15
PIPE TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 16.51
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1110.00 = 1550.00 FEET.

*****
FLOW PROCESS FROM NODE 1110.00 TO NODE 1110.00 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.) = 16.51
RAINFALL INTENSITY(INCH/HR) = 1.73

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AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 10.43
TOTAL STREAM AREA(ACRES) = 10.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 12.15

*****
FLOW PROCESS FROM NODE 1100.00 TO NODE 1112.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 777.06 DOWNSTREAM(FEET) = 767.26

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.549
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.799
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
"5-7 DWELLINGS/ACRE" A 2.38 0.98 0.500 32 15.55
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 2.81
TOTAL AREA(ACRES) = 2.38 PEAK FLOW RATE(CFS) = 2.81

*****
FLOW PROCESS FROM NODE 1112.00 TO NODE 1110.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 767.26 DOWNSTREAM ELEVATION(FEET) = 763.22
STREET LENGTH(FEET) = 430.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 15.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFBLOCKS CARRYING RUNOFF = 1
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) = 4.49
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFBLOCK FLOOD WIDTH(FEET) = 12.59
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.53
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.04
STREET FLOW TRAVEL TIME(MIN.) = 2.83 Tc(MIN.) = 18.38
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.627

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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					
"5-7 DWELLINGS/ACRE"	A	3.28	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 3.28 SUBAREA RUNOFF(CFS) = 3.36  
EFFECTIVE AREA(ACRES) = 5.66 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 5.7 PEAK FLOW RATE(CFS) = 5.80

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 13.99  
FLOW VELOCITY(FEET/SEC.) = 2.70 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.18  
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1110.00 = 1430.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1110.00 TO NODE 1110.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.38  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.627

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"	A	1.93	0.98	0.500	32
PUBLIC PARK	A	1.85	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.671  
SUBAREA AREA(ACRES) = 3.78 SUBAREA RUNOFF(CFS) = 3.31  
EFFECTIVE AREA(ACRES) = 9.44 AREA-AVERAGED Fm(INCH/HR) = 0.55  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.57  
TOTAL AREA(ACRES) = 9.4 PEAK FLOW RATE(CFS) = 9.11

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1110.00 TO NODE 1110.00 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.) = 18.38  
RAINFALL INTENSITY(INCH/HR) = 1.63  
AREA-AVERAGED Fm(INCH/HR) = 0.55  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.57  
EFFECTIVE STREAM AREA(ACRES) = 9.44  
TOTAL STREAM AREA(ACRES) = 9.44  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.11

\*\* CONFLUENCE DATA \*\*

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
--------	---	----	-----------	--------	----	----	-----------

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	12.15	16.51	1.735	0.98( 0.49)	0.50	10.4 1100.00
2	9.11	18.38	1.627	0.98( 0.55)	0.57	9.4 1100.00

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	21.16	16.51	1.735	0.98( 0.52)	0.53	18.9	1100.00
2	20.21	18.38	1.627	0.98( 0.52)	0.53	19.9	1100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 21.16 Tc(MIN.) = 16.51  
EFFECTIVE AREA(ACRES) = 18.91 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 19.9  
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1110.00 = 1550.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1110.00 TO NODE 1116.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 751.92 DOWNSTREAM(FEET) = 748.58  
FLOW LENGTH(FEET) = 560.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.48  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 21.16  
PIPE TRAVEL TIME(MIN.) = 1.44 Tc(MIN.) = 17.95  
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1116.00 = 2110.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1116.00 TO NODE 1116.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.95  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.650

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"	A	8.06	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 8.06 SUBAREA RUNOFF(CFS) = 8.43  
EFFECTIVE AREA(ACRES) = 26.97 AREA-AVERAGED Fm(INCH/HR) = 0.51  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 27.9 PEAK FLOW RATE(CFS) = 27.71

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1116.00 TO NODE 1120.00 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) = 748.58 DOWNSTREAM(FEET) = 743.48
FLOW LENGTH(FEET) = 430.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.06
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.71
PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 18.74
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1120.00 = 2540.00 FEET.

*****
FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 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.) = 18.74
RAINFALL INTENSITY(INCH/HR) = 1.61
AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.52
EFFECTIVE STREAM AREA(ACRES) = 26.97
TOTAL STREAM AREA(ACRES) = 27.93
PEAK FLOW RATE(CFS) AT CONFLUENCE = 27.71

*****
FLOW PROCESS FROM NODE 1108.00 TO NODE 1122.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 750.00
ELEVATION DATA: UPSTREAM(FEET) = 768.75 DOWNSTREAM(FEET) = 763.66

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.916
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.844
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
"5-7 DWELLINGS/ACRE" A 2.28 0.98 0.500 32 14.92
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 2.78
TOTAL AREA(ACRES) = 2.28 PEAK FLOW RATE(CFS) = 2.78

*****
FLOW PROCESS FROM NODE 1122.00 TO NODE 1124.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

```

```

=====
UPSTREAM ELEVATION(FEET) = 763.66 DOWNSTREAM ELEVATION(FEET) = 757.70
STREET LENGTH(FEET) = 340.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 15.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.62
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.36
HALFSTREET FLOOD WIDTH(FEET) = 9.95
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.07
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.10
STREET FLOW TRAVEL TIME(MIN.) = 1.85 Tc(MIN.) = 16.76
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719
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" A 1.51 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 1.51 SUBAREA RUNOFF(CFS) = 1.67
EFFECTIVE AREA(ACRES) = 3.79 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 3.8 PEAK FLOW RATE(CFS) = 4.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 10.65
FLOW VELOCITY(FEET/SEC.) = 3.17 DEPTH*VELOCITY(FT*FT/SEC.) = 1.18
LONGEST FLOWPATH FROM NODE 1108.00 TO NODE 1124.00 = 1090.00 FEET.

*****
FLOW PROCESS FROM NODE 1124.00 TO NODE 1120.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 751.34 DOWNSTREAM(FEET) = 743.48
FLOW LENGTH(FEET) = 780.00 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.) = 5.41
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.20
PIPE TRAVEL TIME(MIN.) = 2.40 Tc(MIN.) = 19.16
LONGEST FLOWPATH FROM NODE 1108.00 TO NODE 1120.00 = 1870.00 FEET.

*****

```

FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.16
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.587
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" A 6.67 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 6.67 SUBAREA RUNOFF(CFS) = 6.60
EFFECTIVE AREA(ACRES) = 10.46 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 10.35

\*\*\*\*\*
FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 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) = 1.59
AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 10.46
TOTAL STREAM AREA(ACRES) = 10.46
PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.35

\*\* 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) = 38.03 Tc(MIN.) = 18.74
EFFECTIVE AREA(ACRES) = 37.20 AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.52

TOTAL AREA(ACRES) = 38.4
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1120.00 = 2540.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.74
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.608
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 2.90 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 2.03
EFFECTIVE AREA(ACRES) = 40.10 AREA-AVERAGED Fm(INCH/HR) = 0.53
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 41.3 PEAK FLOW RATE(CFS) = 39.04

\*\*\*\*\*
FLOW PROCESS FROM NODE 1120.00 TO NODE 1130.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 743.48 DOWNSTREAM(FEET) = 741.40
FLOW LENGTH(FEET) = 420.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.10
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 39.04
PIPE TRAVEL TIME(MIN.) = 0.99 Tc(MIN.) = 19.73
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1130.00 = 2960.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 1130.00 TO NODE 1130.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.73
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.559
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" A 3.21 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 3.21 SUBAREA RUNOFF(CFS) = 3.10
EFFECTIVE AREA(ACRES) = 43.31 AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 44.5 PEAK FLOW RATE(CFS) = 40.38

\*\*\*\*\*

```

FLOW PROCESS FROM NODE 1130.00 TO NODE 1132.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 741.40 DOWNSTREAM(FEET) = 740.70
FLOW LENGTH(FEET) = 165.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.65
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.38
PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 20.14
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1132.00 = 3125.00 FEET.
*****
FLOW PROCESS FROM NODE 1132.00 TO NODE 1132.00 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.) = 20.14
RAINFALL INTENSITY(INCH/HR) = 1.54
AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.54
EFFECTIVE STREAM AREA(ACRES) = 43.31
TOTAL STREAM AREA(ACRES) = 44.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 40.38
*****

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FLOW PROCESS FROM NODE 1150.00 TO NODE 1152.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 767.40 DOWNSTREAM(FEET) = 760.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.448
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.739
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
"5-7 DWELLINGS/ACRE" A 2.28 0.98 0.500 32 16.45
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 7.00 0.57 0.500 69 16.45
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.67
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 11.74
TOTAL AREA(ACRES) = 9.28 PEAK FLOW RATE(CFS) = 11.74
*****

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```

FLOW PROCESS FROM NODE 1152.00 TO NODE 1152.00 IS CODE = 81
-----

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```

-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 16.45
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.739
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 6.79 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 6.79 SUBAREA RUNOFF(CFS) = 8.90
EFFECTIVE AREA(ACRES) = 16.07 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 20.64
*****

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```

FLOW PROCESS FROM NODE 1152.00 TO NODE 1152.00 IS CODE = 81
-----

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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 16.45
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.739
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" A 4.70 0.98 0.500 32
PUBLIC PARK A 1.36 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.579
SUBAREA AREA(ACRES) = 6.06 SUBAREA RUNOFF(CFS) = 6.41
EFFECTIVE AREA(ACRES) = 22.13 AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 22.1 PEAK FLOW RATE(CFS) = 27.05
*****

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```

FLOW PROCESS FROM NODE 1152.00 TO NODE 1154.00 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) = 752.00 DOWNSTREAM(FEET) = 740.70
FLOW LENGTH(FEET) = 1050.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.66
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.05
PIPE TRAVEL TIME(MIN.) = 2.02 Tc(MIN.) = 18.47
LONGEST FLOWPATH FROM NODE 1150.00 TO NODE 1154.00 = 2050.00 FEET.
*****

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FLOW PROCESS FROM NODE 1154.00 TO NODE 1154.00 IS CODE = 81
-----

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```

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

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```

=====
MAINLINE Tc(MIN.) = 18.47
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.622
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"   A       4.00   0.98   0.500   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C       6.31   0.57   0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 10.31   SUBAREA RUNOFF(CFS) = 11.69
EFFECTIVE AREA(ACRES) = 32.44   AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.73   AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 32.4   PEAK FLOW RATE(CFS) = 36.41

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```

*****
FLOW PROCESS FROM NODE 1154.00 TO NODE 1154.00 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.) = 18.47
RAINFALL INTENSITY(INCH/HR) = 1.62
AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.73
AREA-AVERAGED Ap = 0.51
EFFECTIVE STREAM AREA(ACRES) = 32.44
TOTAL STREAM AREA(ACRES) = 32.44
PEAK FLOW RATE(CFS) AT CONFLUENCE = 36.41

```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	40.38	20.14	1.540	0.97( 0.52)	0.54	43.3	1100.00
1	40.02	20.56	1.521	0.98( 0.52)	0.54	43.8	1108.00
1	38.13	22.03	1.459	0.98( 0.52)	0.54	44.5	1100.00
2	36.41	18.47	1.622	0.73( 0.38)	0.51	32.4	1150.00

```

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	76.43	18.47	1.622	0.87( 0.46)	0.53	72.2	1150.00
2	74.39	20.14	1.540	0.87( 0.46)	0.53	75.8	1100.00
3	73.48	20.56	1.521	0.87( 0.46)	0.53	76.2	1108.00
4	69.78	22.03	1.459	0.87( 0.46)	0.53	76.9	1100.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 76.43   Tc(MIN.) = 18.47
EFFECTIVE AREA(ACRES) = 72.15   AREA-AVERAGED Fm(INCH/HR) = 0.46

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AREA-AVERAGED Fp(INCH/HR) = 0.87   AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 76.9
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1154.00 = 3125.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 1154.00 TO NODE 1156.00 IS CODE = 31
-----

```

```

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

```

```

ELEVATION DATA: UPSTREAM(FEET) = 740.70   DOWNSTREAM(FEET) = 739.00
FLOW LENGTH(FEET) = 150.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.40
ESTIMATED PIPE DIAMETER(INCH) = 39.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 76.43
PIPE TRAVEL TIME(MIN.) = 0.22   Tc(MIN.) = 18.69
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1156.00 = 3275.00 FEET.

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```

*****
FLOW PROCESS FROM NODE 1156.00 TO NODE 1156.00 IS CODE = 81
-----

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```

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

MAINLINE Tc(MIN.) = 18.69
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.611
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"   A       6.72   0.98   0.500   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 6.72   SUBAREA RUNOFF(CFS) = 6.79
EFFECTIVE AREA(ACRES) = 78.87   AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.88   AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 83.7   PEAK FLOW RATE(CFS) = 81.74

```

```

*****
FLOW PROCESS FROM NODE 1156.00 TO NODE 1158.00 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) = 739.00   DOWNSTREAM(FEET) = 736.86
FLOW LENGTH(FEET) = 58.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.21
ESTIMATED PIPE DIAMETER(INCH) = 33.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 81.74
PIPE TRAVEL TIME(MIN.) = 0.05   Tc(MIN.) = 18.74
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1158.00 = 3333.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 1158.00 TO NODE 1158.00 IS CODE = 81
-----

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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.74
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.608
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A         1.47     0.98    0.100   32
COMMERCIAL          C         0.46     0.57    0.100   69
PUBLIC PARK         A         0.82     0.98    0.850   32
APARTMENTS          C         0.25     0.57    0.200   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.93
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313
SUBAREA AREA(ACRES) = 3.00   SUBAREA RUNOFF(CFS) = 3.55
EFFECTIVE AREA(ACRES) = 81.87   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.88   AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 86.7     PEAK FLOW RATE(CFS) = 85.09

*****
FLOW PROCESS FROM NODE 1158.00 TO NODE 1160.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 736.86   DOWNSTREAM(FEET) = 735.70
FLOW LENGTH(FEET) = 671.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 44.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.75
ESTIMATED PIPE DIAMETER(INCH) = 57.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 85.09
PIPE TRAVEL TIME(MIN.) = 1.94   Tc(MIN.) = 20.68
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1160.00 = 4004.00 FEET.

*****
FLOW PROCESS FROM NODE 1160.00 TO NODE 1160.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.68
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.516
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL         A         6.58     0.98    0.500   32
"5-7 DWELLINGS/ACRE"
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 6.58   SUBAREA RUNOFF(CFS) = 6.09
EFFECTIVE AREA(ACRES) = 88.45   AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.88   AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 93.2     PEAK FLOW RATE(CFS) = 85.09
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 1160.00 TO NODE 1162.00 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) = 735.70   DOWNSTREAM(FEET) = 735.43
FLOW LENGTH(FEET) = 89.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.08
ESTIMATED PIPE DIAMETER(INCH) = 51.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 85.09
PIPE TRAVEL TIME(MIN.) = 0.21   Tc(MIN.) = 20.89
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1162.00 = 4093.00 FEET.

*****
FLOW PROCESS FROM NODE 1162.00 TO NODE 1162.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.89
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.506
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A         0.72     0.98    0.100   32
PUBLIC PARK         A         0.42     0.98    0.850   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.376
SUBAREA AREA(ACRES) = 1.14   SUBAREA RUNOFF(CFS) = 1.17
EFFECTIVE AREA(ACRES) = 89.59   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.88   AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 94.4     PEAK FLOW RATE(CFS) = 85.09
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 94.4   TC(MIN.) = 20.89
EFFECTIVE AREA(ACRES) = 89.59   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.88   AREA-AVERAGED Ap = 0.514
PEAK FLOW RATE(CFS) = 85.09

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES) NODE
1           85.09 20.89 1.506 0.88( 0.45) 0.51 89.6 1150.00
2           82.42 22.58 1.438 0.89( 0.46) 0.51 93.2 1100.00
3           81.38 23.00 1.422 0.89( 0.46) 0.51 93.6 1108.00
4           77.29 24.53 1.368 0.89( 0.46) 0.52 94.4 1100.00
=====
END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* NMC-CHINO-EAST \*  
\* 100-YR STUDY \*  
\* AREA 'E' \*  
\*\*\*\*\*

FILE NAME: CHINO.DAT  
TIME/DATE OF STUDY: 17:23 10/16/2011

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

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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	20.0	15.0	0.020/0.020/0.020	0.67	2.00 0.0312 0.167	0.0150
2	32.0	27.0	0.020/0.020/0.020	0.67	2.00 0.0312 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.00 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 1100.00 TO NODE 1102.00 IS CODE = 21  
-----

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

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 850.00  
ELEVATION DATA: UPSTREAM(FEET) = 777.06 DOWNSTREAM(FEET) = 769.79

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.972  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.760  
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  
"5-7 DWELLINGS/ACRE" A 5.60 0.98 0.500 32 14.97  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 11.45  
TOTAL AREA(ACRES) = 5.60 PEAK FLOW RATE(CFS) = 11.45

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1102.00 TO NODE 1104.00 IS CODE = 31  
-----

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

===== ELEVATION DATA: UPSTREAM(FEET) = 762.04 DOWNSTREAM(FEET) = 760.46  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.04  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 11.45  
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 15.18  
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1104.00 = 950.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1104.00 TO NODE 1104.00 IS CODE = 81  
-----

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

===== MAINLINE Tc(MIN.) = 15.18  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.737  
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" A 3.11 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 3.11 SUBAREA RUNOFF(CFS) = 6.30  
EFFECTIVE AREA(ACRES) = 8.71 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 17.64

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1104.00 TO NODE 1106.00 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) = 760.46 DOWNSTREAM(FEET) = 757.11
FLOW LENGTH(FEET) = 260.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.45
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.64
PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 15.69
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1106.00 = 1210.00 FEET.

*****
FLOW PROCESS FROM NODE 1106.00 TO NODE 1106.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.69
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.683
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 1.72 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 1.72 SUBAREA RUNOFF(CFS) = 3.40
EFFECTIVE AREA(ACRES) = 10.43 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 10.4 PEAK FLOW RATE(CFS) = 20.61

*****
FLOW PROCESS FROM NODE 1106.00 TO NODE 1110.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 757.11 DOWNSTREAM(FEET) = 751.92
FLOW LENGTH(FEET) = 340.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.33
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.61
PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 16.30
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1110.00 = 1550.00 FEET.

*****
FLOW PROCESS FROM NODE 1110.00 TO NODE 1110.00 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.) = 16.30
RAINFALL INTENSITY(INCH/HR) = 2.62
AREA-AVERAGED Fm(INCH/HR) = 0.49

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AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 10.43
TOTAL STREAM AREA(ACRES) = 10.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 20.61

*****
FLOW PROCESS FROM NODE 1100.00 TO NODE 1112.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 777.06 DOWNSTREAM(FEET) = 767.26

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.549
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.698
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
"5-7 DWELLINGS/ACRE" A 2.38 0.98 0.500 32 15.55
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 4.73
TOTAL AREA(ACRES) = 2.38 PEAK FLOW RATE(CFS) = 4.73

*****
FLOW PROCESS FROM NODE 1112.00 TO NODE 1110.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 767.26 DOWNSTREAM ELEVATION(FEET) = 763.22
STREET LENGTH(FEET) = 430.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 15.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.66
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 15.75
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.87
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.36
STREET FLOW TRAVEL TIME(MIN.) = 2.50 Tc(MIN.) = 18.05
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.467
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									
						1	20.61	16.30	2.623	0.98	(0.49)	0.50	10.4	1100.00
						2	16.25	18.05	2.467	0.98	(0.55)	0.57	9.4	1100.00

RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 3.28 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 3.28 SUBAREA RUNOFF(CFS) = 5.84  
 EFFECTIVE AREA(ACRES) = 5.66 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 5.7 PEAK FLOW RATE(CFS) = 10.09

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	36.48	16.30	2.623	0.98	(0.52)	0.53	19.0	1100.00
2	35.36	18.05	2.467	0.98	(0.52)	0.53	19.9	1100.00

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 17.57  
 FLOW VELOCITY(FEET/SEC.) = 3.08 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.57  
 LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1110.00 = 1430.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 36.48 Tc(MIN.) = 16.30  
 EFFECTIVE AREA(ACRES) = 18.96 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 19.9  
 LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1110.00 = 1550.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1110.00 TO NODE 1110.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.05  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.467  
 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"	A	1.93	0.98	0.500	32
PUBLIC PARK	A	1.85	0.98	0.850	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.671  
 SUBAREA AREA(ACRES) = 3.78 SUBAREA RUNOFF(CFS) = 6.17  
 EFFECTIVE AREA(ACRES) = 9.44 AREA-AVERAGED Fm(INCH/HR) = 0.55  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.57  
 TOTAL AREA(ACRES) = 9.4 PEAK FLOW RATE(CFS) = 16.25

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1110.00 TO NODE 1110.00 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.) = 18.05  
 RAINFALL INTENSITY(INCH/HR) = 2.47  
 AREA-AVERAGED Fm(INCH/HR) = 0.55  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.57  
 EFFECTIVE STREAM AREA(ACRES) = 9.44  
 TOTAL STREAM AREA(ACRES) = 9.44  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.25

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1110.00 TO NODE 1116.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 751.92 DOWNSTREAM(FEET) = 748.58  
 FLOW LENGTH(FEET) = 560.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.42  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 36.48  
 PIPE TRAVEL TIME(MIN.) = 1.26 Tc(MIN.) = 17.56  
 LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1116.00 = 2110.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1116.00 TO NODE 1116.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.56  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.508  
 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"	A	8.06	0.98	0.500	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 8.06 SUBAREA RUNOFF(CFS) = 14.66  
 EFFECTIVE AREA(ACRES) = 27.02 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 27.9 PEAK FLOW RATE(CFS) = 48.62

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1116.00 TO NODE 1120.00 IS CODE = 31

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 748.58 DOWNSTREAM(FEET) = 743.48
FLOW LENGTH(FEET) = 430.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.39
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 48.62
PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 18.25
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1120.00 = 2540.00 FEET.

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*****
FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 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.) = 18.25
RAINFALL INTENSITY(INCH/HR) = 2.45
AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.52
EFFECTIVE STREAM AREA(ACRES) = 27.02
TOTAL STREAM AREA(ACRES) = 27.93
PEAK FLOW RATE(CFS) AT CONFLUENCE = 48.62

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*****
FLOW PROCESS FROM NODE 1108.00 TO NODE 1122.00 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) = 750.00
ELEVATION DATA: UPSTREAM(FEET) = 768.75 DOWNSTREAM(FEET) = 763.66

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.916
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.766
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
"5-7 DWELLINGS/ACRE"  A      2.28    0.98    0.500  32  14.92
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 4.68
TOTAL AREA(ACRES) = 2.28 PEAK FLOW RATE(CFS) = 4.68

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*****
FLOW PROCESS FROM NODE 1122.00 TO NODE 1124.00 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) = 763.66 DOWNSTREAM ELEVATION(FEET) = 757.70
STREET LENGTH(FEET) = 340.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 20.00

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DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 15.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(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) = 6.11
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 12.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.47
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.42
STREET FLOW TRAVEL TIME(MIN.) = 1.63 Tc(MIN.) = 16.55
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.599

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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
"5-7 DWELLINGS/ACRE"  A      1.51    0.98    0.500  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 1.51 SUBAREA RUNOFF(CFS) = 2.87
EFFECTIVE AREA(ACRES) = 3.79 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 3.8 PEAK FLOW RATE(CFS) = 7.20

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 13.47
FLOW VELOCITY(FEET/SEC.) = 3.60 DEPTH*VELOCITY(FT*FT/SEC.) = 1.54
LONGEST FLOWPATH FROM NODE 1108.00 TO NODE 1124.00 = 1090.00 FEET.

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*****
FLOW PROCESS FROM NODE 1124.00 TO NODE 1120.00 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) = 751.34 DOWNSTREAM(FEET) = 743.48
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.16
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.20
PIPE TRAVEL TIME(MIN.) = 2.11 Tc(MIN.) = 18.66
LONGEST FLOWPATH FROM NODE 1108.00 TO NODE 1120.00 = 1870.00 FEET.

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*****
FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.66
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.419
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" A 6.67 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 6.67 SUBAREA RUNOFF(CFS) = 11.59
EFFECTIVE AREA(ACRES) = 10.46 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 18.18

\*\*\*\*\*
FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 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.) = 18.66
RAINFALL INTENSITY(INCH/HR) = 2.42
AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 10.46
TOTAL STREAM AREA(ACRES) = 10.46
PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.18

\*\* 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 1-2.

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 1-3.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 66.70 Tc(MIN.) = 18.25
EFFECTIVE AREA(ACRES) = 37.25 AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 38.4
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1120.00 = 2540.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.25
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.451
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 2.90 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 4.23
EFFECTIVE AREA(ACRES) = 40.15 AREA-AVERAGED Fm(INCH/HR) = 0.53
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 41.3 PEAK FLOW RATE(CFS) = 69.54

\*\*\*\*\*
FLOW PROCESS FROM NODE 1120.00 TO NODE 1130.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 743.48 DOWNSTREAM(FEET) = 741.40
FLOW LENGTH(FEET) = 420.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 32.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.22
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 69.54
PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 19.10
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1130.00 = 2960.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 1130.00 TO NODE 1130.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.10
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.385
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" A 3.21 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 3.21 SUBAREA RUNOFF(CFS) = 5.48
EFFECTIVE AREA(ACRES) = 43.36 AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 44.5 PEAK FLOW RATE(CFS) = 72.63

\*\*\*\*\*
FLOW PROCESS FROM NODE 1130.00 TO NODE 1132.00 IS CODE = 31

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 741.40 DOWNSTREAM(FEET) = 740.70
FLOW LENGTH(FEET) = 165.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.71
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 72.63
PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 19.46
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1132.00 = 3125.00 FEET.

*****
FLOW PROCESS FROM NODE 1132.00 TO NODE 1132.00 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.) = 19.46
RAINFALL INTENSITY(INCH/HR) = 2.36
AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.54
EFFECTIVE STREAM AREA(ACRES) = 43.36
TOTAL STREAM AREA(ACRES) = 44.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 72.63

*****
FLOW PROCESS FROM NODE 1150.00 TO NODE 1152.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 767.40 DOWNSTREAM(FEET) = 760.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.448
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.609
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
"5-7 DWELLINGS/ACRE" A 2.28 0.98 0.500 32 16.45
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 7.00 0.57 0.500 69 16.45
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.67
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 19.00
TOTAL AREA(ACRES) = 9.28 PEAK FLOW RATE(CFS) = 19.00

*****
FLOW PROCESS FROM NODE 1152.00 TO NODE 1152.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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```

=====
MAINLINE Tc(MIN.) = 16.45
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.609
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 6.79 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 6.79 SUBAREA RUNOFF(CFS) = 14.21
EFFECTIVE AREA(ACRES) = 16.07 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 33.22

*****
FLOW PROCESS FROM NODE 1152.00 TO NODE 1152.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.45
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.609
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" A 4.70 0.98 0.500 32
PUBLIC PARK A 1.36 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.579
SUBAREA AREA(ACRES) = 6.06 SUBAREA RUNOFF(CFS) = 11.15
EFFECTIVE AREA(ACRES) = 22.13 AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 22.1 PEAK FLOW RATE(CFS) = 44.37

*****
FLOW PROCESS FROM NODE 1152.00 TO NODE 1154.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 752.00 DOWNSTREAM(FEET) = 740.70
FLOW LENGTH(FEET) = 1050.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.84
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 44.37
PIPE TRAVEL TIME(MIN.) = 1.78 Tc(MIN.) = 18.23
LONGEST FLOWPATH FROM NODE 1150.00 TO NODE 1154.00 = 2050.00 FEET.

*****
FLOW PROCESS FROM NODE 1154.00 TO NODE 1154.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.23

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\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.453  
 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" A 4.00 0.98 0.500 32  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 6.31 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 10.31 SUBAREA RUNOFF(CFS) = 19.40  
 EFFECTIVE AREA(ACRES) = 32.44 AREA-AVERAGED Fm(INCH/HR) = 0.38  
 AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 32.4 PEAK FLOW RATE(CFS) = 60.66

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1154.00 TO NODE 1154.00 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.) = 18.23  
 RAINFALL INTENSITY(INCH/HR) = 2.45  
 AREA-AVERAGED Fm(INCH/HR) = 0.38  
 AREA-AVERAGED Fp(INCH/HR) = 0.73  
 AREA-AVERAGED Ap = 0.51  
 EFFECTIVE STREAM AREA(ACRES) = 32.44  
 TOTAL STREAM AREA(ACRES) = 32.44  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 60.66

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	72.63	19.46	2.359	0.98 ( 0.52)	0.54	43.4	1100.00
1	72.18	19.87	2.329	0.98 ( 0.52)	0.54	43.8	1108.00
1	69.55	21.24	2.238	0.98 ( 0.52)	0.54	44.5	1100.00
2	60.66	18.23	2.453	0.73 ( 0.38)	0.51	32.4	1150.00

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	132.20	18.23	2.453	0.87 ( 0.46)	0.53	73.1	1150.00
2	130.54	19.46	2.359	0.87 ( 0.46)	0.53	75.8	1100.00
3	129.23	19.87	2.329	0.87 ( 0.46)	0.53	76.2	1108.00
4	123.93	21.24	2.238	0.87 ( 0.46)	0.53	76.9	1100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 132.20 Tc(MIN.) = 18.23  
 EFFECTIVE AREA(ACRES) = 73.06 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 76.9

LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1154.00 = 3125.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1154.00 TO NODE 1156.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 740.70 DOWNSTREAM(FEET) = 739.00  
 FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.08  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 132.20  
 PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 18.42  
 LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1156.00 = 3275.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1156.00 TO NODE 1156.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 18.42  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437  
 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" A 6.72 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.72 SUBAREA RUNOFF(CFS) = 11.79  
 EFFECTIVE AREA(ACRES) = 79.78 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 83.7 PEAK FLOW RATE(CFS) = 141.97

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1156.00 TO NODE 1158.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 739.00 DOWNSTREAM(FEET) = 736.86  
 FLOW LENGTH(FEET) = 58.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.63  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 141.97  
 PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 18.46  
 LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1158.00 = 3333.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1158.00 TO NODE 1158.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 18.46  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.434  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.47 0.98 0.100 32  
 COMMERCIAL C 0.46 0.57 0.100 69  
 PUBLIC PARK A 0.82 0.98 0.850 32  
 APARTMENTS C 0.25 0.57 0.200 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.93  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313  
 SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 5.78  
 EFFECTIVE AREA(ACRES) = 82.78 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 86.7 PEAK FLOW RATE(CFS) = 147.49

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1158.00 TO NODE 1160.00 IS CODE = 31  
 -----

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

=====  
 ELEVATION DATA: UPSTREAM(FEET) = 736.86 DOWNSTREAM(FEET) = 735.70  
 FLOW LENGTH(FEET) = 671.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 69.0 INCH PIPE IS 55.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.55  
 ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 147.49  
 PIPE TRAVEL TIME(MIN.) = 1.71 Tc(MIN.) = 20.17  
 LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1160.00 = 4004.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1160.00 TO NODE 1160.00 IS CODE = 81  
 -----

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

=====  
 MAINLINE Tc(MIN.) = 20.17  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.308  
 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" A 6.58 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.58 SUBAREA RUNOFF(CFS) = 10.78  
 EFFECTIVE AREA(ACRES) = 89.36 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 93.2 PEAK FLOW RATE(CFS) = 148.89

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1160.00 TO NODE 1162.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 735.70 DOWNSTREAM(FEET) = 735.43  
 FLOW LENGTH(FEET) = 89.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 49.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.15  
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 148.89  
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 20.35  
 LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1162.00 = 4093.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1162.00 TO NODE 1162.00 IS CODE = 81  
 -----

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

=====  
 MAINLINE Tc(MIN.) = 20.35  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.296  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.72 0.98 0.100 32  
 PUBLIC PARK A 0.42 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.376  
 SUBAREA AREA(ACRES) = 1.14 SUBAREA RUNOFF(CFS) = 1.98  
 EFFECTIVE AREA(ACRES) = 90.50 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 94.4 PEAK FLOW RATE(CFS) = 149.87

=====  
 END OF STUDY SUMMARY:  
 TOTAL AREA(ACRES) = 94.4 TC(MIN.) = 20.35  
 EFFECTIVE AREA(ACRES) = 90.50 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.514  
 PEAK FLOW RATE(CFS) = 149.87

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	149.87	20.35	2.296	0.89( 0.46)	0.51	90.5	1150.00
2	147.58	21.59	2.216	0.89( 0.46)	0.51	93.2	1100.00
3	146.14	22.00	2.191	0.89( 0.46)	0.51	93.7	1108.00
4	140.50	23.38	2.112	0.89( 0.46)	0.52	94.4	1100.00

=====  
 END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

Analysis prepared by:

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

\* NMC-CHINO-EAST \*  
\* 25-YR STUDY \*  
\* AREA 'E' \*  
\*\*\*\*\*

FILE NAME: CHINO.DAT  
TIME/DATE OF STUDY: 17:27 10/16/2011

=====

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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

NO.	WIDTH (FT)	CROWN TO STREET-CROSSFALL (FT)	IN- / OUT- / PARK- SIDE / SIDE / WAY	HEIGHT (FT)	CURB GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	20.0	15.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
2	32.0	27.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*

FLOW PROCESS FROM NODE 1100.00 TO NODE 1102.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 850.00  
ELEVATION DATA: UPSTREAM(FEET) = 777.06 DOWNSTREAM(FEET) = 769.79

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.972  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.163  
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  
"5-7 DWELLINGS/ACRE" A 5.60 0.98 0.500 32 14.97  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 8.44  
TOTAL AREA(ACRES) = 5.60 PEAK FLOW RATE(CFS) = 8.44

\*\*\*\*\*

FLOW PROCESS FROM NODE 1102.00 TO NODE 1104.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 762.04 DOWNSTREAM(FEET) = 760.46  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.61  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 8.44  
PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 15.19  
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1104.00 = 950.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1104.00 TO NODE 1104.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.19  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.144  
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" A 3.11 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 3.11 SUBAREA RUNOFF(CFS) = 4.64  
EFFECTIVE AREA(ACRES) = 8.71 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 12.99

\*\*\*\*\*

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FLOW PROCESS FROM NODE 1104.00 TO NODE 1106.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 760.46 DOWNSTREAM(FEET) = 757.11
FLOW LENGTH(FEET) = 260.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.81
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.99
PIPE TRAVEL TIME(MIN.) = 0.55 Tc(MIN.) = 15.75
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1106.00 = 1210.00 FEET.

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*****
FLOW PROCESS FROM NODE 1106.00 TO NODE 1106.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.75
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.098
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" A 1.72 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 1.72 SUBAREA RUNOFF(CFS) = 2.49
EFFECTIVE AREA(ACRES) = 10.43 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 10.4 PEAK FLOW RATE(CFS) = 15.12

```

```

*****
FLOW PROCESS FROM NODE 1106.00 TO NODE 1110.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 757.11 DOWNSTREAM(FEET) = 751.92
FLOW LENGTH(FEET) = 340.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.60
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.12
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 16.41
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1110.00 = 1550.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 1110.00 TO NODE 1110.00 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.) = 16.41

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RAINFALL INTENSITY(INCH/HR) = 2.05
AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 10.43
TOTAL STREAM AREA(ACRES) = 10.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.12

```

```

*****
FLOW PROCESS FROM NODE 1100.00 TO NODE 1112.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 777.06 DOWNSTREAM(FEET) = 767.26

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.549
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.114
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
"5-7 DWELLINGS/ACRE" A 2.38 0.98 0.500 32 15.55
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 3.48
TOTAL AREA(ACRES) = 2.38 PEAK FLOW RATE(CFS) = 3.48

```

```

*****
FLOW PROCESS FROM NODE 1112.00 TO NODE 1110.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 767.26 DOWNSTREAM ELEVATION(FEET) = 763.22
STREET LENGTH(FEET) = 430.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 15.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(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) = 5.60
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 13.82
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.67
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.16
STREET FLOW TRAVEL TIME(MIN.) = 2.68 Tc(MIN.) = 18.23

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* 25 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
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  A        3.28    0.98    0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 3.28    SUBAREA RUNOFF(CFS) = 4.23
EFFECTIVE AREA(ACRES) = 5.66    AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98    AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 5.7    PEAK FLOW RATE(CFS) = 7.31

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47    HALFSTREET FLOOD WIDTH(FEET) = 15.40
FLOW VELOCITY(FEET/SEC.) = 2.85    DEPTH*VELOCITY(FT*FT/SEC.) = 1.33
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1110.00 = 1430.00 FEET.

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```

*****
FLOW PROCESS FROM NODE 1110.00 TO NODE 1110.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.23
* 25 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
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  A        1.93    0.98    0.500    32
PUBLIC PARK           A        1.85    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.671
SUBAREA AREA(ACRES) = 3.78    SUBAREA RUNOFF(CFS) = 4.31
EFFECTIVE AREA(ACRES) = 9.44    AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.98    AREA-AVERAGED Ap = 0.57
TOTAL AREA(ACRES) = 9.4    PEAK FLOW RATE(CFS) = 11.62

*****
FLOW PROCESS FROM NODE 1110.00 TO NODE 1110.00 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.) = 18.23
RAINFALL INTENSITY(INCH/HR) = 1.92
AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.57
EFFECTIVE STREAM AREA(ACRES) = 9.44
TOTAL STREAM AREA(ACRES) = 9.44
PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.62

```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	15.12	16.41	2.048	0.98 (0.49)	0.50	10.4	1100.00
2	11.62	18.23	1.922	0.98 (0.55)	0.57	9.4	1100.00

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

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** PEAK FLOW RATE TABLE **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	26.54	16.41	2.048	0.98 (0.52)	0.53	18.9	1100.00
2	25.52	18.23	1.922	0.98 (0.52)	0.53	19.9	1100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 26.54 Tc(MIN.) = 16.41  
EFFECTIVE AREA(ACRES) = 18.92 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 19.9  
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1110.00 = 1550.00 FEET.

```

*****
FLOW PROCESS FROM NODE 1110.00 TO NODE 1116.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 751.92    DOWNSTREAM(FEET) = 748.58
FLOW LENGTH(FEET) = 560.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.91
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.54
PIPE TRAVEL TIME(MIN.) = 1.35    Tc(MIN.) = 17.76
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1116.00 = 2110.00 FEET.

*****
FLOW PROCESS FROM NODE 1116.00 TO NODE 1116.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.76
* 25 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
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  A        8.06    0.98    0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 8.06    SUBAREA RUNOFF(CFS) = 10.63
EFFECTIVE AREA(ACRES) = 26.98    AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.98    AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 27.9    PEAK FLOW RATE(CFS) = 35.07

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FLOW PROCESS FROM NODE 1116.00 TO NODE 1120.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 748.58 DOWNSTREAM(FEET) = 743.48
FLOW LENGTH(FEET) = 430.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.65
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 35.07
PIPE TRAVEL TIME(MIN.) = 0.74 Tc(MIN.) = 18.50
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1120.00 = 2540.00 FEET.

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```

*****
FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 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.) = 18.50
RAINFALL INTENSITY(INCH/HR) = 1.91
AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.52
EFFECTIVE STREAM AREA(ACRES) = 26.98
TOTAL STREAM AREA(ACRES) = 27.93
PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.07

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*****
FLOW PROCESS FROM NODE 1108.00 TO NODE 1122.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 750.00
ELEVATION DATA: UPSTREAM(FEET) = 768.75 DOWNSTREAM(FEET) = 763.66

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.916
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.168
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
"5-7 DWELLINGS/ACRE" A 2.28 0.98 0.500 32 14.92
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 3.45
TOTAL AREA(ACRES) = 2.28 PEAK FLOW RATE(CFS) = 3.45

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*****
FLOW PROCESS FROM NODE 1122.00 TO NODE 1124.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

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>>>>(STREET TABLE SECTION # 1 USED)<<<<
-----
UPSTREAM ELEVATION(FEET) = 763.66 DOWNSTREAM ELEVATION(FEET) = 757.70
STREET LENGTH(FEET) = 340.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 20.00
-----
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 15.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
-----
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(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) = 4.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.38
HALFSTREET FLOOD WIDTH(FEET) = 10.95
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.24
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.22
STREET FLOW TRAVEL TIME(MIN.) = 1.75 Tc(MIN.) = 16.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.028
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" A 1.51 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 1.51 SUBAREA RUNOFF(CFS) = 2.09
EFFECTIVE AREA(ACRES) = 3.79 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 3.8 PEAK FLOW RATE(CFS) = 5.26

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 11.77
FLOW VELOCITY(FEET/SEC.) = 3.34 DEPTH*VELOCITY(FT*FT/SEC.) = 1.31
LONGEST FLOWPATH FROM NODE 1108.00 TO NODE 1124.00 = 1090.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 1124.00 TO NODE 1120.00 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) = 751.34 DOWNSTREAM(FEET) = 743.48
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.73
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.26
PIPE TRAVEL TIME(MIN.) = 2.27 Tc(MIN.) = 18.93
LONGEST FLOWPATH FROM NODE 1108.00 TO NODE 1120.00 = 1870.00 FEET.

```



\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 IS CODE = 81

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

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 18.93  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.879  
 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" A 6.67 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.67 SUBAREA RUNOFF(CFS) = 8.35  
 EFFECTIVE AREA(ACRES) = 10.46 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 13.10

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 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.) = 18.93  
 RAINFALL INTENSITY(INCH/HR) = 1.88  
 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA(ACRES) = 10.46  
 TOTAL STREAM AREA(ACRES) = 10.46  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.10

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	35.07	18.50	1.905	0.98 (0.51)	0.52	27.0	1100.00
1	33.45	20.34	1.800	0.98 (0.51)	0.52	27.9	1100.00
2	13.10	18.93	1.879	0.98 (0.49)	0.50	10.5	1108.00

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	48.11	18.50	1.905	0.98 (0.50)	0.52	37.2	1100.00
2	47.78	18.93	1.879	0.98 (0.50)	0.52	37.7	1108.00
3	45.80	20.34	1.800	0.98 (0.50)	0.52	38.4	1100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 48.11 Tc(MIN.) = 18.50  
 EFFECTIVE AREA(ACRES) = 37.20 AREA-AVERAGED Fm(INCH/HR) = 0.50

AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 38.4  
 LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1120.00 = 2540.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1120.00 TO NODE 1120.00 IS CODE = 81

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

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 18.50  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.905  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 PUBLIC PARK A 2.90 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 2.81  
 EFFECTIVE AREA(ACRES) = 40.10 AREA-AVERAGED Fm(INCH/HR) = 0.53  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 41.3 PEAK FLOW RATE(CFS) = 49.77

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1120.00 TO NODE 1130.00 IS CODE = 31

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 743.48 DOWNSTREAM(FEET) = 741.40  
 FLOW LENGTH(FEET) = 420.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.52  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 49.77  
 PIPE TRAVEL TIME(MIN.) = 0.93 Tc(MIN.) = 19.43  
 LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1130.00 = 2960.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1130.00 TO NODE 1130.00 IS CODE = 81

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

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 19.43  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.850  
 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" A 3.21 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 3.21 SUBAREA RUNOFF(CFS) = 3.94  
 EFFECTIVE AREA(ACRES) = 43.31 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 44.5 PEAK FLOW RATE(CFS) = 51.71

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1130.00 TO NODE 1132.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 741.40 DOWNSTREAM(FEET) = 740.70  
FLOW LENGTH(FEET) = 165.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.23  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 51.71  
PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 19.81  
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1132.00 = 3125.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1132.00 TO NODE 1132.00 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.) = 19.81  
RAINFALL INTENSITY(INCH/HR) = 1.83  
AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.54  
EFFECTIVE STREAM AREA(ACRES) = 43.31  
TOTAL STREAM AREA(ACRES) = 44.50  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 51.71

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1150.00 TO NODE 1152.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 767.40 DOWNSTREAM(FEET) = 760.00

$Tc = K * [(LENGTH * 3.00) / (ELEVATION CHANGE)]^{0.20}$   
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.448  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.044  
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  
"5-7 DWELLINGS/ACRE" A 2.28 0.98 0.500 32 16.45  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 7.00 0.57 0.500 69 16.45  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.67  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 14.29  
TOTAL AREA(ACRES) = 9.28 PEAK FLOW RATE(CFS) = 14.29

\*\*\*\*\*

FLOW PROCESS FROM NODE 1152.00 TO NODE 1152.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 16.45  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.044  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 6.79 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 6.79 SUBAREA RUNOFF(CFS) = 10.76  
EFFECTIVE AREA(ACRES) = 16.07 AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 25.05

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1152.00 TO NODE 1152.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 16.45  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.044  
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" A 4.70 0.98 0.500 32  
PUBLIC PARK A 1.36 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.579  
SUBAREA AREA(ACRES) = 6.06 SUBAREA RUNOFF(CFS) = 8.07  
EFFECTIVE AREA(ACRES) = 22.13 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 22.1 PEAK FLOW RATE(CFS) = 33.13

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1152.00 TO NODE 1154.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 752.00 DOWNSTREAM(FEET) = 740.70  
FLOW LENGTH(FEET) = 1050.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.18  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 33.13  
PIPE TRAVEL TIME(MIN.) = 1.91 Tc(MIN.) = 18.35  
LONGEST FLOWPATH FROM NODE 1150.00 TO NODE 1154.00 = 2050.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1154.00 TO NODE 1154.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 18.35
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.914
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" A 4.00 0.98 0.500 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 6.31 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 10.31 SUBAREA RUNOFF(CFS) = 14.40
EFFECTIVE AREA(ACRES) = 32.44 AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 32.4 PEAK FLOW RATE(CFS) = 44.93

\*\*\*\*\*
FLOW PROCESS FROM NODE 1154.00 TO NODE 1154.00 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.) = 18.35
RAINFALL INTENSITY(INCH/HR) = 1.91
AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.73
AREA-AVERAGED Ap = 0.51
EFFECTIVE STREAM AREA(ACRES) = 32.44
TOTAL STREAM AREA(ACRES) = 32.44
PEAK FLOW RATE(CFS) AT CONFLUENCE = 44.93

\*\* 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 4 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 4 rows of data.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 95.99 Tc(MIN.) = 18.35

EFFECTIVE AREA(ACRES) = 72.57 AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 76.9
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1154.00 = 3125.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 1154.00 TO NODE 1156.00 IS CODE = 31
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 740.70 DOWNSTREAM(FEET) = 739.00
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.01
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 95.99
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 18.56
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1156.00 = 3275.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 1156.00 TO NODE 1156.00 IS CODE = 81
-----

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

=====

MAINLINE Tc(MIN.) = 18.56
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.901
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" A 6.72 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 6.72 SUBAREA RUNOFF(CFS) = 8.55
EFFECTIVE AREA(ACRES) = 79.29 AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 83.7 PEAK FLOW RATE(CFS) = 102.87

\*\*\*\*\*
FLOW PROCESS FROM NODE 1156.00 TO NODE 1158.00 IS CODE = 31
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 739.00 DOWNSTREAM(FEET) = 736.86
FLOW LENGTH(FEET) = 58.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.29
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 102.87
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 18.61
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1158.00 = 3333.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 1158.00 TO NODE 1158.00 IS CODE = 81

```

-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 18.61
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.898
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            A      1.47      0.98      0.100      32
COMMERCIAL            C      0.46      0.57      0.100      69
PUBLIC PARK           A      0.82      0.98      0.850      32
APARTMENTS            C      0.25      0.57      0.200      69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.93
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313
SUBAREA AREA(ACRES) = 3.00      SUBAREA RUNOFF(CFS) = 4.34
EFFECTIVE AREA(ACRES) = 82.29      AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.88      AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 86.7      PEAK FLOW RATE(CFS) = 106.99
*****
FLOW PROCESS FROM NODE 1158.00 TO NODE 1160.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 736.86 DOWNSTREAM(FEET) = 735.70
FLOW LENGTH(FEET) = 671.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.13
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 106.99
PIPE TRAVEL TIME(MIN.) = 1.82 Tc(MIN.) = 20.44
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1160.00 = 4004.00 FEET.
*****
FLOW PROCESS FROM NODE 1160.00 TO NODE 1160.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 20.44
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.795
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL          A      6.58      0.98      0.500      32
"5-7 DWELLINGS/ACRE"
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 6.58      SUBAREA RUNOFF(CFS) = 7.74
EFFECTIVE AREA(ACRES) = 88.87      AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.88      AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 93.2      PEAK FLOW RATE(CFS) = 107.05
*****
FLOW PROCESS FROM NODE 1160.00 TO NODE 1162.00 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) = 735.70 DOWNSTREAM(FEET) = 735.43
FLOW LENGTH(FEET) = 89.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.58
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 107.05
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 20.63
LONGEST FLOWPATH FROM NODE 1100.00 TO NODE 1162.00 = 4093.00 FEET.
*****
FLOW PROCESS FROM NODE 1162.00 TO NODE 1162.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 20.63
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.784
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            A      0.72      0.98      0.100      32
PUBLIC PARK           A      0.42      0.98      0.850      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.376
SUBAREA AREA(ACRES) = 1.14      SUBAREA RUNOFF(CFS) = 1.45
EFFECTIVE AREA(ACRES) = 90.01      AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.89      AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 94.4      PEAK FLOW RATE(CFS) = 107.69
-----
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 94.4 TC(MIN.) = 20.63
EFFECTIVE AREA(ACRES) = 90.01 AREA-AVERAGED Fm(INCH/HR)= 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.514
PEAK FLOW RATE(CFS) = 107.69
** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap  Ae  HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1      107.69  20.63  1.784  0.89( 0.45)  0.51  90.0  1150.00
2      105.28  22.09  1.713  0.89( 0.46)  0.51  93.2  1100.00
3      104.08  22.54  1.692  0.89( 0.46)  0.51  93.7  1108.00
4      99.45   24.01  1.629  0.89( 0.46)  0.52  94.4  1100.00
-----
END OF RATIONAL METHOD ANALYSIS

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* EDISON \*  
\* 10-YR STUDY \*  
\* AREA 'D' \*  
\*\*\*\*\*

FILE NAME: EDI.DAT  
TIME/DATE OF STUDY: 17:17 10/16/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
  
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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- / SIDE / SIDE / WAY	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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1300.00 TO NODE 1302.00 IS CODE = 21  
-----

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

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 590.00  
ELEVATION DATA: UPSTREAM(FEET) = 724.00 DOWNSTREAM(FEET) = 722.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.967  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.006  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	2.00	0.98	0.200	32	12.97
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	3.50	0.57	0.200	69	12.97

  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.71  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 9.22  
TOTAL AREA(ACRES) = 5.50 PEAK FLOW RATE(CFS) = 9.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1302.00 TO NODE 1304.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
===== ELEVATION DATA: UPSTREAM(FEET) = 722.00 DOWNSTREAM(FEET) = 719.00  
FLOW LENGTH(FEET) = 520.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.28  
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 9.22  
PIPE TRAVEL TIME(MIN.) = 1.64 Tc(MIN.) = 14.61  
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1304.00 = 1110.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1304.00 TO NODE 1304.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
===== MAINLINE Tc(MIN.) = 14.61  
\* 10 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
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	5.30	0.98	0.200	32

  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 5.30 SUBAREA RUNOFF(CFS) = 7.98  
EFFECTIVE AREA(ACRES) = 10.80 AREA-AVERAGED Fm(INCH/HR) = 0.17  
AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 10.8 PEAK FLOW RATE(CFS) = 16.51

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1304.00 TO NODE 1306.00 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) = 719.00 DOWNSTREAM(FEET) = 712.00
FLOW LENGTH(FEET) = 521.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.24
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.51
PIPE TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 15.66
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1306.00 = 1631.00 FEET.

*****
FLOW PROCESS FROM NODE 1306.00 TO NODE 1306.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.66
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.791
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 1.84 0.98 0.850 32
COMMERCIAL A 2.39 0.98 0.100 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 10.47 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.479
SUBAREA AREA(ACRES) = 14.70 SUBAREA RUNOFF(CFS) = 17.52
EFFECTIVE AREA(ACRES) = 25.50 AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 25.5 PEAK FLOW RATE(CFS) = 33.29

*****
FLOW PROCESS FROM NODE 1306.00 TO NODE 1308.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 712.00 DOWNSTREAM(FEET) = 710.00
FLOW LENGTH(FEET) = 520.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.23
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 33.29
PIPE TRAVEL TIME(MIN.) = 1.39 Tc(MIN.) = 17.05
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1308.00 = 2151.00 FEET.

*****
FLOW PROCESS FROM NODE 1308.00 TO NODE 1308.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.05
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.702

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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 A 3.88 0.98 0.100 32
PUBLIC PARK A 5.13 0.98 0.850 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 1.29 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524
SUBAREA AREA(ACRES) = 10.30 SUBAREA RUNOFF(CFS) = 11.04
EFFECTIVE AREA(ACRES) = 35.80 AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 35.8 PEAK FLOW RATE(CFS) = 42.29

*****
FLOW PROCESS FROM NODE 1308.00 TO NODE 1310.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 710.00 DOWNSTREAM(FEET) = 707.00
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.60
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 42.29
PIPE TRAVEL TIME(MIN.) = 1.97 Tc(MIN.) = 19.02
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1310.00 = 2931.00 FEET.

*****
FLOW PROCESS FROM NODE 1310.00 TO NODE 1310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.02
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.594
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 4.53 0.98 0.100 32
PUBLIC PARK A 1.03 0.98 0.850 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 24.44 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.452
SUBAREA AREA(ACRES) = 30.00 SUBAREA RUNOFF(CFS) = 31.14
EFFECTIVE AREA(ACRES) = 65.80 AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 65.8 PEAK FLOW RATE(CFS) = 69.95

*****
FLOW PROCESS FROM NODE 1310.00 TO NODE 1312.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

```



ELEVATION DATA: UPSTREAM(FEET) = 707.00 DOWNSTREAM(FEET) = 706.00  
 FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.44  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 69.95  
 PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 19.40  
 LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1312.00 = 3121.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1312.00 TO NODE 1312.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.40  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.575  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	3.08	0.98	0.100	32
PUBLIC PARK	A	1.34	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.327  
 SUBAREA AREA(ACRES) = 4.42 SUBAREA RUNOFF(CFS) = 5.00  
 EFFECTIVE AREA(ACRES) = 70.22 AREA-AVERAGED Fm(INCH/HR) = 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA(ACRES) = 70.2 PEAK FLOW RATE(CFS) = 73.84

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 70.2 TC(MIN.) = 19.40  
 EFFECTIVE AREA(ACRES) = 70.22 AREA-AVERAGED Fm(INCH/HR)= 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.421  
 PEAK FLOW RATE(CFS) = 73.84

=====

END OF RATIONAL METHOD ANALYSIS



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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* EDISON \*  
\* 100-YR STUDY \*  
\* AREA 'D' \*  
\*\*\*\*\*

FILE NAME: EDI.DAT  
TIME/DATE OF STUDY: 17:03 10/16/2011

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

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
  
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GUTTER LIP (FT)	GEOMETRIES 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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1300.00 TO NODE 1302.00 IS CODE = 21  
-----

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

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 590.00  
ELEVATION DATA: UPSTREAM(FEET) = 724.00 DOWNSTREAM(FEET) = 722.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.967  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.009  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	2.00	0.98	0.200	32	12.97
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	3.50	0.57	0.200	69	12.97

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.71  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 14.18  
TOTAL AREA(ACRES) = 5.50 PEAK FLOW RATE(CFS) = 14.18

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1302.00 TO NODE 1304.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
===== ELEVATION DATA: UPSTREAM(FEET) = 722.00 DOWNSTREAM(FEET) = 719.00  
FLOW LENGTH(FEET) = 520.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.84  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 14.18  
PIPE TRAVEL TIME(MIN.) = 1.48 Tc(MIN.) = 14.45  
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1304.00 = 1110.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1304.00 TO NODE 1304.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
===== MAINLINE Tc(MIN.) = 14.45  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.819  
SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	5.30	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 5.30 SUBAREA RUNOFF(CFS) = 12.52  
EFFECTIVE AREA(ACRES) = 10.80 AREA-AVERAGED Fm(INCH/HR) = 0.17  
AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 10.8 PEAK FLOW RATE(CFS) = 25.77

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1304.00 TO NODE 1306.00 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) = 719.00 DOWNSTREAM(FEET) = 712.00
FLOW LENGTH(FEET) = 521.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.42
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 25.77
PIPE TRAVEL TIME(MIN.) = 0.92 Tc(MIN.) = 15.37
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1306.00 = 1631.00 FEET.

*****
FLOW PROCESS FROM NODE 1306.00 TO NODE 1306.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.37
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.717
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 1.84 0.98 0.850 32
COMMERCIAL A 2.39 0.98 0.100 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 10.47 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.479
SUBAREA AREA(ACRES) = 14.70 SUBAREA RUNOFF(CFS) = 29.76
EFFECTIVE AREA(ACRES) = 25.50 AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 25.5 PEAK FLOW RATE(CFS) = 54.53

*****
FLOW PROCESS FROM NODE 1306.00 TO NODE 1308.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 712.00 DOWNSTREAM(FEET) = 710.00
FLOW LENGTH(FEET) = 520.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.98
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 54.53
PIPE TRAVEL TIME(MIN.) = 1.24 Tc(MIN.) = 16.61
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1308.00 = 2151.00 FEET.

*****
FLOW PROCESS FROM NODE 1308.00 TO NODE 1308.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.61
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.593

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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 A 3.88 0.98 0.100 32
PUBLIC PARK A 5.13 0.98 0.850 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 1.29 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524
SUBAREA AREA(ACRES) = 10.30 SUBAREA RUNOFF(CFS) = 19.30
EFFECTIVE AREA(ACRES) = 35.80 AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 35.8 PEAK FLOW RATE(CFS) = 71.00

*****
FLOW PROCESS FROM NODE 1308.00 TO NODE 1310.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 710.00 DOWNSTREAM(FEET) = 707.00
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.34
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 71.00
PIPE TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 18.38
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1310.00 = 2931.00 FEET.

*****
FLOW PROCESS FROM NODE 1310.00 TO NODE 1310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.38
* 100 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 A 4.53 0.98 0.100 32
PUBLIC PARK A 1.03 0.98 0.850 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 24.44 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.452
SUBAREA AREA(ACRES) = 30.00 SUBAREA RUNOFF(CFS) = 53.99
EFFECTIVE AREA(ACRES) = 65.80 AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 65.8 PEAK FLOW RATE(CFS) = 120.07

*****
FLOW PROCESS FROM NODE 1310.00 TO NODE 1312.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

```

ELEVATION DATA: UPSTREAM(FEET) = 707.00 DOWNSTREAM(FEET) = 706.00  
 FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 39.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.61  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 120.07  
 PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 18.71  
 LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1312.00 = 3121.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1312.00 TO NODE 1312.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 18.71  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.414  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	3.08	0.98	0.100	32
PUBLIC PARK	A	1.34	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.327  
 SUBAREA AREA(ACRES) = 4.42 SUBAREA RUNOFF(CFS) = 8.33  
 EFFECTIVE AREA(ACRES) = 70.22 AREA-AVERAGED Fm(INCH/HR) = 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA(ACRES) = 70.2 PEAK FLOW RATE(CFS) = 126.87

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 70.2 TC(MIN.) = 18.71  
 EFFECTIVE AREA(ACRES) = 70.22 AREA-AVERAGED Fm(INCH/HR)= 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.421  
 PEAK FLOW RATE(CFS) = 126.87

=====

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* EDISON \*  
\* 25-YR STUDY \*  
\* AREA 'D' \*  
\*\*\*\*\*

FILE NAME: EDI.DAT  
TIME/DATE OF STUDY: 17:19 10/16/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*  
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING  
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR  
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)  
=== =====  
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1300.00 TO NODE 1302.00 IS CODE = 21

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

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 590.00  
ELEVATION DATA: UPSTREAM(FEET) = 724.00 DOWNSTREAM(FEET) = 722.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.967  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.358  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 2.00 0.98 0.200 32 12.97  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 3.50 0.57 0.200 69 12.97  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.71  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 10.96  
TOTAL AREA(ACRES) = 5.50 PEAK FLOW RATE(CFS) = 10.96

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1302.00 TO NODE 1304.00 IS CODE = 31

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

===== ELEVATION DATA: UPSTREAM(FEET) = 722.00 DOWNSTREAM(FEET) = 719.00  
FLOW LENGTH(FEET) = 520.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.40  
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 10.96  
PIPE TRAVEL TIME(MIN.) = 1.60 Tc(MIN.) = 14.57  
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1304.00 = 1110.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1304.00 TO NODE 1304.00 IS CODE = 81

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

===== MAINLINE Tc(MIN.) = 14.57  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.198  
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" A 5.30 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 5.30 SUBAREA RUNOFF(CFS) = 9.56  
EFFECTIVE AREA(ACRES) = 10.80 AREA-AVERAGED Fm(INCH/HR) = 0.17  
AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 10.8 PEAK FLOW RATE(CFS) = 19.73



\*\*\*\*\*  
FLOW PROCESS FROM NODE 1304.00 TO NODE 1306.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	719.00	DOWNSTREAM(FEET) =	712.00
FLOW LENGTH(FEET) =	521.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS	16.1 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	8.78		
ESTIMATED PIPE DIAMETER(INCH) =	24.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	19.73		
PIPE TRAVEL TIME(MIN.) =	0.99	Tc(MIN.) =	15.56
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1306.00 =	1631.00 FEET.		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1306.00 TO NODE 1306.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) =	15.56				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	2.114				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
PUBLIC PARK	A	1.84	0.98	0.850	32
COMMERCIAL	A	2.39	0.98	0.100	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	10.47	0.98	0.500	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.98				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.479				
SUBAREA AREA(ACRES) =	14.70	SUBAREA RUNOFF(CFS) =	21.79		
EFFECTIVE AREA(ACRES) =	25.50	AREA-AVERAGED Fm(INCH/HR) =	0.34		
AREA-AVERAGED Fp(INCH/HR) =	0.94	AREA-AVERAGED Ap =	0.36		
TOTAL AREA(ACRES) =	25.5	PEAK FLOW RATE(CFS) =	40.69		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1306.00 TO NODE 1308.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	712.00	DOWNSTREAM(FEET) =	710.00
FLOW LENGTH(FEET) =	520.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS	27.3 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	6.56		
ESTIMATED PIPE DIAMETER(INCH) =	39.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	40.69		
PIPE TRAVEL TIME(MIN.) =	1.32	Tc(MIN.) =	16.88
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1308.00 =	2151.00 FEET.		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1308.00 TO NODE 1308.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.88  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.013  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	3.88	0.98	0.100	32
PUBLIC PARK	A	5.13	0.98	0.850	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	1.29	0.98	0.500	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.97				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.524				
SUBAREA AREA(ACRES) =	10.30	SUBAREA RUNOFF(CFS) =	13.92		
EFFECTIVE AREA(ACRES) =	35.80	AREA-AVERAGED Fm(INCH/HR) =	0.39		
AREA-AVERAGED Fp(INCH/HR) =	0.96	AREA-AVERAGED Ap =	0.41		
TOTAL AREA(ACRES) =	35.8	PEAK FLOW RATE(CFS) =	52.30		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1308.00 TO NODE 1310.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	710.00	DOWNSTREAM(FEET) =	707.00
FLOW LENGTH(FEET) =	780.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS	30.7 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	6.95		
ESTIMATED PIPE DIAMETER(INCH) =	42.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	52.30		
PIPE TRAVEL TIME(MIN.) =	1.87	Tc(MIN.) =	18.75
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1310.00 =	2931.00 FEET.		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1310.00 TO NODE 1310.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) =	18.75				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.890				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	4.53	0.98	0.100	32
PUBLIC PARK	A	1.03	0.98	0.850	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	24.44	0.98	0.500	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.98				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.452				
SUBAREA AREA(ACRES) =	30.00	SUBAREA RUNOFF(CFS) =	39.13		
EFFECTIVE AREA(ACRES) =	65.80	AREA-AVERAGED Fm(INCH/HR) =	0.41		
AREA-AVERAGED Fp(INCH/HR) =	0.96	AREA-AVERAGED Ap =	0.43		
TOTAL AREA(ACRES) =	65.8	PEAK FLOW RATE(CFS) =	87.47		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1310.00 TO NODE 1312.00 IS CODE = 31

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

```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 707.00 DOWNSTREAM(FEET) = 706.00
FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.88
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 87.47
PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 19.11
LONGEST FLOWPATH FROM NODE 1300.00 TO NODE 1312.00 = 3121.00 FEET.

*****
FLOW PROCESS FROM NODE 1312.00 TO NODE 1312.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.11
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.868
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 3.08 0.98 0.100 32
PUBLIC PARK A 1.34 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.327
SUBAREA AREA(ACRES) = 4.42 SUBAREA RUNOFF(CFS) = 6.16
EFFECTIVE AREA(ACRES) = 70.22 AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 70.2 PEAK FLOW RATE(CFS) = 92.37
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 70.2 TC(MIN.) = 19.11
EFFECTIVE AREA(ACRES) = 70.22 AREA-AVERAGED Fm(INCH/HR)= 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.421
PEAK FLOW RATE(CFS) = 92.37
=====
END OF RATIONAL METHOD ANALYSIS

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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* EUCALYPTUS AVE. \*  
\* 10-YR STUDY \*  
\* AREA 'I' \*  
\*\*\*\*\*

FILE NAME: EUCAL.DAT  
TIME/DATE OF STUDY: 08:32 10/17/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
  
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GUTTER GEOMETRIES LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1500.00 TO NODE 1502.00 IS CODE = 21  
-----

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

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 698.00  
ELEVATION DATA: UPSTREAM(FEET) = 698.50 DOWNSTREAM(FEET) = 694.80

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.683  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.033  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	5.30	0.98	0.200	32	12.68

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 8.77  
TOTAL AREA(ACRES) = 5.30 PEAK FLOW RATE(CFS) = 8.77

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1502.00 TO NODE 1504.00 IS CODE = 31  
-----

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

===== ELEVATION DATA: UPSTREAM(FEET) = 691.80 DOWNSTREAM(FEET) = 686.00  
FLOW LENGTH(FEET) = 210.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.50  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 8.77  
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 13.05  
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1504.00 = 908.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1504.00 TO NODE 1504.00 IS CODE = 81  
-----

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

===== MAINLINE Tc(MIN.) = 13.05  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.998  
SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	2.82	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 2.82 SUBAREA RUNOFF(CFS) = 4.58  
EFFECTIVE AREA(ACRES) = 8.12 AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 8.1 PEAK FLOW RATE(CFS) = 13.18

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1504.00 TO NODE 1504.00 IS CODE = 81  
-----

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.05
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.998
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"    A        1.55     0.98     0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.55      SUBAREA RUNOFF(CFS) = 2.52
EFFECTIVE AREA(ACRES) = 9.67    AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 9.7        PEAK FLOW RATE(CFS) = 15.69

*****
FLOW PROCESS FROM NODE 1504.00 TO NODE 1506.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 686.00  DOWNSTREAM(FEET) = 681.00
FLOW LENGTH(FEET) = 389.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.04
ESTIMATED PIPE DIAMETER(INCH) = 21.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.69
PIPE TRAVEL TIME(MIN.) = 0.81  Tc(MIN.) = 13.86
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1506.00 = 1297.00 FEET.

*****
FLOW PROCESS FROM NODE 1506.00 TO NODE 1506.00 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.) = 13.86
RAINFALL INTENSITY(INCH/HR) = 1.93
AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.20
EFFECTIVE STREAM AREA(ACRES) = 9.67
TOTAL STREAM AREA(ACRES) = 9.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.69

*****
FLOW PROCESS FROM NODE 1510.00 TO NODE 1512.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 851.00
ELEVATION DATA: UPSTREAM(FEET) = 697.00  DOWNSTREAM(FEET) = 692.70

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.006
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.002
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              A        2.00     0.98     0.100    32  13.01
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        3.81     0.98     0.200    32  13.86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.166
SUBAREA RUNOFF(CFS) = 9.63
TOTAL AREA(ACRES) = 5.81  PEAK FLOW RATE(CFS) = 9.63

*****
FLOW PROCESS FROM NODE 1512.00 TO NODE 1506.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 688.70  DOWNSTREAM(FEET) = 681.00
FLOW LENGTH(FEET) = 235.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.37
ESTIMATED PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.63
PIPE TRAVEL TIME(MIN.) = 0.38  Tc(MIN.) = 13.38
LONGEST FLOWPATH FROM NODE 1510.00 TO NODE 1506.00 = 1086.00 FEET.

*****
FLOW PROCESS FROM NODE 1506.00 TO NODE 1506.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.38
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.968
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"    A        1.57     0.98     0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.57      SUBAREA RUNOFF(CFS) = 2.51
EFFECTIVE AREA(ACRES) = 7.38    AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 7.4        PEAK FLOW RATE(CFS) = 11.95

*****
FLOW PROCESS FROM NODE 1506.00 TO NODE 1506.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2

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CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 13.38  
 RAINFALL INTENSITY(INCH/HR) = 1.97  
 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.17  
 EFFECTIVE STREAM AREA(ACRES) = 7.38  
 TOTAL STREAM AREA(ACRES) = 7.38  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.95

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	15.69	13.86	1.927	0.98 (0.20)	0.20	9.7	1500.00
2	11.95	13.38	1.968	0.98 (0.17)	0.17	7.4	1510.00

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	27.46	13.38	1.968	0.98 (0.18)	0.19	16.7	1510.00
2	27.37	13.86	1.927	0.97 (0.18)	0.19	17.0	1500.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 27.46 Tc(MIN.) = 13.38  
 EFFECTIVE AREA(ACRES) = 16.72 AREA-AVERAGED Fm(INCH/HR) = 0.18  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.19  
 TOTAL AREA(ACRES) = 17.0  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1506.00 = 1297.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1506.00 TO NODE 1514.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 681.00 DOWNSTREAM(FEET) = 680.00  
 FLOW LENGTH(FEET) = 261.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.90  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 27.46  
 PIPE TRAVEL TIME(MIN.) = 0.74 Tc(MIN.) = 14.12  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1514.00 = 1558.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1514.00 TO NODE 1514.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.12  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.906  
 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"	A	4.22	0.98	0.200	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA(ACRES) =		4.22	SUBAREA RUNOFF(CFS) =		6.50
EFFECTIVE AREA(ACRES) =		20.94	AREA-AVERAGED Fm(INCH/HR) =		0.19
AREA-AVERAGED Fp(INCH/HR) =		0.98	AREA-AVERAGED Ap =		0.19
TOTAL AREA(ACRES) =		21.3	PEAK FLOW RATE(CFS) =		32.42

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1514.00 TO NODE 1516.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 680.00 DOWNSTREAM(FEET) = 674.00  
 FLOW LENGTH(FEET) = 415.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.08  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 32.42  
 PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 14.81  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1516.00 = 1973.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.81  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.852  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.54 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 1.54 SUBAREA RUNOFF(CFS) = 2.43  
 EFFECTIVE AREA(ACRES) = 22.48 AREA-AVERAGED Fm(INCH/HR) = 0.18  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.18  
 TOTAL AREA(ACRES) = 22.8 PEAK FLOW RATE(CFS) = 33.84

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.81  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.852  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.40 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 1.40 SUBAREA RUNOFF(CFS) = 2.21  
EFFECTIVE AREA(ACRES) = 23.88 AREA-AVERAGED Fm(INCH/HR) = 0.17  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.18  
TOTAL AREA(ACRES) = 24.2 PEAK FLOW RATE(CFS) = 36.05

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 14.81  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.852  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 0.68 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 0.68 SUBAREA RUNOFF(CFS) = 0.63  
EFFECTIVE AREA(ACRES) = 24.56 AREA-AVERAGED Fm(INCH/HR) = 0.19  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 24.9 PEAK FLOW RATE(CFS) = 36.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 14.81  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.852  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.04 0.98 0.100 32  
PUBLIC PARK A 1.80 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.575  
SUBAREA AREA(ACRES) = 2.84 SUBAREA RUNOFF(CFS) = 3.30  
EFFECTIVE AREA(ACRES) = 27.40 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.24  
TOTAL AREA(ACRES) = 27.7 PEAK FLOW RATE(CFS) = 39.98

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 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.) = 14.81  
RAINFALL INTENSITY(INCH/HR) = 1.85  
AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.24  
EFFECTIVE STREAM AREA(ACRES) = 27.40  
TOTAL STREAM AREA(ACRES) = 27.73

PEAK FLOW RATE(CFS) AT CONFLUENCE = 39.98  
\*\*\*\*\*  
FLOW PROCESS FROM NODE 1520.00 TO NODE 1522.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 507.00  
ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 682.00  
  
Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.275  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.750  
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 A 4.53 0.98 0.850 32 16.28  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA RUNOFF(CFS) = 3.76  
TOTAL AREA(ACRES) = 4.53 PEAK FLOW RATE(CFS) = 3.76

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1522.00 TO NODE 1524.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 678.00 DOWNSTREAM(FEET) = 675.00  
FLOW LENGTH(FEET) = 306.00 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.) = 5.20  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 3.76  
PIPE TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 17.26  
LONGEST FLOWPATH FROM NODE 1520.00 TO NODE 1524.00 = 813.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1524.00 TO NODE 1524.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 17.26  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.690  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 4.21 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 4.21 SUBAREA RUNOFF(CFS) = 3.26  
EFFECTIVE AREA(ACRES) = 8.74 AREA-AVERAGED Fm(INCH/HR) = 0.83  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85  
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 6.77



\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1524.00 TO NODE 1516.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 675.00 DOWNSTREAM(FEET) = 674.00  
 FLOW LENGTH(FEET) = 203.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.51  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 6.77  
 PIPE TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 18.01  
 LONGEST FLOWPATH FROM NODE 1520.00 TO NODE 1516.00 = 1016.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 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.) = 18.01  
 RAINFALL INTENSITY(INCH/HR) = 1.65  
 AREA-AVERAGED Fm(INCH/HR) = 0.83  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.85  
 EFFECTIVE STREAM AREA(ACRES) = 8.74  
 TOTAL STREAM AREA(ACRES) = 8.74  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.77

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	39.98	14.81	1.852	0.98 ( 0.23)	0.24	27.4	1510.00
1	39.60	15.28	1.818	0.98 ( 0.23)	0.24	27.7	1500.00
2	6.77	18.01	1.647	0.98 ( 0.83)	0.85	8.7	1520.00

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	46.75	14.81	1.852	0.98 ( 0.36)	0.36	34.6	1510.00
2	46.38	15.28	1.818	0.98 ( 0.36)	0.37	35.1	1500.00
3	42.12	18.01	1.647	0.98 ( 0.37)	0.38	36.5	1520.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 46.75 Tc(MIN.) = 14.81  
 EFFECTIVE AREA(ACRES) = 34.59 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA(ACRES) = 36.5  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1516.00 = 1973.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1516.00 TO NODE 1526.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 674.00 DOWNSTREAM(FEET) = 670.00  
 FLOW LENGTH(FEET) = 1110.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.46  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 46.75  
 PIPE TRAVEL TIME(MIN.) = 2.86 Tc(MIN.) = 17.67  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1526.00 = 3083.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 17.67  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.666  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	0.82	0.98	0.200	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.37	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 1.19 SUBAREA RUNOFF(CFS) = 1.60  
 EFFECTIVE AREA(ACRES) = 35.78 AREA-AVERAGED Fm(INCH/HR) = 0.35  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA(ACRES) = 37.7 PEAK FLOW RATE(CFS) = 46.75  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 IS CODE = 10

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

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1530.00 TO NODE 1532.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 665.00  
 ELEVATION DATA: UPSTREAM(FEET) = 691.30 DOWNSTREAM(FEET) = 684.70

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.973  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.217

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	A	1.32	0.98	0.850	32	16.36
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	7.05	0.57	0.200	69	10.97

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303  
SUBAREA RUNOFF(CFS) = 15.00  
TOTAL AREA(ACRES) = 8.37 PEAK FLOW RATE(CFS) = 15.00

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1532.00 TO NODE 1534.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 680.70 DOWNSTREAM(FEET) = 676.81  
FLOW LENGTH(FEET) = 244.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.75  
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 15.00  
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 11.44  
LONGEST FLOWPATH FROM NODE 1530.00 TO NODE 1534.00 = 909.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 11.44  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.163  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	1.07	0.57	0.200	69	

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 1.07 SUBAREA RUNOFF(CFS) = 1.97  
EFFECTIVE AREA(ACRES) = 9.44 AREA-AVERAGED Fm(INCH/HR) = 0.21  
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.29  
TOTAL AREA(ACRES) = 9.4 PEAK FLOW RATE(CFS) = 16.56

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 11.44  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.163  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.42	0.57	0.100	69	

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 0.80  
EFFECTIVE AREA(ACRES) = 9.86 AREA-AVERAGED Fm(INCH/HR) = 0.21  
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.28  
TOTAL AREA(ACRES) = 9.9 PEAK FLOW RATE(CFS) = 17.36

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 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.) = 11.44  
RAINFALL INTENSITY(INCH/HR) = 2.16  
AREA-AVERAGED Fm(INCH/HR) = 0.21  
AREA-AVERAGED Fp(INCH/HR) = 0.73  
AREA-AVERAGED Ap = 0.28  
EFFECTIVE STREAM AREA(ACRES) = 9.86  
TOTAL STREAM AREA(ACRES) = 9.86  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.36

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1540.00 TO NODE 1542.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 676.00  
ELEVATION DATA: UPSTREAM(FEET) = 688.50 DOWNSTREAM(FEET) = 685.00  
  
Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.581  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.042  
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	5.64	0.98	0.200	32	12.58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 9.38  
TOTAL AREA(ACRES) = 5.64 PEAK FLOW RATE(CFS) = 9.38

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1542.00 TO NODE 1534.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 681.00 DOWNSTREAM(FEET) = 676.80  
FLOW LENGTH(FEET) = 244.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.05  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 9.38  
 PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 13.09  
 LONGEST FLOWPATH FROM NODE 1540.00 TO NODE 1534.00 = 920.00 FEET.

LONGEST FLOWPATH FROM NODE 1540.00 TO NODE 1536.00 = 1304.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 IS CODE = 1  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 IS CODE = 81  
 -----

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

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

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 13.09  
 RAINFALL INTENSITY(INCH/HR) = 1.99  
 AREA-AVERAGED Fm(INCH/HR) = 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.20  
 EFFECTIVE STREAM AREA(ACRES) = 5.64  
 TOTAL STREAM AREA(ACRES) = 5.64  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.38

=====

MAINLINE Tc(MIN.) = 12.33  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.067  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	1.08	0.57	0.200	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA(ACRES) = 1.08 SUBAREA RUNOFF(CFS) = 1.90					
EFFECTIVE AREA(ACRES) = 15.87 AREA-AVERAGED Fm(INCH/HR) = 0.20					
AREA-AVERAGED Fp(INCH/HR) = 0.78 AREA-AVERAGED Ap = 0.25					
TOTAL AREA(ACRES) = 16.6 PEAK FLOW RATE(CFS) = 26.72					

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	17.36	11.44	2.163	0.73( 0.21)	0.28	9.9	1530.00
2	9.38	13.09	1.995	0.97( 0.20)	0.20	5.6	1540.00

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 IS CODE = 81  
 -----

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

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

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	26.32	11.44	2.163	0.79( 0.20)	0.26	14.8	1530.00
2	25.25	13.09	1.995	0.80( 0.20)	0.25	15.5	1540.00

=====

MAINLINE Tc(MIN.) = 12.33  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.067  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	6.04	0.57	0.200	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA(ACRES) = 6.04 SUBAREA RUNOFF(CFS) = 10.62					
EFFECTIVE AREA(ACRES) = 21.91 AREA-AVERAGED Fm(INCH/HR) = 0.17					
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.24					
TOTAL AREA(ACRES) = 22.6 PEAK FLOW RATE(CFS) = 37.34					

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 26.32 Tc(MIN.) = 11.44  
 EFFECTIVE AREA(ACRES) = 14.79 AREA-AVERAGED Fm(INCH/HR) = 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.79 AREA-AVERAGED Ap = 0.26  
 TOTAL AREA(ACRES) = 15.5  
 LONGEST FLOWPATH FROM NODE 1540.00 TO NODE 1534.00 = 920.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 IS CODE = 1  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1534.00 TO NODE 1536.00 IS CODE = 31  
 -----

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

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

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

ELEVATION DATA: UPSTREAM( FEET) = 676.80 DOWNSTREAM( FEET) = 674.30  
 FLOW LENGTH( FEET) = 384.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.0 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC. ) = 7.16  
 ESTIMATED PIPE DIAMETER( INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 26.32  
 PIPE TRAVEL TIME(MIN. ) = 0.89 Tc(MIN. ) = 12.33

=====

TIME OF CONCENTRATION(MIN. ) = 12.33  
 RAINFALL INTENSITY(INCH/HR) = 2.07  
 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.73  
 AREA-AVERAGED Ap = 0.24  
 EFFECTIVE STREAM AREA(ACRES) = 21.91  
 TOTAL STREAM AREA(ACRES) = 22.62  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 37.34

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*****
FLOW PROCESS FROM NODE 1550.00 TO NODE 1552.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 764.00
ELEVATION DATA: UPSTREAM(FEET) = 689.00 DOWNSTREAM(FEET) = 684.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.607
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.040
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 10.20 0.57 0.200 69 12.61
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 17.69
TOTAL AREA(ACRES) = 10.20 PEAK FLOW RATE(CFS) = 17.69

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*****
FLOW PROCESS FROM NODE 1552.00 TO NODE 1556.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 677.00 DOWNSTREAM(FEET) = 675.25
FLOW LENGTH(FEET) = 300.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.25
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.69
PIPE TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 13.41
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1556.00 = 1064.00 FEET.

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*****
FLOW PROCESS FROM NODE 1556.00 TO NODE 1556.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 13.41
* 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 C 1.24 0.57 0.100 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 0.65 0.57 0.200 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.134
SUBAREA AREA(ACRES) = 1.89 SUBAREA RUNOFF(CFS) = 3.21
EFFECTIVE AREA(ACRES) = 12.09 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.19
TOTAL AREA(ACRES) = 12.1 PEAK FLOW RATE(CFS) = 20.22

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*****
FLOW PROCESS FROM NODE 1556.00 TO NODE 1536.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 675.25 DOWNSTREAM(FEET) = 674.30
FLOW LENGTH(FEET) = 425.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.49
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.22
PIPE TRAVEL TIME(MIN.) = 1.58 Tc(MIN.) = 14.99
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1536.00 = 1489.00 FEET.

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*****
FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 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.) = 14.99
RAINFALL INTENSITY(INCH/HR) = 1.84
AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.57
AREA-AVERAGED Ap = 0.19
EFFECTIVE STREAM AREA(ACRES) = 12.09
TOTAL STREAM AREA(ACRES) = 12.09
PEAK FLOW RATE(CFS) AT CONFLUENCE = 20.22

```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	37.34	12.33	2.067	0.73( 0.17)	0.24	21.9	1530.00
1	35.47	13.99	1.917	0.74( 0.17)	0.24	22.6	1540.00
2	20.22	14.99	1.839	0.57( 0.11)	0.19	12.1	1550.00

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	56.17	12.33	2.067	0.69( 0.15)	0.22	31.9	1530.00
2	55.20	13.99	1.917	0.69( 0.15)	0.22	33.9	1540.00
3	54.11	14.99	1.839	0.69( 0.15)	0.22	34.7	1550.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 56.17 Tc(MIN.) = 12.33  
EFFECTIVE AREA(ACRES) = 31.86 AREA-AVERAGED Fm(INCH/HR) = 0.15  
AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.22  
TOTAL AREA(ACRES) = 34.7  
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1536.00 = 1489.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1536.00 TO NODE 1526.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 674.30 DOWNSTREAM(FEET) = 670.00  
 FLOW LENGTH(FEET) = 602.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.96  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 56.17  
 PIPE TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 13.45  
 LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1526.00 = 2091.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 13.45  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.962  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.52	0.57	0.100	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	0.70	0.57	0.200	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.132  
 SUBAREA AREA(ACRES) = 2.22 SUBAREA RUNOFF(CFS) = 3.77  
 EFFECTIVE AREA(ACRES) = 34.08 AREA-AVERAGED Fm(INCH/HR) = 0.15  
 AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.22  
 TOTAL AREA(ACRES) = 36.9 PEAK FLOW RATE(CFS) = 56.17  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 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	56.17	13.45	1.962	0.68( 0.15)	0.22	34.1	1530.00
2	55.20	15.11	1.830	0.68( 0.15)	0.22	36.1	1540.00
3	54.11	16.11	1.761	0.68( 0.15)	0.21	36.9	1550.00

 LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1526.00 = 2091.00 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	46.75	17.67	1.666	0.97( 0.35)	0.36	35.8	1510.00
2	46.38	18.14	1.640	0.97( 0.35)	0.36	36.3	1500.00

3 42.12 20.89 1.507 0.97( 0.37) 0.38 37.7 1520.00  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1526.00 = 3083.00 FEET.

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	99.77	13.45	1.962	0.85( 0.24)	0.28	61.3	1530.00
2	100.15	15.11	1.830	0.85( 0.24)	0.28	66.7	1540.00
3	99.81	16.11	1.761	0.86( 0.24)	0.28	69.6	1550.00
4	97.69	17.67	1.666	0.86( 0.25)	0.29	72.7	1510.00
5	96.43	18.14	1.640	0.86( 0.25)	0.29	73.3	1500.00
6	87.72	20.89	1.507	0.87( 0.26)	0.30	74.6	1520.00

 TOTAL AREA(ACRES) = 74.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 100.15 Tc(MIN.) = 15.109  
 EFFECTIVE AREA(ACRES) = 66.71 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.85 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 74.6  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1526.00 = 3083.00 FEET.

=====

END OF STUDY SUMMARY:  
 TOTAL AREA(ACRES) = 74.6 TC(MIN.) = 15.11  
 EFFECTIVE AREA(ACRES) = 66.71 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.85 AREA-AVERAGED Ap = 0.281  
 PEAK FLOW RATE(CFS) = 100.15

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	99.77	13.45	1.962	0.85( 0.24)	0.28	61.3	1530.00
2	100.15	15.11	1.830	0.85( 0.24)	0.28	66.7	1540.00
3	99.81	16.11	1.761	0.86( 0.24)	0.28	69.6	1550.00
4	97.69	17.67	1.666	0.86( 0.25)	0.29	72.7	1510.00
5	96.43	18.14	1.640	0.86( 0.25)	0.29	73.3	1500.00
6	87.72	20.89	1.507	0.87( 0.26)	0.30	74.6	1520.00

 =====

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* EUCALYPTUS AVE. \*  
\* 100-YR STUDY \*  
\* AREA 'I' \*  
\*\*\*\*\*

FILE NAME: EUCAL.DAT  
TIME/DATE OF STUDY: 08:30 10/17/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====  
--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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- / SIDE / SIDE / WAY	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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\* FLOW PROCESS FROM NODE 1500.00 TO NODE 1502.00 IS CODE = 21 \*\*\*\*\*

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

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 698.00  
ELEVATION DATA: UPSTREAM(FEET) = 698.50 DOWNSTREAM(FEET) = 694.80

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.683  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.049  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 5.30 0.98 0.200 32 12.68  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 13.61  
TOTAL AREA(ACRES) = 5.30 PEAK FLOW RATE(CFS) = 13.61

\*\*\*\*\* FLOW PROCESS FROM NODE 1502.00 TO NODE 1504.00 IS CODE = 31 \*\*\*\*\*

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

===== ELEVATION DATA: UPSTREAM(FEET) = 691.80 DOWNSTREAM(FEET) = 686.00  
FLOW LENGTH(FEET) = 210.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.46  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 13.61  
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 13.02  
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1504.00 = 908.00 FEET.

\*\*\*\*\* FLOW PROCESS FROM NODE 1504.00 TO NODE 1504.00 IS CODE = 81 \*\*\*\*\*

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

===== MAINLINE Tc(MIN.) = 13.02  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.002  
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" A 2.82 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 2.82 SUBAREA RUNOFF(CFS) = 7.12  
EFFECTIVE AREA(ACRES) = 8.12 AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 8.1 PEAK FLOW RATE(CFS) = 20.51

\*\*\*\*\* FLOW PROCESS FROM NODE 1504.00 TO NODE 1504.00 IS CODE = 81 \*\*\*\*\*

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



```

=====
MAINLINE Tc(MIN.) = 13.02
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.002
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"   A        1.55    0.98    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.55      SUBAREA RUNOFF(CFS) = 3.92
EFFECTIVE AREA(ACRES) = 9.67    AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 9.7        PEAK FLOW RATE(CFS) = 24.43

*****
FLOW PROCESS FROM NODE 1504.00 TO NODE 1506.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 686.00 DOWNSTREAM(FEET) = 681.00
FLOW LENGTH(FEET) = 389.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.15
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.43
PIPE TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 13.73
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1506.00 = 1297.00 FEET.

*****
FLOW PROCESS FROM NODE 1506.00 TO NODE 1506.00 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.) = 13.73
RAINFALL INTENSITY(INCH/HR) = 2.91
AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.20
EFFECTIVE STREAM AREA(ACRES) = 9.67
TOTAL STREAM AREA(ACRES) = 9.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 24.43

*****
FLOW PROCESS FROM NODE 1510.00 TO NODE 1512.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 851.00
ELEVATION DATA: UPSTREAM(FEET) = 697.00 DOWNSTREAM(FEET) = 692.70

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

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SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.006
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.003
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              A        2.00    0.98    0.100    32  13.01
RESIDENTIAL
"11+ DWELLINGS/ACRE"   A        3.81    0.98    0.200    32  13.86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.166
SUBAREA RUNOFF(CFS) = 14.86
TOTAL AREA(ACRES) = 5.81      PEAK FLOW RATE(CFS) = 14.86

*****
FLOW PROCESS FROM NODE 1512.00 TO NODE 1506.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 688.70 DOWNSTREAM(FEET) = 681.00
FLOW LENGTH(FEET) = 235.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.40
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.86
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 13.35
LONGEST FLOWPATH FROM NODE 1510.00 TO NODE 1506.00 = 1086.00 FEET.

*****
FLOW PROCESS FROM NODE 1506.00 TO NODE 1506.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 13.35
* 100 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
RESIDENTIAL
"11+ DWELLINGS/ACRE"   A        1.57    0.98    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.57      SUBAREA RUNOFF(CFS) = 3.90
EFFECTIVE AREA(ACRES) = 7.38    AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 7.4        PEAK FLOW RATE(CFS) = 18.52

*****
FLOW PROCESS FROM NODE 1506.00 TO NODE 1506.00 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.) = 13.35

```

RAINFALL INTENSITY(INCH/HR) = 2.96  
 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.17  
 EFFECTIVE STREAM AREA(ACRES) = 7.38  
 TOTAL STREAM AREA(ACRES) = 7.38  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.52

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	24.43	13.73	2.908	0.98 (0.20)	0.20	9.7	1500.00
2	18.52	13.35	2.957	0.98 (0.17)	0.17	7.4	1510.00

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	42.70	13.35	2.957	0.98 (0.18)	0.19	16.8	1510.00
2	42.62	13.73	2.908	0.97 (0.18)	0.19	17.0	1500.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 42.70 Tc(MIN.) = 13.35  
 EFFECTIVE AREA(ACRES) = 16.78 AREA-AVERAGED Fm(INCH/HR) = 0.18  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.19  
 TOTAL AREA(ACRES) = 17.0  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1506.00 = 1297.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1506.00 TO NODE 1514.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 681.00 DOWNSTREAM(FEET) = 680.00  
 FLOW LENGTH(FEET) = 261.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.60  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 42.70  
 PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 14.01  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1514.00 = 1558.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1514.00 TO NODE 1514.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.01  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.872  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL A 1.40 0.98 0.100 32

"11+ DWELLINGS/ACRE" A 4.22 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 4.22 SUBAREA RUNOFF(CFS) = 10.17  
 EFFECTIVE AREA(ACRES) = 21.00 AREA-AVERAGED Fm(INCH/HR) = 0.19  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.19  
 TOTAL AREA(ACRES) = 21.3 PEAK FLOW RATE(CFS) = 50.79

\*\*\*\*\*

FLOW PROCESS FROM NODE 1514.00 TO NODE 1516.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 680.00 DOWNSTREAM(FEET) = 674.00  
 FLOW LENGTH(FEET) = 415.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.38  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 50.79  
 PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 14.62  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1516.00 = 1973.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.62  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.800  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.54 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 1.54 SUBAREA RUNOFF(CFS) = 3.75  
 EFFECTIVE AREA(ACRES) = 22.54 AREA-AVERAGED Fm(INCH/HR) = 0.18  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.18  
 TOTAL AREA(ACRES) = 22.8 PEAK FLOW RATE(CFS) = 53.17

\*\*\*\*\*

FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.62  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.800  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.40 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 1.40 SUBAREA RUNOFF(CFS) = 3.41  
 EFFECTIVE AREA(ACRES) = 23.94 AREA-AVERAGED Fm(INCH/HR) = 0.17

AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.18  
TOTAL AREA(ACRES) = 24.2 PEAK FLOW RATE(CFS) = 56.57

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) =	14.62
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =	2.800
SUBAREA LOSS RATE DATA(AMC II):	
DEVELOPMENT TYPE/	SCS SOIL AREA Fp Ap SCS
LAND USE	GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK	A 0.68 0.98 0.850 32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 0.68 SUBAREA RUNOFF(CFS) = 1.21  
EFFECTIVE AREA(ACRES) = 24.62 AREA-AVERAGED Fm(INCH/HR) = 0.19  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 24.9 PEAK FLOW RATE(CFS) = 57.78

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) =	14.62
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =	2.800
SUBAREA LOSS RATE DATA(AMC II):	
DEVELOPMENT TYPE/	SCS SOIL AREA Fp Ap SCS
LAND USE	GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL	A 1.04 0.98 0.100 32
PUBLIC PARK	A 1.80 0.98 0.850 32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.575  
SUBAREA AREA(ACRES) = 2.84 SUBAREA RUNOFF(CFS) = 5.72  
EFFECTIVE AREA(ACRES) = 27.46 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.24  
TOTAL AREA(ACRES) = 27.7 PEAK FLOW RATE(CFS) = 63.50

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 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.) = 14.62  
RAINFALL INTENSITY(INCH/HR) = 2.80  
AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.24  
EFFECTIVE STREAM AREA(ACRES) = 27.46  
TOTAL STREAM AREA(ACRES) = 27.73  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 63.50

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1520.00 TO NODE 1522.00 IS CODE = 21  
-----

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 507.00  
ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 682.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.275  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.625  
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	A 4.53 0.98 0.850 32 16.28

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA RUNOFF(CFS) = 7.32  
TOTAL AREA(ACRES) = 4.53 PEAK FLOW RATE(CFS) = 7.32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1522.00 TO NODE 1524.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 678.00 DOWNSTREAM(FEET) = 675.00  
FLOW LENGTH(FEET) = 306.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.12  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 7.32  
PIPE TRAVEL TIME(MIN.) = 0.83 Tc(MIN.) = 17.11  
LONGEST FLOWPATH FROM NODE 1520.00 TO NODE 1524.00 = 813.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1524.00 TO NODE 1524.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) =	17.11
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =	2.548
SUBAREA LOSS RATE DATA(AMC II):	
DEVELOPMENT TYPE/	SCS SOIL AREA Fp Ap SCS
LAND USE	GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK	A 4.21 0.98 0.850 32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 4.21 SUBAREA RUNOFF(CFS) = 6.51  
EFFECTIVE AREA(ACRES) = 8.74 AREA-AVERAGED Fm(INCH/HR) = 0.83  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85  
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 13.52

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1524.00 TO NODE 1516.00 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) = 675.00 DOWNSTREAM(FEET) = 674.00
FLOW LENGTH(FEET) = 203.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.42
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.52
PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 17.73
LONGEST FLOWPATH FROM NODE 1520.00 TO NODE 1516.00 = 1016.00 FEET.

*****
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 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.) = 17.73
RAINFALL INTENSITY(INCH/HR) = 2.49
AREA-AVERAGED Fm(INCH/HR) = 0.83
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.85
EFFECTIVE STREAM AREA(ACRES) = 8.74
TOTAL STREAM AREA(ACRES) = 8.74
PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.52

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 63.50 14.62 2.800 0.98( 0.23) 0.24 27.5 1510.00
1 63.07 14.99 2.758 0.98( 0.23) 0.24 27.7 1500.00
2 13.52 17.73 2.493 0.98( 0.83) 0.85 8.7 1520.00

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 76.70 14.62 2.800 0.98( 0.36) 0.36 34.7 1510.00
2 76.31 14.99 2.758 0.98( 0.36) 0.37 35.1 1500.00
3 69.99 17.73 2.493 0.98( 0.37) 0.38 36.5 1520.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 76.70 Tc(MIN.) = 14.62
EFFECTIVE AREA(ACRES) = 34.67 AREA-AVERAGED Fm(INCH/HR) = 0.36
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 36.5
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1516.00 = 1973.00 FEET.

*****
FLOW PROCESS FROM NODE 1516.00 TO NODE 1526.00 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) = 674.00 DOWNSTREAM(FEET) = 670.00
FLOW LENGTH(FEET) = 1110.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.40
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 76.70
PIPE TRAVEL TIME(MIN.) = 2.50 Tc(MIN.) = 17.12
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1526.00 = 3083.00 FEET.

*****
FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 17.12
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.547
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" A 0.82 0.98 0.200 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 0.37 0.57 0.200 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.19 SUBAREA RUNOFF(CFS) = 2.55
EFFECTIVE AREA(ACRES) = 35.86 AREA-AVERAGED Fm(INCH/HR) = 0.35
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 37.7 PEAK FLOW RATE(CFS) = 76.70
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
=====
*****
FLOW PROCESS FROM NODE 1530.00 TO NODE 1532.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 665.00
ELEVATION DATA: UPSTREAM(FEET) = 691.30 DOWNSTREAM(FEET) = 684.70

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.973
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.326
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 A 1.32 0.98 0.850 32 16.36  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 7.05 0.57 0.200 69 10.97  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303  
 SUBAREA RUNOFF(CFS) = 23.35  
 TOTAL AREA(ACRES) = 8.37 PEAK FLOW RATE(CFS) = 23.35

EFFECTIVE AREA(ACRES) = 9.86 AREA-AVERAGED Fm(INCH/HR) = 0.21  
 AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 9.9 PEAK FLOW RATE(CFS) = 27.02

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 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.) = 11.39  
 RAINFALL INTENSITY(INCH/HR) = 3.25  
 AREA-AVERAGED Fm(INCH/HR) = 0.21  
 AREA-AVERAGED Fp(INCH/HR) = 0.73  
 AREA-AVERAGED Ap = 0.28  
 EFFECTIVE STREAM AREA(ACRES) = 9.86  
 TOTAL STREAM AREA(ACRES) = 9.86  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 27.02

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1540.00 TO NODE 1542.00 IS CODE = 21  
 -----

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 676.00  
 ELEVATION DATA: UPSTREAM(FEET) = 688.50 DOWNSTREAM(FEET) = 685.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.581  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.064  
 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.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	1.07	0.57	0.200	69	
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200						
SUBAREA AREA(ACRES) = 1.07 SUBAREA RUNOFF(CFS) = 3.02						
EFFECTIVE AREA(ACRES) = 9.44 AREA-AVERAGED Fm(INCH/HR) = 0.21						
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.29						
TOTAL AREA(ACRES) = 9.4 PEAK FLOW RATE(CFS) = 25.81						

TOTAL AREA(ACRES) = 5.64 PEAK FLOW RATE(CFS) = 14.56

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1542.00 TO NODE 1534.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 681.00 DOWNSTREAM(FEET) = 676.80  
 FLOW LENGTH(FEET) = 244.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.97  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 14.56  
 PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 13.03  
 LONGEST FLOWPATH FROM NODE 1540.00 TO NODE 1534.00 = 920.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1532.00 TO NODE 1534.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 680.70 DOWNSTREAM(FEET) = 676.81  
 FLOW LENGTH(FEET) = 244.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.70  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 23.35  
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 11.39  
 LONGEST FLOWPATH FROM NODE 1530.00 TO NODE 1534.00 = 909.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 11.39  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.252  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	1.07	0.57	0.200	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA(ACRES) = 1.07 SUBAREA RUNOFF(CFS) = 3.02					
EFFECTIVE AREA(ACRES) = 9.44 AREA-AVERAGED Fm(INCH/HR) = 0.21					
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.29					
TOTAL AREA(ACRES) = 9.4 PEAK FLOW RATE(CFS) = 25.81					

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 11.39  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.252  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.42	0.57	0.100	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100					
SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 1.21					

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 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.) = 13.03  
RAINFALL INTENSITY(INCH/HR) = 3.00  
AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.20  
EFFECTIVE STREAM AREA(ACRES) = 5.64  
TOTAL STREAM AREA(ACRES) = 5.64  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.56

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	27.02	11.39	3.252	0.73 (0.21)	0.28	9.9	1530.00
2	14.56	13.03	2.999	0.97 (0.20)	0.20	5.6	1540.00

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	40.89	11.39	3.252	0.79 (0.20)	0.26	14.8	1530.00
2	39.34	13.03	2.999	0.80 (0.20)	0.25	15.5	1540.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 40.89 Tc(MIN.) = 11.39  
EFFECTIVE AREA(ACRES) = 14.79 AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.79 AREA-AVERAGED Ap = 0.26  
TOTAL AREA(ACRES) = 15.5  
LONGEST FLOWPATH FROM NODE 1540.00 TO NODE 1534.00 = 920.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1534.00 TO NODE 1536.00 IS CODE = 31

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

-----  
ELEVATION DATA: UPSTREAM( FEET) = 676.80 DOWNSTREAM( FEET) = 674.30  
FLOW LENGTH( FEET) = 384.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.4 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC.) = 8.03  
ESTIMATED PIPE DIAMETER( INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 40.89  
PIPE TRAVEL TIME( MIN.) = 0.80 Tc( MIN.) = 12.19  
LONGEST FLOWPATH FROM NODE 1540.00 TO NODE 1536.00 = 1304.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 IS CODE = 81

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

-----  
MAINLINE Tc(MIN.) = 12.19  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.122  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 1.08 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 1.08 SUBAREA RUNOFF(CFS) = 2.92  
EFFECTIVE AREA(ACRES) = 15.87 AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.78 AREA-AVERAGED Ap = 0.25  
TOTAL AREA(ACRES) = 16.6 PEAK FLOW RATE(CFS) = 41.79

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 IS CODE = 81

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

-----  
MAINLINE Tc(MIN.) = 12.19  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.122  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 6.04 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 6.04 SUBAREA RUNOFF(CFS) = 16.36  
EFFECTIVE AREA(ACRES) = 21.91 AREA-AVERAGED Fm(INCH/HR) = 0.17  
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.24  
TOTAL AREA(ACRES) = 22.6 PEAK FLOW RATE(CFS) = 58.14

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 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.) = 12.19  
RAINFALL INTENSITY(INCH/HR) = 3.12  
AREA-AVERAGED Fm(INCH/HR) = 0.17  
AREA-AVERAGED Fp(INCH/HR) = 0.73  
AREA-AVERAGED Ap = 0.24  
EFFECTIVE STREAM AREA(ACRES) = 21.91  
TOTAL STREAM AREA(ACRES) = 22.62  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 58.14

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1550.00 TO NODE 1552.00 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) = 764.00
ELEVATION DATA: UPSTREAM(FEET) = 689.00 DOWNSTREAM(FEET) = 684.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.607
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"   C      10.20    0.57    0.200   69  12.61
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 27.05
TOTAL AREA(ACRES) = 10.20 PEAK FLOW RATE(CFS) = 27.05

*****
FLOW PROCESS FROM NODE 1552.00 TO NODE 1556.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 677.00 DOWNSTREAM(FEET) = 675.25
FLOW LENGTH(FEET) = 300.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.86
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.05
PIPE TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 13.34
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1556.00 = 1064.00 FEET.

*****
FLOW PROCESS FROM NODE 1556.00 TO NODE 1556.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 13.34
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.958
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp      Ap      SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C      1.24    0.57    0.100   69
RESIDENTIAL
"11+ DWELLINGS/ACRE"   C      0.65    0.57    0.200   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.134
SUBAREA AREA(ACRES) = 1.89 SUBAREA RUNOFF(CFS) = 4.90
EFFECTIVE AREA(ACRES) = 12.09 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.19
TOTAL AREA(ACRES) = 12.1 PEAK FLOW RATE(CFS) = 31.02

*****
FLOW PROCESS FROM NODE 1556.00 TO NODE 1536.00 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) = 675.25 DOWNSTREAM(FEET) = 674.30
FLOW LENGTH(FEET) = 425.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.00
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.02
PIPE TRAVEL TIME(MIN.) = 1.42 Tc(MIN.) = 14.75
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1536.00 = 1489.00 FEET.

*****
FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 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.) = 14.75
RAINFALL INTENSITY(INCH/HR) = 2.78
AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.57
AREA-AVERAGED Ap = 0.19
EFFECTIVE STREAM AREA(ACRES) = 12.09
TOTAL STREAM AREA(ACRES) = 12.09
PEAK FLOW RATE(CFS) AT CONFLUENCE = 31.02

** CONFLUENCE DATA **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1           58.14 12.19 3.122 0.73( 0.17) 0.24 21.9 1530.00
1           55.31 13.86 2.891 0.74( 0.17) 0.24 22.6 1540.00
2           31.02 14.75 2.785 0.57( 0.11) 0.19 12.1 1550.00

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           87.01 12.19 3.122 0.69( 0.15) 0.22 31.9 1530.00
2           85.61 13.86 2.891 0.69( 0.15) 0.22 34.0 1540.00
3           84.16 14.75 2.785 0.69( 0.15) 0.22 34.7 1550.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 87.01 Tc(MIN.) = 12.19
EFFECTIVE AREA(ACRES) = 31.90 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 34.7
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1536.00 = 1489.00 FEET.

*****
FLOW PROCESS FROM NODE 1536.00 TO NODE 1526.00 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) = 674.30 DOWNSTREAM(FEET) = 670.00
FLOW LENGTH(FEET) = 602.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.93
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 87.01
PIPE TRAVEL TIME(MIN.) = 1.01 Tc(MIN.) = 13.20
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1526.00 = 2091.00 FEET.

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*****
FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.20
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.977
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.52 0.57 0.100 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 0.70 0.57 0.200 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.132
SUBAREA AREA(ACRES) = 2.22 SUBAREA RUNOFF(CFS) = 5.80
EFFECTIVE AREA(ACRES) = 34.12 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 36.9 PEAK FLOW RATE(CFS) = 87.01
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 IS CODE = 11
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>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
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** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 87.01 13.20 2.977 0.68( 0.15) 0.22 34.1 1530.00
2 85.61 14.87 2.771 0.68( 0.15) 0.22 36.2 1540.00
3 84.16 15.77 2.676 0.68( 0.15) 0.21 36.9 1550.00
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1526.00 = 2091.00 FEET.

```

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** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 76.70 17.12 2.547 0.97( 0.35) 0.36 35.9 1510.00
2 76.31 17.49 2.514 0.97( 0.35) 0.36 36.3 1500.00
3 69.99 20.26 2.302 0.97( 0.37) 0.38 37.7 1520.00
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1526.00 = 3083.00 FEET.

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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
1 157.72 13.20 2.977 0.85( 0.24) 0.28 61.8 1530.00
2 159.04 14.87 2.771 0.85( 0.24) 0.28 67.4 1540.00
3 158.95 15.77 2.676 0.86( 0.24) 0.28 70.0 1550.00
4 156.58 17.12 2.547 0.86( 0.25) 0.29 72.8 1510.00
5 155.09 17.49 2.514 0.86( 0.25) 0.29 73.2 1500.00
6 141.72 20.26 2.302 0.87( 0.26) 0.30 74.6 1520.00
TOTAL AREA(ACRES) = 74.6

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COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 159.04 Tc(MIN.) = 14.871
EFFECTIVE AREA(ACRES) = 67.35 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.85 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 74.6
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1526.00 = 3083.00 FEET.

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=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 74.6 TC(MIN.) = 14.87
EFFECTIVE AREA(ACRES) = 67.35 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.85 AREA-AVERAGED Ap = 0.282
PEAK FLOW RATE(CFS) = 159.04

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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
1 157.72 13.20 2.977 0.85( 0.24) 0.28 61.8 1530.00
2 159.04 14.87 2.771 0.85( 0.24) 0.28 67.4 1540.00
3 158.95 15.77 2.676 0.86( 0.24) 0.28 70.0 1550.00
4 156.58 17.12 2.547 0.86( 0.25) 0.29 72.8 1510.00
5 155.09 17.49 2.514 0.86( 0.25) 0.29 73.2 1500.00
6 141.72 20.26 2.302 0.87( 0.26) 0.30 74.6 1520.00

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=====
END OF RATIONAL METHOD ANALYSIS

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\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* EUCALYPTUS AVE. \*  
\* 25-YR STUDY \*  
\* AREA 'I' \*  
\*\*\*\*\*

FILE NAME: EUCAL.DAT  
TIME/DATE OF STUDY: 08:34 10/17/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*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 STREET-CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/ SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP (FT)	STREETS: 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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.00 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 1500.00 TO NODE 1502.00 IS CODE = 21

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

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 698.00  
ELEVATION DATA: UPSTREAM(FEET) = 698.50 DOWNSTREAM(FEET) = 694.80

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.683  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.389  
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	5.30	0.98	0.200	32	12.68
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200						
SUBAREA RUNOFF(CFS) = 10.47						
TOTAL AREA(ACRES) = 5.30 PEAK FLOW RATE(CFS) = 10.47						

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1502.00 TO NODE 1504.00 IS CODE = 31

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

===== ELEVATION DATA: UPSTREAM(FEET) = 691.80 DOWNSTREAM(FEET) = 686.00  
FLOW LENGTH(FEET) = 210.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.92  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 10.47  
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 13.04  
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1504.00 = 908.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1504.00 TO NODE 1504.00 IS CODE = 81

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

===== MAINLINE Tc(MIN.) = 13.04  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.350  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	2.82	0.98	0.200	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA(ACRES) = 2.82 SUBAREA RUNOFF(CFS) = 5.47					
EFFECTIVE AREA(ACRES) = 8.12 AREA-AVERAGED Fm(INCH/HR) = 0.20					
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.20					
TOTAL AREA(ACRES) = 8.1 PEAK FLOW RATE(CFS) = 15.75					

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1504.00 TO NODE 1504.00 IS CODE = 81

```

-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 13.04
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.350
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"    A        1.55     0.98     0.200   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.55     SUBAREA RUNOFF(CFS) = 3.01
EFFECTIVE AREA(ACRES) = 9.67     AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.98     AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 9.7         PEAK FLOW RATE(CFS) = 18.76

*****
FLOW PROCESS FROM NODE 1504.00 TO NODE 1506.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 686.00 DOWNSTREAM(FEET) = 681.00
FLOW LENGTH(FEET) = 389.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.55
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 18.76
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 13.79
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1506.00 = 1297.00 FEET.

*****
FLOW PROCESS FROM NODE 1506.00 TO NODE 1506.00 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.) = 13.79
RAINFALL INTENSITY(INCH/HR) = 2.27
AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.20
EFFECTIVE STREAM AREA(ACRES) = 9.67
TOTAL STREAM AREA(ACRES) = 9.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.76

*****
FLOW PROCESS FROM NODE 1510.00 TO NODE 1512.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 851.00
ELEVATION DATA: UPSTREAM(FEET) = 697.00 DOWNSTREAM(FEET) = 692.70

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```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.006
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.354
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
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        3.81     0.98     0.200   32  13.86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.166
SUBAREA RUNOFF(CFS) = 11.46
TOTAL AREA(ACRES) = 5.81     PEAK FLOW RATE(CFS) = 11.46

*****
FLOW PROCESS FROM NODE 1512.00 TO NODE 1506.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 688.70 DOWNSTREAM(FEET) = 681.00
FLOW LENGTH(FEET) = 235.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.81
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.46
PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 13.37
LONGEST FLOWPATH FROM NODE 1510.00 TO NODE 1506.00 = 1086.00 FEET.

*****
FLOW PROCESS FROM NODE 1506.00 TO NODE 1506.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 13.37
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.315
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"    A        1.57     0.98     0.200   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.57     SUBAREA RUNOFF(CFS) = 3.00
EFFECTIVE AREA(ACRES) = 7.38     AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.98     AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 7.4         PEAK FLOW RATE(CFS) = 14.26

*****
FLOW PROCESS FROM NODE 1506.00 TO NODE 1506.00 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.) = 13.37  
 RAINFALL INTENSITY(INCH/HR) = 2.32  
 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.17  
 EFFECTIVE STREAM AREA(ACRES) = 7.38  
 TOTAL STREAM AREA(ACRES) = 7.38  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.26

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.76	13.79	2.272	0.98 ( 0.20)	0.20	9.7	1500.00
2	14.26	13.37	2.315	0.98 ( 0.17)	0.17	7.4	1510.00

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	32.81	13.37	2.315	0.98 ( 0.18)	0.19	16.8	1510.00
2	32.73	13.79	2.272	0.97 ( 0.18)	0.19	17.0	1500.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 32.81 Tc(MIN.) = 13.37  
 EFFECTIVE AREA(ACRES) = 16.75 AREA-AVERAGED Fm(INCH/HR) = 0.18  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.19  
 TOTAL AREA(ACRES) = 17.0  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1506.00 = 1297.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1506.00 TO NODE 1514.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 681.00 DOWNSTREAM(FEET) = 680.00  
 FLOW LENGTH(FEET) = 261.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.21  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 32.81  
 PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 14.07  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1514.00 = 1558.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1514.00 TO NODE 1514.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 14.07  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.245  
 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"	A	4.22	0.98	0.200	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA(ACRES) =		4.22	SUBAREA RUNOFF(CFS) = 7.79		
EFFECTIVE AREA(ACRES) =		20.97	AREA-AVERAGED Fm(INCH/HR) = 0.19		
AREA-AVERAGED Fp(INCH/HR) =		0.98	AREA-AVERAGED Ap = 0.19		
TOTAL AREA(ACRES) =		21.3	PEAK FLOW RATE(CFS) = 38.87		

\*\*\*\*\*

FLOW PROCESS FROM NODE 1514.00 TO NODE 1516.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 680.00 DOWNSTREAM(FEET) = 674.00  
 FLOW LENGTH(FEET) = 415.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.66  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 38.87  
 PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 14.72  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1516.00 = 1973.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 14.72  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.185  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.54 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 1.54 SUBAREA RUNOFF(CFS) = 2.89  
 EFFECTIVE AREA(ACRES) = 22.51 AREA-AVERAGED Fm(INCH/HR) = 0.18  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.18  
 TOTAL AREA(ACRES) = 22.8 PEAK FLOW RATE(CFS) = 40.63

\*\*\*\*\*

FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 14.72  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.185  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.40 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 1.40 SUBAREA RUNOFF(CFS) = 2.63  
EFFECTIVE AREA(ACRES) = 23.91 AREA-AVERAGED Fm(INCH/HR) = 0.17  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.18  
TOTAL AREA(ACRES) = 24.2 PEAK FLOW RATE(CFS) = 43.26

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 14.72  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.185  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 0.68 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 0.68 SUBAREA RUNOFF(CFS) = 0.83  
EFFECTIVE AREA(ACRES) = 24.59 AREA-AVERAGED Fm(INCH/HR) = 0.19  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 24.9 PEAK FLOW RATE(CFS) = 44.09

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 14.72  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.185  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.04 0.98 0.100 32  
PUBLIC PARK A 1.80 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.575  
SUBAREA AREA(ACRES) = 2.84 SUBAREA RUNOFF(CFS) = 4.15  
EFFECTIVE AREA(ACRES) = 27.43 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.24  
TOTAL AREA(ACRES) = 27.7 PEAK FLOW RATE(CFS) = 48.25

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 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.) = 14.72  
RAINFALL INTENSITY(INCH/HR) = 2.19  
AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.24  
EFFECTIVE STREAM AREA(ACRES) = 27.43  
TOTAL STREAM AREA(ACRES) = 27.73

PEAK FLOW RATE(CFS) AT CONFLUENCE = 48.25  
\*\*\*\*\*  
FLOW PROCESS FROM NODE 1520.00 TO NODE 1522.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 507.00  
ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 682.00  
  
Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.275  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.057  
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 A 4.53 0.98 0.850 32 16.28  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA RUNOFF(CFS) = 5.01  
TOTAL AREA(ACRES) = 4.53 PEAK FLOW RATE(CFS) = 5.01

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1522.00 TO NODE 1524.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 678.00 DOWNSTREAM(FEET) = 675.00  
FLOW LENGTH(FEET) = 306.00 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.) = 5.60  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 5.01  
PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 17.19  
LONGEST FLOWPATH FROM NODE 1520.00 TO NODE 1524.00 = 813.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1524.00 TO NODE 1524.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 17.19  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.991  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 4.21 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 4.21 SUBAREA RUNOFF(CFS) = 4.40  
EFFECTIVE AREA(ACRES) = 8.74 AREA-AVERAGED Fm(INCH/HR) = 0.83  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85  
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 9.14

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1524.00 TO NODE 1516.00 IS CODE = 31

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 675.00 DOWNSTREAM(FEET) = 674.00  
FLOW LENGTH(FEET) = 203.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.94  
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 9.14  
PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 17.87  
LONGEST FLOWPATH FROM NODE 1520.00 TO NODE 1516.00 = 1016.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1516.00 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.) = 17.87  
RAINFALL INTENSITY(INCH/HR) = 1.95  
AREA-AVERAGED Fm(INCH/HR) = 0.83  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.85  
EFFECTIVE STREAM AREA(ACRES) = 8.74  
TOTAL STREAM AREA(ACRES) = 8.74  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.14

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	48.25	14.72	2.185	0.98 ( 0.23)	0.24	27.4	1510.00
1	47.85	15.15	2.148	0.98 ( 0.23)	0.24	27.7	1500.00
2	9.14	17.87	1.945	0.98 ( 0.83)	0.85	8.7	1520.00

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	57.39	14.72	2.185	0.98 ( 0.36)	0.36	34.6	1510.00
2	57.00	15.15	2.148	0.98 ( 0.36)	0.37	35.1	1500.00
3	51.93	17.87	1.945	0.98 ( 0.37)	0.38	36.5	1520.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 57.39 Tc(MIN.) = 14.72  
EFFECTIVE AREA(ACRES) = 34.63 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.36  
TOTAL AREA(ACRES) = 36.5  
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1516.00 = 1973.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1516.00 TO NODE 1526.00 IS CODE = 31

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 674.00 DOWNSTREAM(FEET) = 670.00  
FLOW LENGTH(FEET) = 1110.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.98  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 57.39  
PIPE TRAVEL TIME(MIN.) = 2.65 Tc(MIN.) = 17.37  
LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1526.00 = 3083.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 IS CODE = 81

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

-----  
MAINLINE Tc(MIN.) = 17.37  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.979  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 0.82 0.98 0.200 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 0.37 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 1.19 SUBAREA RUNOFF(CFS) = 1.94  
EFFECTIVE AREA(ACRES) = 35.82 AREA-AVERAGED Fm(INCH/HR) = 0.35  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.36  
TOTAL AREA(ACRES) = 37.7 PEAK FLOW RATE(CFS) = 57.39  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 IS CODE = 10

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1530.00 TO NODE 1532.00 IS CODE = 21

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

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 665.00  
ELEVATION DATA: UPSTREAM(FEET) = 691.30 DOWNSTREAM(FEET) = 684.70

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.973  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.606



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	A	1.32	0.98	0.850	32	16.36
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	7.05	0.57	0.200	69	10.97

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303  
SUBAREA RUNOFF(CFS) = 17.93  
TOTAL AREA(ACRES) = 8.37 PEAK FLOW RATE(CFS) = 17.93

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 0.94  
EFFECTIVE AREA(ACRES) = 9.86 AREA-AVERAGED Fm(INCH/HR) = 0.21  
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.28  
TOTAL AREA(ACRES) = 9.9 PEAK FLOW RATE(CFS) = 20.74

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 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.) = 11.43  
RAINFALL INTENSITY(INCH/HR) = 2.54  
AREA-AVERAGED Fm(INCH/HR) = 0.21  
AREA-AVERAGED Fp(INCH/HR) = 0.73  
AREA-AVERAGED Ap = 0.28  
EFFECTIVE STREAM AREA(ACRES) = 9.86  
TOTAL STREAM AREA(ACRES) = 9.86  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 20.74

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1540.00 TO NODE 1542.00 IS CODE = 21  
-----

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

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 676.00  
ELEVATION DATA: UPSTREAM(FEET) = 688.50 DOWNSTREAM(FEET) = 685.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.581  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.401  
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	5.64	0.98	0.200	32	12.58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 11.20  
TOTAL AREA(ACRES) = 5.64 PEAK FLOW RATE(CFS) = 11.20

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1542.00 TO NODE 1534.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 681.00 DOWNSTREAM(FEET) = 676.80  
FLOW LENGTH(FEET) = 244.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.31  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1532.00 TO NODE 1534.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 680.70 DOWNSTREAM(FEET) = 676.81  
FLOW LENGTH(FEET) = 244.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.98  
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 17.93  
PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 11.43  
LONGEST FLOWPATH FROM NODE 1530.00 TO NODE 1534.00 = 909.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 11.43  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.544  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	1.07	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 1.07 SUBAREA RUNOFF(CFS) = 2.34  
EFFECTIVE AREA(ACRES) = 9.44 AREA-AVERAGED Fm(INCH/HR) = 0.21  
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.29  
TOTAL AREA(ACRES) = 9.4 PEAK FLOW RATE(CFS) = 19.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 11.43  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.544  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.42	0.57	0.100	69

PIPE-FLOW(CFS) = 11.20  
 PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 13.07  
 LONGEST FLOWPATH FROM NODE 1540.00 TO NODE 1534.00 = 920.00 FEET.

LONGEST FLOWPATH FROM NODE 1540.00 TO NODE 1536.00 = 1304.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1534.00 TO NODE 1534.00 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.) = 13.07  
 RAINFALL INTENSITY(INCH/HR) = 2.35  
 AREA-AVERAGED Fm(INCH/HR) = 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.20  
 EFFECTIVE STREAM AREA(ACRES) = 5.64  
 TOTAL STREAM AREA(ACRES) = 5.64  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.20

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	20.74	11.43	2.544	0.73 (0.21)	0.28	9.9	1530.00
2	11.20	13.07	2.347	0.97 (0.20)	0.20	5.6	1540.00

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	31.43	11.43	2.544	0.79 (0.20)	0.26	14.8	1530.00
2	30.19	13.07	2.347	0.80 (0.20)	0.25	15.5	1540.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 31.43 Tc(MIN.) = 11.43  
 EFFECTIVE AREA(ACRES) = 14.79 AREA-AVERAGED Fm(INCH/HR) = 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.79 AREA-AVERAGED Ap = 0.26  
 TOTAL AREA(ACRES) = 15.5  
 LONGEST FLOWPATH FROM NODE 1540.00 TO NODE 1534.00 = 920.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1534.00 TO NODE 1536.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM( FEET) = 676.80 DOWNSTREAM( FEET) = 674.30  
 FLOW LENGTH( FEET) = 384.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 21.8 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC. ) = 7.53  
 ESTIMATED PIPE DIAMETER( INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 31.43  
 PIPE TRAVEL TIME( MIN. ) = 0.85 Tc( MIN. ) = 12.28

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 12.28  
 \* 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					
"11+ DWELLINGS/ACRE"	C	1.08	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 1.08 SUBAREA RUNOFF(CFS) = 2.26  
 EFFECTIVE AREA(ACRES) = 15.87 AREA-AVERAGED Fm(INCH/HR) = 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.78 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 16.6 PEAK FLOW RATE(CFS) = 31.99

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 12.28  
 \* 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					
"11+ DWELLINGS/ACRE"	C	6.04	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 6.04 SUBAREA RUNOFF(CFS) = 12.63  
 EFFECTIVE AREA(ACRES) = 21.91 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.24  
 TOTAL AREA(ACRES) = 22.6 PEAK FLOW RATE(CFS) = 44.62

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 IS CODE = 1  
 -----

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

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 12.28  
 RAINFALL INTENSITY(INCH/HR) = 2.44  
 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.73  
 AREA-AVERAGED Ap = 0.24  
 EFFECTIVE STREAM AREA(ACRES) = 21.91  
 TOTAL STREAM AREA(ACRES) = 22.62  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 44.62

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*****
FLOW PROCESS FROM NODE 1550.00 TO NODE 1552.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 764.00
ELEVATION DATA: UPSTREAM(FEET) = 689.00 DOWNSTREAM(FEET) = 684.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.607
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.398
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 10.20 0.57 0.200 69 12.61
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 20.97
TOTAL AREA(ACRES) = 10.20 PEAK FLOW RATE(CFS) = 20.97

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*****
FLOW PROCESS FROM NODE 1552.00 TO NODE 1556.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 677.00 DOWNSTREAM(FEET) = 675.25
FLOW LENGTH(FEET) = 300.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.41
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.97
PIPE TRAVEL TIME(MIN.) = 0.78 Tc(MIN.) = 13.39
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1556.00 = 1064.00 FEET.

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*****
FLOW PROCESS FROM NODE 1556.00 TO NODE 1556.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 13.39
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.313
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.24 0.57 0.100 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 0.65 0.57 0.200 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.134
SUBAREA AREA(ACRES) = 1.89 SUBAREA RUNOFF(CFS) = 3.81
EFFECTIVE AREA(ACRES) = 12.09 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.19
TOTAL AREA(ACRES) = 12.1 PEAK FLOW RATE(CFS) = 24.00

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*****
FLOW PROCESS FROM NODE 1556.00 TO NODE 1536.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 675.25 DOWNSTREAM(FEET) = 674.30
FLOW LENGTH(FEET) = 425.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.70
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.00
PIPE TRAVEL TIME(MIN.) = 1.51 Tc(MIN.) = 14.89
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1536.00 = 1489.00 FEET.

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*****
FLOW PROCESS FROM NODE 1536.00 TO NODE 1536.00 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.) = 14.89
RAINFALL INTENSITY(INCH/HR) = 2.17
AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.57
AREA-AVERAGED Ap = 0.19
EFFECTIVE STREAM AREA(ACRES) = 12.09
TOTAL STREAM AREA(ACRES) = 12.09
PEAK FLOW RATE(CFS) AT CONFLUENCE = 24.00

```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	44.62	12.28	2.437	0.73( 0.17)	0.24	21.9	1530.00
1	42.40	13.95	2.257	0.74( 0.17)	0.24	22.6	1540.00
2	24.00	14.89	2.170	0.57( 0.11)	0.19	12.1	1550.00

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	66.97	12.28	2.437	0.69( 0.15)	0.22	31.9	1530.00
2	65.82	13.95	2.257	0.69( 0.15)	0.22	33.9	1540.00
3	64.63	14.89	2.170	0.69( 0.15)	0.22	34.7	1550.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 66.97 Tc(MIN.) = 12.28
EFFECTIVE AREA(ACRES) = 31.88 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 34.7
LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1536.00 = 1489.00 FEET.

```

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1536.00 TO NODE 1526.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 674.30 DOWNSTREAM(FEET) = 670.00  
 FLOW LENGTH(FEET) = 602.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.38  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 66.97  
 PIPE TRAVEL TIME(MIN.) = 1.07 Tc(MIN.) = 13.35  
 LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1526.00 = 2091.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 13.35  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.317  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.52	0.57	0.100	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	0.70	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.132  
 SUBAREA AREA(ACRES) = 2.22 SUBAREA RUNOFF(CFS) = 4.48  
 EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.15  
 AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.22  
 TOTAL AREA(ACRES) = 36.9 PEAK FLOW RATE(CFS) = 66.97  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1526.00 TO NODE 1526.00 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	66.97	13.35	2.317	0.68( 0.15)	0.22	34.1	1530.00
2	65.82	15.05	2.156	0.68( 0.15)	0.22	36.2	1540.00
3	64.63	16.00	2.079	0.68( 0.15)	0.21	36.9	1550.00

LONGEST FLOWPATH FROM NODE 1550.00 TO NODE 1526.00 = 2091.00 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	57.39	17.37	1.979	0.97( 0.35)	0.36	35.8	1510.00
2	57.00	17.87	1.945	0.97( 0.35)	0.36	36.3	1500.00

3 51.93 20.61 1.785 0.97( 0.37) 0.38 37.7 1520.00  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1526.00 = 3083.00 FEET.

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	120.24	13.35	2.317	0.85( 0.24)	0.28	61.6	1530.00
2	120.97	15.05	2.156	0.85( 0.24)	0.28	67.2	1540.00
3	120.73	16.00	2.079	0.86( 0.24)	0.28	69.9	1550.00
4	118.66	17.37	1.979	0.86( 0.25)	0.29	72.7	1510.00
5	117.15	17.87	1.945	0.86( 0.25)	0.29	73.3	1500.00
6	106.74	20.61	1.785	0.87( 0.26)	0.30	74.6	1520.00

TOTAL AREA(ACRES) = 74.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 120.97 Tc(MIN.) = 15.051  
 EFFECTIVE AREA(ACRES) = 67.20 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.85 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 74.6  
 LONGEST FLOWPATH FROM NODE 1500.00 TO NODE 1526.00 = 3083.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 74.6 TC(MIN.) = 15.05  
 EFFECTIVE AREA(ACRES) = 67.20 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.85 AREA-AVERAGED Ap = 0.282  
 PEAK FLOW RATE(CFS) = 120.97

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	120.24	13.35	2.317	0.85( 0.24)	0.28	61.6	1530.00
2	120.97	15.05	2.156	0.85( 0.24)	0.28	67.2	1540.00
3	120.73	16.00	2.079	0.86( 0.24)	0.28	69.9	1550.00
4	118.66	17.37	1.979	0.86( 0.25)	0.29	72.7	1510.00
5	117.15	17.87	1.945	0.86( 0.25)	0.29	73.3	1500.00
6	106.74	20.61	1.785	0.87( 0.26)	0.30	74.6	1520.00

=====

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* W.O. #915-1, ONTARIO MPD \*  
\* 10-YR STUDY \*  
\* EUCLID, CAMPUS & BONVIEW AVENUE \*  
\*\*\*\*\*

FILE NAME: EUCLID\_M.DAT  
TIME/DATE OF STUDY: 16:58 08/15/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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- / SIDE / SIDE / WAY	STREET-CROSSFALL: IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GUTTER LIP (FT)	GUTTER HIKE (FT)	GEOMETRIES: MANNING FACTOR (n)
1	65.0	60.0	0.020/0.020/0.020	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
2	54.0	49.0	0.020/0.020/0.020	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
3	47.0	42.0	0.020/0.020/0.020	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	42.0	37.0	0.020/0.020/0.020	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
5	38.0	33.0	0.020/0.020/0.020	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
6	32.0	27.0	0.020/0.020/0.020	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
7	24.0	19.0	0.020/0.020/0.020	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
8	20.0	15.0	0.020/0.020/0.020	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
9	18.0	13.0	0.020/0.020/0.020	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150

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

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.30
30-MINUTES	0.61
1-HOUR	0.80
3-HOUR	1.38
6-HOUR	1.94
24-HOUR	3.65

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21 \*\*\*\*\*

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 775.00  
ELEVATION DATA: UPSTREAM(FEET) = 783.00 DOWNSTREAM(FEET) = 776.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.273  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.894  
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						
"5-7 DWELLINGS/ACRE"	A	0.80	0.98	0.500	32	14.27
RESIDENTIAL						
"5-7 DWELLINGS/ACRE"	C	5.50	0.57	0.500	69	14.27

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 8.98  
TOTAL AREA(ACRES) = 6.30 PEAK FLOW RATE(CFS) = 8.98

\*\*\*\*\* FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62 \*\*\*\*\*

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 9 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 776.00 DOWNSTREAM ELEVATION(FEET) = 765.00  
STREET LENGTH(FEET) = 1029.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00

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

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.74  
 \*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(Feet) = 0.53  
 HALFSTREET FLOOD WIDTH(Feet) = 18.00  
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.44  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.81  
 STREET FLOW TRAVEL TIME(MIN.) = 4.98 Tc(MIN.) = 19.26

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.582  
 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"	A	20.20	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	9.50	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 29.70 SUBAREA RUNOFF(CFS) = 31.01  
 EFFECTIVE AREA(ACRES) = 36.00 AREA-AVERAGED Fm(INCH/HR) = 0.40  
 AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 36.0 PEAK FLOW RATE(CFS) = 38.23

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(Feet) = 0.59 HALFSTREET FLOOD WIDTH(Feet) = 18.00  
 FLOW VELOCITY(Feet/Sec.) = 4.07 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.40  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 1804.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 765.00 DOWNSTREAM(Feet) = 750.00  
 FLOW LENGTH(Feet) = 1367.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.1 INCHES  
 PIPE-FLOW VELOCITY(Feet/Sec.) = 9.44  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 38.23  
 PIPE TRAVEL TIME(MIN.) = 2.41 Tc(MIN.) = 21.67  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 3171.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4.00 TO NODE 4.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 21.67  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.474  
 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"	A	48.90	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	1.00	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 49.90 SUBAREA RUNOFF(CFS) = 44.48  
 EFFECTIVE AREA(ACRES) = 85.90 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 85.9 PEAK FLOW RATE(CFS) = 79.20

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4.00 TO NODE 4.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 21.67  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.474  
 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"	A	39.00	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 39.00 SUBAREA RUNOFF(CFS) = 34.62  
 EFFECTIVE AREA(ACRES) = 124.90 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 124.9 PEAK FLOW RATE(CFS) = 113.82

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 750.00 DOWNSTREAM(Feet) = 717.00  
 FLOW LENGTH(Feet) = 2637.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.0 INCHES  
 PIPE-FLOW VELOCITY(Feet/Sec.) = 13.13  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 113.82  
 PIPE TRAVEL TIME(MIN.) = 3.35 Tc(MIN.) = 25.02  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 5808.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5.00 TO NODE 5.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 25.02



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* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.352
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"   A       31.80   0.98   0.500   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C       35.20   0.57   0.500   69
PUBLIC PARK            C       1.20    0.57   0.850   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.506
SUBAREA AREA(ACRES) = 68.20   SUBAREA RUNOFF(CFS) = 59.56
EFFECTIVE AREA(ACRES) = 193.10   AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.86   AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 193.1   PEAK FLOW RATE(CFS) = 159.70

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*****
FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE = 81

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

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*****
MAINLINE Tc(MIN.) = 25.02
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.352
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK            A       3.50    0.98   0.850   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   A      40.50    0.98   0.500   32
PUBLIC PARK            C       3.50    0.57   0.850   69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C      46.10    0.57   0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.76
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.526
SUBAREA AREA(ACRES) = 93.60   SUBAREA RUNOFF(CFS) = 80.27
EFFECTIVE AREA(ACRES) = 286.70   AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.83   AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 286.7   PEAK FLOW RATE(CFS) = 239.96

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*****
FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 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) = 717.00   DOWNSTREAM(FEET) = 692.00
FLOW LENGTH( FEET) = 2642.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 49.1 INCHES
PIPE-FLOW VELOCITY( FEET/SEC. ) = 13.95
ESTIMATED PIPE DIAMETER(INCH) = 60.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 239.96
PIPE TRAVEL TIME(MIN.) = 3.16   Tc(MIN.) = 28.17
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 = 8450.00 FEET.

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*****
FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE = 81

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

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*****
MAINLINE Tc(MIN.) = 28.17
* 10 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
RESIDENTIAL
"11+ DWELLINGS/ACRE"   A      14.10    0.98   0.200   32
PUBLIC PARK            A       3.70    0.98   0.850   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   A       7.00    0.98   0.500   32
PUBLIC PARK            C       3.80    0.57   0.850   69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C      35.00    0.57   0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475
SUBAREA AREA(ACRES) = 63.60   SUBAREA RUNOFF(CFS) = 53.21
EFFECTIVE AREA(ACRES) = 350.30   AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.80   AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 350.3   PEAK FLOW RATE(CFS) = 269.17

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*****
FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE = 81

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```

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

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```

*****
MAINLINE Tc(MIN.) = 28.17
* 10 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
RESIDENTIAL
"11+ DWELLINGS/ACRE"   A       1.40    0.98   0.200   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   A      11.20    0.98   0.500   32
PUBLIC PARK            C       5.60    0.57   0.850   69
RESIDENTIAL
"11+ DWELLINGS/ACRE"   C      16.10    0.57   0.200   69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C      46.30    0.57   0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.459
SUBAREA AREA(ACRES) = 80.60   SUBAREA RUNOFF(CFS) = 70.32
EFFECTIVE AREA(ACRES) = 430.90   AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.77   AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 430.9   PEAK FLOW RATE(CFS) = 339.49

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*****
FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 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) = 692.00   DOWNSTREAM( FEET) = 670.00

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FLOW LENGTH(FEET) = 2643.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 72.0 INCH PIPE IS 54.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.72  
 ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 339.49  
 PIPE TRAVEL TIME(MIN.) = 2.99 Tc(MIN.) = 31.17  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 11093.00 FEET.

TOTAL AREA(ACRES) = 549.9 PEAK FLOW RATE(CFS) = 408.28

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 670.00 DOWNSTREAM(FEET) = 650.00  
 FLOW LENGTH(FEET) = 2592.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 78.0 INCH PIPE IS 59.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.96  
 ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 408.28  
 PIPE TRAVEL TIME(MIN.) = 2.89 Tc(MIN.) = 34.05  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 13685.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 34.05  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.124  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	2.20	0.98	0.200	32
COMMERCIAL	B	27.50	0.75	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	63.70	0.75	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	12.60	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.73  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.174  
 SUBAREA AREA(ACRES) = 106.00 SUBAREA RUNOFF(CFS) = 95.11  
 EFFECTIVE AREA(ACRES) = 655.90 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 655.9 PEAK FLOW RATE(CFS) = 473.03

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 71  
 -----

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<<<  
 >>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<<<

=====

UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.57; LAG(HR) = 0.45; Fm(INCH/HR) = 0.32; Ybar = 0.40  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
 3HR = 1.00; 6HR = 1.00; 24HR = 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 655.9

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 7.00 TO NODE 7.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 31.17  
 \* 10 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
PUBLIC PARK	A	3.80	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	13.00	0.98	0.200	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.80	0.75	0.200	56
PUBLIC PARK	C	10.20	0.57	0.850	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	7.30	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427  
 SUBAREA AREA(ACRES) = 40.10 SUBAREA RUNOFF(CFS) = 31.71  
 EFFECTIVE AREA(ACRES) = 471.00 AREA-AVERAGED Fm(INCH/HR) = 0.38  
 AREA-AVERAGED Fp(INCH/HR) = 0.77 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 471.0 PEAK FLOW RATE(CFS) = 342.50

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 7.00 TO NODE 7.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 31.17  
 \* 10 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
PUBLIC PARK	A	3.70	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	3.50	0.98	0.200	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	11.60	0.75	0.200	56
PUBLIC PARK	C	22.10	0.57	0.850	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	38.00	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.413  
 SUBAREA AREA(ACRES) = 78.90 SUBAREA RUNOFF(CFS) = 65.78  
 EFFECTIVE AREA(ACRES) = 549.90 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.48

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 13685.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0306; Lca/L=0.4,n=.0275; Lca/L=0.5,n=.0252;Lca/L=0.6,n=.0235  
 TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 124.94  
 UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 552.26  
 TOTAL PEAK FLOW RATE(CFS) = 552.26 (SOURCE FLOW INCLUDED)  
 RATIONAL METHOD PEAK FLOW RATE(CFS) = 473.03  
 (UPSTREAM NODE PEAK FLOW RATE(CFS) = 473.03)  
 PEAK FLOW RATE(CFS) USED = 552.26

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.163  
 SUBAREA RUNOFF(CFS) = 16.47  
 TOTAL AREA(ACRES) = 9.40 PEAK FLOW RATE(CFS) = 16.47

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 12.00 TO NODE 13.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 4 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 690.00 DOWNSTREAM ELEVATION(FEET) = 678.00  
 STREET LENGTH(FEET) = 1343.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 36.14

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.61  
 HALFSTREET FLOOD WIDTH(FEET) = 22.38  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.48  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.11  
 STREET FLOW TRAVEL TIME(MIN.) = 6.44 Tc(MIN.) = 18.52  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.619

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	5.20	0.98	0.200	32
PUBLIC PARK	A	1.50	0.98	0.850	32
COMMERCIAL	C	11.60	0.57	0.100	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	1.30	0.57	0.200	69
PUBLIC PARK	C	12.70	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.450  
 SUBAREA AREA(ACRES) = 32.30 SUBAREA RUNOFF(CFS) = 38.82  
 EFFECTIVE AREA(ACRES) = 41.70 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.39  
 TOTAL AREA(ACRES) = 41.7 PEAK FLOW RATE(CFS) = 51.29

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.67 HALFSTREET FLOOD WIDTH(FEET) = 25.84  
 FLOW VELOCITY(FEET/SEC.) = 3.79 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.55  
 LONGEST FLOWPATH FROM NODE 11.00 TO NODE 13.00 = 2078.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 13.00 TO NODE 14.00 IS CODE = 31  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 8.00 TO NODE 15.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 650.00 DOWNSTREAM(FEET) = 645.00  
 FLOW LENGTH(FEET) = 1277.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 102.0 INCH PIPE IS 73.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.63  
 ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 552.26  
 PIPE TRAVEL TIME(MIN.) = 1.69 Tc(MIN.) = 35.74  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 15.00 = 14962.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 1  
 -----

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

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 PEAK FLOW RATE(CFS) = 552.26 Tc(MIN.) = 35.74  
 AREA-AVERAGED Fm(INCH/HR) = 0.32 Ybar = 0.40  
 TOTAL AREA(ACRES) = 655.9

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 21  
 -----

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 735.00  
 ELEVATION DATA: UPSTREAM(FEET) = 694.00 DOWNSTREAM(FEET) = 690.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.085  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.092

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	A	0.40	0.98	0.100	32	12.08
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	5.90	0.98	0.200	32	12.88
COMMERCIAL	C	3.10	0.57	0.100	69	12.08

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 678.00 DOWNSTREAM(FEET) = 670.00
FLOW LENGTH(FEET) = 910.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.45
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 51.29
PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 20.13
LONGEST FLOWPATH FROM NODE 11.00 TO NODE 14.00 = 2988.00 FEET.

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*****
FLOW PROCESS FROM NODE 14.00 TO NODE 14.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 20.13
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.541
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL         B       6.10   0.75  0.100  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B       9.30   0.75  0.200  56
COMMERCIAL         C       1.70   0.57  0.100  69
RESIDENTIAL
"11+ DWELLINGS/ACRE" C       4.90   0.57  0.200  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.165
SUBAREA AREA(ACRES) = 22.00 SUBAREA RUNOFF(CFS) = 28.25
EFFECTIVE AREA(ACRES) = 63.70 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 63.7 PEAK FLOW RATE(CFS) = 76.59

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*****
FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 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) = 670.00 DOWNSTREAM(FEET) = 645.00
FLOW LENGTH(FEET) = 2595.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.56
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 76.59
PIPE TRAVEL TIME(MIN.) = 4.09 Tc(MIN.) = 24.22
LONGEST FLOWPATH FROM NODE 11.00 TO NODE 15.00 = 5583.00 FEET.

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*****
FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 24.22

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* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.379
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       61.10  0.75  0.200  56
COMMERCIAL         B       21.30  0.75  0.100  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.174
SUBAREA AREA(ACRES) = 82.40 SUBAREA RUNOFF(CFS) = 92.58
EFFECTIVE AREA(ACRES) = 146.10 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.70 AREA-AVERAGED Ap = 0.23
TOTAL AREA(ACRES) = 146.1 PEAK FLOW RATE(CFS) = 159.88

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*****
FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 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.) = 24.22
RAINFALL INTENSITY(INCH/HR) = 1.38
AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.70
AREA-AVERAGED Ap = 0.23
EFFECTIVE STREAM AREA(ACRES) = 146.10
TOTAL STREAM AREA(ACRES) = 146.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 159.88
** CONFLUENCE DATA **
STREAM   Q       Tc     AREA   HEADWATER
NUMBER  (CFS)  (MIN.) (ACRES)  NODE
1       552.26  35.74  655.90  1.00
2       159.88  24.22  146.10  11.00

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COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.60; LAG(HR) = 0.48; Fm(INCH/HR) = 0.29; Ybar = 0.37
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 802.0
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 15.00 = 14962.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0297; Lca/L=0.4,n=.0267; Lca/L=0.5,n=.0245;Lca/L=0.6,n=.0229
TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 159.27
PEAK FLOW RATE(CFS) = 656.66

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*****
FLOW PROCESS FROM NODE 15.00 TO NODE 16.00 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) = 645.00 DOWNSTREAM(FEET) = 639.40  
FLOW LENGTH(FEET) = 1392.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 108.0 INCH PIPE IS 78.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.31  
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 656.66  
PIPE TRAVEL TIME(MIN.) = 1.74 Tc(MIN.) = 37.48  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 16.00 = 16354.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 37.48  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.061  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 20.10 0.75 0.100 56  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" B 56.00 0.75 0.200 56  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.174  
SUBAREA AREA(ACRES) = 76.10  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.62; LAG(HR) = 0.50; Fm(INCH/HR) = 0.28; Ybar = 0.36  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 878.1  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 16.00 = 16354.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0289; Lca/L=0.4,n=.0259; Lca/L=0.5,n=.0238;Lca/L=0.6,n=.0222  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 177.91  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 707.28  
TOTAL AREA(ACRES) = 878.1 PEAK FLOW RATE(CFS) = 707.28

\*\*\*\*\*  
FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 639.40 DOWNSTREAM(FEET) = 633.60  
FLOW LENGTH(FEET) = 1455.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 108.0 INCH PIPE IS 83.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.37  
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 707.28  
PIPE TRAVEL TIME(MIN.) = 1.81 Tc(MIN.) = 39.30

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 17.00 = 17809.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 39.30  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.031  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 69.60 0.75 0.100 56  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" B 17.70 0.75 0.200 56  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.120  
SUBAREA AREA(ACRES) = 87.30  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.65; LAG(HR) = 0.52; Fm(INCH/HR) = 0.26; Ybar = 0.34  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 965.4  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 17.00 = 17809.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0281; Lca/L=0.4,n=.0252; Lca/L=0.5,n=.0232;Lca/L=0.6,n=.0216  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 200.38  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 770.89  
TOTAL AREA(ACRES) = 965.4 PEAK FLOW RATE(CFS) = 770.89

\*\*\*\*\*  
FLOW PROCESS FROM NODE 17.00 TO NODE 48.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 633.60 DOWNSTREAM(FEET) = 633.00  
FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 108.0 INCH PIPE IS 87.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.90  
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 770.89  
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 39.46  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 48.00 = 17949.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 48.00 TO NODE 48.00 IS CODE = 10  
-----

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

\*\*\*\*\*

FLOW PROCESS FROM NODE 21.00 TO NODE 22.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
INITIAL SUBAREA FLOW-LENGTH(FEET) = 688.00
ELEVATION DATA: UPSTREAM(FEET) = 787.00 DOWNSTREAM(FEET) = 779.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.111
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.329
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 A 5.60 0.98 0.100 32 10.11
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 11.24
TOTAL AREA(ACRES) = 5.60 PEAK FLOW RATE(CFS) = 11.24

\*\*\*\*\*
FLOW PROCESS FROM NODE 22.00 TO NODE 23.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 4 USED)<<<<<
UPSTREAM ELEVATION(FEET) = 779.00 DOWNSTREAM ELEVATION(FEET) = 760.00
STREET LENGTH(FEET) = 1980.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.84
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.51
HALFSTREET FLOOD WIDTH(FEET) = 17.39
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.09
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.56
STREET FLOW TRAVEL TIME(MIN.) = 10.70 Tc(MIN.) = 20.81
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.510

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" A 17.90 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 17.90 SUBAREA RUNOFF(CFS) = 16.48
EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.39

AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 23.60

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 18.62
FLOW VELOCITY(FEET/SEC.) = 3.23 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.71
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 23.00 = 2668.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 23.00 TO NODE 24.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
ELEVATION DATA: UPSTREAM(FEET) = 760.00 DOWNSTREAM(FEET) = 753.00
FLOW LENGTH(FEET) = 1230.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.65
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 23.60
PIPE TRAVEL TIME(MIN.) = 3.08 Tc(MIN.) = 23.89
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 24.00 = 3898.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 24.00 TO NODE 24.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
MAINLINE Tc(MIN.) = 23.89
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.390
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 5.90 0.98 0.100 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 9.20 0.98 0.200 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 47.00 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.418
SUBAREA AREA(ACRES) = 62.10 SUBAREA RUNOFF(CFS) = 54.94
EFFECTIVE AREA(ACRES) = 85.60 AREA-AVERAGED Fm(INCH/HR) = 0.40
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 85.6 PEAK FLOW RATE(CFS) = 75.99

\*\*\*\*\*
FLOW PROCESS FROM NODE 24.00 TO NODE 25.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
ELEVATION DATA: UPSTREAM(FEET) = 753.00 DOWNSTREAM(FEET) = 751.20
FLOW LENGTH(FEET) = 1525.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.89
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1



PIPE-FLOW(CFS) = 75.99  
PIPE TRAVEL TIME(MIN.) = 5.20 Tc(MIN.) = 29.09  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 25.00 = 5423.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 25.00 TO NODE 25.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 29.09  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.235  
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" A 55.50 0.98 0.200 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 15.30 0.57 0.200 69  
COMMERCIAL A 14.88 0.98 0.100 32  
COMMERCIAL C 0.92 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.182  
SUBAREA AREA(ACRES) = 86.60 SUBAREA RUNOFF(CFS) = 83.62  
EFFECTIVE AREA(ACRES) = 172.20 AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.30  
TOTAL AREA(ACRES) = 172.2 PEAK FLOW RATE(CFS) = 147.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 25.00 TO NODE 29.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 751.20 DOWNSTREAM(FEET) = 751.00  
FLOW LENGTH(FEET) = 105.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 69.0 INCH PIPE IS 53.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.86  
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 147.68  
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 29.34  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 29.00 = 5528.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 29.00 TO NODE 29.00 IS CODE = 1  
-----

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

-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 29.34  
RAINFALL INTENSITY(INCH/HR) = 1.23  
AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.95  
AREA-AVERAGED Ap = 0.30  
EFFECTIVE STREAM AREA(ACRES) = 172.20  
TOTAL STREAM AREA(ACRES) = 172.20

PEAK FLOW RATE(CFS) AT CONFLUENCE = 147.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 26.00 TO NODE 27.00 IS CODE = 21  
-----

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

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 805.00 DOWNSTREAM(FEET) = 800.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 17.789  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.659  
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  
"5-7 DWELLINGS/ACRE" A 5.06 0.98 0.500 32 17.79  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 5.34  
TOTAL AREA(ACRES) = 5.06 PEAK FLOW RATE(CFS) = 5.34

\*\*\*\*\*  
FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 17.79  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.659  
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" A 5.42 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 5.42 SUBAREA RUNOFF(CFS) = 5.72  
EFFECTIVE AREA(ACRES) = 10.48 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 11.05

\*\*\*\*\*  
FLOW PROCESS FROM NODE 27.00 TO NODE 28.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 6 USED)<<<<<

-----  
UPSTREAM ELEVATION(FEET) = 800.00 DOWNSTREAM ELEVATION(FEET) = 785.00  
STREET LENGTH(FEET) = 1760.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 32.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 27.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020



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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 28.47  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.57  
 HALFSTREET FLOOD WIDTH(FEET) = 20.58  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.22  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.83

STREET FLOW TRAVEL TIME(MIN.) = 9.12 Tc(MIN.) = 26.91  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.294

SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	15.47	0.98	0.100	32
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	7.16	0.98	0.200	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	15.04	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.279  
 SUBAREA AREA(ACRES) = 37.67 SUBAREA RUNOFF(CFS) = 34.67  
 EFFECTIVE AREA(ACRES) = 48.15 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 48.2 PEAK FLOW RATE(CFS) = 42.28

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.64 HALFSTREET FLOOD WIDTH(FEET) = 24.01  
 FLOW VELOCITY(FEET/SEC.) = 3.55 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.27  
 \*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
 AND L = 1760.0 FT WITH ELEVATION-DROP = 15.0 FT, IS 51.5 CFS,  
 WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 28.00  
 LONGEST FLOWPATH FROM NODE 26.00 TO NODE 28.00 = 2760.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 28.00 TO NODE 29.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM( FEET) = 785.00 DOWNSTREAM( FEET) = 751.00  
 FLOW LENGTH( FEET) = 2580.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.3 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC. ) = 10.35  
 ESTIMATED PIPE DIAMETER( INCH ) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS ) = 42.28  
 PIPE TRAVEL TIME( MIN. ) = 4.15 Tc( MIN. ) = 31.06  
 LONGEST FLOWPATH FROM NODE 26.00 TO NODE 29.00 = 5340.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 29.00 TO NODE 29.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 31.06  
 \* 10 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
COMMERCIAL	A	9.22	0.98	0.100	32
COMMERCIAL	C	1.68	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.91  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 10.75  
 EFFECTIVE AREA(ACRES) = 59.05 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 59.1 PEAK FLOW RATE(CFS) = 48.40

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 29.00 TO NODE 29.00 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.) = 31.06  
 RAINFALL INTENSITY(INCH/HR) = 1.19  
 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.28  
 EFFECTIVE STREAM AREA(ACRES) = 59.05  
 TOTAL STREAM AREA(ACRES) = 59.05  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 48.40

\*\* CONFLUENCE DATA \*\*  

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	147.68	29.34	1.229	0.95( 0.28)	0.30	172.2	21.00
2	48.40	31.06	1.188	0.97( 0.28)	0.28	59.1	26.00

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	195.48	29.34	1.229	0.95( 0.28)	0.29	228.0	21.00
2	189.65	31.06	1.188	0.96( 0.28)	0.29	231.2	26.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 195.48 Tc(MIN.) = 29.34  
 EFFECTIVE AREA(ACRES) = 227.98 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.29  
 TOTAL AREA(ACRES) = 231.2  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 29.00 = 5528.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 29.00 TO NODE 35.00 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) = 751.00 DOWNSTREAM(FEET) = 718.50
FLOW LENGTH(FEET) = 2645.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.79
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 195.48
PIPE TRAVEL TIME(MIN.) = 2.98 Tc(MIN.) = 32.32
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 35.00 = 8173.00 FEET.

*****
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 32.32
* 10 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
COMMERCIAL C 11.10 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 11.02
EFFECTIVE AREA(ACRES) = 239.08 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 242.4 PEAK FLOW RATE(CFS) = 195.48
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 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.) = 32.32
RAINFALL INTENSITY(INCH/HR) = 1.16
AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.95
AREA-AVERAGED Ap = 0.29
EFFECTIVE STREAM AREA(ACRES) = 239.08
TOTAL STREAM AREA(ACRES) = 242.35
PEAK FLOW RATE(CFS) AT CONFLUENCE = 195.48

*****
FLOW PROCESS FROM NODE 30.00 TO NODE 31.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 937.00
ELEVATION DATA: UPSTREAM(FEET) = 760.00 DOWNSTREAM(FEET) = 750.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.893
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.846
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
"5-7 DWELLINGS/ACRE" A 7.50 0.98 0.500 32 14.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 9.17
TOTAL AREA(ACRES) = 7.50 PEAK FLOW RATE(CFS) = 9.17

*****
FLOW PROCESS FROM NODE 31.00 TO NODE 32.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 4 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 750.00 DOWNSTREAM ELEVATION(FEET) = 722.00
STREET LENGTH(FEET) = 1670.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.84
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 14.14
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.62
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.60
STREET FLOW TRAVEL TIME(MIN.) = 7.69 Tc(MIN.) = 22.59
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.438
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" A 6.50 0.98 0.500 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 7.40 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.76
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 13.90 SUBAREA RUNOFF(CFS) = 13.25
EFFECTIVE AREA(ACRES) = 21.40 AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 21.4 PEAK FLOW RATE(CFS) = 19.66

END OF SUBAREA STREET FLOW HYDRAULICS:

```

DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 15.44  
FLOW VELOCITY(FEET/SEC.) = 3.82 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.78  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 2607.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 32.00 TO NODE 33.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 722.00 DOWNSTREAM(FEET) = 720.50  
FLOW LENGTH(FEET) = 1270.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.48  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 19.66  
PIPE TRAVEL TIME(MIN.) = 6.08 Tc(MIN.) = 28.66  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 33.00 = 3877.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 33.00 TO NODE 33.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 28.66  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.246  
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" A 58.00 0.98 0.500 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 10.80 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.91  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 68.80 SUBAREA RUNOFF(CFS) = 48.97  
EFFECTIVE AREA(ACRES) = 90.20 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 90.2 PEAK FLOW RATE(CFS) = 64.94

\*\*\*\*\*  
FLOW PROCESS FROM NODE 33.00 TO NODE 34.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 720.50 DOWNSTREAM(FEET) = 718.70  
FLOW LENGTH(FEET) = 1525.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.71  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 64.94  
PIPE TRAVEL TIME(MIN.) = 5.39 Tc(MIN.) = 34.06  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 34.00 = 5402.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 34.06  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.124  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 58.70 0.57 0.200 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 4.50 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 25.80 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.58  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.287  
SUBAREA AREA(ACRES) = 89.00 SUBAREA RUNOFF(CFS) = 76.67  
EFFECTIVE AREA(ACRES) = 179.20 AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.78 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 179.2 PEAK FLOW RATE(CFS) = 131.66

\*\*\*\*\*  
FLOW PROCESS FROM NODE 34.00 TO NODE 35.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 718.70 DOWNSTREAM(FEET) = 718.50  
FLOW LENGTH(FEET) = 105.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 51.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.66  
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 131.66  
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 34.32  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 35.00 = 5507.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 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.) = 34.32  
RAINFALL INTENSITY(INCH/HR) = 1.12  
AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.78  
AREA-AVERAGED Ap = 0.39  
EFFECTIVE STREAM AREA(ACRES) = 179.20  
TOTAL STREAM AREA(ACRES) = 179.20  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 131.66

\*\* CONFLUENCE DATA \*\*

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	195.48	32.32	1.159	0.95 ( 0.27)	0.29	239.1 21.00
1	189.65	34.05	1.124	0.95 ( 0.27)	0.29	242.4 26.00
2	131.66	34.32	1.119	0.78 ( 0.31)	0.39	179.2 30.00

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	325.75	32.32	1.159	0.87 ( 0.29)	0.33	407.9	21.00
2	321.14	34.05	1.124	0.86 ( 0.29)	0.33	420.2	26.00
3	320.14	34.32	1.119	0.86 ( 0.29)	0.33	421.6	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 325.75 Tc(MIN.) = 32.32  
EFFECTIVE AREA(ACRES) = 407.86 AREA-AVERAGED Fm(INCH/HR) = 0.29  
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 421.6  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 35.00 = 8173.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 35.00 TO NODE 41.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 718.50 DOWNSTREAM(FEET) = 688.00  
FLOW LENGTH(FEET) = 2640.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 51.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.40  
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 325.75  
PIPE TRAVEL TIME(MIN.) = 2.68 Tc(MIN.) = 35.01  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 41.00 = 10813.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 35.01  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.105  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 11.60 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 11.60 SUBAREA RUNOFF(CFS) = 10.95  
EFFECTIVE AREA(ACRES) = 419.46 AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 433.2 PEAK FLOW RATE(CFS) = 325.75  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 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.) = 35.01  
RAINFALL INTENSITY(INCH/HR) = 1.11  
AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.86  
AREA-AVERAGED Ap = 0.32  
EFFECTIVE STREAM AREA(ACRES) = 419.46  
TOTAL STREAM AREA(ACRES) = 433.15  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 325.75

\*\*\*\*\*  
FLOW PROCESS FROM NODE 36.00 TO NODE 37.00 IS CODE = 21

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

\*\*\*\*\*  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 719.00  
ELEVATION DATA: UPSTREAM(FEET) = 722.00 DOWNSTREAM(FEET) = 715.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.365  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.171  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 3.60 0.98 0.200 32 11.36  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 2.60 0.98 0.500 32 13.64  
PUBLIC PARK A 2.90 0.98 0.850 32 16.94  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.493  
SUBAREA RUNOFF(CFS) = 13.84  
TOTAL AREA(ACRES) = 9.10 PEAK FLOW RATE(CFS) = 13.84

\*\*\*\*\*  
FLOW PROCESS FROM NODE 37.00 TO NODE 38.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 4 USED)<<<<<  
\*\*\*\*\*  
UPSTREAM ELEVATION(FEET) = 715.00 DOWNSTREAM ELEVATION(FEET) = 695.00  
STREET LENGTH(FEET) = 1996.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 29.78  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.56  
HALFSTREET FLOOD WIDTH(FEET) = 20.28  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.46  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.95  
STREET FLOW TRAVEL TIME(MIN.) = 9.61 Tc(MIN.) = 20.98  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.503

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" A 18.10 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 7.90 0.98 0.500 32  
PUBLIC PARK A 2.60 0.98 0.850 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 1.00 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.337  
SUBAREA AREA(ACRES) = 29.60 SUBAREA RUNOFF(CFS) = 31.35  
EFFECTIVE AREA(ACRES) = 38.70 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 38.7 PEAK FLOW RATE(CFS) = 39.72

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.61 HALFSTREET FLOOD WIDTH(FEET) = 22.74  
FLOW VELOCITY(FEET/SEC.) = 3.70 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.27  
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.00 = 2715.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 38.00 TO NODE 39.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 692.00  
FLOW LENGTH(FEET) = 1310.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.35  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 39.72  
PIPE TRAVEL TIME(MIN.) = 4.08 Tc(MIN.) = 25.06  
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 39.00 = 4025.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 39.00 TO NODE 39.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 25.06  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.351

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 5.00 0.98 0.850 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 30.70 0.98 0.200 32  
PUBLIC PARK C 3.10 0.57 0.850 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 19.60 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.82  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.290  
SUBAREA AREA(ACRES) = 58.40 SUBAREA RUNOFF(CFS) = 58.54  
EFFECTIVE AREA(ACRES) = 97.10 AREA-AVERAGED Fm(INCH/HR) = 0.29  
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 97.1 PEAK FLOW RATE(CFS) = 92.97

\*\*\*\*\*  
FLOW PROCESS FROM NODE 39.00 TO NODE 40.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 692.00 DOWNSTREAM(FEET) = 688.30  
FLOW LENGTH(FEET) = 1490.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.82  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 92.97  
PIPE TRAVEL TIME(MIN.) = 3.64 Tc(MIN.) = 28.70  
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 40.00 = 5515.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 40.00 TO NODE 40.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 28.70  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.245  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 0.90 0.98 0.850 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 4.70 0.98 0.200 32  
PUBLIC PARK C 11.50 0.57 0.850 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 29.50 0.57 0.200 69  
COMMERCIAL C 41.50 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244  
SUBAREA AREA(ACRES) = 88.10 SUBAREA RUNOFF(CFS) = 87.14  
EFFECTIVE AREA(ACRES) = 185.20 AREA-AVERAGED Fm(INCH/HR) = 0.22  
AREA-AVERAGED Fp(INCH/HR) = 0.77 AREA-AVERAGED Ap = 0.29  
TOTAL AREA(ACRES) = 185.2 PEAK FLOW RATE(CFS) = 170.88

\*\*\*\*\*

FLOW PROCESS FROM NODE 40.00 TO NODE 41.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 688.30 DOWNSTREAM(FEET) = 688.00
FLOW LENGTH(FEET) = 137.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 72.0 INCH PIPE IS 53.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.53
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 170.88
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 29.01
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 41.00 = 5652.00 FEET.

FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 29.01
RAINFALL INTENSITY(INCH/HR) = 1.24
AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.77
AREA-AVERAGED Ap = 0.29
EFFECTIVE STREAM AREA(ACRES) = 185.20
TOTAL STREAM AREA(ACRES) = 185.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 170.88

\*\* 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 4 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 4 rows of data.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 483.92 Tc(MIN.) = 29.01
EFFECTIVE AREA(ACRES) = 532.75 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 618.4
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 41.00 = 10813.00 FEET.

FLOW PROCESS FROM NODE 41.00 TO NODE 47.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 688.00 DOWNSTREAM(FEET) = 665.00
FLOW LENGTH(FEET) = 2655.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 81.0 INCH PIPE IS 62.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.27
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 483.92
PIPE TRAVEL TIME(MIN.) = 2.72 Tc(MIN.) = 31.72
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 47.00 = 13468.00 FEET.

FLOW PROCESS FROM NODE 47.00 TO NODE 47.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 31.72
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.173
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 4.00 0.75 0.100 56
COMMERCIAL C 8.00 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 11.99
EFFECTIVE AREA(ACRES) = 544.75 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 630.4 PEAK FLOW RATE(CFS) = 483.92
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 47.00 TO NODE 47.00 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.) = 31.72
RAINFALL INTENSITY(INCH/HR) = 1.17
AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.83
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA(ACRES) = 544.75
TOTAL STREAM AREA(ACRES) = 630.35
PEAK FLOW RATE(CFS) AT CONFLUENCE = 483.92

FLOW PROCESS FROM NODE 42.00 TO NODE 43.00 IS CODE = 21

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



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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 694.00 DOWNSTREAM(FEET) = 690.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.537  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.873  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL C 8.70 0.57 0.100 69 14.54  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 14.22  
TOTAL AREA(ACRES) = 8.70 PEAK FLOW RATE(CFS) = 14.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 43.00 TO NODE 44.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 7 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 690.00 DOWNSTREAM ELEVATION(FEET) = 680.00  
STREET LENGTH(FEET) = 890.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 24.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 19.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 28.17

STRETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.55  
HALFSTREET FLOOD WIDTH(FEET) = 19.36  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.58  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.95  
STREET FLOW TRAVEL TIME(MIN.) = 4.15 Tc(MIN.) = 18.68  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.611

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 19.90 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 19.90 SUBAREA RUNOFF(CFS) = 27.84  
EFFECTIVE AREA(ACRES) = 28.60 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 28.6 PEAK FLOW RATE(CFS) = 40.01

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 22.26  
FLOW VELOCITY(FEET/SEC.) = 3.89 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.35  
LONGEST FLOWPATH FROM NODE 42.00 TO NODE 44.00 = 1890.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 44.00 TO NODE 45.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 7 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 680.00 DOWNSTREAM ELEVATION(FEET) = 667.60  
STREET LENGTH(FEET) = 1365.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 24.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 19.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 58.11

\*\*\*STREET FLOWING FULL\*\*\*  
STRETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.69  
HALFSTREET FLOOD WIDTH(FEET) = 24.93  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.10  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.81  
STREET FLOW TRAVEL TIME(MIN.) = 5.55 Tc(MIN.) = 24.23  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.378

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 18.60 0.75 0.100 56  
COMMERCIAL C 12.00 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.68  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 30.60 SUBAREA RUNOFF(CFS) = 36.10  
EFFECTIVE AREA(ACRES) = 59.20 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 59.2 PEAK FLOW RATE(CFS) = 70.12

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.72 HALFSTREET FLOOD WIDTH(FEET) = 26.70  
FLOW VELOCITY(FEET/SEC.) = 4.38 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.16  
LONGEST FLOWPATH FROM NODE 42.00 TO NODE 45.00 = 3255.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 45.00 TO NODE 46.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 667.60 DOWNSTREAM(FEET) = 665.20



FLOW LENGTH(FEET) = 1435.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.44  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 70.12  
 PIPE TRAVEL TIME(MIN.) = 4.39 Tc(MIN.) = 28.63  
 LONGEST FLOWPATH FROM NODE 42.00 TO NODE 46.00 = 4690.00 FEET.

TOTAL STREAM AREA(ACRES) = 145.90  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 155.54

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	483.92	31.72	1.173	0.83( 0.25)	0.31	544.7	36.00
1	474.44	37.73	1.057	0.84( 0.26)	0.31	616.7	21.00
1	464.54	39.47	1.029	0.83( 0.26)	0.31	629.0	26.00
1	462.76	39.79	1.024	0.83( 0.26)	0.31	630.4	30.00
2	155.54	29.03	1.237	0.63( 0.06)	0.10	145.9	42.00

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	629.29	29.03	1.237	0.81( 0.21)	0.26	644.3	42.00
2	630.96	31.72	1.173	0.81( 0.21)	0.26	690.6	36.00
3	606.13	37.73	1.057	0.82( 0.22)	0.27	762.6	21.00
4	592.50	39.47	1.029	0.82( 0.22)	0.27	774.9	26.00
5	590.06	39.79	1.024	0.82( 0.22)	0.27	776.2	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 630.96 Tc(MIN.) = 31.72  
 EFFECTIVE AREA(ACRES) = 690.65 AREA-AVERAGED Fm(INCH/HR) = 0.21  
 AREA-AVERAGED Fp(INCH/HR) = 0.81 AREA-AVERAGED Ap = 0.26  
 TOTAL AREA(ACRES) = 776.2  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 47.00 = 13468.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 47.00 TO NODE 47.00 IS CODE = 71  
 \*\*\*\*\*

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<<<  
 >>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<<<

\*\*\*\*\*  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.63; LAG(HR) = 0.50; Fm(INCH/HR) = 0.22; Ybar = 0.29  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 776.2  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 47.00 = 13468.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0339; Lca/L=0.4,n=.0304; Lca/L=0.5,n=.0279;Lca/L=0.6,n=.0261  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 172.52  
 UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 659.96  
 TOTAL PEAK FLOW RATE(CFS) = 659.96 (SOURCE FLOW INCLUDED)  
 RATIONAL METHOD PEAK FLOW RATE(CFS) = 630.96  
 (UPSTREAM NODE PEAK FLOW RATE(CFS) = 630.96)  
 PEAK FLOW RATE(CFS) USED = 659.96

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 46.00 TO NODE 46.00 IS CODE = 81  
 \*\*\*\*\*

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

-----  
 MAINLINE Tc(MIN.) = 28.63  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.247  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	29.30	0.75	0.100	56
COMMERCIAL	C	57.40	0.57	0.100	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 86.70 SUBAREA RUNOFF(CFS) = 92.42  
 EFFECTIVE AREA(ACRES) = 145.90 AREA-AVERAGED Fm(INCH/HR) = 0.06  
 AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 145.9 PEAK FLOW RATE(CFS) = 155.54

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 46.00 TO NODE 47.00 IS CODE = 31  
 \*\*\*\*\*

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

-----  
 ELEVATION DATA: UPSTREAM(FEET) = 665.20 DOWNSTREAM(FEET) = 665.00  
 FLOW LENGTH(FEET) = 147.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 75.0 INCH PIPE IS 57.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.12  
 ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 155.54  
 PIPE TRAVEL TIME(MIN.) = 0.40 Tc(MIN.) = 29.03  
 LONGEST FLOWPATH FROM NODE 42.00 TO NODE 47.00 = 4837.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 47.00 TO NODE 47.00 IS CODE = 1  
 \*\*\*\*\*

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

-----  
 TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 29.03  
 RAINFALL INTENSITY(INCH/HR) = 1.24  
 AREA-AVERAGED Fm(INCH/HR) = 0.06  
 AREA-AVERAGED Fp(INCH/HR) = 0.63  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA(ACRES) = 145.90

\*\*\*\*\*  
FLOW PROCESS FROM NODE 47.00 TO NODE 48.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 665.00 DOWNSTREAM(FEET) = 633.00  
FLOW LENGTH(FEET) = 2630.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 84.0 INCH PIPE IS 67.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.80  
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 659.96  
PIPE TRAVEL TIME(MIN.) = 2.21 Tc(MIN.) = 39.95  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 48.00 = 16098.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 48.00 TO NODE 48.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 39.95  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.021  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 12.10 0.75 0.100 56  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 12.10  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.67; LAG(HR) = 0.53; Fm(INCH/HR) = 0.22; Ybar = 0.29  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 788.3  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 48.00 = 16098.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0317; Lca/L=0.4,n=.0284; Lca/L=0.5,n=.0261;Lca/L=0.6,n=.0243  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 175.69  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 654.78  
TOTAL AREA(ACRES) = 788.3 PEAK FLOW RATE(CFS) = 659.96  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 48.00 TO NODE 48.00 IS CODE = 11  
-----

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

\*\* MAIN STREAM CONFLUENCE DATA \*\*  
PEAK FLOW RATE(CFS) = 659.96 Tc(MIN.) = 39.95  
AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.29  
TOTAL AREA(ACRES) = 788.3

LONGEST FLOWPATH FROM NODE 21.00 TO NODE 48.00 = 16098.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*  
PEAK FLOW RATE(CFS) = 770.89 Tc(MIN.) = 39.46  
AREA-AVERAGED Fm(INCH/HR) = 0.26 Ybar = 0.34  
TOTAL AREA(ACRES) = 965.4  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 48.00 = 17949.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.66; LAG(HR) = 0.53; Fm(INCH/HR) = 0.24; Ybar = 0.32  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.92; 30M = 0.92; 1HR = 0.92;  
3HR = 0.99; 6HR = 0.99; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1753.7  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 48.00 = 17949.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0281; Lca/L=0.4,n=.0252; Lca/L=0.5,n=.0231;Lca/L=0.6,n=.0216  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 374.57  
PEAK FLOW RATE(CFS) = 1367.54  
=====

END OF STUDY SUMMARY:  
TOTAL AREA(ACRES) = 1753.7 TC(MIN.) = 39.46  
AREA-AVERAGED Fm(INCH/HR)= 0.24 Ybar = 0.32  
PEAK FLOW RATE(CFS) = 1367.54  
=====

END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS



\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

Analysis prepared by:

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

\* W.O. #915-1, ONTARIO MPD \*
\* 100-YR STUDY \*
\* EUCLID, CAMPUS & BONVIEW AVENUE \*
\*\*\*\*\*

FILE NAME: EUCLID\_M.DAT
TIME/DATE OF STUDY: 13:40 08/11/2011

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

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

Table with columns: NO., WIDTH (FT), CROWN TO CROSSFALL (FT), STREET-CROSSFALL IN- / OUT- / PARK- SIDE / SIDE / WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GUTTER LIP (FT), GUTTER HIKE (FT), GEOMETRIES (n), MANNING FACTOR. Rows 1-9.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.00 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
SIERRA MADRE DEPTH-AREA FACTORS USED.

Table with columns: DURATION, AREA-AVERAGED RAINFALL(INCH). Rows: 5-MINUTES (0.44), 30-MINUTES (0.91), 1-HOUR (1.20), 3-HOUR (2.10), 6-HOUR (3.00), 24-HOUR (6.00).

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\*

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 775.00
ELEVATION DATA: UPSTREAM(FEET) = 783.00 DOWNSTREAM(FEET) = 776.00

Table with columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows: RESIDENTIAL (5-7 DWELLINGS/ACRE), RESIDENTIAL (5-7 DWELLINGS/ACRE).

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 14.35
TOTAL AREA(ACRES) = 6.30 PEAK FLOW RATE(CFS) = 14.35

\*\*\*\*\*

FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 9 USED)<<<<

UPSTREAM ELEVATION(FEET) = 776.00 DOWNSTREAM ELEVATION(FEET) = 765.00
STREET LENGTH(FEET) = 1029.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00

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

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 41.61  
\*\*\*STREET FLOWING FULL\*\*\*

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.60  
HALFSTREET FLOOD WIDTH(FEET) = 18.00  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.22  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.54  
STREET FLOW TRAVEL TIME(MIN.) = 4.07 Tc(MIN.) = 18.34  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.444

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 20.20 0.98 0.500 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 9.50 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 29.70 SUBAREA RUNOFF(CFS) = 54.04  
EFFECTIVE AREA(ACRES) = 36.00 AREA-AVERAGED Fm(INCH/HR) = 0.40  
AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 36.0 PEAK FLOW RATE(CFS) = 66.14

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.69 HALFSTREET FLOOD WIDTH(FEET) = 19.15  
FLOW VELOCITY(FEET/SEC.) = 5.06 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.49  
\*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
AND L = 1029.0 FT WITH ELEVATION-DROP = 11.0 FT, IS 61.1 CFS,  
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 3.00  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 1804.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 765.00 DOWNSTREAM(FEET) = 750.00  
FLOW LENGTH(FEET) = 1367.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.69  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 66.14  
PIPE TRAVEL TIME(MIN.) = 2.13 Tc(MIN.) = 20.47  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 3171.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4.00 TO NODE 4.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 20.47  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.288  
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" A 48.90 0.98 0.500 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 1.00 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 49.90 SUBAREA RUNOFF(CFS) = 81.03  
EFFECTIVE AREA(ACRES) = 85.90 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 85.9 PEAK FLOW RATE(CFS) = 142.11

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4.00 TO NODE 4.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 20.47  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.288  
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" A 39.00 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 39.00 SUBAREA RUNOFF(CFS) = 63.18  
EFFECTIVE AREA(ACRES) = 124.90 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 124.9 PEAK FLOW RATE(CFS) = 205.29

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 717.00  
FLOW LENGTH(FEET) = 2637.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 54.0 INCH PIPE IS 43.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.96  
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 205.29  
PIPE TRAVEL TIME(MIN.) = 2.94 Tc(MIN.) = 23.41  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 5808.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5.00 TO NODE 5.00 IS CODE = 81  
-----

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

```

=====
MAINLINE Tc(MIN.) = 23.41
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.111
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"  A       31.80    0.98     0.500    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C       35.20    0.57     0.500    69
PUBLIC PARK
"5-7 DWELLINGS/ACRE"  C        1.20    0.57     0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.506
SUBAREA AREA(ACRES) = 68.20      SUBAREA RUNOFF(CFS) = 106.12
EFFECTIVE AREA(ACRES) = 193.10   AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.86  AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 193.1      PEAK FLOW RATE(CFS) = 291.53

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*****
FLOW PROCESS FROM NODE 5.00 TO NODE 5.00 IS CODE = 81
-----

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

```

=====
MAINLINE Tc(MIN.) = 23.41
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.111
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap        SCS
  LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
PUBLIC PARK
"5-7 DWELLINGS/ACRE"  A       40.50    0.98     0.500    32
PUBLIC PARK
"5-7 DWELLINGS/ACRE"  C       3.50     0.57     0.850    69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C      46.10    0.57     0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.76
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.526
SUBAREA AREA(ACRES) = 93.60      SUBAREA RUNOFF(CFS) = 144.17
EFFECTIVE AREA(ACRES) = 286.70   AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.83  AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 286.7      PEAK FLOW RATE(CFS) = 435.70

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*****
FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 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) = 717.00  DOWNSTREAM(FEET) = 692.00
FLOW LENGTH(FEET) = 2642.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 61.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.19
ESTIMATED PIPE DIAMETER(INCH) = 75.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 435.70
PIPE TRAVEL TIME(MIN.) = 2.72    Tc(MIN.) = 26.13
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 8450.00 FEET.

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*****
FLOW PROCESS FROM NODE 6.00 TO NODE 6.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 26.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.976
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"  A      14.10    0.98     0.200    32
PUBLIC PARK
"11+ DWELLINGS/ACRE"  A       3.70    0.98     0.850    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  A       7.00    0.98     0.500    32
PUBLIC PARK
"5-7 DWELLINGS/ACRE"  C       3.80    0.57     0.850    69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C      35.00    0.57     0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475
SUBAREA AREA(ACRES) = 63.60      SUBAREA RUNOFF(CFS) = 94.24
EFFECTIVE AREA(ACRES) = 350.30   AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.80  AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 350.3      PEAK FLOW RATE(CFS) = 495.19

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*****
FLOW PROCESS FROM NODE 6.00 TO NODE 6.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 26.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.976
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"  A       1.40    0.98     0.200    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  A      11.20    0.98     0.500    32
PUBLIC PARK
"5-7 DWELLINGS/ACRE"  C       5.60    0.57     0.850    69
RESIDENTIAL
"11+ DWELLINGS/ACRE"  C      16.10    0.57     0.200    69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C      46.30    0.57     0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.459
SUBAREA AREA(ACRES) = 80.60      SUBAREA RUNOFF(CFS) = 122.32
EFFECTIVE AREA(ACRES) = 430.90   AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.77  AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 430.9      PEAK FLOW RATE(CFS) = 617.51

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*****
FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 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) = 692.00 DOWNSTREAM(FEET) = 670.00
FLOW LENGTH(FEET) = 2643.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 90.0 INCH PIPE IS 68.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.09
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 617.51
PIPE TRAVEL TIME(MIN.) = 2.58 Tc(MIN.) = 28.71
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 11093.00 FEET.

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*****
FLOW PROCESS FROM NODE 7.00 TO NODE 7.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 28.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.868
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 3.80 0.98 0.850 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 13.00 0.98 0.200 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 5.80 0.75 0.200 56
PUBLIC PARK C 10.20 0.57 0.850 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 7.30 0.57 0.200 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427
SUBAREA AREA(ACRES) = 40.10 SUBAREA RUNOFF(CFS) = 56.34
EFFECTIVE AREA(ACRES) = 471.00 AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.77 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 471.0 PEAK FLOW RATE(CFS) = 631.79

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*****
FLOW PROCESS FROM NODE 7.00 TO NODE 7.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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```

MAINLINE Tc(MIN.) = 28.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.868
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 3.70 0.98 0.850 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 3.50 0.98 0.200 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 11.60 0.75 0.200 56
PUBLIC PARK C 22.10 0.57 0.850 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 38.00 0.57 0.200 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.413

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SUBAREA AREA(ACRES) = 78.90 SUBAREA RUNOFF(CFS) = 114.24
EFFECTIVE AREA(ACRES) = 549.90 AREA-AVERAGED Fm(INCH/HR) = 0.36
AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 549.9 PEAK FLOW RATE(CFS) = 746.02

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*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 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) = 670.00 DOWNSTREAM(FEET) = 650.00
FLOW LENGTH(FEET) = 2592.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 96.0 INCH PIPE IS 77.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.24
ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 746.02
PIPE TRAVEL TIME(MIN.) = 2.51 Tc(MIN.) = 31.21
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 13685.00 FEET.

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*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 31.21
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.776
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" A 2.20 0.98 0.200 32
COMMERCIAL B 27.50 0.75 0.100 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 63.70 0.75 0.200 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 12.60 0.57 0.200 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.73
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.174
SUBAREA AREA(ACRES) = 106.00 SUBAREA RUNOFF(CFS) = 157.34
EFFECTIVE AREA(ACRES) = 655.90 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 655.9 PEAK FLOW RATE(CFS) = 858.09

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*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 71
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>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<
>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<
=====

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UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.52; LAG(HR) = 0.42; Fm(INCH/HR) = 0.32; Ybar = 0.34
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

```



DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
 3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 655.9  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 13685.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0281; Lca/L=0.4,n=.0252; Lca/L=0.5,n=.0231;Lca/L=0.6,n=.0216  
 TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 223.69  
 UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 922.15  
 TOTAL PEAK FLOW RATE(CFS) = 922.15 (SOURCE FLOW INCLUDED)  
 RATIONAL METHOD PEAK FLOW RATE(CFS) = 858.09  
 (UPSTREAM NODE PEAK FLOW RATE(CFS) = 858.09)  
 PEAK FLOW RATE(CFS) USED = 922.15

"11+ DWELLINGS/ACRE"	A	5.90	0.98	0.200	32	12.88
COMMERCIAL	C	3.10	0.57	0.100	69	12.08

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.163  
 SUBAREA RUNOFF(CFS) = 25.32  
 TOTAL AREA(ACRES) = 9.40 PEAK FLOW RATE(CFS) = 25.32

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 12.00 TO NODE 13.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 4 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 690.00 DOWNSTREAM ELEVATION(FEET) = 678.00  
 STREET LENGTH(FEET) = 1343.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 57.54  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.70  
 HALfstREET FLOOD WIDTH(FEET) = 28.30  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.87  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.69  
 STREET FLOW TRAVEL TIME(MIN.) = 5.78 Tc(MIN.) = 17.86  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.483

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	5.20	0.98	0.200	32
PUBLIC PARK	A	1.50	0.98	0.850	32
COMMERCIAL	C	11.60	0.57	0.100	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	1.30	0.57	0.200	69
PUBLIC PARK	C	12.70	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.450  
 SUBAREA AREA(ACRES) = 32.30 SUBAREA RUNOFF(CFS) = 63.92  
 EFFECTIVE AREA(ACRES) = 41.70 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.39  
 TOTAL AREA(ACRES) = 41.7 PEAK FLOW RATE(CFS) = 83.69

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.78 HALfstREET FLOOD WIDTH(FEET) = 36.39  
 FLOW VELOCITY(FEET/SEC.) = 4.17 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.24  
 \*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
 AND L = 1343.0 FT WITH ELEVATION-DROP = 12.0 FT, IS 75.5 CFS,

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 8.00 TO NODE 15.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 650.00 DOWNSTREAM(FEET) = 645.00  
 FLOW LENGTH(FEET) = 1277.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 120.0 INCH PIPE IS 92.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.21  
 ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 922.15  
 PIPE TRAVEL TIME(MIN.) = 1.50 Tc(MIN.) = 32.71  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 15.00 = 14962.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 1  
 -----

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

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 PEAK FLOW RATE(CFS) = 922.15 Tc(MIN.) = 32.71  
 AREA-AVERAGED Fm(INCH/HR) = 0.32 Ybar = 0.34  
 TOTAL AREA(ACRES) = 655.9

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 21  
 -----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 735.00  
 ELEVATION DATA: UPSTREAM(FEET) = 694.00 DOWNSTREAM(FEET) = 690.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.085  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.139  
 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	A	0.40	0.98	0.100	32	12.08
RESIDENTIAL						

WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 13.00  
LONGEST FLOWPATH FROM NODE 11.00 TO NODE 13.00 = 2078.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 13.00 TO NODE 14.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 678.00 DOWNSTREAM(FEET) = 670.00  
FLOW LENGTH(FEET) = 910.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.57  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 83.69  
PIPE TRAVEL TIME(MIN.) = 1.43 Tc(MIN.) = 19.30  
LONGEST FLOWPATH FROM NODE 11.00 TO NODE 14.00 = 2988.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 14.00 TO NODE 14.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 19.30  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.370  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 6.10 0.75 0.100 56  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" B 9.30 0.75 0.200 56  
COMMERCIAL C 1.70 0.57 0.100 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 4.90 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.165  
SUBAREA AREA(ACRES) = 22.00 SUBAREA RUNOFF(CFS) = 44.68  
EFFECTIVE AREA(ACRES) = 63.70 AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.31  
TOTAL AREA(ACRES) = 63.7 PEAK FLOW RATE(CFS) = 124.15

\*\*\*\*\*  
FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 670.00 DOWNSTREAM(FEET) = 645.00  
FLOW LENGTH(FEET) = 2595.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.09  
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 124.15  
PIPE TRAVEL TIME(MIN.) = 3.58 Tc(MIN.) = 22.87  
LONGEST FLOWPATH FROM NODE 11.00 TO NODE 15.00 = 5583.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 22.87  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.140  
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 61.10 0.75 0.200 56  
COMMERCIAL B 21.30 0.75 0.100 56  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.174  
SUBAREA AREA(ACRES) = 82.40 SUBAREA RUNOFF(CFS) = 149.06  
EFFECTIVE AREA(ACRES) = 146.10 AREA-AVERAGED Fm(INCH/HR) = 0.16  
AREA-AVERAGED Fp(INCH/HR) = 0.70 AREA-AVERAGED Ap = 0.23  
TOTAL AREA(ACRES) = 146.1 PEAK FLOW RATE(CFS) = 260.03

\*\*\*\*\*  
FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 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.) = 22.87  
RAINFALL INTENSITY(INCH/HR) = 2.14  
AREA-AVERAGED Fm(INCH/HR) = 0.16  
AREA-AVERAGED Fp(INCH/HR) = 0.70  
AREA-AVERAGED Ap = 0.23  
EFFECTIVE STREAM AREA(ACRES) = 146.10  
TOTAL STREAM AREA(ACRES) = 146.10  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 260.03  
\*\* CONFLUENCE DATA \*\*  
STREAM Q Tc AREA HEADWATER  
NUMBER (CFS) (MIN.) (ACRES) NODE  
1 922.15 32.71 655.90 1.00  
2 260.03 22.87 146.10 11.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.55; LAG(HR) = 0.44; Fm(INCH/HR) = 0.29; Ybar = 0.31  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR = 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 802.0  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 15.00 = 14962.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0272; Lca/L=0.4,n=.0244; Lca/L=0.5,n=.0224;Lca/L=0.6,n=.0209  
TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 283.63

```

PEAK FLOW RATE(CFS) = 1117.23
*****
FLOW PROCESS FROM NODE 15.00 TO NODE 16.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 645.00 DOWNSTREAM(FEET) = 639.40
FLOW LENGTH(FEET) = 1392.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 126.0 INCH PIPE IS 101.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.92
ESTIMATED PIPE DIAMETER(INCH) = 126.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1117.23
PIPE TRAVEL TIME(MIN.) = 1.55 Tc(MIN.) = 34.27
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 16.00 = 16354.00 FEET.
*****
FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 34.27
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.679
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 20.10 0.75 0.100 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 56.00 0.75 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.174
SUBAREA AREA(ACRES) = 76.10
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.57; LAG(HR) = 0.46; Fm(INCH/HR) = 0.28; Ybar = 0.30
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 878.1
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 16.00 = 16354.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0264; Lca/L=0.4,n=.0237; Lca/L=0.5,n=.0217;Lca/L=0.6,n=.0203
TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 315.88
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1195.68
TOTAL AREA(ACRES) = 878.1 PEAK FLOW RATE(CFS) = 1195.68
*****
FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 639.40 DOWNSTREAM(FEET) = 633.60

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FLOW LENGTH(FEET) = 1455.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 132.0 INCH PIPE IS 101.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.27
ESTIMATED PIPE DIAMETER(INCH) = 132.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1195.68
PIPE TRAVEL TIME(MIN.) = 1.59 Tc(MIN.) = 35.85
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 17.00 = 17809.00 FEET.
*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 35.85
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.634
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 69.60 0.75 0.100 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 17.70 0.75 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.120
SUBAREA AREA(ACRES) = 87.30
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.60; LAG(HR) = 0.48; Fm(INCH/HR) = 0.26; Ybar = 0.28
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 965.4
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 17.00 = 17809.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0257; Lca/L=0.4,n=.0230; Lca/L=0.5,n=.0211;Lca/L=0.6,n=.0197
TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 354.37
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1270.95
TOTAL AREA(ACRES) = 965.4 PEAK FLOW RATE(CFS) = 1270.95
*****
FLOW PROCESS FROM NODE 17.00 TO NODE 48.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 633.60 DOWNSTREAM(FEET) = 633.00
FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 132.0 INCH PIPE IS 103.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.87
ESTIMATED PIPE DIAMETER(INCH) = 132.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1270.95
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 36.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 48.00 = 17949.00 FEET.
*****

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FLOW PROCESS FROM NODE 48.00 TO NODE 48.00 IS CODE = 10

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 21.00 TO NODE 22.00 IS CODE = 21

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 688.00  
ELEVATION DATA: UPSTREAM(FEET) = 787.00 DOWNSTREAM(FEET) = 779.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.111  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.493  
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 A 5.60 0.98 0.100 32 10.11  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 17.11  
TOTAL AREA(ACRES) = 5.60 PEAK FLOW RATE(CFS) = 17.11

\*\*\*\*\*  
FLOW PROCESS FROM NODE 22.00 TO NODE 23.00 IS CODE = 62

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

>>>>(STREET TABLE SECTION # 4 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 779.00 DOWNSTREAM ELEVATION(FEET) = 760.00  
STREET LENGTH(FEET) = 1980.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 32.50

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.58  
HALFSTREET FLOOD WIDTH(FEET) = 21.15  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.49  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.03  
STREET FLOW TRAVEL TIME(MIN.) = 9.47 Tc(MIN.) = 19.58

\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 2.350  
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" A 17.90 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 17.90 SUBAREA RUNOFF(CFS) = 30.00  
EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.39  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.40  
TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 41.35

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.62 HALFSTREET FLOOD WIDTH(FEET) = 23.25  
FLOW VELOCITY(FEET/SEC.) = 3.70 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.30  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 23.00 = 2668.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 23.00 TO NODE 24.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 760.00 DOWNSTREAM(FEET) = 753.00  
FLOW LENGTH(FEET) = 1230.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.60  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 41.35  
PIPE TRAVEL TIME(MIN.) = 2.70 Tc(MIN.) = 22.28  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 24.00 = 3898.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 24.00 TO NODE 24.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.28  
\* 100 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  
COMMERCIAL A 5.90 0.98 0.100 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 9.20 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 47.00 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.418  
SUBAREA AREA(ACRES) = 62.10 SUBAREA RUNOFF(CFS) = 98.78  
EFFECTIVE AREA(ACRES) = 85.60 AREA-AVERAGED Fm(INCH/HR) = 0.40  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.41  
TOTAL AREA(ACRES) = 85.6 PEAK FLOW RATE(CFS) = 136.42

\*\*\*\*\*  
FLOW PROCESS FROM NODE 24.00 TO NODE 25.00 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) = 753.00 DOWNSTREAM(FEET) = 751.20
FLOW LENGTH(FEET) = 1525.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 72.0 INCH PIPE IS 58.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.57
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 136.42
PIPE TRAVEL TIME(MIN.) = 4.57 Tc(MIN.) = 26.84
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 25.00 = 5423.00 FEET.

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*****
FLOW PROCESS FROM NODE 25.00 TO NODE 25.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 26.84
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.944
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"    A      55.50    0.98    0.200    32
RESIDENTIAL
"11+ DWELLINGS/ACRE"    C      15.30    0.57    0.200    69
COMMERCIAL               A      14.88    0.98    0.100    32
COMMERCIAL               C      0.92    0.57    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.182
SUBAREA AREA(ACRES) = 86.60 SUBAREA RUNOFF(CFS) = 138.89
EFFECTIVE AREA(ACRES) = 172.20 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 172.2 PEAK FLOW RATE(CFS) = 257.58

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*****
FLOW PROCESS FROM NODE 25.00 TO NODE 29.00 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) = 751.20 DOWNSTREAM(FEET) = 751.00
FLOW LENGTH(FEET) = 105.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 84.0 INCH PIPE IS 66.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.83
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 257.58
PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 27.07
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 29.00 = 5528.00 FEET.

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*****
FLOW PROCESS FROM NODE 29.00 TO NODE 29.00 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.) = 27.07

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RAINFALL INTENSITY(INCH/HR) = 1.93
AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.95
AREA-AVERAGED Ap = 0.30
EFFECTIVE STREAM AREA(ACRES) = 172.20
TOTAL STREAM AREA(ACRES) = 172.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 257.58

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*****
FLOW PROCESS FROM NODE 26.00 TO NODE 27.00 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) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 805.00 DOWNSTREAM(FEET) = 800.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 17.789
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.489
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
"5-7 DWELLINGS/ACRE"    A      5.06    0.98    0.500    32  17.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 9.11
TOTAL AREA(ACRES) = 5.06 PEAK FLOW RATE(CFS) = 9.11

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*****
FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 17.79
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.489
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"    A      5.42    0.98    0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 5.42 SUBAREA RUNOFF(CFS) = 9.76
EFFECTIVE AREA(ACRES) = 10.48 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 18.88

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*****
FLOW PROCESS FROM NODE 27.00 TO NODE 28.00 IS CODE = 62
-----

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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 6 USED)<<<<
-----

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```

UPSTREAM ELEVATION(FEET) = 800.00 DOWNSTREAM ELEVATION(FEET) = 785.00

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STREET LENGTH(FEET) = 1760.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 32.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 27.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 48.17  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.66  
HALFSTREET FLOOD WIDTH(FEET) = 25.28  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.66  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.43  
STREET FLOW TRAVEL TIME(MIN.) = 8.01 Tc(MIN.) = 25.80  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.991

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 15.47 0.98 0.100 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 7.16 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 15.04 0.98 0.500 32  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.279  
SUBAREA AREA(ACRES) = 37.67 SUBAREA RUNOFF(CFS) = 58.29  
EFFECTIVE AREA(ACRES) = 48.15 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 48.2 PEAK FLOW RATE(CFS) = 72.47

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.75 HALFSTREET FLOOD WIDTH(FEET) = 33.67  
FLOW VELOCITY(FEET/SEC.) = 3.99 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.99  
\*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
AND L = 1760.0 FT WITH ELEVATION-DROP = 15.0 FT, IS 81.8 CFS,  
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 28.00  
LONGEST FLOWPATH FROM NODE 26.00 TO NODE 28.00 = 2760.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 28.00 TO NODE 29.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 751.00  
FLOW LENGTH(FEET) = 2580.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.72  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 72.47  
PIPE TRAVEL TIME(MIN.) = 3.67 Tc(MIN.) = 29.47

LONGEST FLOWPATH FROM NODE 26.00 TO NODE 29.00 = 5340.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 29.00 TO NODE 29.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

MAINLINE Tc(MIN.) = 29.47  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.838  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 9.22 0.98 0.100 32  
COMMERCIAL C 1.68 0.57 0.100 69  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.91  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 17.14  
EFFECTIVE AREA(ACRES) = 59.05 AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.28  
TOTAL AREA(ACRES) = 59.1 PEAK FLOW RATE(CFS) = 82.99

\*\*\*\*\*  
FLOW PROCESS FROM NODE 29.00 TO NODE 29.00 IS CODE = 1  
-----  
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<  
-----

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
TIME OF CONCENTRATION(MIN.) = 29.47  
RAINFALL INTENSITY(INCH/HR) = 1.84  
AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.28  
EFFECTIVE STREAM AREA(ACRES) = 59.05  
TOTAL STREAM AREA(ACRES) = 59.05  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 82.99

\*\* CONFLUENCE DATA \*\*  
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
1 257.58 27.07 1.935 0.95( 0.28) 0.30 172.2 21.00  
2 82.99 29.47 1.838 0.97( 0.28) 0.28 59.1 26.00

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  
1 338.50 27.07 1.935 0.95( 0.28) 0.29 226.4 21.00  
2 325.55 29.47 1.838 0.96( 0.28) 0.29 231.2 26.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 338.50 Tc(MIN.) = 27.07  
EFFECTIVE AREA(ACRES) = 226.43 AREA-AVERAGED Fm(INCH/HR) = 0.28



AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.29  
TOTAL AREA(ACRES) = 231.2  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 29.00 = 5528.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 29.00 TO NODE 35.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	751.00	DOWNSTREAM(FEET) =	718.50
FLOW LENGTH(FEET) =	2645.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	66.0 INCH PIPE IS	51.8 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	16.92		
ESTIMATED PIPE DIAMETER(INCH) =	66.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	338.50		
PIPE TRAVEL TIME(MIN.) =	2.60	Tc(MIN.) =	29.67
LONGEST FLOWPATH FROM NODE	21.00 TO NODE	35.00 =	8173.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) =	29.67				
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =	1.831				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	C	11.10	0.57	0.100	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.57				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.100				
SUBAREA AREA(ACRES) =	11.10	SUBAREA RUNOFF(CFS) =	17.73		
EFFECTIVE AREA(ACRES) =	237.53	AREA-AVERAGED Fm(INCH/HR) =	0.27		
AREA-AVERAGED Fp(INCH/HR) =	0.95	AREA-AVERAGED Ap =	0.29		
TOTAL AREA(ACRES) =	242.4	PEAK FLOW RATE(CFS) =	338.50		
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE					

\*\*\*\*\*  
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 1  
-----

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

=====

TOTAL NUMBER OF STREAMS =	2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:	
TIME OF CONCENTRATION(MIN.) =	29.67
RAINFALL INTENSITY(INCH/HR) =	1.83
AREA-AVERAGED Fm(INCH/HR) =	0.27
AREA-AVERAGED Fp(INCH/HR) =	0.95
AREA-AVERAGED Ap =	0.29
EFFECTIVE STREAM AREA(ACRES) =	237.53
TOTAL STREAM AREA(ACRES) =	242.35
PEAK FLOW RATE(CFS) AT CONFLUENCE =	338.50

\*\*\*\*\*  
FLOW PROCESS FROM NODE 30.00 TO NODE 31.00 IS CODE = 21  
-----

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) =	937.00		
ELEVATION DATA: UPSTREAM(FEET) =	760.00	DOWNSTREAM(FEET) =	750.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.893  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.769  
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						
"5-7 DWELLINGS/ACRE"	A	7.50	0.98	0.500	32	14.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.98					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.500					
SUBAREA RUNOFF(CFS) =	15.40					
TOTAL AREA(ACRES) =	7.50	PEAK FLOW RATE(CFS) =	15.40			

\*\*\*\*\*  
FLOW PROCESS FROM NODE 31.00 TO NODE 32.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 4 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) =	750.00	DOWNSTREAM ELEVATION(FEET) =	722.00
STREET LENGTH(FEET) =	1670.00	CURB HEIGHT(INCHES) =	8.0
STREET HALFWIDTH(FEET) =	42.00		

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =	37.00
INSIDE STREET CROSSFALL(DECIMAL) =	0.020
OUTSIDE STREET CROSSFALL(DECIMAL) =	0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.92  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.51  
HALFSTREET FLOOD WIDTH(FEET) = 17.61  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.09  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.09  
STREET FLOW TRAVEL TIME(MIN.) = 6.80 Tc(MIN.) = 21.70  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.209

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"	A	6.50	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	7.40	0.57	0.500	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.76				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.500				



SUBAREA AREA(ACRES) = 13.90 SUBAREA RUNOFF(CFS) = 22.90  
EFFECTIVE AREA(ACRES) = 21.40 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 21.4 PEAK FLOW RATE(CFS) = 34.52

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.55 HALFSTREET FLOOD WIDTH(FEET) = 19.42  
FLOW VELOCITY(FEET/SEC.) = 4.36 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.38  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 2607.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 32.00 TO NODE 33.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 722.00 DOWNSTREAM(FEET) = 720.50  
FLOW LENGTH(FEET) = 1270.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 32.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.02  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 34.52  
PIPE TRAVEL TIME(MIN.) = 5.26 Tc(MIN.) = 26.96  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 33.00 = 3877.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 33.00 TO NODE 33.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 26.96  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.939  
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"	A	58.00	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	10.80	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.91  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 68.80 SUBAREA RUNOFF(CFS) = 91.89  
EFFECTIVE AREA(ACRES) = 90.20 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 90.2 PEAK FLOW RATE(CFS) = 121.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 33.00 TO NODE 34.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 720.50 DOWNSTREAM(FEET) = 718.70  
FLOW LENGTH(FEET) = 1525.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 69.0 INCH PIPE IS 55.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.41

ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 121.22  
PIPE TRAVEL TIME(MIN.) = 4.70 Tc(MIN.) = 31.66  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 34.00 = 5402.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 31.66  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.761  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	58.70	0.57	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	4.50	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	25.80	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.58  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.287  
SUBAREA AREA(ACRES) = 89.00 SUBAREA RUNOFF(CFS) = 127.73  
EFFECTIVE AREA(ACRES) = 179.20 AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.78 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 179.2 PEAK FLOW RATE(CFS) = 234.48

\*\*\*\*\*  
FLOW PROCESS FROM NODE 34.00 TO NODE 35.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 718.70 DOWNSTREAM(FEET) = 718.50  
FLOW LENGTH(FEET) = 105.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 64.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.65  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 234.48  
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 31.88  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 35.00 = 5507.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 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.) = 31.88  
RAINFALL INTENSITY(INCH/HR) = 1.75  
AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.78  
AREA-AVERAGED Ap = 0.39

EFFECTIVE STREAM AREA(ACRES) = 179.20  
 TOTAL STREAM AREA(ACRES) = 179.20  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 234.48

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	338.50	29.67	1.831	0.95 ( 0.27)	0.29	237.5	21.00
1	325.55	32.09	1.747	0.95 ( 0.27)	0.29	242.4	26.00
2	234.48	31.88	1.754	0.78 ( 0.31)	0.39	179.2	30.00

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	568.37	29.67	1.831	0.87 ( 0.29)	0.33	404.3	21.00
2	561.11	31.88	1.754	0.86 ( 0.29)	0.33	421.1	30.00
3	558.96	32.09	1.747	0.86 ( 0.29)	0.33	421.6	26.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 568.37 Tc(MIN.) = 29.67  
 EFFECTIVE AREA(ACRES) = 404.30 AREA-AVERAGED Fm(INCH/HR) = 0.29  
 AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 421.6  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 35.00 = 8173.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 35.00 TO NODE 41.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 718.50 DOWNSTREAM(FEET) = 688.00  
 FLOW LENGTH(FEET) = 2640.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 81.0 INCH PIPE IS 63.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.81  
 ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 568.37  
 PIPE TRAVEL TIME(MIN.) = 2.34 Tc(MIN.) = 32.01  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 41.00 = 10813.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 32.01  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.749  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 11.60 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 11.60 SUBAREA RUNOFF(CFS) = 17.67  
 EFFECTIVE AREA(ACRES) = 415.90 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.32  
 TOTAL AREA(ACRES) = 433.2 PEAK FLOW RATE(CFS) = 568.37  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 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.) = 32.01  
 RAINFALL INTENSITY(INCH/HR) = 1.75  
 AREA-AVERAGED Fm(INCH/HR) = 0.28  
 AREA-AVERAGED Fp(INCH/HR) = 0.86  
 AREA-AVERAGED Ap = 0.32  
 EFFECTIVE STREAM AREA(ACRES) = 415.90  
 TOTAL STREAM AREA(ACRES) = 433.15  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 568.37

\*\*\*\*\*

FLOW PROCESS FROM NODE 36.00 TO NODE 37.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 719.00  
 ELEVATION DATA: UPSTREAM(FEET) = 722.00 DOWNSTREAM(FEET) = 715.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.365  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.256  
 SUBAREA Tc AND LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 3.60 0.98 0.200 32 11.36  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 2.60 0.98 0.500 32 13.64  
 PUBLIC PARK A 2.90 0.98 0.850 32 16.94  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.493  
 SUBAREA RUNOFF(CFS) = 22.73  
 TOTAL AREA(ACRES) = 9.10 PEAK FLOW RATE(CFS) = 22.73

\*\*\*\*\*

FLOW PROCESS FROM NODE 37.00 TO NODE 38.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 4 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 715.00 DOWNSTREAM ELEVATION(FEET) = 695.00  
 STREET LENGTH(FEET) = 1996.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 49.76  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.65  
 HALFSTREET FLOOD WIDTH(FEET) = 24.84  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.91  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.56  
 STREET FLOW TRAVEL TIME(MIN.) = 8.50 Tc(MIN.) = 19.87  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.329  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	18.10	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	7.90	0.98	0.500	32
PUBLIC PARK	A	2.60	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	1.00	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.337  
 SUBAREA AREA(ACRES) = 29.60 SUBAREA RUNOFF(CFS) = 53.37  
 EFFECTIVE AREA(ACRES) = 38.70 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA(ACRES) = 38.7 PEAK FLOW RATE(CFS) = 68.51

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.72 HALFSTREET FLOOD WIDTH(FEET) = 30.61  
 FLOW VELOCITY(FEET/SEC.) = 4.23 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.04  
 \*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
 AND L = 1996.0 FT WITH ELEVATION-DROP = 20.0 FT, IS 59.4 CFS,  
 WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 38.00  
 LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.00 = 2715.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 38.00 TO NODE 39.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 692.00  
 FLOW LENGTH(FEET) = 1310.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.11  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 68.51  
 PIPE TRAVEL TIME(MIN.) = 3.57 Tc(MIN.) = 23.44

LONGEST FLOWPATH FROM NODE 36.00 TO NODE 39.00 = 4025.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 39.00 TO NODE 39.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 23.44  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.109  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	5.00	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	30.70	0.98	0.200	32
PUBLIC PARK	C	3.10	0.57	0.850	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	19.60	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.82  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.290  
 SUBAREA AREA(ACRES) = 58.40 SUBAREA RUNOFF(CFS) = 98.40  
 EFFECTIVE AREA(ACRES) = 97.10 AREA-AVERAGED Fm(INCH/HR) = 0.29  
 AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.32  
 TOTAL AREA(ACRES) = 97.1 PEAK FLOW RATE(CFS) = 159.24

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 39.00 TO NODE 40.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 692.00 DOWNSTREAM(FEET) = 688.30  
 FLOW LENGTH(FEET) = 1490.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 69.0 INCH PIPE IS 50.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.78  
 ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 159.24  
 PIPE TRAVEL TIME(MIN.) = 3.19 Tc(MIN.) = 26.63  
 LONGEST FLOWPATH FROM NODE 36.00 TO NODE 40.00 = 5515.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 40.00 TO NODE 40.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 26.63  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.954  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	0.90	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	4.70	0.98	0.200	32
PUBLIC PARK	C	11.50	0.57	0.850	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	29.50	0.57	0.200	69

COMMERCIAL C 41.50 0.57 0.100 69 3 806.21 34.23 1.681 0.84( 0.26) 0.31 617.9 30.00  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60 4 803.06 34.43 1.675 0.84( 0.26) 0.31 618.4 26.00  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244  
 SUBAREA AREA(ACRES) = 88.10 SUBAREA RUNOFF(CFS) = 143.30  
 EFFECTIVE AREA(ACRES) = 185.20 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.77 AREA-AVERAGED Ap = 0.29  
 TOTAL AREA(ACRES) = 185.2 PEAK FLOW RATE(CFS) = 288.95

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 829.09 Tc(MIN.) = 26.90  
 EFFECTIVE AREA(ACRES) = 534.68 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.31  
 TOTAL AREA(ACRES) = 618.4  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 41.00 = 10813.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 40.00 TO NODE 41.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 688.30 DOWNSTREAM(FEET) = 688.00  
 FLOW LENGTH(FEET) = 137.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 87.0 INCH PIPE IS 66.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.57  
 ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 288.95  
 PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 26.90  
 LONGEST FLOWPATH FROM NODE 36.00 TO NODE 41.00 = 5652.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 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.) = 26.90  
 RAINFALL INTENSITY(INCH/HR) = 1.94  
 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.77  
 AREA-AVERAGED Ap = 0.29  
 EFFECTIVE STREAM AREA(ACRES) = 185.20  
 TOTAL STREAM AREA(ACRES) = 185.20  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 288.95

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	568.37	32.01	1.749	0.86( 0.28)	0.32	415.9	21.00
1	561.11	34.23	1.681	0.86( 0.28)	0.33	432.7	30.00
1	558.96	34.43	1.675	0.86( 0.28)	0.33	433.2	26.00
2	288.95	26.90	1.942	0.77( 0.22)	0.29	185.2	36.00

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	829.09	26.90	1.942	0.83( 0.26)	0.31	534.7	36.00
2	825.02	32.01	1.749	0.84( 0.26)	0.31	601.1	21.00

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 41.00 TO NODE 47.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 688.00 DOWNSTREAM(FEET) = 665.00  
 FLOW LENGTH(FEET) = 2655.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 102.0 INCH PIPE IS 74.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.81  
 ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 829.09  
 PIPE TRAVEL TIME(MIN.) = 2.35 Tc(MIN.) = 29.25  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 47.00 = 13468.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 47.00 TO NODE 47.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 29.25  
 \* 100 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  
 COMMERCIAL B 4.00 0.75 0.100 56  
 COMMERCIAL C 8.00 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 19.27  
 EFFECTIVE AREA(ACRES) = 546.68 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.31  
 TOTAL AREA(ACRES) = 630.4 PEAK FLOW RATE(CFS) = 829.09  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 47.00 TO NODE 47.00 IS CODE = 1  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 =====  
 TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 29.25  
 RAINFALL INTENSITY(INCH/HR) = 1.85  
 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.83

AREA-AVERAGED  $A_p$  = 0.31  
EFFECTIVE STREAM AREA(ACRES) = 546.68  
TOTAL STREAM AREA(ACRES) = 630.35  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 829.09

\*\*\*\*\*  
FLOW PROCESS FROM NODE 42.00 TO NODE 43.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 694.00 DOWNSTREAM(FEET) = 690.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
SUBAREA ANALYSIS USED MINIMUM  $T_c$ (MIN.) = 14.537  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.809  
SUBAREA  $T_c$  AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA  $F_p$   $A_p$  SCS  $T_c$   
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL C 8.70 0.57 0.100 69 14.54  
SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.100  
SUBAREA RUNOFF(CFS) = 21.55  
TOTAL AREA(ACRES) = 8.70 PEAK FLOW RATE(CFS) = 21.55

\*\*\*\*\*  
FLOW PROCESS FROM NODE 43.00 TO NODE 44.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 7 USED)<<<<<  
-----  
UPSTREAM ELEVATION(FEET) = 690.00 DOWNSTREAM ELEVATION(FEET) = 680.00  
STREET LENGTH(FEET) = 890.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 24.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 19.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020  
  
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.01  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.62  
HALFSTREET FLOOD WIDTH(FEET) = 22.92  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.95  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.44  
STREET FLOW TRAVEL TIME(MIN.) = 3.76  $T_c$ (MIN.) = 18.29  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.447  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA  $F_p$   $A_p$  SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL C 19.90 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.100  
SUBAREA AREA(ACRES) = 19.90 SUBAREA RUNOFF(CFS) = 42.82  
EFFECTIVE AREA(ACRES) = 28.60 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.06  
AREA-AVERAGED  $F_p$ (INCH/HR) = 0.57 AREA-AVERAGED  $A_p$  = 0.10  
TOTAL AREA(ACRES) = 28.6 PEAK FLOW RATE(CFS) = 61.54

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.68 HALFSTREET FLOOD WIDTH(FEET) = 24.50  
FLOW VELOCITY(FEET/SEC.) = 4.48 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.03  
LONGEST FLOWPATH FROM NODE 42.00 TO NODE 44.00 = 1890.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 44.00 TO NODE 45.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 7 USED)<<<<<  
-----  
UPSTREAM ELEVATION(FEET) = 680.00 DOWNSTREAM ELEVATION(FEET) = 667.60  
STREET LENGTH(FEET) = 1365.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 24.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 19.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020  
  
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 89.99  
\*\*\*STREET FLOWING FULL\*\*\*  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.77  
HALFSTREET FLOOD WIDTH(FEET) = 29.26  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.77  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 3.68  
STREET FLOW TRAVEL TIME(MIN.) = 4.77  $T_c$ (MIN.) = 23.06  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.130  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA  $F_p$   $A_p$  SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 18.60 0.75 0.100 56  
COMMERCIAL C 12.00 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.68  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.100  
SUBAREA AREA(ACRES) = 30.60 SUBAREA RUNOFF(CFS) = 56.79  
EFFECTIVE AREA(ACRES) = 59.20 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.06  
AREA-AVERAGED  $F_p$ (INCH/HR) = 0.62 AREA-AVERAGED  $A_p$  = 0.10  
TOTAL AREA(ACRES) = 59.2 PEAK FLOW RATE(CFS) = 110.15

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.82 HALFSTREET FLOOD WIDTH(FEET) = 31.64  
FLOW VELOCITY(FEET/SEC.) = 5.06 DEPTH\*VELOCITY(FT\*FT/SEC.) = 4.15

\*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
 AND L = 1365.0 FT WITH ELEVATION-DROP = 12.4 FT, IS 77.4 CFS,  
 WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 45.00  
 LONGEST FLOWPATH FROM NODE 42.00 TO NODE 45.00 = 3255.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 45.00 TO NODE 46.00 IS CODE = 31  
 -----

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

-----  
 ELEVATION DATA: UPSTREAM( FEET ) = 667.60 DOWNSTREAM( FEET ) = 665.20  
 FLOW LENGTH( FEET ) = 1435.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 49.4 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC. ) = 6.05  
 ESTIMATED PIPE DIAMETER( INCH ) = 63.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS ) = 110.15  
 PIPE TRAVEL TIME( MIN. ) = 3.95 Tc( MIN. ) = 27.01  
 LONGEST FLOWPATH FROM NODE 42.00 TO NODE 46.00 = 4690.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 46.00 TO NODE 46.00 IS CODE = 81  
 -----

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

-----  
 MAINLINE Tc( MIN. ) = 27.01  
 \* 100 YEAR RAINFALL INTENSITY( INCH/HR ) = 1.937  
 SUBAREA LOSS RATE DATA( AMC II ):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA ( ACRES )	Fp ( INCH/HR )	Ap ( DECIMAL )	SCS CN
COMMERCIAL	B	29.30	0.75	0.100	56
COMMERCIAL	C	57.40	0.57	0.100	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR ) = 0.63  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA( ACRES ) = 86.70 SUBAREA RUNOFF( CFS ) = 146.24  
 EFFECTIVE AREA( ACRES ) = 145.90 AREA-AVERAGED Fm( INCH/HR ) = 0.06  
 AREA-AVERAGED Fp( INCH/HR ) = 0.63 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA( ACRES ) = 145.9 PEAK FLOW RATE( CFS ) = 246.12

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 46.00 TO NODE 47.00 IS CODE = 31  
 -----

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

-----  
 ELEVATION DATA: UPSTREAM( FEET ) = 665.20 DOWNSTREAM( FEET ) = 665.00  
 FLOW LENGTH( FEET ) = 147.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 90.0 INCH PIPE IS 67.8 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC. ) = 6.90  
 ESTIMATED PIPE DIAMETER( INCH ) = 90.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS ) = 246.12  
 PIPE TRAVEL TIME( MIN. ) = 0.36 Tc( MIN. ) = 27.37  
 LONGEST FLOWPATH FROM NODE 42.00 TO NODE 47.00 = 4837.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 47.00 TO NODE 47.00 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. ) = 27.37  
 RAINFALL INTENSITY( INCH/HR ) = 1.92  
 AREA-AVERAGED Fm( INCH/HR ) = 0.06  
 AREA-AVERAGED Fp( INCH/HR ) = 0.63  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA( ACRES ) = 145.90  
 TOTAL STREAM AREA( ACRES ) = 145.90  
 PEAK FLOW RATE( CFS ) AT CONFLUENCE = 246.12

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q ( CFS )	Tc ( MIN. )	Intensity ( INCH/HR )	Fp( Fm ) ( INCH/HR )	Ap	Ae ( ACRES )	HEADWATER NODE
1	829.09	29.25	1.847	0.83( 0.25 )	0.31	546.7	36.00
1	825.02	34.36	1.677	0.84( 0.26 )	0.31	613.1	21.00
1	806.21	36.59	1.615	0.83( 0.26 )	0.31	629.9	30.00
1	803.06	36.85	1.608	0.83( 0.26 )	0.31	630.4	26.00
2	246.12	27.37	1.922	0.63( 0.06 )	0.10	145.9	42.00

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	1058.50	27.37	1.922	0.81( 0.21 )	0.26	657.4	42.00
2	1065.27	29.25	1.847	0.82( 0.21 )	0.26	692.6	36.00
3	1038.67	34.36	1.677	0.82( 0.22 )	0.27	759.0	21.00
4	1011.67	36.59	1.615	0.82( 0.22 )	0.27	775.8	30.00
5	1007.61	36.85	1.608	0.82( 0.22 )	0.27	776.2	26.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE( CFS ) = 1065.27 Tc( MIN. ) = 29.25  
 EFFECTIVE AREA( ACRES ) = 692.58 AREA-AVERAGED Fm( INCH/HR ) = 0.21  
 AREA-AVERAGED Fp( INCH/HR ) = 0.82 AREA-AVERAGED Ap = 0.26  
 TOTAL AREA( ACRES ) = 776.2  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 47.00 = 13468.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 47.00 TO NODE 47.00 IS CODE = 71  
 -----

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<<  
 >>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<<

-----  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL( INCH ): 5M= 0.44; 30M= 0.91; 1H= 1.20; 3H= 2.10; 6H= 3.00; 24H= 6.00  
 S-GRAPH: VALLEY( DEV. )=100.0%; VALLEY( UNDEV. )/DESERT= 0.0%  
 MOUNTAIN= 0.0%; FOOTHILL= 0.0%; DESERT( UNDEV. )= 0.0%  
 Tc( HR ) = 0.57; LAG( HR ) = 0.46; Fm( INCH/HR ) = 0.22; Ybar = 0.25  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;



3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 776.2  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 47.00 = 13468.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0309; Lca/L=0.4,n=.0277; Lca/L=0.5,n=.0254;Lca/L=0.6,n=.0237  
 TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 298.04  
 UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 1097.00  
 TOTAL PEAK FLOW RATE(CFS) = 1097.00 (SOURCE FLOW INCLUDED)  
 RATIONAL METHOD PEAK FLOW RATE(CFS) = 1065.27  
 (UPSTREAM NODE PEAK FLOW RATE(CFS) = 1065.27)  
 PEAK FLOW RATE(CFS) USED = 1097.00

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 48.00 TO NODE 48.00 IS CODE = 11  
 -----  
 >>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<  
 =====

\*\* MAIN STREAM CONFLUENCE DATA \*\*  
 PEAK FLOW RATE(CFS) = 1097.00 Tc(MIN.) = 36.31  
 AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.25  
 TOTAL AREA(ACRES) = 788.3  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 48.00 = 16098.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*  
 PEAK FLOW RATE(CFS) = 1270.95 Tc(MIN.) = 36.00  
 AREA-AVERAGED Fm(INCH/HR) = 0.26 Ybar = 0.28  
 TOTAL AREA(ACRES) = 965.4  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 48.00 = 17949.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.60; LAG(HR) = 0.48; Fm(INCH/HR) = 0.24; Ybar = 0.27  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.92; 30M = 0.92; 1HR = 0.92;  
 3HR = 0.99; 6HR = 0.99; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1753.7  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 48.00 = 17949.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0256; Lca/L=0.4,n=.0230; Lca/L=0.5,n=.0211;Lca/L=0.6,n=.0197  
 TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 655.41  
 PEAK FLOW RATE(CFS) = 2234.49

=====  
 END OF STUDY SUMMARY:  
 TOTAL AREA(ACRES) = 1753.7 TC(MIN.) = 36.00  
 AREA-AVERAGED Fm(INCH/HR)= 0.24 Ybar = 0.27  
 PEAK FLOW RATE(CFS) = 2234.49  
 =====

=====  
 END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS  
 =====

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 47.00 TO NODE 48.00 IS CODE = 31  
 -----

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

=====  
 ELEVATION DATA: UPSTREAM(FEET) = 665.00 DOWNSTREAM(FEET) = 633.00  
 FLOW LENGTH(FEET) = 2630.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 102.0 INCH PIPE IS 81.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.53  
 ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 1097.00  
 PIPE TRAVEL TIME(MIN.) = 1.95 Tc(MIN.) = 36.31  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 48.00 = 16098.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 48.00 TO NODE 48.00 IS CODE = 81  
 -----

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

=====  
 MAINLINE Tc(MIN.) = 36.31  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.622  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	12.10	0.75	0.100	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 12.10

UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.61; LAG(HR) = 0.48; Fm(INCH/HR) = 0.22; Ybar = 0.25

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 788.3  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 48.00 = 16098.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0288; Lca/L=0.4,n=.0258; Lca/L=0.5,n=.0237;Lca/L=0.6,n=.0221  
 TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 303.46  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1060.48  
 TOTAL AREA(ACRES) = 788.3 PEAK FLOW RATE(CFS) = 1097.00





\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* W.O. #915-1, ONTARIO MPD \*  
\* 25-YR STUDY \*  
\* EUCLID, CAMPUS & BONVIEW AVENUE \*  
\*\*\*\*\*

FILE NAME: EUCLID\_M.DAT  
TIME/DATE OF STUDY: 17:03 08/15/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*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- / SIDE / SIDE / WAY	STREET-CROSSFALL: CURB HEIGHT (FT)	GUTTER WIDTH (FT)	STREET-CROSSFALL: GUTTER HEIGHT (FT)	STREET-CROSSFALL: GUTTER WIDTH (FT)	STREET-CROSSFALL: GUTTER HIKE (FT)	STREET-CROSSFALL: GUTTER MANNING FACTOR (n)
1	65.0	60.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150	
2	54.0	49.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150	
3	47.0	42.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150	
4	42.0	37.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150	
5	38.0	33.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150	
6	32.0	27.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150	
7	24.0	19.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150	
8	20.0	15.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150	
9	18.0	13.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150	

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET

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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH  
FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.35
30-MINUTES	0.71
1-HOUR	0.94
3-HOUR	1.64
6-HOUR	2.32
24-HOUR	4.49

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21 \*\*\*\*\*

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 775.00  
ELEVATION DATA: UPSTREAM(FEET) = 783.00 DOWNSTREAM(FEET) = 776.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.273  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.226  
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						
"5-7 DWELLINGS/ACRE"	A	0.80	0.98	0.500	32	14.27
RESIDENTIAL						
"5-7 DWELLINGS/ACRE"	C	5.50	0.57	0.500	69	14.27

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 10.87  
TOTAL AREA(ACRES) = 6.30 PEAK FLOW RATE(CFS) = 10.87

\*\*\*\*\* FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62 \*\*\*\*\*

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 9 USED)<<<<<  
===== UPSTREAM ELEVATION(FEET) = 776.00 DOWNSTREAM ELEVATION(FEET) = 765.00  
STREET LENGTH(FEET) = 1029.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 30.64  
 \*\*\*STREET FLOWING FULL\*\*\*

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.56  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.74  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.08  
 STREET FLOW TRAVEL TIME(MIN.) = 4.59 Tc(MIN.) = 18.86  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.883

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"	A	20.20	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	9.50	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 29.70 SUBAREA RUNOFF(CFS) = 39.05  
 EFFECTIVE AREA(ACRES) = 36.00 AREA-AVERAGED Fm(INCH/HR) = 0.40  
 AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 36.0 PEAK FLOW RATE(CFS) = 47.98

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.63 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 FLOW VELOCITY(FEET/SEC.) = 4.46 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.80  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 1804.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 31  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 765.00 DOWNSTREAM(FEET) = 750.00  
 FLOW LENGTH(FEET) = 1367.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.03  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 47.98  
 PIPE TRAVEL TIME(MIN.) = 2.27 Tc(MIN.) = 21.13  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 3171.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4.00 TO NODE 4.00 IS CODE = 81  
 -----

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

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 21.13  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.759  
 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"	A	48.90	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	1.00	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 49.90 SUBAREA RUNOFF(CFS) = 57.28  
 EFFECTIVE AREA(ACRES) = 85.90 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 85.9 PEAK FLOW RATE(CFS) = 101.23

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4.00 TO NODE 4.00 IS CODE = 81  
 -----

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

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 21.13  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.759  
 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"	A	39.00	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	9.50	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 39.00 SUBAREA RUNOFF(CFS) = 44.62  
 EFFECTIVE AREA(ACRES) = 124.90 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 124.9 PEAK FLOW RATE(CFS) = 145.86

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 31  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 717.00  
 FLOW LENGTH(FEET) = 2637.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.81  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 145.86  
 PIPE TRAVEL TIME(MIN.) = 3.18 Tc(MIN.) = 24.32  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 5808.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5.00 TO NODE 5.00 IS CODE = 81  
 -----

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

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=====
MAINLINE Tc(MIN.) = 24.32
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.617
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"   A       31.80   0.98   0.500   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C       35.20   0.57   0.500   69
PUBLIC PARK             C        1.20   0.57   0.850   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.506
SUBAREA AREA(ACRES) = 68.20   SUBAREA RUNOFF(CFS) = 75.81
EFFECTIVE AREA(ACRES) = 193.10   AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.86   AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 193.1   PEAK FLOW RATE(CFS) = 205.71

*****
FLOW PROCESS FROM NODE 5.00 TO NODE 5.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.32
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.617
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK             A        3.50   0.98   0.850   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   A       40.50   0.98   0.500   32
PUBLIC PARK             C        3.50   0.57   0.850   69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C       46.10   0.57   0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.76
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.526
SUBAREA AREA(ACRES) = 93.60   SUBAREA RUNOFF(CFS) = 102.57
EFFECTIVE AREA(ACRES) = 286.70   AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.83   AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 286.7   PEAK FLOW RATE(CFS) = 308.28

*****
FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 717.00   DOWNSTREAM(FEET) = 692.00
FLOW LENGTH(FEET) = 2642.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 53.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.87
ESTIMATED PIPE DIAMETER(INCH) = 66.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 308.28
PIPE TRAVEL TIME(MIN.) = 2.96   Tc(MIN.) = 27.28
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 8450.00 FEET.

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*****
FLOW PROCESS FROM NODE 6.00 TO NODE 6.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 27.28
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.509
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"   A       14.10   0.98   0.200   32
PUBLIC PARK             A        3.70   0.98   0.850   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   A        7.00   0.98   0.500   32
PUBLIC PARK             C        3.80   0.57   0.850   69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C       35.00   0.57   0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475
SUBAREA AREA(ACRES) = 63.60   SUBAREA RUNOFF(CFS) = 67.52
EFFECTIVE AREA(ACRES) = 350.30   AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.80   AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 350.3   PEAK FLOW RATE(CFS) = 348.00

*****
FLOW PROCESS FROM NODE 6.00 TO NODE 6.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 27.28
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.509
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"   A        1.40   0.98   0.200   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   A       11.20   0.98   0.500   32
PUBLIC PARK             C        5.60   0.57   0.850   69
RESIDENTIAL
"11+ DWELLINGS/ACRE"   C       16.10   0.57   0.200   69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C       46.30   0.57   0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.459
SUBAREA AREA(ACRES) = 80.60   SUBAREA RUNOFF(CFS) = 88.46
EFFECTIVE AREA(ACRES) = 430.90   AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.77   AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 430.9   PEAK FLOW RATE(CFS) = 436.45

*****
FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 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) = 692.00 DOWNSTREAM(FEET) = 670.00
FLOW LENGTH(FEET) = 2643.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 61.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.57
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 436.45
PIPE TRAVEL TIME(MIN.) = 2.83 Tc(MIN.) = 30.11
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 11093.00 FEET.

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*****
FLOW PROCESS FROM NODE 7.00 TO NODE 7.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 30.11
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.422
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK         A       3.80   0.98  0.850  32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A       13.00  0.98  0.200  32
RESIDENTIAL
"11+ DWELLINGS/ACRE" B       5.80   0.75  0.200  56
PUBLIC PARK         C      10.20  0.57  0.850  69
RESIDENTIAL
"11+ DWELLINGS/ACRE" C       7.30   0.57  0.200  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427
SUBAREA AREA(ACRES) = 40.10 SUBAREA RUNOFF(CFS) = 40.28
EFFECTIVE AREA(ACRES) = 471.00 AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.77 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 471.0 PEAK FLOW RATE(CFS) = 443.09

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*****
FLOW PROCESS FROM NODE 7.00 TO NODE 7.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 30.11
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.422
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK         A       3.70   0.98  0.850  32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A       3.50   0.98  0.200  32
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      11.60  0.75  0.200  56
PUBLIC PARK         C      22.10  0.57  0.850  69
RESIDENTIAL
"11+ DWELLINGS/ACRE" C      38.00  0.57  0.200  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.413
SUBAREA AREA(ACRES) = 78.90 SUBAREA RUNOFF(CFS) = 82.63

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EFFECTIVE AREA(ACRES) = 549.90 AREA-AVERAGED Fm(INCH/HR) = 0.36
AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 549.9 PEAK FLOW RATE(CFS) = 525.72

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*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 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) = 670.00 DOWNSTREAM(FEET) = 650.00
FLOW LENGTH(FEET) = 2592.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 84.0 INCH PIPE IS 67.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.77
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 525.72
PIPE TRAVEL TIME(MIN.) = 2.74 Tc(MIN.) = 32.85
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 13685.00 FEET.

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*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 32.85
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.350
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" A       2.20   0.98  0.200  32
COMMERCIAL         B      27.50  0.75  0.100  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      63.70  0.75  0.200  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" C      12.60  0.57  0.200  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.73
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.174
SUBAREA AREA(ACRES) = 106.00 SUBAREA RUNOFF(CFS) = 116.69
EFFECTIVE AREA(ACRES) = 655.90 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 655.9 PEAK FLOW RATE(CFS) = 606.57

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*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 71
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>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<
>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<
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UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.55; LAG(HR) = 0.44; Fm(INCH/HR) = 0.32; Ybar = 0.38
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

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3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 655.9  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 13685.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0295; Lca/L=0.4,n=.0265; Lca/L=0.5,n=.0243;Lca/L=0.6,n=.0227  
 TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 159.13  
 UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 680.24  
 TOTAL PEAK FLOW RATE(CFS) = 680.24 (SOURCE FLOW INCLUDED)  
 RATIONAL METHOD PEAK FLOW RATE(CFS) = 606.57  
 (UPSTREAM NODE PEAK FLOW RATE(CFS) = 606.57)  
 PEAK FLOW RATE(CFS) USED = 680.24

COMMERCIAL C 3.10 0.57 0.100 69 12.08  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.163  
 SUBAREA RUNOFF(CFS) = 19.58  
 TOTAL AREA(ACRES) = 9.40 PEAK FLOW RATE(CFS) = 19.58

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 12.00 TO NODE 13.00 IS CODE = 62  
 -----  
 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 4 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 690.00 DOWNSTREAM ELEVATION(FEET) = 678.00  
 STREET LENGTH(FEET) = 1343.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.64  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.64  
 HALFSTREET FLOOD WIDTH(FEET) = 24.11  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.63  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.33  
 STREET FLOW TRAVEL TIME(MIN.) = 6.16 Tc(MIN.) = 18.24  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.921  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	5.20	0.98	0.200	32
PUBLIC PARK	A	1.50	0.98	0.850	32
COMMERCIAL	C	11.60	0.57	0.100	69

RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	1.30	0.57	0.200	69
PUBLIC PARK	C	12.70	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.450  
 SUBAREA AREA(ACRES) = 32.30 SUBAREA RUNOFF(CFS) = 47.59  
 EFFECTIVE AREA(ACRES) = 41.70 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.39  
 TOTAL AREA(ACRES) = 41.7 PEAK FLOW RATE(CFS) = 62.61

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.71 HALFSTREET FLOOD WIDTH(FEET) = 30.03  
 FLOW VELOCITY(FEET/SEC.) = 3.95 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.81  
 \*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
 AND L = 1343.0 FT WITH ELEVATION-DROP = 12.0 FT, IS 57.4 CFS,  
 WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 13.00

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 8.00 TO NODE 15.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 650.00 DOWNSTREAM(FEET) = 645.00  
 FLOW LENGTH(FEET) = 1277.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 108.0 INCH PIPE IS 81.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.22  
 ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 680.24  
 PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 34.46  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 15.00 = 14962.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 1  
 -----

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

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 PEAK FLOW RATE(CFS) = 680.24 Tc(MIN.) = 34.46  
 AREA-AVERAGED Fm(INCH/HR) = 0.32 Ybar = 0.38  
 TOTAL AREA(ACRES) = 655.9

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 21  
 -----

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 735.00  
 ELEVATION DATA: UPSTREAM(FEET) = 694.00 DOWNSTREAM(FEET) = 690.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.085  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.460  
 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	A	0.40	0.98	0.100	32	12.08
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	5.90	0.98	0.200	32	12.88

LONGEST FLOWPATH FROM NODE 11.00 TO NODE 13.00 = 2078.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 13.00 TO NODE 14.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 678.00 DOWNSTREAM(FEET) = 670.00  
FLOW LENGTH(FEET) = 910.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.94  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 62.61  
PIPE TRAVEL TIME(MIN.) = 1.53 Tc(MIN.) = 19.77  
LONGEST FLOWPATH FROM NODE 11.00 TO NODE 14.00 = 2988.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 14.00 TO NODE 14.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.77  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.831  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 6.10 0.75 0.100 56  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" B 9.30 0.75 0.200 56  
COMMERCIAL C 1.70 0.57 0.100 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 4.90 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.165  
SUBAREA AREA(ACRES) = 22.00 SUBAREA RUNOFF(CFS) = 34.00  
EFFECTIVE AREA(ACRES) = 63.70 AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.31  
TOTAL AREA(ACRES) = 63.7 PEAK FLOW RATE(CFS) = 93.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 670.00 DOWNSTREAM(FEET) = 645.00  
FLOW LENGTH(FEET) = 2595.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 34.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.10  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 93.22  
PIPE TRAVEL TIME(MIN.) = 3.90 Tc(MIN.) = 23.67  
LONGEST FLOWPATH FROM NODE 11.00 TO NODE 15.00 = 5583.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 23.67  
\* 25 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  
"11+ DWELLINGS/ACRE" B 61.10 0.75 0.200 56  
COMMERCIAL B 21.30 0.75 0.100 56  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.174  
SUBAREA AREA(ACRES) = 82.40 SUBAREA RUNOFF(CFS) = 112.21  
EFFECTIVE AREA(ACRES) = 146.10 AREA-AVERAGED Fm(INCH/HR) = 0.16  
AREA-AVERAGED Fp(INCH/HR) = 0.70 AREA-AVERAGED Ap = 0.23  
TOTAL AREA(ACRES) = 146.1 PEAK FLOW RATE(CFS) = 194.70

\*\*\*\*\*  
FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 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.) = 23.67  
RAINFALL INTENSITY(INCH/HR) = 1.64  
AREA-AVERAGED Fm(INCH/HR) = 0.16  
AREA-AVERAGED Fp(INCH/HR) = 0.70  
AREA-AVERAGED Ap = 0.23  
EFFECTIVE STREAM AREA(ACRES) = 146.10  
TOTAL STREAM AREA(ACRES) = 146.10  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 194.70  
\*\* CONFLUENCE DATA \*\*  
STREAM Q Tc AREA HEADWATER  
NUMBER (CFS) (MIN.) (ACRES) NODE  
1 680.24 34.46 655.90 1.00  
2 194.70 23.67 146.10 11.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.57; LAG(HR) = 0.46; Fm(INCH/HR) = 0.29; Ybar = 0.35  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR = 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 802.0  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 15.00 = 14962.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0287; Lca/L=0.4,n=.0257; Lca/L=0.5,n=.0236;Lca/L=0.6,n=.0220  
TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 202.46  
PEAK FLOW RATE(CFS) = 817.60



\*\*\*\*\*  
FLOW PROCESS FROM NODE 15.00 TO NODE 16.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 645.00 DOWNSTREAM(FEET) = 639.40  
FLOW LENGTH(FEET) = 1392.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 114.0 INCH PIPE IS 88.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.92  
ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 817.60  
PIPE TRAVEL TIME(MIN.) = 1.67 Tc(MIN.) = 36.12  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 16.00 = 16354.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 36.12  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.275  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	20.10	0.75	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	56.00	0.75	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.174  
SUBAREA AREA(ACRES) = 76.10

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.60; LAG(HR) = 0.48; Fm(INCH/HR) = 0.28; Ybar = 0.33  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR = 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 878.1  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 16.00 = 16354.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0278; Lca/L=0.4,n=.0250; Lca/L=0.5,n=.0229;Lca/L=0.6,n=.0214  
TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 225.90  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 860.32  
TOTAL AREA(ACRES) = 878.1 PEAK FLOW RATE(CFS) = 860.32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 639.40 DOWNSTREAM(FEET) = 633.60  
FLOW LENGTH(FEET) = 1455.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 114.0 INCH PIPE IS 93.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.89  
ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 860.32  
PIPE TRAVEL TIME(MIN.) = 1.75 Tc(MIN.) = 37.87  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 17.00 = 17809.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 37.87  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.240  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	69.60	0.75	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	17.70	0.75	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.120  
SUBAREA AREA(ACRES) = 87.30

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.63; LAG(HR) = 0.50; Fm(INCH/HR) = 0.26; Ybar = 0.32  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR = 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 965.4  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 17.00 = 17809.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0271; Lca/L=0.4,n=.0243; Lca/L=0.5,n=.0223;Lca/L=0.6,n=.0208  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 254.03  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 939.31  
TOTAL AREA(ACRES) = 965.4 PEAK FLOW RATE(CFS) = 939.31

\*\*\*\*\*  
FLOW PROCESS FROM NODE 17.00 TO NODE 48.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 633.60 DOWNSTREAM(FEET) = 633.00  
FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 120.0 INCH PIPE IS 90.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.83  
ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 939.31  
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 38.02  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 48.00 = 17949.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 48.00 TO NODE 48.00 IS CODE = 10

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 21.00 TO NODE 22.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 688.00  
ELEVATION DATA: UPSTREAM(FEET) = 787.00 DOWNSTREAM(FEET) = 779.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.111  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.737  
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 A 5.60 0.98 0.100 32 10.11  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 13.30  
TOTAL AREA(ACRES) = 5.60 PEAK FLOW RATE(CFS) = 13.30

\*\*\*\*\*  
FLOW PROCESS FROM NODE 22.00 TO NODE 23.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 4 USED)<<<<<  
-----  
UPSTREAM ELEVATION(FEET) = 779.00 DOWNSTREAM ELEVATION(FEET) = 760.00  
STREET LENGTH(FEET) = 1980.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSSTREETS 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) = 24.25  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.54  
HALFSSTREET FLOOD WIDTH(FEET) = 18.84  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.24  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.74  
STREET FLOW TRAVEL TIME(MIN.) = 10.17 Tc(MIN.) = 20.29  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.803  
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" A 17.90 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 17.90 SUBAREA RUNOFF(CFS) = 21.19  
EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.39  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.40  
TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 29.78

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.57 HALFSSTREET FLOOD WIDTH(FEET) = 20.43  
FLOW VELOCITY(FEET/SEC.) = 3.41 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.93  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 23.00 = 2668.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 23.00 TO NODE 24.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 760.00 DOWNSTREAM(FEET) = 753.00  
FLOW LENGTH(FEET) = 1230.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.06  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 29.78  
PIPE TRAVEL TIME(MIN.) = 2.90 Tc(MIN.) = 23.19  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 24.00 = 3898.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 24.00 TO NODE 24.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 23.19  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.664  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 5.90 0.98 0.100 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 9.20 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 47.00 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.418  
SUBAREA AREA(ACRES) = 62.10 SUBAREA RUNOFF(CFS) = 70.22  
EFFECTIVE AREA(ACRES) = 85.60 AREA-AVERAGED Fm(INCH/HR) = 0.40  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.41  
TOTAL AREA(ACRES) = 85.6 PEAK FLOW RATE(CFS) = 97.06

\*\*\*\*\*  
FLOW PROCESS FROM NODE 24.00 TO NODE 25.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 753.00 DOWNSTREAM(FEET) = 751.20  
FLOW LENGTH(FEET) = 1525.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 48.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.20  
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 97.06  
PIPE TRAVEL TIME(MIN.) = 4.88 Tc(MIN.) = 28.07  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 25.00 = 5423.00 FEET.

AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.95  
AREA-AVERAGED Ap = 0.30  
EFFECTIVE STREAM AREA(ACRES) = 172.20  
TOTAL STREAM AREA(ACRES) = 172.20  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 186.13

\*\*\*\*\*  
FLOW PROCESS FROM NODE 26.00 TO NODE 27.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 805.00 DOWNSTREAM(FEET) = 800.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 17.789  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.950  
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  
"5-7 DWELLINGS/ACRE" A 5.06 0.98 0.500 32 17.79  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 6.66  
TOTAL AREA(ACRES) = 5.06 PEAK FLOW RATE(CFS) = 6.66

\*\*\*\*\*  
FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 17.79  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.950  
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" A 5.42 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 5.42 SUBAREA RUNOFF(CFS) = 7.14  
EFFECTIVE AREA(ACRES) = 10.48 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 13.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 27.00 TO NODE 28.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 6 USED)<<<<<  
-----

UPSTREAM ELEVATION(FEET) = 800.00 DOWNSTREAM ELEVATION(FEET) = 785.00  
STREET LENGTH(FEET) = 1760.00 CURB HEIGHT(INCHES) = 8.0

\*\*\*\*\*  
FLOW PROCESS FROM NODE 25.00 TO NODE 25.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 28.07  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.483  
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" A 55.50 0.98 0.200 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 15.30 0.57 0.200 69  
COMMERCIAL A 14.88 0.98 0.100 32  
COMMERCIAL C 0.92 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.182  
SUBAREA AREA(ACRES) = 86.60 SUBAREA RUNOFF(CFS) = 102.96  
EFFECTIVE AREA(ACRES) = 172.20 AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.30  
TOTAL AREA(ACRES) = 172.2 PEAK FLOW RATE(CFS) = 186.13

\*\*\*\*\*  
FLOW PROCESS FROM NODE 25.00 TO NODE 29.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 751.20 DOWNSTREAM(FEET) = 751.00  
FLOW LENGTH(FEET) = 105.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 75.0 INCH PIPE IS 58.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.25  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 186.13  
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 28.32  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 29.00 = 5528.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 29.00 TO NODE 29.00 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.) = 28.32  
RAINFALL INTENSITY(INCH/HR) = 1.48

STREET HALFWIDTH(FEET) = 32.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 27.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSSTREETS 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) = 35.38  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.61  
HALFSTREET FLOOD WIDTH(FEET) = 22.43  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.39  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.06  
STREET FLOW TRAVEL TIME(MIN.) = 8.66 Tc(MIN.) = 26.45  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.537

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 15.47 0.98 0.100 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 7.16 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 15.04 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.279  
SUBAREA AREA(ACRES) = 37.67 SUBAREA RUNOFF(CFS) = 42.91  
EFFECTIVE AREA(ACRES) = 48.15 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 48.2 PEAK FLOW RATE(CFS) = 52.82

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.68 HALFSTREET FLOOD WIDTH(FEET) = 26.92  
FLOW VELOCITY(FEET/SEC.) = 3.75 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.56  
\*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
AND L = 1760.0 FT WITH ELEVATION-DROP = 15.0 FT, IS 62.2 CFS,  
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 28.00  
LONGEST FLOWPATH FROM NODE 26.00 TO NODE 28.00 = 2760.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 28.00 TO NODE 29.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 751.00  
FLOW LENGTH(FEET) = 2580.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.00  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 52.82  
PIPE TRAVEL TIME(MIN.) = 3.91 Tc(MIN.) = 30.36  
LONGEST FLOWPATH FROM NODE 26.00 TO NODE 29.00 = 5340.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 29.00 TO NODE 29.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 30.36  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.415  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 9.22 0.98 0.100 32  
COMMERCIAL C 1.68 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.91  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 12.99  
EFFECTIVE AREA(ACRES) = 59.05 AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.28  
TOTAL AREA(ACRES) = 59.1 PEAK FLOW RATE(CFS) = 60.52

\*\*\*\*\*  
FLOW PROCESS FROM NODE 29.00 TO NODE 29.00 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.) = 30.36  
RAINFALL INTENSITY(INCH/HR) = 1.42  
AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.28  
EFFECTIVE STREAM AREA(ACRES) = 59.05  
TOTAL STREAM AREA(ACRES) = 59.05  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 60.52

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	186.13	28.32	1.476	0.95( 0.28)	0.30	172.2	21.00
2	60.52	30.36	1.415	0.97( 0.28)	0.28	59.1	26.00

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	245.57	28.32	1.476	0.95( 0.28)	0.29	227.3	21.00
2	237.24	30.36	1.415	0.96( 0.28)	0.29	231.2	26.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 245.57 Tc(MIN.) = 28.32  
EFFECTIVE AREA(ACRES) = 227.28 AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.29

TOTAL AREA(ACRES) = 231.2  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 29.00 = 5528.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 29.00 TO NODE 35.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 751.00 DOWNSTREAM(FEET) = 718.50  
FLOW LENGTH(FEET) = 2645.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.78  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 245.57  
PIPE TRAVEL TIME(MIN.) = 2.79 Tc(MIN.) = 31.11  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 35.00 = 8173.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 31.11  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.395  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 11.10 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 13.37  
EFFECTIVE AREA(ACRES) = 238.38 AREA-AVERAGED Fm(INCH/HR) = 0.27  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.29  
TOTAL AREA(ACRES) = 242.4 PEAK FLOW RATE(CFS) = 245.57  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 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.) = 31.11  
RAINFALL INTENSITY(INCH/HR) = 1.39  
AREA-AVERAGED Fm(INCH/HR) = 0.27  
AREA-AVERAGED Fp(INCH/HR) = 0.95  
AREA-AVERAGED Ap = 0.29  
EFFECTIVE STREAM AREA(ACRES) = 238.38  
TOTAL STREAM AREA(ACRES) = 242.35  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 245.57

\*\*\*\*\*  
FLOW PROCESS FROM NODE 30.00 TO NODE 31.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 937.00  
ELEVATION DATA: UPSTREAM(FEET) = 760.00 DOWNSTREAM(FEET) = 750.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.893  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.170  
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  
"5-7 DWELLINGS/ACRE" A 7.50 0.98 0.500 32 14.89  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 11.36  
TOTAL AREA(ACRES) = 7.50 PEAK FLOW RATE(CFS) = 11.36

\*\*\*\*\*  
FLOW PROCESS FROM NODE 31.00 TO NODE 32.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 4 USED)<<<<<  
-----

UPSTREAM ELEVATION(FEET) = 750.00 DOWNSTREAM ELEVATION(FEET) = 722.00  
STREET LENGTH(FEET) = 1670.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.72  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.47  
HALFSTREET FLOOD WIDTH(FEET) = 15.51  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.80  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.78  
STREET FLOW TRAVEL TIME(MIN.) = 7.33 Tc(MIN.) = 22.22

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.707  
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" A 6.50 0.98 0.500 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 7.40 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.76  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 13.90 SUBAREA RUNOFF(CFS) = 16.61

EFFECTIVE AREA(ACRES) = 21.40 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 21.4 PEAK FLOW RATE(CFS) = 24.84

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 17.03  
FLOW VELOCITY(FEET/SEC.) = 4.02 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.01  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 2607.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 32.00 TO NODE 33.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 722.00 DOWNSTREAM(FEET) = 720.50  
FLOW LENGTH(FEET) = 1270.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.68  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 24.84  
PIPE TRAVEL TIME(MIN.) = 5.75 Tc(MIN.) = 27.97  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 33.00 = 3877.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 33.00 TO NODE 33.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 27.97  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.487  
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" A 58.00 0.98 0.500 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 10.80 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.91  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 68.80 SUBAREA RUNOFF(CFS) = 63.85  
EFFECTIVE AREA(ACRES) = 90.20 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 90.2 PEAK FLOW RATE(CFS) = 84.46

\*\*\*\*\*  
FLOW PROCESS FROM NODE 33.00 TO NODE 34.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 720.50 DOWNSTREAM(FEET) = 718.70  
FLOW LENGTH(FEET) = 1525.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 48.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.93  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 84.46  
PIPE TRAVEL TIME(MIN.) = 5.16 Tc(MIN.) = 33.13  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 34.00 = 5402.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 33.13  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.343  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 58.70 0.57 0.200 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 4.50 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 25.80 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.58  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.287  
SUBAREA AREA(ACRES) = 89.00 SUBAREA RUNOFF(CFS) = 94.24  
EFFECTIVE AREA(ACRES) = 179.20 AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.78 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 179.2 PEAK FLOW RATE(CFS) = 167.05

\*\*\*\*\*  
FLOW PROCESS FROM NODE 34.00 TO NODE 35.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 718.70 DOWNSTREAM(FEET) = 718.50  
FLOW LENGTH(FEET) = 105.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 56.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.06  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 167.05  
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 33.38  
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 35.00 = 5507.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 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.) = 33.38  
RAINFALL INTENSITY(INCH/HR) = 1.34  
AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.78  
AREA-AVERAGED Ap = 0.39  
EFFECTIVE STREAM AREA(ACRES) = 179.20



TOTAL STREAM AREA(ACRES) = 179.20  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 167.05

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	245.57	31.11	1.395	0.95 ( 0.27)	0.29	238.4	21.00
1	237.24	33.22	1.341	0.95 ( 0.27)	0.29	242.4	26.00
2	167.05	33.38	1.337	0.78 ( 0.31)	0.39	179.2	30.00

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	409.99	31.11	1.395	0.87 ( 0.29)	0.33	405.4	21.00
2	404.12	33.22	1.341	0.86 ( 0.29)	0.33	420.7	26.00
3	403.48	33.38	1.337	0.86 ( 0.29)	0.33	421.6	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 409.99 Tc(MIN.) = 31.11  
EFFECTIVE AREA(ACRES) = 405.42 AREA-AVERAGED Fm(INCH/HR) = 0.29  
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 421.6  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 35.00 = 8173.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 35.00 TO NODE 41.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 718.50 DOWNSTREAM(FEET) = 688.00  
FLOW LENGTH(FEET) = 2640.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 56.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.38  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 409.99  
PIPE TRAVEL TIME(MIN.) = 2.53 Tc(MIN.) = 33.64  
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 41.00 = 10813.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 33.64  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.331  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 11.60 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 11.60 SUBAREA RUNOFF(CFS) = 13.30

EFFECTIVE AREA(ACRES) = 417.02 AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 433.2 PEAK FLOW RATE(CFS) = 409.99  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 33.64  
RAINFALL INTENSITY(INCH/HR) = 1.33  
AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.86  
AREA-AVERAGED Ap = 0.32  
EFFECTIVE STREAM AREA(ACRES) = 417.02  
TOTAL STREAM AREA(ACRES) = 433.15  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 409.99

\*\*\*\*\*  
FLOW PROCESS FROM NODE 36.00 TO NODE 37.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 719.00  
ELEVATION DATA: UPSTREAM(FEET) = 722.00 DOWNSTREAM(FEET) = 715.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.365  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.552  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 3.60 0.98 0.200 32 11.36  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 2.60 0.98 0.500 32 13.64  
PUBLIC PARK A 2.90 0.98 0.850 32 16.94  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.493  
SUBAREA RUNOFF(CFS) = 16.97  
TOTAL AREA(ACRES) = 9.10 PEAK FLOW RATE(CFS) = 16.97

\*\*\*\*\*  
FLOW PROCESS FROM NODE 37.00 TO NODE 38.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 4 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 715.00 DOWNSTREAM ELEVATION(FEET) = 695.00  
STREET LENGTH(FEET) = 1996.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 42.00



DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 37.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSSTREETS 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) = 36.79  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.60  
HALFSSTREET FLOOD WIDTH(FEET) = 22.02  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.65  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.19  
STREET FLOW TRAVEL TIME(MIN.) = 9.11 Tc(MIN.) = 20.48  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.793

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" A 18.10 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 7.90 0.98 0.500 32  
PUBLIC PARK A 2.60 0.98 0.850 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 1.00 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.337  
SUBAREA AREA(ACRES) = 29.60 SUBAREA RUNOFF(CFS) = 39.07  
EFFECTIVE AREA(ACRES) = 38.70 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 38.7 PEAK FLOW RATE(CFS) = 49.81

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.65 HALFSSTREET FLOOD WIDTH(FEET) = 24.84  
FLOW VELOCITY(FEET/SEC.) = 3.92 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.57  
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.00 = 2715.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 38.00 TO NODE 39.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 692.00  
FLOW LENGTH(FEET) = 1310.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.63  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 49.81  
PIPE TRAVEL TIME(MIN.) = 3.88 Tc(MIN.) = 24.35  
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 39.00 = 4025.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 39.00 TO NODE 39.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 24.35  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.615  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 5.00 0.98 0.850 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 30.70 0.98 0.200 32  
PUBLIC PARK C 3.10 0.57 0.850 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 19.60 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.82  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.290  
SUBAREA AREA(ACRES) = 58.40 SUBAREA RUNOFF(CFS) = 72.45  
EFFECTIVE AREA(ACRES) = 97.10 AREA-AVERAGED Fm(INCH/HR) = 0.29  
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 97.1 PEAK FLOW RATE(CFS) = 116.09

\*\*\*\*\*  
FLOW PROCESS FROM NODE 39.00 TO NODE 40.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 692.00 DOWNSTREAM(FEET) = 688.30  
FLOW LENGTH(FEET) = 1490.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 46.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.13  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 116.09  
PIPE TRAVEL TIME(MIN.) = 3.48 Tc(MIN.) = 27.84  
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 40.00 = 5515.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 40.00 TO NODE 40.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 27.84  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.491  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 0.90 0.98 0.850 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 4.70 0.98 0.200 32  
PUBLIC PARK C 11.50 0.57 0.850 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 29.50 0.57 0.200 69  
COMMERCIAL C 41.50 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244  
SUBAREA AREA(ACRES) = 88.10 SUBAREA RUNOFF(CFS) = 106.62

EFFECTIVE AREA(ACRES) = 185.20 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.77 AREA-AVERAGED Ap = 0.29  
 TOTAL AREA(ACRES) = 185.2 PEAK FLOW RATE(CFS) = 211.84

PEAK FLOW RATE(CFS) = 603.80 Tc(MIN.) = 28.12  
 EFFECTIVE AREA(ACRES) = 533.81 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.31  
 TOTAL AREA(ACRES) = 618.4  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 41.00 = 10813.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 40.00 TO NODE 41.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 688.30 DOWNSTREAM(FEET) = 688.00  
 FLOW LENGTH(FEET) = 137.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.95  
 ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 211.84  
 PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 28.12  
 LONGEST FLOWPATH FROM NODE 36.00 TO NODE 41.00 = 5652.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 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.) = 28.12  
 RAINFALL INTENSITY(INCH/HR) = 1.48  
 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.77  
 AREA-AVERAGED Ap = 0.29  
 EFFECTIVE STREAM AREA(ACRES) = 185.20  
 TOTAL STREAM AREA(ACRES) = 185.20  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 211.84

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	409.99	33.64	1.331	0.86( 0.28)	0.32	417.0	21.00
1	404.12	35.76	1.283	0.86( 0.28)	0.33	432.3	26.00
1	403.48	35.91	1.280	0.86( 0.28)	0.33	433.2	30.00
2	211.84	28.12	1.482	0.77( 0.22)	0.29	185.2	36.00

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	603.80	28.12	1.482	0.83( 0.26)	0.31	533.8	36.00
2	596.46	33.64	1.331	0.84( 0.26)	0.31	602.2	21.00
3	582.56	35.76	1.283	0.84( 0.26)	0.31	617.5	26.00
4	581.38	35.91	1.280	0.84( 0.26)	0.31	618.4	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 41.00 TO NODE 47.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 688.00 DOWNSTREAM(FEET) = 665.00  
 FLOW LENGTH(FEET) = 2655.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 87.0 INCH PIPE IS 69.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.10  
 ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 603.80  
 PIPE TRAVEL TIME(MIN.) = 2.59 Tc(MIN.) = 30.71  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 47.00 = 13468.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 47.00 TO NODE 47.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 30.71  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.406  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	4.00	0.75	0.100	56
COMMERCIAL	C	8.00	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 14.50  
 EFFECTIVE AREA(ACRES) = 545.81 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.31  
 TOTAL AREA(ACRES) = 630.4 PEAK FLOW RATE(CFS) = 603.80  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 47.00 TO NODE 47.00 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.) = 30.71  
 RAINFALL INTENSITY(INCH/HR) = 1.41  
 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.83  
 AREA-AVERAGED Ap = 0.31  
 EFFECTIVE STREAM AREA(ACRES) = 545.81  
 TOTAL STREAM AREA(ACRES) = 630.35  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 603.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 42.00 TO NODE 43.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 694.00 DOWNSTREAM(FEET) = 690.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.537  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.202  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL C 8.70 0.57 0.100 69 14.54  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 16.80  
TOTAL AREA(ACRES) = 8.70 PEAK FLOW RATE(CFS) = 16.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 43.00 TO NODE 44.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 7 USED)<<<<<  
=====

UPSTREAM ELEVATION(FEET) = 690.00 DOWNSTREAM ELEVATION(FEET) = 680.00  
STREET LENGTH(FEET) = 890.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 24.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 19.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.37

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.57  
HALFSTREET FLOOD WIDTH(FEET) = 20.77  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.70  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.13  
STREET FLOW TRAVEL TIME(MIN.) = 4.00 Tc(MIN.) = 18.54  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.903

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 19.90 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 19.90 SUBAREA RUNOFF(CFS) = 33.06

EFFECTIVE AREA(ACRES) = 28.60 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 28.6 PEAK FLOW RATE(CFS) = 47.52

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.63 HALFSTREET FLOOD WIDTH(FEET) = 23.81  
FLOW VELOCITY(FEET/SEC.) = 4.05 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.57  
LONGEST FLOWPATH FROM NODE 42.00 TO NODE 44.00 = 1890.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 44.00 TO NODE 45.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 7 USED)<<<<<  
=====

UPSTREAM ELEVATION(FEET) = 680.00 DOWNSTREAM ELEVATION(FEET) = 667.60  
STREET LENGTH(FEET) = 1365.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 24.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 19.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 69.22

\*\*\*STREET FLOWING FULL\*\*\*

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.72  
HALFSTREET FLOOD WIDTH(FEET) = 26.58  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.36  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 3.13  
STREET FLOW TRAVEL TIME(MIN.) = 5.22 Tc(MIN.) = 23.76  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.640

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 18.60 0.75 0.100 56  
COMMERCIAL C 12.00 0.57 0.100 69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.68  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 30.60 SUBAREA RUNOFF(CFS) = 43.29  
EFFECTIVE AREA(ACRES) = 59.20 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 59.2 PEAK FLOW RATE(CFS) = 84.04

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.76 HALFSTREET FLOOD WIDTH(FEET) = 28.53  
FLOW VELOCITY(FEET/SEC.) = 4.66 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.53  
\*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
AND L = 1365.0 FT WITH ELEVATION-DROP = 12.4 FT, IS 60.2 CFS,  
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 45.00  
LONGEST FLOWPATH FROM NODE 42.00 TO NODE 45.00 = 3255.00 FEET.

```

*****
FLOW PROCESS FROM NODE      45.00 TO NODE      46.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 667.60 DOWNSTREAM(FEET) = 665.20
FLOW LENGTH( FEET) = 1435.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 44.5 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 5.66
ESTIMATED PIPE DIAMETER( INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS) = 84.04
PIPE TRAVEL TIME( MIN.) = 4.23 Tc( MIN.) = 27.98
LONGEST FLOWPATH FROM NODE 42.00 TO NODE 46.00 = 4690.00 FEET.
*****
FLOW PROCESS FROM NODE      46.00 TO NODE      46.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc( MIN.) = 27.98
* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 1.486
SUBAREA LOSS RATE DATA( AMC II ):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B      29.30   0.75  0.100  56
COMMERCIAL          C      57.40   0.57  0.100  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.63
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA( ACRES) = 86.70 SUBAREA RUNOFF( CFS) = 111.08
EFFECTIVE AREA( ACRES) = 145.90 AREA-AVERAGED Fm( INCH/HR) = 0.06
AREA-AVERAGED Fp( INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.10
TOTAL AREA( ACRES) = 145.9 PEAK FLOW RATE( CFS) = 186.94
*****
FLOW PROCESS FROM NODE      46.00 TO NODE      47.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM( FEET) = 665.20 DOWNSTREAM( FEET) = 665.00
FLOW LENGTH( FEET) = 147.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 81.0 INCH PIPE IS 61.3 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 6.43
ESTIMATED PIPE DIAMETER( INCH) = 81.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS) = 186.94
PIPE TRAVEL TIME( MIN.) = 0.38 Tc( MIN.) = 28.36
LONGEST FLOWPATH FROM NODE 42.00 TO NODE 47.00 = 4837.00 FEET.
*****
FLOW PROCESS FROM NODE      47.00 TO NODE      47.00 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.) = 28.36
RAINFALL INTENSITY( INCH/HR) = 1.47
AREA-AVERAGED Fm( INCH/HR) = 0.06
AREA-AVERAGED Fp( INCH/HR) = 0.63
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA( ACRES) = 145.90
TOTAL STREAM AREA( ACRES) = 145.90
PEAK FLOW RATE( CFS) AT CONFLUENCE = 186.94

```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	603.80	30.71	1.406	0.83( 0.25)	0.31	545.8	36.00
1	596.46	36.23	1.273	0.84( 0.26)	0.31	614.2	21.00
1	582.56	38.35	1.230	0.83( 0.26)	0.31	629.5	26.00
1	581.38	38.50	1.227	0.83( 0.26)	0.31	630.4	30.00
2	186.94	28.36	1.474	0.63( 0.06)	0.10	145.9	42.00

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	777.86	28.36	1.474	0.81( 0.21)	0.26	650.0	42.00
2	781.64	30.71	1.406	0.82( 0.21)	0.26	691.7	36.00
3	756.73	36.23	1.273	0.82( 0.22)	0.27	760.1	21.00
4	737.17	38.35	1.230	0.82( 0.22)	0.27	775.4	26.00
5	735.60	38.50	1.227	0.82( 0.22)	0.27	776.2	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE( CFS) = 781.64 Tc( MIN.) = 30.71
EFFECTIVE AREA( ACRES) = 691.71 AREA-AVERAGED Fm( INCH/HR) = 0.21
AREA-AVERAGED Fp( INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.26
TOTAL AREA( ACRES) = 776.2
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 47.00 = 13468.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE      47.00 TO NODE      47.00 IS CODE = 71
-----
>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<
>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<
=====
UNIT-HYDROGRAPH DATA:
RAINFALL( INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49
S-GRAPH: VALLEY( DEV. )=100.0%;VALLEY( UNDEV. )/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT( UNDEV. )= 0.0%
Tc( HR) = 0.60; LAG( HR) = 0.48; Fm( INCH/HR) = 0.22; Ybar = 0.28
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
3HR = 0.99; 6HR = 1.00; 24HR = 1.00
UNIT-INTERVAL( MIN) = 5.00 TOTAL AREA( ACRES) = 776.2
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 47.00 = 13468.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:

```

Lca/L=0.3,n=.0326; Lca/L=0.4,n=.0292; Lca/L=0.5,n=.0268;Lca/L=0.6,n=.0250  
 TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 216.53  
 UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 796.42  
 TOTAL PEAK FLOW RATE(CFS) = 796.42 (SOURCE FLOW INCLUDED)  
 RATIONAL METHOD PEAK FLOW RATE(CFS) = 781.64  
 (UPSTREAM NODE PEAK FLOW RATE(CFS) = 781.64)  
 PEAK FLOW RATE(CFS) USED = 796.42

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 47.00 TO NODE 48.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 665.00 DOWNSTREAM(FEET) = 633.00  
 FLOW LENGTH(FEET) = 2630.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 90.0 INCH PIPE IS 73.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.73  
 ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 796.42  
 PIPE TRAVEL TIME(MIN.) = 2.11 Tc(MIN.) = 38.35  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 48.00 = 16098.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 48.00 TO NODE 48.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 38.35  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.230  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	12.10	0.75	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 12.10

UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.64; LAG(HR) = 0.51; Fm(INCH/HR) = 0.22; Ybar = 0.27  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 788.3  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 48.00 = 16098.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0304; Lca/L=0.4,n=.0272; Lca/L=0.5,n=.0250;Lca/L=0.6,n=.0234  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 220.50  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 795.36  
 TOTAL AREA(ACRES) = 788.3 PEAK FLOW RATE(CFS) = 796.42  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 48.00 TO NODE 48.00 IS CODE = 11  
 -----

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

\*\* MAIN STREAM CONFLUENCE DATA \*\*  
 PEAK FLOW RATE(CFS) = 796.42 Tc(MIN.) = 38.35  
 AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.27  
 TOTAL AREA(ACRES) = 788.3  
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 48.00 = 16098.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*  
 PEAK FLOW RATE(CFS) = 939.31 Tc(MIN.) = 38.02  
 AREA-AVERAGED Fm(INCH/HR) = 0.26 Ybar = 0.32  
 TOTAL AREA(ACRES) = 965.4  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 48.00 = 17949.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.63; LAG(HR) = 0.51; Fm(INCH/HR) = 0.24; Ybar = 0.30  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.92; 30M = 0.92; 1HR = 0.92;  
 3HR = 0.99; 6HR = 0.99; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1753.7  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 48.00 = 17949.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0270; Lca/L=0.4,n=.0242; Lca/L=0.5,n=.0223;Lca/L=0.6,n=.0208  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 472.73  
 PEAK FLOW RATE(CFS) = 1663.15

=====

END OF STUDY SUMMARY:  
 TOTAL AREA(ACRES) = 1753.7 TC(MIN.) = 38.02  
 AREA-AVERAGED Fm(INCH/HR)= 0.24 Ybar = 0.30  
 PEAK FLOW RATE(CFS) = 1663.15

=====

END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS  
 =====



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* W.O. #915-1, ONTARIO MPD \*  
\* 10-YR STUDY \*  
\* GROVE AVE. AREA 'B' \*  
\*\*\*\*\*

FILE NAME: GROVE\_M.DAT  
TIME/DATE OF STUDY: 17:10 08/15/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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 WIDTH (FT)	GUTTER GEOMETRIES: LIP (FT) HIKE (FT)	MANNING FACTOR (n)
1	65.0	60.0	0.020/0.020/0.020	0.67	2.00	0.0312 0.167	0.0150
2	54.0	49.0	0.020/0.020/0.020	0.67	2.00	0.0312 0.167	0.0150
3	47.0	42.0	0.020/0.020/0.020	0.67	2.00	0.0312 0.167	0.0150
4	42.0	37.0	0.020/0.020/0.020	0.67	2.00	0.0312 0.167	0.0150
5	38.0	33.0	0.020/0.020/0.020	0.67	2.00	0.0312 0.167	0.0150
6	32.0	27.0	0.020/0.020/0.020	0.67	2.00	0.0312 0.167	0.0150
7	24.0	19.0	0.020/0.020/0.020	0.67	2.00	0.0312 0.167	0.0150
8	20.0	15.0	0.020/0.020/0.020	0.67	2.00	0.0312 0.167	0.0150
9	18.0	13.0	0.020/0.020/0.020	0.67	2.00	0.0312 0.167	0.0150

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

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.30
30-MINUTES	0.61
1-HOUR	0.80
3-HOUR	1.38
6-HOUR	1.94
24-HOUR	3.65

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

===== FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 21 =====

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

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 912.00 =====  
ELEVATION DATA: UPSTREAM(FEET) = 780.00 DOWNSTREAM(FEET) = 770.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.654  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.864  
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						
"5-7 DWELLINGS/ACRE"	C	10.00	0.57	0.500	69	14.65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 14.23  
TOTAL AREA(ACRES) = 10.00 PEAK FLOW RATE(CFS) = 14.23

===== FLOW PROCESS FROM NODE 61.00 TO NODE 62.00 IS CODE = 62 =====

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 9 USED)<<<<<

===== UPSTREAM ELEVATION(FEET) = 770.00 DOWNSTREAM ELEVATION(FEET) = 750.00 =====  
STREET LENGTH(FEET) = 1838.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020



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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.32  
 \*\*\*STREET FLOWING FULL\*\*\*

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.52  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.43  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.80  
 STREET FLOW TRAVEL TIME(MIN.) = 8.94 Tc(MIN.) = 23.60  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.400

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"	A	19.20	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.80	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.91  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 23.00 SUBAREA RUNOFF(CFS) = 19.60  
 EFFECTIVE AREA(ACRES) = 33.00 AREA-AVERAGED Fm(INCH/HR) = 0.40  
 AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 33.0 PEAK FLOW RATE(CFS) = 29.65

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.55 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 FLOW VELOCITY(FEET/SEC.) = 3.72 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.04  
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 62.00 = 2750.00 FEET.

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 FLOW PROCESS FROM NODE 62.00 TO NODE 63.00 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) = 750.00 DOWNSTREAM(FEET) = 748.00  
 FLOW LENGTH(FEET) = 1318.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.19  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 29.65  
 PIPE TRAVEL TIME(MIN.) = 5.24 Tc(MIN.) = 28.84  
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 63.00 = 4068.00 FEET.

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 FLOW PROCESS FROM NODE 63.00 TO NODE 63.00 IS CODE = 81

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

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MAINLINE Tc(MIN.) = 28.84  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.242

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	18.90	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	13.40	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	5.50	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350  
 SUBAREA AREA(ACRES) = 37.80 SUBAREA RUNOFF(CFS) = 31.64  
 EFFECTIVE AREA(ACRES) = 70.80 AREA-AVERAGED Fm(INCH/HR) = 0.35  
 AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA(ACRES) = 70.8 PEAK FLOW RATE(CFS) = 56.58

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 FLOW PROCESS FROM NODE 63.00 TO NODE 63.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 28.84  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.242  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	9.00	0.98	0.100	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	42.10	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	26.30	0.98	0.500	32
COMMERCIAL	C	0.90	0.57	0.100	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.80	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.94  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298  
 SUBAREA AREA(ACRES) = 82.10 SUBAREA RUNOFF(CFS) = 71.01  
 EFFECTIVE AREA(ACRES) = 152.90 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.35  
 TOTAL AREA(ACRES) = 152.9 PEAK FLOW RATE(CFS) = 127.60

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 FLOW PROCESS FROM NODE 63.00 TO NODE 63.00 IS CODE = 16

>>>>USER SPECIFIED CONSTANT SOURCE FLOW AT NODE<<<<<

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USER-SPECIFIED CONSTANT SOURCE FLOW = 300.00(CFS)  
 USER-SPECIFIED AREA ASSOCIATED TO SOURCE FLOW = 248.90(ACRES)  
 \* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(AC.) = 248.90  
 \* SUMMED DATA: FLOW(CFS) = 427.60 TOTAL AREA(ACRES) = 401.80

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 FLOW PROCESS FROM NODE 63.00 TO NODE 65.00 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) = 748.00 DOWNSTREAM(FEET) = 720.00
FLOW LENGTH(FEET) = 2635.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 57.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.09
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 427.60
PIPE TRAVEL TIME(MIN.) = 2.57 Tc(MIN.) = 31.41
* TOTAL SOURCE FLOW(CFS) = 300.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 6703.00 FEET.

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FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 31.41
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.180
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 9.80 0.98 0.100 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 26.50 0.98 0.200 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 15.30 0.98 0.500 32
PUBLIC PARK A 4.80 0.98 0.850 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 0.50 0.57 0.200 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 8.40 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.90
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.342
SUBAREA AREA(ACRES) = 65.30 SUBAREA RUNOFF(CFS) = 51.33
EFFECTIVE AREA(ACRES) = 218.20 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 218.2 PEAK FLOW RATE(CFS) = 170.40

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 470.40 TOTAL AREA(ACRES) = 467.1

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FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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=====
MAINLINE Tc(MIN.) = 31.41
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.180
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" A 36.90 0.98 0.200 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 17.00 0.98 0.500 32
PUBLIC PARK A 5.10 0.98 0.850 32

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.343
SUBAREA AREA(ACRES) = 59.00 SUBAREA RUNOFF(CFS) = 44.90
EFFECTIVE AREA(ACRES) = 277.20 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 277.2 PEAK FLOW RATE(CFS) = 215.30

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 515.30 TOTAL AREA(ACRES) = 526.1

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FLOW PROCESS FROM NODE 65.00 TO NODE 66.00 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) = 720.00 DOWNSTREAM(FEET) = 695.00
FLOW LENGTH(FEET) = 2650.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 81.0 INCH PIPE IS 63.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.01
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 515.30
PIPE TRAVEL TIME(MIN.) = 2.60 Tc(MIN.) = 34.01
* TOTAL SOURCE FLOW(CFS) = 300.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 9353.00 FEET.

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FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 34.01
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.125
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 8.50 0.98 0.100 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 14.90 0.98 0.200 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 19.50 0.98 0.500 32
PUBLIC PARK A 4.60 0.98 0.850 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 22.20 0.57 0.200 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 9.30 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.336
SUBAREA AREA(ACRES) = 79.00 SUBAREA RUNOFF(CFS) = 59.99
EFFECTIVE AREA(ACRES) = 356.20 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 356.2 PEAK FLOW RATE(CFS) = 261.59

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 561.59 TOTAL AREA(ACRES) = 605.1

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FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 34.01
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.125
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 8.40 0.98 0.100 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 19.30 0.98 0.200 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 26.00 0.98 0.500 32
PUBLIC PARK A 3.20 0.98 0.850 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 19.00 0.57 0.200 69
PUBLIC PARK C 2.10 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.333
SUBAREA AREA(ACRES) = 78.00 SUBAREA RUNOFF(CFS) = 58.19
EFFECTIVE AREA(ACRES) = 434.20 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 434.2 PEAK FLOW RATE(CFS) = 319.79

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 619.79 TOTAL AREA(ACRES) = 683.1

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FLOW PROCESS FROM NODE 66.00 TO NODE 67.00 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) = 695.00 DOWNSTREAM(FEET) = 673.50
FLOW LENGTH(FEET) = 2642.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 90.0 INCH PIPE IS 69.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.92
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 619.79
PIPE TRAVEL TIME(MIN.) = 2.60 Tc(MIN.) = 36.61
* TOTAL SOURCE FLOW(CFS) = 300.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 67.00 = 11995.00 FEET.

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FLOW PROCESS FROM NODE 67.00 TO NODE 67.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 36.61
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.076
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 15.70 0.98 0.100 32

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RESIDENTIAL
"11+ DWELLINGS/ACRE" A 32.60 0.98 0.200 32
PUBLIC PARK A 10.70 0.98 0.850 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 10.40 0.57 0.200 69
PUBLIC PARK C 11.40 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.358
SUBAREA AREA(ACRES) = 80.80 SUBAREA RUNOFF(CFS) = 57.18
EFFECTIVE AREA(ACRES) = 515.00 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 515.0 PEAK FLOW RATE(CFS) = 357.94

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 657.94 TOTAL AREA(ACRES) = 763.9

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*****
FLOW PROCESS FROM NODE 67.00 TO NODE 67.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 36.61
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.076
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 16.90 0.98 0.100 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 50.60 0.98 0.200 32
PUBLIC PARK A 12.90 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.283
SUBAREA AREA(ACRES) = 80.40 SUBAREA RUNOFF(CFS) = 57.88
EFFECTIVE AREA(ACRES) = 595.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 595.4 PEAK FLOW RATE(CFS) = 415.81

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 715.81 TOTAL AREA(ACRES) = 844.3

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FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 673.50 DOWNSTREAM(FEET) = 655.90
FLOW LENGTH(FEET) = 2641.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 102.0 INCH PIPE IS 73.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.46
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 715.81
PIPE TRAVEL TIME(MIN.) = 2.67 Tc(MIN.) = 39.28
* TOTAL SOURCE FLOW(CFS) = 300.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 68.00 = 14636.00 FEET.

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FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81  
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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MAINLINE Tc(MIN.) = 39.28  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.031  
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" A 16.00 0.98 0.200 32  
COMMERCIAL B 5.00 0.75 0.100 56  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 16.90 0.57 0.200 69  
COMMERCIAL C 19.60 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.157  
SUBAREA AREA(ACRES) = 57.50 SUBAREA RUNOFF(CFS) = 47.51  
EFFECTIVE AREA(ACRES) = 652.90 AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 652.9 PEAK FLOW RATE(CFS) = 439.45  
  
\* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 739.45 TOTAL AREA(ACRES) = 901.8

\*\*\*\*\*  
FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 71  
-----

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<  
>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<

-----  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.65; LAG(HR) = 0.52; Fm(INCH/HR) = 0.28; Ybar = 0.34  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 652.9  
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 68.00 = 14636.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0327; Lca/L=0.4,n=.0293; Lca/L=0.5,n=.0269;Lca/L=0.6,n=.0251  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 134.59  
UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 523.88  
TOTAL PEAK FLOW RATE(CFS) = 823.88 (SOURCE FLOW INCLUDED)  
RATIONAL METHOD PEAK FLOW RATE(CFS) = 739.45  
(UPSTREAM NODE PEAK FLOW RATE(CFS) = 739.45)  
PEAK FLOW RATE(CFS) USED = 823.88  
TOTAL SOURCE FLOW(CFS) = 300.00  
TOTAL AREA ASSOCIATED TO SOURCE FLOW(ACRES) = 248.9

\*\*\*\*\*  
FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 39.28  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.031  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 17.60 0.98 0.100 32  
COMMERCIAL B 8.50 0.75 0.100 56  
COMMERCIAL C 14.80 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 40.90  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.65; LAG(HR) = 0.52; Fm(INCH/HR) = 0.27; Ybar = 0.33  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 693.8  
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 68.00 = 14636.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0327; Lca/L=0.4,n=.0293; Lca/L=0.5,n=.0269;Lca/L=0.6,n=.0251  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 145.32  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 560.95  
TOTAL AREA(ACRES) = 693.8 PEAK FLOW RATE(CFS) = 560.95

\* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 860.95 TOTAL AREA(ACRES) = 942.7

-----  
END OF STUDY SUMMARY:  
TOTAL AREA(ACRES) = 693.8 TC(MIN.) = 39.28  
AREA-AVERAGED Fm(INCH/HR)= 0.27 Ybar = 0.33  
PEAK FLOW RATE(CFS) = 560.95  
\* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(AC.) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 860.95 TOTAL AREA(ACRES) = 942.7

-----  
END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* W.O. #915-1, ONTARIO MPD \*  
\* 100-YR STUDY \*  
\* GROVE AVE. AREA 'B' \*  
\*\*\*\*\*

FILE NAME: GROVE\_M.DAT  
TIME/DATE OF STUDY: 13:01 08/09/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====  
--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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 WIDTH (FT)	GUTTER LIP (FT)	GEOMETRIES HIKE (FT)	MANNING FACTOR (n)
1	65.0	60.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
2	54.0	49.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
3	47.0	42.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	42.0	37.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
5	38.0	33.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
6	32.0	27.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
7	24.0	19.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
8	20.0	15.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
9	18.0	13.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150

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

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.44
30-MINUTES	0.91
1-HOUR	1.20
3-HOUR	2.10
6-HOUR	3.00
24-HOUR	6.00

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

===== FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 21 =====

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

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 912.00 =====  
ELEVATION DATA: UPSTREAM(FEET) = 780.00 DOWNSTREAM(FEET) = 770.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.654  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.796  
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						
"5-7 DWELLINGS/ACRE"	C	10.00	0.57	0.500	69	14.65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 22.62  
TOTAL AREA(ACRES) = 10.00 PEAK FLOW RATE(CFS) = 22.62

===== FLOW PROCESS FROM NODE 61.00 TO NODE 62.00 IS CODE = 62 =====

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 9 USED)<<<<<

===== UPSTREAM ELEVATION(FEET) = 770.00 DOWNSTREAM ELEVATION(FEET) = 750.00 =====  
STREET LENGTH(FEET) = 1838.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 40.94  
 \*\*\*STREET FLOWING FULL\*\*\*

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.60  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.22  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.52  
 STREET FLOW TRAVEL TIME(MIN.) = 7.25 Tc(MIN.) = 21.91  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.196

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"	A	19.20	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.80	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.91  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 23.00 SUBAREA RUNOFF(CFS) = 36.07  
 EFFECTIVE AREA(ACRES) = 33.00 AREA-AVERAGED Fm(INCH/HR) = 0.40  
 AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 33.0 PEAK FLOW RATE(CFS) = 53.30

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.64 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 FLOW VELOCITY(FEET/SEC.) = 4.67 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.01  
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 62.00 = 2750.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 62.00 TO NODE 63.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 748.00  
 FLOW LENGTH(FEET) = 1318.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.94  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 53.30  
 PIPE TRAVEL TIME(MIN.) = 4.45 Tc(MIN.) = 26.35  
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 63.00 = 4068.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 63.00 TO NODE 63.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 26.35  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.966

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	18.90	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	13.40	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	5.50	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350  
 SUBAREA AREA(ACRES) = 37.80 SUBAREA RUNOFF(CFS) = 56.29  
 EFFECTIVE AREA(ACRES) = 70.80 AREA-AVERAGED Fm(INCH/HR) = 0.35  
 AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA(ACRES) = 70.8 PEAK FLOW RATE(CFS) = 102.74

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 63.00 TO NODE 63.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 26.35  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.966

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	9.00	0.98	0.100	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	42.10	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	26.30	0.98	0.500	32
COMMERCIAL	C	0.90	0.57	0.100	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.80	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.94  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298  
 SUBAREA AREA(ACRES) = 82.10 SUBAREA RUNOFF(CFS) = 124.54  
 EFFECTIVE AREA(ACRES) = 152.90 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.35  
 TOTAL AREA(ACRES) = 152.9 PEAK FLOW RATE(CFS) = 227.27

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 63.00 TO NODE 63.00 IS CODE = 16

>>>>USER SPECIFIED CONSTANT SOURCE FLOW AT NODE<<<<<

=====

USER-SPECIFIED CONSTANT SOURCE FLOW = 300.00(CFS)  
 USER-SPECIFIED AREA ASSOCIATED TO SOURCE FLOW = 248.90(ACRES)  
 \* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(AC.) = 248.90  
 \* SUMMED DATA: FLOW(CFS) = 527.27 TOTAL AREA(ACRES) = 401.80

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 63.00 TO NODE 65.00 IS CODE = 31

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



```

=====
ELEVATION DATA: UPSTREAM(FEET) = 748.00 DOWNSTREAM(FEET) = 720.00
FLOW LENGTH(FEET) = 2635.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 81.0 INCH PIPE IS 61.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.00
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 527.27
PIPE TRAVEL TIME(MIN.) = 2.44 Tc(MIN.) = 28.79
* TOTAL SOURCE FLOW(CFS) = 300.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 6703.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

=====
MAINLINE Tc(MIN.) = 28.79
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.864
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            A        9.80    0.98    0.100    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        26.50   0.98    0.200    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A        15.30   0.98    0.500    32
PUBLIC PARK           A         4.80   0.98    0.850    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C         0.50   0.57    0.200    69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C         8.40   0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.90
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.342
SUBAREA AREA(ACRES) = 65.30 SUBAREA RUNOFF(CFS) = 91.57
EFFECTIVE AREA(ACRES) = 218.20 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 218.2 PEAK FLOW RATE(CFS) = 304.84

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 604.84 TOTAL AREA(ACRES) = 467.1

```

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*****
FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

=====
MAINLINE Tc(MIN.) = 28.79
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.864
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" A        36.90   0.98    0.200    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A        17.00   0.98    0.500    32
PUBLIC PARK           A         5.10   0.98    0.850    32

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.343
SUBAREA AREA(ACRES) = 59.00 SUBAREA RUNOFF(CFS) = 81.25
EFFECTIVE AREA(ACRES) = 277.20 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 277.2 PEAK FLOW RATE(CFS) = 386.09

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 686.09 TOTAL AREA(ACRES) = 526.1

```

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*****
FLOW PROCESS FROM NODE 65.00 TO NODE 66.00 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) = 720.00 DOWNSTREAM(FEET) = 695.00
FLOW LENGTH(FEET) = 2650.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 90.0 INCH PIPE IS 71.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.25
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 686.09
PIPE TRAVEL TIME(MIN.) = 2.42 Tc(MIN.) = 31.21
* TOTAL SOURCE FLOW(CFS) = 300.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 9353.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

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=====
MAINLINE Tc(MIN.) = 31.21
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.776
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            A         8.50    0.98    0.100    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        14.90   0.98    0.200    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A        19.50   0.98    0.500    32
PUBLIC PARK           A         4.60   0.98    0.850    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C        22.20   0.57    0.200    69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C         9.30   0.57    0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.336
SUBAREA AREA(ACRES) = 79.00 SUBAREA RUNOFF(CFS) = 106.30
EFFECTIVE AREA(ACRES) = 356.20 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 356.2 PEAK FLOW RATE(CFS) = 470.41

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 770.41 TOTAL AREA(ACRES) = 605.1

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*****
FLOW PROCESS FROM NODE      66.00 TO NODE      66.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 31.21
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.776
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            A      8.40     0.98     0.100    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A      19.30    0.98     0.200    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A      26.00    0.98     0.500    32
PUBLIC PARK           A      3.20     0.98     0.850    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C      19.00    0.57     0.200    69
PUBLIC PARK           C      2.10     0.57     0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.333
SUBAREA AREA(ACRES) = 78.00 SUBAREA RUNOFF(CFS) = 103.92
EFFECTIVE AREA(ACRES) = 434.20 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 434.2 PEAK FLOW RATE(CFS) = 574.33

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 874.33 TOTAL AREA(ACRES) = 683.1

```

```

*****
FLOW PROCESS FROM NODE      66.00 TO NODE      67.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 673.50
FLOW LENGTH(FEET) = 2642.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 102.0 INCH PIPE IS 79.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.40
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 874.33
PIPE TRAVEL TIME(MIN.) = 2.39 Tc(MIN.) = 33.61
* TOTAL SOURCE FLOW(CFS) = 300.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 67.00 = 11995.00 FEET.

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*****
FLOW PROCESS FROM NODE      67.00 TO NODE      67.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 33.61
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.699
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            A      15.70    0.98     0.100    32

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RESIDENTIAL
"11+ DWELLINGS/ACRE" A      32.60    0.98     0.200    32
PUBLIC PARK           A      10.70    0.98     0.850    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C      10.40    0.57     0.200    69
PUBLIC PARK           C      11.40    0.57     0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.358
SUBAREA AREA(ACRES) = 80.80 SUBAREA RUNOFF(CFS) = 102.48
EFFECTIVE AREA(ACRES) = 515.00 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 515.0 PEAK FLOW RATE(CFS) = 646.72

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 946.72 TOTAL AREA(ACRES) = 763.9

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*****
FLOW PROCESS FROM NODE      67.00 TO NODE      67.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 33.61
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.699
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            A      16.90    0.98     0.100    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A      50.60    0.98     0.200    32
PUBLIC PARK           A      12.90    0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.283
SUBAREA AREA(ACRES) = 80.40 SUBAREA RUNOFF(CFS) = 102.96
EFFECTIVE AREA(ACRES) = 595.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 595.4 PEAK FLOW RATE(CFS) = 749.69

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 1049.69 TOTAL AREA(ACRES) = 844.3

```

```

*****
FLOW PROCESS FROM NODE      67.00 TO NODE      68.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 673.50 DOWNSTREAM(FEET) = 655.90
FLOW LENGTH(FEET) = 2641.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 114.0 INCH PIPE IS 87.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.92
ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1049.69
PIPE TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 36.06
* TOTAL SOURCE FLOW(CFS) = 300.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 68.00 = 14636.00 FEET.

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 36.06  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.629  
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" A 16.00 0.98 0.200 32  
COMMERCIAL B 5.00 0.75 0.100 56  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 16.90 0.57 0.200 69  
COMMERCIAL C 19.60 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.157  
SUBAREA AREA(ACRES) = 57.50 SUBAREA RUNOFF(CFS) = 78.42  
EFFECTIVE AREA(ACRES) = 652.90 AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 652.9 PEAK FLOW RATE(CFS) = 790.37  
  
\* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 1090.37 TOTAL AREA(ACRES) = 901.8

\*\*\*\*\*  
FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 71  
-----

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<  
>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<

-----  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.60; LAG(HR) = 0.48; Fm(INCH/HR) = 0.28; Ybar = 0.31  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 652.9  
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 68.00 = 14636.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0300; Lca/L=0.4,n=.0269; Lca/L=0.5,n=.0247;Lca/L=0.6,n=.0231  
TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 232.33  
UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 854.97  
TOTAL PEAK FLOW RATE(CFS) = 1154.97 (SOURCE FLOW INCLUDED)  
RATIONAL METHOD PEAK FLOW RATE(CFS) = 1090.37  
(UPSTREAM NODE PEAK FLOW RATE(CFS) = 1090.37)  
PEAK FLOW RATE(CFS) USED = 1154.97  
TOTAL SOURCE FLOW(CFS) = 300.00  
TOTAL AREA ASSOCIATED TO SOURCE FLOW(ACRES) = 248.9

\*\*\*\*\*  
FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 36.06  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.629  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 17.60 0.98 0.100 32  
COMMERCIAL B 8.50 0.75 0.100 56  
COMMERCIAL C 14.80 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 40.90  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.60; LAG(HR) = 0.48; Fm(INCH/HR) = 0.27; Ybar = 0.30  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 693.8  
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 68.00 = 14636.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0300; Lca/L=0.4,n=.0269; Lca/L=0.5,n=.0247;Lca/L=0.6,n=.0231  
TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 250.59  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 913.69  
TOTAL AREA(ACRES) = 693.8 PEAK FLOW RATE(CFS) = 913.69

\* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 1213.69 TOTAL AREA(ACRES) = 942.7

-----  
END OF STUDY SUMMARY:  
TOTAL AREA(ACRES) = 693.8 TC(MIN.) = 36.06  
AREA-AVERAGED Fm(INCH/HR)= 0.27 Ybar = 0.30  
PEAK FLOW RATE(CFS) = 913.69  
\* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(AC.) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 1213.69 TOTAL AREA(ACRES) = 942.7

-----  
END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* W.O. #915-1, ONTARIO MPD \*  
\* 25-YR STUDY \*  
\* GROVE AVE. AREA 'B' \*  
\*\*\*\*\*

FILE NAME: GROVE\_M.DAT  
TIME/DATE OF STUDY: 17:14 08/15/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*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- / SIDE / SIDE / WAY	STREET-CROSSFALL: CURB HEIGHT (FT)	GUTTER WIDTH (FT)	STREET-CROSSFALL: GUTTER GEOMETRIES: LIP (FT)	STREET-CROSSFALL: GUTTER GEOMETRIES: HIKE (FT)	MANNING FACTOR (n)
1	65.0	60.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
2	54.0	49.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
3	47.0	42.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	42.0	37.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
5	38.0	33.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
6	32.0	27.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
7	24.0	19.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
8	20.0	15.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
9	18.0	13.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET

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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH  
FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.35
30-MINUTES	0.71
1-HOUR	0.94
3-HOUR	1.64
6-HOUR	2.32
24-HOUR	4.49

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 21 \*\*\*\*\*

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 912.00  
ELEVATION DATA: UPSTREAM(FEET) = 780.00 DOWNSTREAM(FEET) = 770.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.654  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.191

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 "5-7 DWELLINGS/ACRE"	C	10.00	0.57	0.500	69	14.65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500						
SUBAREA RUNOFF(CFS) = 17.17						
TOTAL AREA(ACRES) = 10.00 PEAK FLOW RATE(CFS) = 17.17						

\*\*\*\*\* FLOW PROCESS FROM NODE 61.00 TO NODE 62.00 IS CODE = 62 \*\*\*\*\*

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 9 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 770.00 DOWNSTREAM ELEVATION(FEET) = 750.00  
STREET LENGTH(FEET) = 1838.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00

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

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 30.14  
\*\*\*STREET FLOWING FULL\*\*\*  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH( FEET) = 0.55  
HALFSTREET FLOOD WIDTH( FEET) = 18.00  
AVERAGE FLOW VELOCITY( FEET/SEC.) = 3.74  
PRODUCT OF DEPTH&VELOCITY( FT\*FT/SEC.) = 2.06  
STREET FLOW TRAVEL TIME( MIN.) = 8.20 Tc( MIN.) = 22.85  
\* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 1.678

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" A 19.20 0.98 0.500 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 3.80 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.91  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA( ACRES) = 23.00 SUBAREA RUNOFF( CFS) = 25.35  
EFFECTIVE AREA( ACRES) = 33.00 AREA-AVERAGED Fm( INCH/HR) = 0.40  
AREA-AVERAGED Fp( INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.50  
TOTAL AREA( ACRES) = 33.0 PEAK FLOW RATE( CFS) = 37.90

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH( FEET) = 0.58 HALFSTREET FLOOD WIDTH( FEET) = 18.00  
FLOW VELOCITY( FEET/SEC.) = 4.10 DEPTH\*VELOCITY( FT\*FT/SEC.) = 2.40  
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 62.00 = 2750.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 62.00 TO NODE 63.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM( FEET) = 750.00 DOWNSTREAM( FEET) = 748.00  
FLOW LENGTH( FEET) = 1318.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.8 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC.) = 4.54  
ESTIMATED PIPE DIAMETER( INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 37.90  
PIPE TRAVEL TIME( MIN.) = 4.84 Tc( MIN.) = 27.69  
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 63.00 = 4068.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 63.00 TO NODE 63.00 IS CODE = 81  
-----

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

MAINLINE Tc( MIN.) = 27.69  
\* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 1.496  
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" A 18.90 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 13.40 0.98 0.500 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 5.50 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.89  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350  
SUBAREA AREA( ACRES) = 37.80 SUBAREA RUNOFF( CFS) = 40.28  
EFFECTIVE AREA( ACRES) = 70.80 AREA-AVERAGED Fm( INCH/HR) = 0.35  
AREA-AVERAGED Fp( INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.42  
TOTAL AREA( ACRES) = 70.8 PEAK FLOW RATE( CFS) = 72.76

\*\*\*\*\*  
FLOW PROCESS FROM NODE 63.00 TO NODE 63.00 IS CODE = 81  
-----

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

MAINLINE Tc( MIN.) = 27.69  
\* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 1.496  
SUBAREA LOSS RATE DATA( AMC II ):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL  
"11+ DWELLINGS/ACRE" A 42.10 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 26.30 0.98 0.500 32  
COMMERCIAL  
"5-7 DWELLINGS/ACRE" C 3.80 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.94  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298  
SUBAREA AREA( ACRES) = 82.10 SUBAREA RUNOFF( CFS) = 89.78  
EFFECTIVE AREA( ACRES) = 152.90 AREA-AVERAGED Fm( INCH/HR) = 0.31  
AREA-AVERAGED Fp( INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.35  
TOTAL AREA( ACRES) = 152.9 PEAK FLOW RATE( CFS) = 162.54

\*\*\*\*\*  
FLOW PROCESS FROM NODE 63.00 TO NODE 63.00 IS CODE = 16  
-----

>>>>USER SPECIFIED CONSTANT SOURCE FLOW AT NODE<<<<  
-----

USER-SPECIFIED CONSTANT SOURCE FLOW = 300.00( CFS)  
USER-SPECIFIED AREA ASSOCIATED TO SOURCE FLOW = 248.90( ACRES)  
\* CUMULATIVE SOURCE FLOW DATA: FLOW( CFS) = 300.00 AREA( AC.) = 248.90  
\* SUMMED DATA: FLOW( CFS) = 462.54 TOTAL AREA( ACRES) = 401.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 63.00 TO NODE 65.00 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) = 748.00 DOWNSTREAM(FEET) = 720.00
FLOW LENGTH(FEET) = 2635.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.49
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 462.54
PIPE TRAVEL TIME(MIN.) = 2.51 Tc(MIN.) = 30.20
* TOTAL SOURCE FLOW(CFS) = 300.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 6703.00 FEET.

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*****
FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 30.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.420
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 9.80 0.98 0.100 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 26.50 0.98 0.200 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 15.30 0.98 0.500 32
PUBLIC PARK A 4.80 0.98 0.850 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 0.50 0.57 0.200 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 8.40 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.90
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.342
SUBAREA AREA(ACRES) = 65.30 SUBAREA RUNOFF(CFS) = 65.44
EFFECTIVE AREA(ACRES) = 218.20 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 218.2 PEAK FLOW RATE(CFS) = 217.54

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 517.54 TOTAL AREA(ACRES) = 467.1

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*****
FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 30.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.420
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" A 36.90 0.98 0.200 32
RESIDENTIAL

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```

"5-7 DWELLINGS/ACRE" A 17.00 0.98 0.500 32
PUBLIC PARK A 5.10 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.343
SUBAREA AREA(ACRES) = 59.00 SUBAREA RUNOFF(CFS) = 57.65
EFFECTIVE AREA(ACRES) = 277.20 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 277.2 PEAK FLOW RATE(CFS) = 275.18

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9
* SUMMED DATA: FLOW(CFS) = 575.18 TOTAL AREA(ACRES) = 526.1

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*****
FLOW PROCESS FROM NODE 65.00 TO NODE 66.00 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) = 720.00 DOWNSTREAM(FEET) = 695.00
FLOW LENGTH(FEET) = 2650.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 84.0 INCH PIPE IS 67.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.43
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 575.18
PIPE TRAVEL TIME(MIN.) = 2.53 Tc(MIN.) = 32.74
* TOTAL SOURCE FLOW(CFS) = 300.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 9353.00 FEET.

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FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 32.74
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.353
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 8.50 0.98 0.100 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 14.90 0.98 0.200 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 19.50 0.98 0.500 32
PUBLIC PARK A 4.60 0.98 0.850 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 22.20 0.57 0.200 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 9.30 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.336
SUBAREA AREA(ACRES) = 79.00 SUBAREA RUNOFF(CFS) = 76.20
EFFECTIVE AREA(ACRES) = 356.20 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 356.2 PEAK FLOW RATE(CFS) = 334.67

* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9

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\* SUMMED DATA: FLOW(CFS) = 634.67 TOTAL AREA(ACRES) = 605.1

\*\*\*\*\*  
FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 81

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

-----  
MAINLINE Tc(MIN.) = 32.74  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.353  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	8.40	0.98	0.100	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	19.30	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	26.00	0.98	0.500	32
PUBLIC PARK	A	3.20	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	19.00	0.57	0.200	69
PUBLIC PARK	C	2.10	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.333  
SUBAREA AREA(ACRES) = 78.00 SUBAREA RUNOFF(CFS) = 74.20  
EFFECTIVE AREA(ACRES) = 434.20 AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.34  
TOTAL AREA(ACRES) = 434.2 PEAK FLOW RATE(CFS) = 408.87

\* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 708.87 TOTAL AREA(ACRES) = 683.1

\*\*\*\*\*  
FLOW PROCESS FROM NODE 66.00 TO NODE 67.00 IS CODE = 31

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 673.50  
FLOW LENGTH(FEET) = 2642.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 93.0 INCH PIPE IS 75.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.33  
ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 708.87  
PIPE TRAVEL TIME(MIN.) = 2.54 Tc(MIN.) = 35.28  
\* TOTAL SOURCE FLOW(CFS) = 300.00  
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 67.00 = 11995.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 67.00 TO NODE 67.00 IS CODE = 81

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

-----  
MAINLINE Tc(MIN.) = 35.28  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.293  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	15.70	0.98	0.100	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	32.60	0.98	0.200	32
PUBLIC PARK	A	10.70	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	10.40	0.57	0.200	69
PUBLIC PARK	C	11.40	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.358  
SUBAREA AREA(ACRES) = 80.80 SUBAREA RUNOFF(CFS) = 72.98  
EFFECTIVE AREA(ACRES) = 515.00 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 515.0 PEAK FLOW RATE(CFS) = 458.66

\* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 758.66 TOTAL AREA(ACRES) = 763.9

\*\*\*\*\*  
FLOW PROCESS FROM NODE 67.00 TO NODE 67.00 IS CODE = 81

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

-----  
MAINLINE Tc(MIN.) = 35.28  
\* 25 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
COMMERCIAL	A	16.90	0.98	0.100	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	50.60	0.98	0.200	32
PUBLIC PARK	A	12.90	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.283  
SUBAREA AREA(ACRES) = 80.40 SUBAREA RUNOFF(CFS) = 73.60  
EFFECTIVE AREA(ACRES) = 595.40 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.34  
TOTAL AREA(ACRES) = 595.4 PEAK FLOW RATE(CFS) = 532.27

\* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 832.27 TOTAL AREA(ACRES) = 844.3

\*\*\*\*\*  
FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 31

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 673.50 DOWNSTREAM(FEET) = 655.90  
FLOW LENGTH(FEET) = 2641.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 108.0 INCH PIPE IS 77.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.10  
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 832.27  
PIPE TRAVEL TIME(MIN.) = 2.57 Tc(MIN.) = 37.85  
\* TOTAL SOURCE FLOW(CFS) = 300.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 68.00 = 14636.00 FEET.

FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81

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

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====  
MAINLINE Tc(MIN.) = 37.85  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.240  
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" A 16.00 0.98 0.200 32  
COMMERCIAL B 5.00 0.75 0.100 56  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 16.90 0.57 0.200 69  
COMMERCIAL C 19.60 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.157  
SUBAREA AREA(ACRES) = 57.50 SUBAREA RUNOFF(CFS) = 58.30  
EFFECTIVE AREA(ACRES) = 652.90 AREA-AVERAGED Fm(INCH/HR) = 0.28  
AREA-AVERAGED Fp(INCH/HR) = 0.88 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 652.9 PEAK FLOW RATE(CFS) = 561.88  
  
\* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 861.88 TOTAL AREA(ACRES) = 901.8

-----  
MAINLINE Tc(MIN.) = 37.85  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.240  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 17.60 0.98 0.100 32  
COMMERCIAL B 8.50 0.75 0.100 56  
COMMERCIAL C 14.80 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 40.90  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.63; LAG(HR) = 0.50; Fm(INCH/HR) = 0.27; Ybar = 0.32  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR = 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 693.8  
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 68.00 = 14636.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0315; Lca/L=0.4,n=.0283; Lca/L=0.5,n=.0260;Lca/L=0.6,n=.0242  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 182.08  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 681.05  
TOTAL AREA(ACRES) = 693.8 PEAK FLOW RATE(CFS) = 681.05

\*\*\*\*\*  
FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 71

-----  
\* SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(ACRES) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 981.05 TOTAL AREA(ACRES) = 942.7  
=====

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<<  
>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<<  
=====  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.63; LAG(HR) = 0.50; Fm(INCH/HR) = 0.28; Ybar = 0.33  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR = 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 652.9  
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 68.00 = 14636.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0315; Lca/L=0.4,n=.0283; Lca/L=0.5,n=.0260;Lca/L=0.6,n=.0242  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 168.67  
UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 636.51  
TOTAL PEAK FLOW RATE(CFS) = 936.51 (SOURCE FLOW INCLUDED)  
RATIONAL METHOD PEAK FLOW RATE(CFS) = 861.88  
(UPSTREAM NODE PEAK FLOW RATE(CFS) = 861.88)  
PEAK FLOW RATE(CFS) USED = 936.51  
TOTAL SOURCE FLOW(CFS) = 300.00  
TOTAL AREA ASSOCIATED TO SOURCE FLOW(ACRES) = 248.9

-----  
END OF STUDY SUMMARY:  
TOTAL AREA(ACRES) = 693.8 TC(MIN.) = 37.85  
AREA-AVERAGED Fm(INCH/HR) = 0.27 Ybar = 0.32  
PEAK FLOW RATE(CFS) = 681.05  
\* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) = 300.00 AREA(AC.) = 248.9  
\* SUMMED DATA: FLOW(CFS) = 981.05 TOTAL AREA(ACRES) = 942.7  
=====  
END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS

\*\*\*\*\*



\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

Analysis prepared by:

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FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.30
30-MINUTES	0.61
1-HOUR	0.80
3-HOUR	1.38
6-HOUR	1.94
24-HOUR	3.65

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

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

\* NMC-HAVEN \*  
\* 10-YR STUDY \*  
\* AREA 'N' WITH DIVERSION & NO LAKE \*  
\*\*\*\*\*

FILE NAME: HAVEN\_M.DAT  
TIME/DATE OF STUDY: 09:42 08/24/2011

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

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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 GUTTER-GEOMETRIES:				MANNING FACTOR (n)
	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT-/ SIDE	HEIGHT (FT)	WIDTH (FT)	LIP (FT)	HIKE (FT)	
1	30.0	20.0	0.018/0.018/0.020	0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH

\*\*\*\*\*

FLOW PROCESS FROM NODE 4000.00 TO NODE 4005.00 IS CODE = 21

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

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 469.00  
ELEVATION DATA: UPSTREAM(FEET) = 790.50 DOWNSTREAM(FEET) = 787.60

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.594  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.041  
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 "5-7 DWELLINGS/ACRE"	A	2.44	0.98	0.500	32	12.59

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 3.41  
TOTAL AREA(ACRES) = 2.44 PEAK FLOW RATE(CFS) = 3.41

\*\*\*\*\*

FLOW PROCESS FROM NODE 4005.00 TO NODE 4010.00 IS CODE = 62

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

===== UPSTREAM ELEVATION(FEET) = 787.60 DOWNSTREAM ELEVATION(FEET) = 776.50  
STREET LENGTH(FEET) = 585.00 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) = 9.09  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.37  
 HALFSTREET FLOOD WIDTH(FEET) = 11.60  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.26  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.20  
 STREET FLOW TRAVEL TIME(MIN.) = 2.99 Tc(MIN.) = 15.59  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.796  
 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"	A	9.60	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 9.60 SUBAREA RUNOFF(CFS) = 11.31  
 EFFECTIVE AREA(ACRES) = 12.04 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 12.0 PEAK FLOW RATE(CFS) = 14.18

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 14.10  
 FLOW VELOCITY(FEET/SEC.) = 3.60 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.49  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4010.00 = 1054.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4010.00 TO NODE 4015.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 770.50 DOWNSTREAM(FEET) = 766.00  
 FLOW LENGTH(FEET) = 685.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.17  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 14.18  
 PIPE TRAVEL TIME(MIN.) = 1.85 Tc(MIN.) = 17.44  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4015.00 = 1739.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4015.00 TO NODE 4015.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 17.44  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.679  
 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"	A	11.46	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 11.46 SUBAREA RUNOFF(CFS) = 12.29  
 EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 25.20

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4015.00 TO NODE 4015.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 17.44  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.679  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.05	0.98	0.100	32
PUBLIC PARK	A	1.09	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.360  
 SUBAREA AREA(ACRES) = 3.14 SUBAREA RUNOFF(CFS) = 3.75  
 EFFECTIVE AREA(ACRES) = 26.64 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 26.6 PEAK FLOW RATE(CFS) = 28.95

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4015.00 TO NODE 4016.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 766.00 DOWNSTREAM(FEET) = 761.50  
 FLOW LENGTH(FEET) = 344.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.51  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 28.95  
 PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 18.04  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4016.00 = 2083.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4016.00 TO NODE 4016.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 18.04  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.645  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.89	0.98	0.100	32
PUBLIC PARK	A	1.26	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.540  
 SUBAREA AREA(ACRES) = 2.15 SUBAREA RUNOFF(CFS) = 2.17  
 EFFECTIVE AREA(ACRES) = 28.79 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 28.8 PEAK FLOW RATE(CFS) = 30.31

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4016.00 TO NODE 4025.00 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) = 761.50 DOWNSTREAM(FEET) = 761.30
FLOW LENGTH(FEET) = 166.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.90
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 30.31
PIPE TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 18.75
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4025.00 = 2249.00 FEET.

*****
FLOW PROCESS FROM NODE 4025.00 TO NODE 4025.00 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.) = 18.75
RAINFALL INTENSITY(INCH/HR) = 1.61
AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA(ACRES) = 28.79
TOTAL STREAM AREA(ACRES) = 28.79
PEAK FLOW RATE(CFS) AT CONFLUENCE = 30.31

*****
FLOW PROCESS FROM NODE 4020.00 TO NODE 4022.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 336.00
ELEVATION DATA: UPSTREAM(FEET) = 776.00 DOWNSTREAM(FEET) = 774.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.473
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.159
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
"5-7 DWELLINGS/ACRE" A 1.23 0.98 0.500 32 11.47
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 1.85
TOTAL AREA(ACRES) = 1.23 PEAK FLOW RATE(CFS) = 1.85

*****
FLOW PROCESS FROM NODE 4022.00 TO NODE 4025.00 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) = 768.32 DOWNSTREAM(FEET) = 761.30
FLOW LENGTH(FEET) = 1317.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
DEPTH OF FLOW IN 24.0 INCH PIPE IS 5.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.35
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.85
PIPE TRAVEL TIME(MIN.) = 6.56 Tc(MIN.) = 18.03
LONGEST FLOWPATH FROM NODE 4020.00 TO NODE 4025.00 = 1653.00 FEET.

*****
FLOW PROCESS FROM NODE 4025.00 TO NODE 4025.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.03
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.646
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" A 12.42 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 12.42 SUBAREA RUNOFF(CFS) = 12.95
EFFECTIVE AREA(ACRES) = 13.65 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 13.6 PEAK FLOW RATE(CFS) = 14.23

*****
FLOW PROCESS FROM NODE 4025.00 TO NODE 4025.00 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.) = 18.03
RAINFALL INTENSITY(INCH/HR) = 1.65
AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 13.65
TOTAL STREAM AREA(ACRES) = 13.65
PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.23

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 30.31 18.75 1.608 0.98( 0.48) 0.49 28.8 4000.00
2 14.23 18.03 1.646 0.98( 0.49) 0.50 13.6 4020.00

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

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	44.36	18.03	1.646	0.98 ( 0.48)	0.49	41.3	4020.00
2	44.07	18.75	1.608	0.97( 0.48)	0.49	42.4	4000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 44.36 Tc(MIN.) = 18.03  
EFFECTIVE AREA(ACRES) = 41.33 AREA-AVERAGED Fm(INCH/HR) = 0.48  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 42.4  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4025.00 = 2249.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4025.00 TO NODE 4026.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 761.30 DOWNSTREAM(FEET) = 745.80  
FLOW LENGTH(FEET) = 1141.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.53  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 44.36  
PIPE TRAVEL TIME(MIN.) = 1.81 Tc(MIN.) = 19.83  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4026.00 = 3390.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4026.00 TO NODE 4026.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.83  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.554  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	5.91	0.98	0.100	32
PUBLIC PARK	A	2.01	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.290  
SUBAREA AREA(ACRES) = 7.92 SUBAREA RUNOFF(CFS) = 9.06  
EFFECTIVE AREA(ACRES) = 49.25 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 49.04

\*\*\*\*\*

FLOW PROCESS FROM NODE 4026.00 TO NODE 4070.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 745.80 DOWNSTREAM(FEET) = 744.50  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 9.63  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 49.04  
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 20.06  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4070.00 = 3520.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4070.00 TO NODE 4070.00 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.) = 20.06  
RAINFALL INTENSITY(INCH/HR) = 1.54  
AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.46  
EFFECTIVE STREAM AREA(ACRES) = 49.25  
TOTAL STREAM AREA(ACRES) = 50.36  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 49.04

\*\*\*\*\*

FLOW PROCESS FROM NODE 4045.00 TO NODE 4050.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 444.00  
ELEVATION DATA: UPSTREAM(FEET) = 772.80 DOWNSTREAM(FEET) = 770.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.273  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.073  
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 "5-7 DWELLINGS/ACRE"	A	4.70	0.98	0.500	32	12.27

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 6.71  
TOTAL AREA(ACRES) = 4.70 PEAK FLOW RATE(CFS) = 6.71

\*\*\*\*\*

FLOW PROCESS FROM NODE 4050.00 TO NODE 4055.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 770.00 DOWNSTREAM ELEVATION(FEET) = 767.40  
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 HALFSSTREETS 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) = 12.16  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.47  
 HALFSSTREET FLOOD WIDTH(FEET) = 17.46  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.08  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.99  
 STREET FLOW TRAVEL TIME(MIN.) = 4.13 Tc(MIN.) = 16.41

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.742  
 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"	A	9.60	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 9.60 SUBAREA RUNOFF(CFS) = 10.84  
 EFFECTIVE AREA(ACRES) = 14.30 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 14.3 PEAK FLOW RATE(CFS) = 16.14

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.51 HALFSSTREET FLOOD WIDTH(FEET) = 19.57  
 FLOW VELOCITY(FEET/SEC.) = 2.23 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.14  
 LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4055.00 = 961.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4055.00 TO NODE 4060.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 750.70 DOWNSTREAM(FEET) = 749.60  
 FLOW LENGTH(FEET) = 374.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.74  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 16.14  
 PIPE TRAVEL TIME(MIN.) = 1.32 Tc(MIN.) = 17.72  
 LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4060.00 = 1335.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4060.00 TO NODE 4060.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 17.72  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.663  
 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	0.58	0.75	0.850	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	5.10	0.75	0.500	56
PUBLIC PARK	A	0.74	0.98	0.850	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	4.07	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.544  
 SUBAREA AREA(ACRES) = 10.49 SUBAREA RUNOFF(CFS) = 10.34  
 EFFECTIVE AREA(ACRES) = 36.57 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 36.6 PEAK FLOW RATE(CFS) = 35.16

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
PUBLIC PARK	B	0.51	0.75	0.850	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	4.06	0.75	0.500	56
PUBLIC PARK	A	2.28	0.98	0.850	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	4.93	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.583  
 SUBAREA AREA(ACRES) = 11.78 SUBAREA RUNOFF(CFS) = 12.11  
 EFFECTIVE AREA(ACRES) = 26.08 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 26.1 PEAK FLOW RATE(CFS) = 27.23

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4060.00 TO NODE 4065.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 749.60 DOWNSTREAM(FEET) = 748.60  
 FLOW LENGTH(FEET) = 540.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 26.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.52  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 27.23  
 PIPE TRAVEL TIME(MIN.) = 1.99 Tc(MIN.) = 19.71  
 LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4065.00 = 1875.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4065.00 TO NODE 4065.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 19.71  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.560  
 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	0.58	0.75	0.850	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	5.10	0.75	0.500	56
PUBLIC PARK	A	0.74	0.98	0.850	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	4.07	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.544  
 SUBAREA AREA(ACRES) = 10.49 SUBAREA RUNOFF(CFS) = 10.34  
 EFFECTIVE AREA(ACRES) = 36.57 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 36.6 PEAK FLOW RATE(CFS) = 35.16

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4065.00 TO NODE 4066.00 IS CODE = 31

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

```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM( FEET) = 748.60 DOWNSTREAM( FEET) = 745.00
FLOW LENGTH( FEET) = 585.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.3 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 7.49
ESTIMATED PIPE DIAMETER( INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS) = 35.16
PIPE TRAVEL TIME( MIN.) = 1.30 Tc( MIN.) = 21.02
LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4066.00 = 2460.00 FEET.

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*****
FLOW PROCESS FROM NODE 4066.00 TO NODE 4066.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc( MIN.) = 21.02
* 10 YEAR RAINFALL INTENSITY( INCH/HR) = 1.501
SUBAREA LOSS RATE DATA( AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP ( ACRES) ( INCH/HR) ( DECIMAL) CN
COMMERCIAL B 2.13 0.75 0.100 56
COMMERCIAL A 3.00 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.88
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA( ACRES) = 5.13 SUBAREA RUNOFF( CFS) = 6.52
EFFECTIVE AREA( ACRES) = 41.70 AREA-AVERAGED Fm( INCH/HR) = 0.44
AREA-AVERAGED Fp( INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.49
TOTAL AREA( ACRES) = 41.7 PEAK FLOW RATE( CFS) = 39.75

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*****
FLOW PROCESS FROM NODE 4066.00 TO NODE 4070.00 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) = 745.00 DOWNSTREAM( FEET) = 744.50
FLOW LENGTH( FEET) = 130.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 26.8 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 6.53
ESTIMATED PIPE DIAMETER( INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS) = 39.75
PIPE TRAVEL TIME( MIN.) = 0.33 Tc( MIN.) = 21.35
LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4070.00 = 2590.00 FEET.

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*****
FLOW PROCESS FROM NODE 4070.00 TO NODE 4070.00 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.) = 21.35
RAINFALL INTENSITY( INCH/HR) = 1.49
AREA-AVERAGED Fm( INCH/HR) = 0.44

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AREA-AVERAGED Fp( INCH/HR) = 0.91
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA( ACRES) = 41.70
TOTAL STREAM AREA( ACRES) = 41.70
PEAK FLOW RATE( CFS) AT CONFLUENCE = 39.75

```

```

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp( Fm) Ap Ae HEADWATER
NUMBER ( CFS) ( MIN.) ( INCH/HR) ( INCH/HR) ( ACRES) NODE
1 49.04 20.06 1.544 0.98( 0.45) 0.46 49.3 4020.00
1 48.62 20.78 1.511 0.97( 0.45) 0.46 50.4 4000.00
2 39.75 21.35 1.487 0.91( 0.44) 0.49 41.7 4045.00

```

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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 88.42 20.06 1.544 0.95( 0.45) 0.47 88.4 4020.00
2 88.22 20.78 1.511 0.95( 0.45) 0.47 91.0 4000.00
3 87.27 21.35 1.487 0.95( 0.45) 0.47 92.1 4045.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE( CFS) = 88.42 Tc( MIN.) = 20.06
EFFECTIVE AREA( ACRES) = 88.44 AREA-AVERAGED Fm( INCH/HR) = 0.45
AREA-AVERAGED Fp( INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.47
TOTAL AREA( ACRES) = 92.1
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4070.00 = 3520.00 FEET.

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*****
FLOW PROCESS FROM NODE 4070.00 TO NODE 4071.00 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) = 744.50 DOWNSTREAM( FEET) = 740.50
FLOW LENGTH( FEET) = 566.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.9 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 9.90
ESTIMATED PIPE DIAMETER( INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS) = 88.42
PIPE TRAVEL TIME( MIN.) = 0.95 Tc( MIN.) = 21.01
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4071.00 = 4086.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 4071.00 TO NODE 4071.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc( MIN.) = 21.01
* 10 YEAR RAINFALL INTENSITY( INCH/HR) = 1.501
SUBAREA LOSS RATE DATA( AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP ( ACRES) ( INCH/HR) ( DECIMAL) CN
COMMERCIAL A 0.85 0.98 0.100 32

```

PUBLIC PARK A 1.45 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.573  
 SUBAREA AREA(ACRES) = 2.30 SUBAREA RUNOFF(CFS) = 1.95  
 EFFECTIVE AREA(ACRES) = 90.74 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.45  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.95 AREA-AVERAGED  $A_p$  = 0.47  
 TOTAL AREA(ACRES) = 94.4 PEAK FLOW RATE(CFS) = 88.42  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4071.00 TO NODE 4075.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 740.50 DOWNSTREAM(FEET) = 740.00  
 FLOW LENGTH(FEET) = 125.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.05  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 88.42  
 PIPE TRAVEL TIME(MIN.) = 0.26  $T_c$ (MIN.) = 21.27  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4075.00 = 4211.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4075.00 TO NODE 4075.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE  $T_c$ (MIN.) = 21.27  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.490  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	$F_p$ (INCH/HR)	$A_p$ (DECIMAL)	SCS CN
PUBLIC PARK	B	2.41	0.75	0.850	56
PUBLIC PARK	A	12.00	0.98	0.850	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.94  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.850  
 SUBAREA AREA(ACRES) = 14.41 SUBAREA RUNOFF(CFS) = 9.00  
 EFFECTIVE AREA(ACRES) = 105.15 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.50  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.94 AREA-AVERAGED  $A_p$  = 0.53  
 TOTAL AREA(ACRES) = 108.8 PEAK FLOW RATE(CFS) = 94.11

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4075.00 TO NODE 4076.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 740.00 DOWNSTREAM(FEET) = 729.80  
 FLOW LENGTH(FEET) = 855.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.27  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 94.11  
 PIPE TRAVEL TIME(MIN.) = 1.16  $T_c$ (MIN.) = 22.43

LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4076.00 = 5066.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4076.00 TO NODE 4076.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE  $T_c$ (MIN.) = 22.43  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.444  
 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	A	1.75	0.98	0.100	32
PUBLIC PARK	A	2.82	0.98	0.850	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.563  
 SUBAREA AREA(ACRES) = 4.57 SUBAREA RUNOFF(CFS) = 3.68  
 EFFECTIVE AREA(ACRES) = 109.72 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.50  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.95 AREA-AVERAGED  $A_p$  = 0.53  
 TOTAL AREA(ACRES) = 113.3 PEAK FLOW RATE(CFS) = 94.11  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4076.00 TO NODE 4120.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 729.80 DOWNSTREAM(FEET) = 729.30  
 FLOW LENGTH(FEET) = 176.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.11  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 94.11  
 PIPE TRAVEL TIME(MIN.) = 0.41  $T_c$ (MIN.) = 22.84  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4120.00 = 5242.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 IS CODE = 10  
 -----

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

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 -----  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 425.00  
 ELEVATION DATA: UPSTREAM(FEET) = 795.00 DOWNSTREAM(FEET) = 790.00  
 $T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
 SUBAREA ANALYSIS USED MINIMUM  $T_c$ (MIN.) = 11.276  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.181  
 SUBAREA  $T_c$  AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
 SCHOOL A 4.60 0.98 0.600 32 11.28  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 SUBAREA RUNOFF(CFS) = 6.61  
 TOTAL AREA(ACRES) = 4.60 PEAK FLOW RATE(CFS) = 6.61

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.83  
 AVERAGE FLOW DEPTH(FEET) = 0.47 TRAVEL TIME(MIN.) = 1.92  
 Tc(MIN.) = 14.69  
 SUBAREA AREA(ACRES) = 26.30 SUBAREA RUNOFF(CFS) = 30.21  
 EFFECTIVE AREA(ACRES) = 35.40 AREA-AVERAGED Fm(INCH/HR) = 0.59  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.60  
 TOTAL AREA(ACRES) = 35.4 PEAK FLOW RATE(CFS) = 40.66

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 51  
 -----

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.58 FLOW VELOCITY(FEET/SEC.) = 8.82  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4039.00 = 1725.00 FEET.

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

ELEVATION DATA: UPSTREAM(FEET) = 790.00 DOWNSTREAM(FEET) = 785.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 400.00 CHANNEL SLOPE = 0.0125  
 CHANNEL BASE(FEET) = 5.00 "Z" FACTOR = 5.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.024  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 SCHOOL A 4.50 0.98 0.600 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.53  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.45  
 AVERAGE FLOW DEPTH(FEET) = 0.32 TRAVEL TIME(MIN.) = 1.50  
 Tc(MIN.) = 12.77  
 SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 5.83  
 EFFECTIVE AREA(ACRES) = 9.10 AREA-AVERAGED Fm(INCH/HR) = 0.58  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.60  
 TOTAL AREA(ACRES) = 9.1 PEAK FLOW RATE(CFS) = 11.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.36 FLOW VELOCITY(FEET/SEC.) = 4.79  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 825.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3.00 TO NODE 4039.00 IS CODE = 51  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 762.36  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 900.00 CHANNEL SLOPE = 0.0252  
 CHANNEL BASE(FEET) = 5.00 "Z" FACTOR = 5.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.861  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 SCHOOL A 26.30 0.98 0.600 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.93

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4039.00 TO NODE 4039.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 14.69  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.861  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 MOBILE HOME PARK A 6.30 0.98 0.250 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.250  
 SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 9.17  
 EFFECTIVE AREA(ACRES) = 41.70 AREA-AVERAGED Fm(INCH/HR) = 0.53  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.55  
 TOTAL AREA(ACRES) = 41.7 PEAK FLOW RATE(CFS) = 49.84

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4039.00 TO NODE 4040.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 762.36 DOWNSTREAM(FEET) = 760.10  
 FLOW LENGTH(FEET) = 987.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.63  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 49.84  
 PIPE TRAVEL TIME(MIN.) = 2.92 Tc(MIN.) = 17.61  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4040.00 = 2712.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4040.00 TO NODE 4040.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 17.61  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.669  
 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" A 12.63 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 12.63 SUBAREA RUNOFF(CFS) = 13.43  
 EFFECTIVE AREA(ACRES) = 54.33 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 54.3 PEAK FLOW RATE(CFS) = 56.07

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4040.00 TO NODE 4080.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 760.10 DOWNSTREAM(FEET) = 749.00  
 FLOW LENGTH(FEET) = 407.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.75  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 56.07  
 PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 18.07  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4080.00 = 3119.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4080.00 TO NODE 4080.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 18.07  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.644  
 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"	A	10.57	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 10.57 SUBAREA RUNOFF(CFS) = 11.00  
 EFFECTIVE AREA(ACRES) = 64.90 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 64.9 PEAK FLOW RATE(CFS) = 65.81

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4080.00 TO NODE 4082.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 749.00 DOWNSTREAM(FEET) = 748.50  
 FLOW LENGTH(FEET) = 345.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.07  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 65.81  
 PIPE TRAVEL TIME(MIN.) = 1.13 Tc(MIN.) = 19.20  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4082.00 = 3464.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4082.00 TO NODE 4082.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 19.20  
 \* 10 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	A	1.87	0.98	0.100	32
PUBLIC PARK	A	1.27	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.403  
 SUBAREA AREA(ACRES) = 3.14 SUBAREA RUNOFF(CFS) = 3.37  
 EFFECTIVE AREA(ACRES) = 68.04 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 68.0 PEAK FLOW RATE(CFS) = 65.81  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4082.00 TO NODE 4120.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 748.50 DOWNSTREAM(FEET) = 729.30  
 FLOW LENGTH(FEET) = 2619.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.22  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 65.81  
 PIPE TRAVEL TIME(MIN.) = 4.74 Tc(MIN.) = 23.94  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4120.00 = 6083.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 23.94  
 \* 10 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
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	11.55	0.98	0.200	32
PUBLIC PARK	A	10.51	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.510  
 SUBAREA AREA(ACRES) = 22.06 SUBAREA RUNOFF(CFS) = 17.70  
 EFFECTIVE AREA(ACRES) = 90.10 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 90.1 PEAK FLOW RATE(CFS) = 71.41

\*\*\*\*\*

FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 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	71.41	23.94	1.388	0.98 ( 0.51)	0.52	90.1	1.00

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4120.00 = 6083.00 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	94.11	22.84	1.428	0.95 ( 0.50)	0.53	109.7	4020.00
2	93.59	23.57	1.401	0.95 ( 0.50)	0.53	112.2	4000.00
3	92.44	24.14	1.382	0.95 ( 0.50)	0.53	113.3	4045.00

LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4120.00 = 5242.00 FEET.

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	165.32	22.84	1.428	0.96 ( 0.50)	0.52	195.7	4020.00
2	164.94	23.57	1.401	0.96 ( 0.50)	0.52	200.9	4000.00
3	164.25	23.94	1.388	0.96 ( 0.50)	0.52	203.1	1.00
4	163.29	24.14	1.382	0.96 ( 0.50)	0.52	203.4	4045.00

TOTAL AREA(ACRES) = 203.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 165.32 Tc(MIN.) = 22.845  
EFFECTIVE AREA(ACRES) = 195.70 AREA-AVERAGED Fm(INCH/HR) = 0.50  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 203.4  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4120.00 = 6083.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 IS CODE = 12

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

\*\*\*\*\*

FLOW PROCESS FROM NODE 4120.00 TO NODE 4125.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 729.30 DOWNSTREAM(FEET) = 720.30  
FLOW LENGTH(FEET) = 790.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.73  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 165.32  
PIPE TRAVEL TIME(MIN.) = 0.96 Tc(MIN.) = 23.80  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4125.00 = 6873.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4125.00 TO NODE 4125.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 23.80  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.393  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	16.30	0.98	0.200	32
PUBLIC PARK	A	3.36	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.311  
SUBAREA AREA(ACRES) = 19.66 SUBAREA RUNOFF(CFS) = 19.28  
EFFECTIVE AREA(ACRES) = 215.36 AREA-AVERAGED Fm(INCH/HR) = 0.48  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 223.1 PEAK FLOW RATE(CFS) = 176.17

\*\*\*\*\*

FLOW PROCESS FROM NODE 4125.00 TO NODE 4126.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 720.30 DOWNSTREAM(FEET) = 714.40  
FLOW LENGTH(FEET) = 683.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.75  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 176.17  
PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 24.70  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4126.00 = 7556.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4126.00 TO NODE 4126.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 24.70  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.363  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.69	0.98	0.100	32
PUBLIC PARK	A	4.25	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.559  
SUBAREA AREA(ACRES) = 6.94 SUBAREA RUNOFF(CFS) = 5.11  
EFFECTIVE AREA(ACRES) = 222.30 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.51  
TOTAL AREA(ACRES) = 230.0 PEAK FLOW RATE(CFS) = 176.17  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE



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*****
FLOW PROCESS FROM NODE 4126.00 TO NODE 4145.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 714.40 DOWNSTREAM(FEET) = 713.90
FLOW LENGTH(FEET) = 120.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 50.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.56
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 176.17
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 24.91
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4145.00 = 7676.00 FEET.

*****
FLOW PROCESS FROM NODE 4145.00 TO NODE 4145.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.91
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.356
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 26.70 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 26.70 SUBAREA RUNOFF(CFS) = 30.24
EFFECTIVE AREA(ACRES) = 249.00 AREA-AVERAGED Fm(INCH/HR) = 0.44
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 256.7 PEAK FLOW RATE(CFS) = 204.24

*****
FLOW PROCESS FROM NODE 4145.00 TO NODE 4145.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.91
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.356
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" A 2.09 0.98 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 2.09 SUBAREA RUNOFF(CFS) = 2.18
EFFECTIVE AREA(ACRES) = 251.09 AREA-AVERAGED Fm(INCH/HR) = 0.44
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 258.8 PEAK FLOW RATE(CFS) = 206.42

*****
FLOW PROCESS FROM NODE 4145.00 TO NODE 4146.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 713.90 DOWNSTREAM(FEET) = 712.50
FLOW LENGTH(FEET) = 551.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.35
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 206.42
PIPE TRAVEL TIME(MIN.) = 1.10 Tc(MIN.) = 26.01
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4146.00 = 8227.00 FEET.

*****
FLOW PROCESS FROM NODE 4146.00 TO NODE 4146.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 26.01
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.321
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.06 0.98 0.100 32
PUBLIC PARK A 1.62 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.553
SUBAREA AREA(ACRES) = 2.68 SUBAREA RUNOFF(CFS) = 1.89
EFFECTIVE AREA(ACRES) = 253.77 AREA-AVERAGED Fm(INCH/HR) = 0.44
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 261.5 PEAK FLOW RATE(CFS) = 206.42
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 4146.00 TO NODE 4170.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 712.50 DOWNSTREAM(FEET) = 711.41
FLOW LENGTH(FEET) = 128.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.15
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 206.42
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 26.17
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4170.00 = 8355.00 FEET.

*****
FLOW PROCESS FROM NODE 4170.00 TO NODE 4170.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 26.17
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.316
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

```



COMMERCIAL A 6.26 0.98 0.100 32  
PUBLIC PARK A 4.13 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.398  
SUBAREA AREA(ACRES) = 10.39 SUBAREA RUNOFF(CFS) = 8.68  
EFFECTIVE AREA(ACRES) = 264.16 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 271.9 PEAK FLOW RATE(CFS) = 208.02

SUBAREA AREA(ACRES) = 6.83 SUBAREA RUNOFF(CFS) = 5.01  
EFFECTIVE AREA(ACRES) = 290.55 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 298.3 PEAK FLOW RATE(CFS) = 229.47  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4171.00 TO NODE 4171.00 IS CODE = 81  
-----

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

-----

MAINLINE Tc(MIN.) = 27.69  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.272  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 35.70 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 35.70 SUBAREA RUNOFF(CFS) = 37.75  
EFFECTIVE AREA(ACRES) = 326.25 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.40  
TOTAL AREA(ACRES) = 334.0 PEAK FLOW RATE(CFS) = 261.01

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4171.00 TO NODE 4200.00 IS CODE = 31  
-----

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

-----

ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 699.50  
FLOW LENGTH(FEET) = 148.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.86  
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 261.01  
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 27.94  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4200.00 = 9754.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4200.00 TO NODE 4200.00 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.) = 27.94  
RAINFALL INTENSITY(INCH/HR) = 1.27  
AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.40  
EFFECTIVE STREAM AREA(ACRES) = 326.25  
TOTAL STREAM AREA(ACRES) = 333.99  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 261.01

\*\*\*\*\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4170.00 TO NODE 4170.00 IS CODE = 81  
-----

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

-----

MAINLINE Tc(MIN.) = 26.17  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.316  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 19.56 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 19.56 SUBAREA RUNOFF(CFS) = 21.45  
EFFECTIVE AREA(ACRES) = 283.72 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.43  
TOTAL AREA(ACRES) = 291.5 PEAK FLOW RATE(CFS) = 229.47

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4170.00 TO NODE 4171.00 IS CODE = 31  
-----

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

-----

ELEVATION DATA: UPSTREAM(FEET) = 711.41 DOWNSTREAM(FEET) = 700.00  
FLOW LENGTH(FEET) = 1251.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.69  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 229.47  
PIPE TRAVEL TIME(MIN.) = 1.52 Tc(MIN.) = 27.69  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4171.00 = 9606.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4171.00 TO NODE 4171.00 IS CODE = 81  
-----

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

-----

MAINLINE Tc(MIN.) = 27.69  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.272  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 3.47 0.98 0.100 32  
PUBLIC PARK A 3.36 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.469

FLOW PROCESS FROM NODE 4175.00 TO NODE 4180.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 561.00
ELEVATION DATA: UPSTREAM(FEET) = 723.50 DOWNSTREAM(FEET) = 720.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.249
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.184
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 6.59 0.98 0.200 32 11.25
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 11.80
TOTAL AREA(ACRES) = 6.59 PEAK FLOW RATE(CFS) = 11.80

\*\*\*\*\*
FLOW PROCESS FROM NODE 4180.00 TO NODE 4200.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 720.00 DOWNSTREAM(FEET) = 699.00
FLOW LENGTH(FEET) = 770.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
DEPTH OF FLOW IN 24.0 INCH PIPE IS 9.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.14
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.80
PIPE TRAVEL TIME(MIN.) = 1.27 Tc(MIN.) = 12.51
LONGEST FLOWPATH FROM NODE 4175.00 TO NODE 4200.00 = 1331.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 4200.00 TO NODE 4200.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.51
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.049
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 1.10 0.98 0.850 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 5.15 0.98 0.500 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 5.38 0.98 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.394
SUBAREA AREA(ACRES) = 11.63 SUBAREA RUNOFF(CFS) = 17.42
EFFECTIVE AREA(ACRES) = 18.22 AREA-AVERAGED Fm(INCH/HR) = 0.32

AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 18.2 PEAK FLOW RATE(CFS) = 28.42

\*\*\*\*\*
FLOW PROCESS FROM NODE 4200.00 TO NODE 4200.00 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.) = 12.51
RAINFALL INTENSITY(INCH/HR) = 2.05
AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.32
EFFECTIVE STREAM AREA(ACRES) = 18.22
TOTAL STREAM AREA(ACRES) = 18.22
PEAK FLOW RATE(CFS) AT CONFLUENCE = 28.42

\*\* 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 5 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 5 rows of data.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 276.58 Tc(MIN.) = 27.94
EFFECTIVE AREA(ACRES) = 344.47 AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 352.2
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4200.00 = 9754.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 4200.00 TO NODE 4205.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 699.00 DOWNSTREAM(FEET) = 697.00
FLOW LENGTH(FEET) = 499.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 75.0 INCH PIPE IS 59.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.53  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 276.58  
PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 28.73  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4205.00 = 10253.00 FEET.

PIPE-FLOW VELOCITY(FEET/SEC.) = 10.49  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 276.58  
PIPE TRAVEL TIME(MIN.) = 1.80 Tc(MIN.) = 30.53  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4206.00 = 11385.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4205.00 TO NODE 4205.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 28.73  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.244  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	7.04	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 7.04 SUBAREA RUNOFF(CFS) = 6.65  
EFFECTIVE AREA(ACRES) = 351.51 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 359.3 PEAK FLOW RATE(CFS) = 276.58  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4205.00 TO NODE 4205.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 28.73  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.244  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.80	0.98	0.100	32
PUBLIC PARK	A	1.36	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.572  
SUBAREA AREA(ACRES) = 2.16 SUBAREA RUNOFF(CFS) = 1.33  
EFFECTIVE AREA(ACRES) = 353.67 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 361.4 PEAK FLOW RATE(CFS) = 276.58  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4205.00 TO NODE 4206.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 697.00 DOWNSTREAM(FEET) = 692.50  
FLOW LENGTH(FEET) = 1132.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 75.0 INCH PIPE IS 60.1 INCHES

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4206.00 TO NODE 4206.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 30.53  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.200  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.30	0.98	0.100	32
PUBLIC PARK	A	2.16	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.568  
SUBAREA AREA(ACRES) = 3.46 SUBAREA RUNOFF(CFS) = 2.01  
EFFECTIVE AREA(ACRES) = 357.13 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 364.9 PEAK FLOW RATE(CFS) = 276.58  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4206.00 TO NODE 4235.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 692.50 DOWNSTREAM(FEET) = 692.00  
FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 84.0 INCH PIPE IS 63.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.93  
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 276.58  
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 30.90  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4235.00 = 11585.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 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.) = 30.90  
RAINFALL INTENSITY(INCH/HR) = 1.19  
AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.39  
EFFECTIVE STREAM AREA(ACRES) = 357.13  
TOTAL STREAM AREA(ACRES) = 364.87  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 276.58

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4210.00 TO NODE 4215.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 945.00  
ELEVATION DATA: UPSTREAM(FEET) = 721.00 DOWNSTREAM(FEET) = 711.10

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.887  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.776  
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.)  
SCHOOL A 9.77 0.98 0.600 32 15.89  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA RUNOFF(CFS) = 10.47  
TOTAL AREA(ACRES) = 9.77 PEAK FLOW RATE(CFS) = 10.47

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4215.00 TO NODE 4235.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 702.50 DOWNSTREAM(FEET) = 692.00  
FLOW LENGTH(FEET) = 1233.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 12.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.39  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 10.47  
PIPE TRAVEL TIME(MIN.) = 3.21 Tc(MIN.) = 19.10  
LONGEST FLOWPATH FROM NODE 4210.00 TO NODE 4235.00 = 2178.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 19.10  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.590  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
SCHOOL A 1.82 0.98 0.600 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 19.00 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.235  
SUBAREA AREA(ACRES) = 20.82 SUBAREA RUNOFF(CFS) = 25.50  
EFFECTIVE AREA(ACRES) = 30.59 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.35

TOTAL AREA(ACRES) = 30.6 PEAK FLOW RATE(CFS) = 34.33

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 19.10  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.590  
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" A 35.18 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 35.18 SUBAREA RUNOFF(CFS) = 44.16  
EFFECTIVE AREA(ACRES) = 65.77 AREA-AVERAGED Fm(INCH/HR) = 0.26  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.27  
TOTAL AREA(ACRES) = 65.8 PEAK FLOW RATE(CFS) = 78.49

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 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.) = 19.10  
RAINFALL INTENSITY(INCH/HR) = 1.59  
AREA-AVERAGED Fm(INCH/HR) = 0.26  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.27  
EFFECTIVE STREAM AREA(ACRES) = 65.77  
TOTAL STREAM AREA(ACRES) = 65.77  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 78.49

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	250.28	15.56	1.798	0.96( 0.37)	0.39	177.0	4175.00
1	276.58	30.90	1.191	0.96( 0.38)	0.39	357.1	4020.00
1	274.14	31.64	1.174	0.96( 0.38)	0.40	362.4	4000.00
1	272.51	32.01	1.166	0.96( 0.38)	0.40	364.5	1.00
1	271.15	32.22	1.162	0.96( 0.38)	0.40	364.9	4045.00
2	78.49	19.10	1.590	0.98( 0.26)	0.27	65.8	4210.00

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	324.25	15.56	1.798	0.97( 0.35)	0.36	230.6	4175.00
2	334.85	19.10	1.590	0.97( 0.35)	0.36	284.4	4210.00

3	331.48	30.90	1.191	0.96 ( 0.36)	0.37	422.9	4020.00
4	328.05	31.64	1.174	0.96 ( 0.36)	0.38	428.1	4000.00
5	325.94	32.01	1.166	0.96 ( 0.36)	0.38	430.3	1.00
6	324.31	32.22	1.162	0.96 ( 0.36)	0.38	430.6	4045.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 334.85 Tc(MIN.) = 19.10  
EFFECTIVE AREA(ACRES) = 284.39 AREA-AVERAGED Fm(INCH/HR) = 0.35  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.36  
TOTAL AREA(ACRES) = 430.6  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4235.00 = 11585.00 FEET.

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	19.00	0.98	0.200	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	16.49	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 35.49 SUBAREA RUNOFF(CFS) = 43.67  
EFFECTIVE AREA(ACRES) = 326.98 AREA-AVERAGED Fm(INCH/HR) = 0.33  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.34  
TOTAL AREA(ACRES) = 473.2 PEAK FLOW RATE(CFS) = 352.88

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4236.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 692.00 DOWNSTREAM(FEET) = 684.00  
FLOW LENGTH(FEET) = 1134.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 58.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.61  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 334.85  
PIPE TRAVEL TIME(MIN.) = 1.39 Tc(MIN.) = 20.49  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4236.00 = 12719.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4236.00 TO NODE 4236.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 20.49  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.524  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	6.25	0.98	0.100	32
PUBLIC PARK	A	0.85	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.190  
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 8.56  
EFFECTIVE AREA(ACRES) = 291.49 AREA-AVERAGED Fm(INCH/HR) = 0.35  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.36  
TOTAL AREA(ACRES) = 437.7 PEAK FLOW RATE(CFS) = 334.85  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4236.00 TO NODE 4236.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 20.49  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.524  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	6.25	0.98	0.100	32
PUBLIC PARK	A	0.85	0.98	0.850	32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4236.00 TO NODE 4280.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 684.00 DOWNSTREAM(FEET) = 683.30  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 78.0 INCH PIPE IS 61.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.53  
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 352.88  
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 20.66  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4280.00 = 12849.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4280.00 TO NODE 4280.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 20.66  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.517  
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"	A	2.50	0.98	0.200	32
PUBLIC PARK	A	32.54	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.804  
SUBAREA AREA(ACRES) = 35.04 SUBAREA RUNOFF(CFS) = 23.12  
EFFECTIVE AREA(ACRES) = 362.02 AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 508.3 PEAK FLOW RATE(CFS) = 373.74

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4280.00 TO NODE 4281.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 683.30 DOWNSTREAM(FEET) = 672.50  
FLOW LENGTH(FEET) = 1199.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 57.8 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 15.37  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 373.74  
PIPE TRAVEL TIME(MIN.) = 1.30 Tc(MIN.) = 21.96  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4281.00 = 14048.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4281.00 TO NODE 4281.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 21.96  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.462  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 3.14 0.98 0.100 32  
PUBLIC PARK A 2.03 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.394  
SUBAREA AREA(ACRES) = 5.17 SUBAREA RUNOFF(CFS) = 5.01  
EFFECTIVE AREA(ACRES) = 367.19 AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 513.4 PEAK FLOW RATE(CFS) = 373.74  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4281.00 TO NODE 4300.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 672.50 DOWNSTREAM(FEET) = 672.00  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 84.0 INCH PIPE IS 68.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.13  
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 373.74  
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 22.16  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4300.00 = 14178.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4300.00 TO NODE 4300.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 22.16  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.454  
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" A 33.70 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 33.70 SUBAREA RUNOFF(CFS) = 38.20

EFFECTIVE AREA(ACRES) = 400.89 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 547.1 PEAK FLOW RATE(CFS) = 396.64

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4300.00 TO NODE 4325.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 672.00 DOWNSTREAM(FEET) = 658.70  
FLOW LENGTH(FEET) = 1418.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.03  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 396.64  
PIPE TRAVEL TIME(MIN.) = 1.47 Tc(MIN.) = 23.63  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4325.00 = 15596.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4325.00 TO NODE 4325.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 23.63  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.399  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 3.29 0.98 0.100 32  
URBAN GOOD COVER  
"TURF" A 1.86 0.97 1.000 33  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.425  
SUBAREA AREA(ACRES) = 5.15 SUBAREA RUNOFF(CFS) = 4.57  
EFFECTIVE AREA(ACRES) = 406.04 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 552.3 PEAK FLOW RATE(CFS) = 396.64  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4325.00 TO NODE 4325.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 23.63  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.399  
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" A 23.00 0.98 0.200 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 16.82 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200

SUBAREA AREA(ACRES) = 39.82      SUBAREA RUNOFF(CFS) = 44.39  
 EFFECTIVE AREA(ACRES) = 445.86      AREA-AVERAGED Fm(INCH/HR) = 0.34  
 AREA-AVERAGED Fp(INCH/HR) = 0.95      AREA-AVERAGED Ap = 0.36  
 TOTAL AREA(ACRES) = 592.1      PEAK FLOW RATE(CFS) = 425.72

=====  
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 592.1      TC(MIN.) = 23.63  
 EFFECTIVE AREA(ACRES) = 445.86      AREA-AVERAGED Fm(INCH/HR)= 0.34  
 AREA-AVERAGED Fp(INCH/HR) = 0.95      AREA-AVERAGED Ap = 0.355  
 PEAK FLOW RATE(CFS) = 425.72

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	425.57	20.09	1.542	0.95( 0.34)	0.35	392.0	4175.00
2	425.72	23.63	1.399	0.95( 0.34)	0.36	445.9	4210.00
3	393.06	35.47	1.097	0.95( 0.35)	0.37	584.4	4020.00
4	388.77	36.22	1.083	0.95( 0.35)	0.37	589.6	4000.00
5	386.34	36.59	1.076	0.95( 0.35)	0.37	591.7	1.00
6	384.65	36.80	1.073	0.95( 0.35)	0.37	592.1	4045.00

=====  
 END OF RATIONAL METHOD ANALYSIS





\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
SIERRA MADRE DEPTH-AREA FACTORS USED.

Table with 2 columns: DURATION, AREA-AVERAGED RAINFALL(INCH). Rows include 5-MINUTES (0.44), 30-MINUTES (0.91), 1-HOUR (1.20), 3-HOUR (2.10), 6-HOUR (3.00), 24-HOUR (6.00).

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

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

\* NMC-HAVEN \*
\* 100-YR STUDY \*
\* AREA 'N' WITH DIVERSION & NO LAKE \*
\*\*\*\*\*

FILE NAME: HAVEN\_M.DAT
TIME/DATE OF STUDY: 15:43 08/03/2011

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

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

Table with 10 columns: NO., WIDTH (FT), CROSSFALL (FT), IN- / OUT- / SIDE / WAY, STREET-CROSSFALL: IN- / OUT- / PARK- / SIDE / WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), LIP (FT), HIKE (FT), MANNING FACTOR (n). Row 1: 1, 30.0, 20.0, 0.018/0.018/0.020, 0.67, 2.00, 0.0312, 0.167, 0.0150.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.50 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH

\*\*\*\*\*

FLOW PROCESS FROM NODE 4000.00 TO NODE 4005.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 469.00
ELEVATION DATA: UPSTREAM(FEET) = 790.50 DOWNSTREAM(FEET) = 787.60

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.594
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.062
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 "5-7 DWELLINGS/ACRE" A 2.44 0.98 0.500 32 12.59
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 5.65
TOTAL AREA(ACRES) = 2.44 PEAK FLOW RATE(CFS) = 5.65

\*\*\*\*\*

FLOW PROCESS FROM NODE 4005.00 TO NODE 4010.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 787.60 DOWNSTREAM ELEVATION(FEET) = 776.50
STREET LENGTH(FEET) = 585.00 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) = 15.37
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.42  
 HALFSTREET FLOOD WIDTH(FEET) = 14.57  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.68  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.55  
 STREET FLOW TRAVEL TIME(MIN.) = 2.65 Tc(MIN.) = 15.25  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.730  
 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"	A	9.60	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 9.60 SUBAREA RUNOFF(CFS) = 19.38  
 EFFECTIVE AREA(ACRES) = 12.04 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 12.0 PEAK FLOW RATE(CFS) = 24.30

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.62  
 FLOW VELOCITY(FEET/SEC.) = 4.10 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.96  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4010.00 = 1054.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4010.00 TO NODE 4015.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 770.50 DOWNSTREAM(FEET) = 766.00  
 FLOW LENGTH(FEET) = 685.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.09  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 24.30  
 PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 16.86  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4015.00 = 1739.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4015.00 TO NODE 4015.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 16.86  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.570  
 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"	A	11.46	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 11.46 SUBAREA RUNOFF(CFS) = 21.48  
 EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 44.05

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4015.00 TO NODE 4015.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 16.86  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.570  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.05	0.98	0.100	32
PUBLIC PARK	A	1.09	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.360  
 SUBAREA AREA(ACRES) = 3.14 SUBAREA RUNOFF(CFS) = 6.27  
 EFFECTIVE AREA(ACRES) = 26.64 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 26.6 PEAK FLOW RATE(CFS) = 50.33

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4015.00 TO NODE 4016.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 766.00 DOWNSTREAM(FEET) = 761.50  
 FLOW LENGTH(FEET) = 344.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.89  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 50.33  
 PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 17.38  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4016.00 = 2083.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4016.00 TO NODE 4016.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 17.38  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.523  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.89	0.98	0.100	32
PUBLIC PARK	A	1.26	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.540  
 SUBAREA AREA(ACRES) = 2.15 SUBAREA RUNOFF(CFS) = 3.87  
 EFFECTIVE AREA(ACRES) = 28.79 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 28.8 PEAK FLOW RATE(CFS) = 53.06

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4016.00 TO NODE 4025.00 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) = 761.50 DOWNSTREAM(FEET) = 761.30
FLOW LENGTH(FEET) = 166.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.46
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 53.06
PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 18.00
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4025.00 = 2249.00 FEET.

*****
FLOW PROCESS FROM NODE 4025.00 TO NODE 4025.00 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.) = 18.00
RAINFALL INTENSITY(INCH/HR) = 2.47
AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA(ACRES) = 28.79
TOTAL STREAM AREA(ACRES) = 28.79
PEAK FLOW RATE(CFS) AT CONFLUENCE = 53.06

*****
FLOW PROCESS FROM NODE 4020.00 TO NODE 4022.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 336.00
ELEVATION DATA: UPSTREAM(FEET) = 776.00 DOWNSTREAM(FEET) = 774.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.473
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.238
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
"5-7 DWELLINGS/ACRE" A 1.23 0.98 0.500 32 11.47
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 3.04
TOTAL AREA(ACRES) = 1.23 PEAK FLOW RATE(CFS) = 3.04

*****
FLOW PROCESS FROM NODE 4022.00 TO NODE 4025.00 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) = 768.32 DOWNSTREAM(FEET) = 761.30
FLOW LENGTH(FEET) = 1317.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
DEPTH OF FLOW IN 24.0 INCH PIPE IS 7.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.86
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.04
PIPE TRAVEL TIME(MIN.) = 5.68 Tc(MIN.) = 17.15
LONGEST FLOWPATH FROM NODE 4020.00 TO NODE 4025.00 = 1653.00 FEET.

*****
FLOW PROCESS FROM NODE 4025.00 TO NODE 4025.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.15
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.544
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" A 12.42 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 12.42 SUBAREA RUNOFF(CFS) = 22.98
EFFECTIVE AREA(ACRES) = 13.65 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 13.6 PEAK FLOW RATE(CFS) = 25.26

*****
FLOW PROCESS FROM NODE 4025.00 TO NODE 4025.00 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) = 2.54
AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 13.65
TOTAL STREAM AREA(ACRES) = 13.65
PEAK FLOW RATE(CFS) AT CONFLUENCE = 25.26

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 53.06 18.00 2.471 0.98( 0.48) 0.49 28.8 4000.00
2 25.26 17.15 2.544 0.98( 0.49) 0.50 13.6 4020.00

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	77.66	17.15	2.544	0.98 ( 0.48)	0.49	41.1	4020.00
2	77.43	18.00	2.471	0.97( 0.48)	0.49	42.4	4000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 77.66 Tc(MIN.) = 17.15  
EFFECTIVE AREA(ACRES) = 41.08 AREA-AVERAGED Fm(INCH/HR) = 0.48  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 42.4  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4025.00 = 2249.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4025.00 TO NODE 4026.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 761.30 DOWNSTREAM(FEET) = 745.80  
FLOW LENGTH(FEET) = 1141.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.36  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 77.66  
PIPE TRAVEL TIME(MIN.) = 1.54 Tc(MIN.) = 18.69  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4026.00 = 3390.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4026.00 TO NODE 4026.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.69  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.416  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	5.91	0.98	0.100	32
PUBLIC PARK	A	2.01	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.290  
SUBAREA AREA(ACRES) = 7.92 SUBAREA RUNOFF(CFS) = 15.20  
EFFECTIVE AREA(ACRES) = 49.00 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 86.80

\*\*\*\*\*

FLOW PROCESS FROM NODE 4026.00 TO NODE 4070.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 745.80 DOWNSTREAM(FEET) = 744.50  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 11.24  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 86.80  
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 18.89  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4070.00 = 3520.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4070.00 TO NODE 4070.00 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.) = 18.89  
RAINFALL INTENSITY(INCH/HR) = 2.40  
AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.46  
EFFECTIVE STREAM AREA(ACRES) = 49.00  
TOTAL STREAM AREA(ACRES) = 50.36  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 86.80

\*\*\*\*\*

FLOW PROCESS FROM NODE 4045.00 TO NODE 4050.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 444.00  
ELEVATION DATA: UPSTREAM(FEET) = 772.80 DOWNSTREAM(FEET) = 770.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.273  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.110  
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 "5-7 DWELLINGS/ACRE"	A	4.70	0.98	0.500	32	12.27

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 11.09  
TOTAL AREA(ACRES) = 4.70 PEAK FLOW RATE(CFS) = 11.09

\*\*\*\*\*

FLOW PROCESS FROM NODE 4050.00 TO NODE 4055.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 770.00 DOWNSTREAM ELEVATION(FEET) = 767.40  
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 HALFSSTREETS 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) = 20.51  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.55  
 HALFSSTREET FLOOD WIDTH(FEET) = 21.52  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.37  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.30  
 STREET FLOW TRAVEL TIME(MIN.) = 3.64 Tc(MIN.) = 15.91  
 \* 100 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 "5-7 DWELLINGS/ACRE"	A	9.60	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 9.60 SUBAREA RUNOFF(CFS) = 18.78  
 EFFECTIVE AREA(ACRES) = 14.30 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 14.3 PEAK FLOW RATE(CFS) = 27.97

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.60 HALFSSTREET FLOOD WIDTH(FEET) = 24.34  
 FLOW VELOCITY(FEET/SEC.) = 2.55 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.52  
 LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4055.00 = 961.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4055.00 TO NODE 4060.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 750.70 DOWNSTREAM(FEET) = 749.60  
 FLOW LENGTH(FEET) = 374.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.41  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 27.97  
 PIPE TRAVEL TIME(MIN.) = 1.15 Tc(MIN.) = 17.06  
 LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4060.00 = 1335.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4060.00 TO NODE 4060.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 17.06  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.552  
 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
PUBLIC PARK	B	0.51	0.75	0.850	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	4.06	0.75	0.500	56
PUBLIC PARK	A	2.28	0.98	0.850	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	4.93	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.583  
 SUBAREA AREA(ACRES) = 11.78 SUBAREA RUNOFF(CFS) = 21.53  
 EFFECTIVE AREA(ACRES) = 26.08 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 26.1 PEAK FLOW RATE(CFS) = 48.10

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4060.00 TO NODE 4065.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 749.60 DOWNSTREAM(FEET) = 748.60  
 FLOW LENGTH(FEET) = 540.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.09  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 48.10  
 PIPE TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 18.83  
 LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4065.00 = 1875.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4065.00 TO NODE 4065.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 18.83  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.405  
 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	0.58	0.75	0.850	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	5.10	0.75	0.500	56
PUBLIC PARK	A	0.74	0.98	0.850	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	4.07	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.544  
 SUBAREA AREA(ACRES) = 10.49 SUBAREA RUNOFF(CFS) = 18.32  
 EFFECTIVE AREA(ACRES) = 36.57 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 36.6 PEAK FLOW RATE(CFS) = 62.98

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4065.00 TO NODE 4066.00 IS CODE = 31  
 -----

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

```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM( FEET) = 748.60 DOWNSTREAM( FEET) = 745.00
FLOW LENGTH( FEET) = 585.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.5 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 8.72
ESTIMATED PIPE DIAMETER( INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS) = 62.98
PIPE TRAVEL TIME( MIN.) = 1.12 Tc( MIN.) = 19.95
LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4066.00 = 2460.00 FEET.

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*****
FLOW PROCESS FROM NODE 4066.00 TO NODE 4066.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc( MIN.) = 19.95
* 100 YEAR RAINFALL INTENSITY( INCH/HR) = 2.323
SUBAREA LOSS RATE DATA( AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP ( ACRES) ( INCH/HR) ( DECIMAL) CN
COMMERCIAL B 2.13 0.75 0.100 56
COMMERCIAL A 3.00 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.88
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA( ACRES) = 5.13 SUBAREA RUNOFF( CFS) = 10.32
EFFECTIVE AREA( ACRES) = 41.70 AREA-AVERAGED Fm( INCH/HR) = 0.44
AREA-AVERAGED Fp( INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.49
TOTAL AREA( ACRES) = 41.7 PEAK FLOW RATE( CFS) = 70.61

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*****
FLOW PROCESS FROM NODE 4066.00 TO NODE 4070.00 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) = 745.00 DOWNSTREAM( FEET) = 744.50
FLOW LENGTH( FEET) = 130.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.6 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 7.34
ESTIMATED PIPE DIAMETER( INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS) = 70.61
PIPE TRAVEL TIME( MIN.) = 0.30 Tc( MIN.) = 20.24
LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4070.00 = 2590.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 4070.00 TO NODE 4070.00 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.) = 20.24
RAINFALL INTENSITY( INCH/HR) = 2.30
AREA-AVERAGED Fm( INCH/HR) = 0.44

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AREA-AVERAGED Fp( INCH/HR) = 0.91
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA( ACRES) = 41.70
TOTAL STREAM AREA( ACRES) = 41.70
PEAK FLOW RATE( CFS) AT CONFLUENCE = 70.61

```

```

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp( Fm) Ap Ae HEADWATER
NUMBER ( CFS) ( MIN.) ( INCH/HR) ( INCH/HR) ( ACRES) NODE
1 86.80 18.89 2.401 0.98( 0.45) 0.46 49.0 4020.00
1 86.28 19.74 2.338 0.97( 0.45) 0.46 50.4 4000.00
2 70.61 20.24 2.303 0.91( 0.44) 0.49 41.7 4045.00

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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
1 156.14 18.89 2.401 0.95( 0.45) 0.47 87.9 4020.00
2 156.43 19.74 2.338 0.95( 0.45) 0.47 91.0 4000.00
3 155.28 20.24 2.303 0.95( 0.45) 0.47 92.1 4045.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE( CFS) = 156.43 Tc( MIN.) = 19.74
EFFECTIVE AREA( ACRES) = 91.02 AREA-AVERAGED Fm( INCH/HR) = 0.45
AREA-AVERAGED Fp( INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.47
TOTAL AREA( ACRES) = 92.1
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4070.00 = 3520.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 4070.00 TO NODE 4071.00 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) = 744.50 DOWNSTREAM( FEET) = 740.50
FLOW LENGTH( FEET) = 566.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 44.1 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 11.24
ESTIMATED PIPE DIAMETER( INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS) = 156.43
PIPE TRAVEL TIME( MIN.) = 0.84 Tc( MIN.) = 20.58
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4071.00 = 4086.00 FEET.

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```

*****
FLOW PROCESS FROM NODE 4071.00 TO NODE 4071.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc( MIN.) = 20.58
* 100 YEAR RAINFALL INTENSITY( INCH/HR) = 2.281
SUBAREA LOSS RATE DATA( AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP ( ACRES) ( INCH/HR) ( DECIMAL) CN
COMMERCIAL A 0.85 0.98 0.100 32

```



PUBLIC PARK A 1.45 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.573  
 SUBAREA AREA(ACRES) = 2.30 SUBAREA RUNOFF(CFS) = 3.56  
 EFFECTIVE AREA(ACRES) = 93.32 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 94.4 PEAK FLOW RATE(CFS) = 156.43  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4071.00 TO NODE 4075.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 740.50 DOWNSTREAM(FEET) = 740.00  
 FLOW LENGTH(FEET) = 125.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 45.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.27  
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 156.43  
 PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 20.80  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4075.00 = 4211.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4075.00 TO NODE 4075.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 20.80  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.266  
 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 2.41 0.75 0.850 56  
 PUBLIC PARK A 12.00 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.94  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 14.41 SUBAREA RUNOFF(CFS) = 19.06  
 EFFECTIVE AREA(ACRES) = 107.73 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 108.8 PEAK FLOW RATE(CFS) = 171.70

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	172.01	19.95	2.323	0.94 (0.50)	0.53	104.6	4020.00
2	171.70	20.80	2.266	0.94 (0.49)	0.52	107.7	4000.00
3	170.20	21.31	2.233	0.94 (0.49)	0.52	108.8	4045.00

NEW PEAK FLOW DATA ARE:  
 PEAK FLOW RATE(CFS) = 172.01 Tc(MIN.) = 19.95  
 AREA-AVERAGED Fm(INCH/HR) = 0.50 AREA-AVERAGED Fp(INCH/HR) = 0.94  
 AREA-AVERAGED Ap = 0.53 EFFECTIVE AREA(ACRES) = 104.62

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4075.00 TO NODE 4076.00 IS CODE = 31  
 -----

-----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 740.00 DOWNSTREAM(FEET) = 729.80  
 FLOW LENGTH(FEET) = 855.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 41.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.06  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 172.01  
 PIPE TRAVEL TIME(MIN.) = 1.01 Tc(MIN.) = 20.97  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4076.00 = 5066.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4076.00 TO NODE 4076.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 20.97  
 \* 100 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 A 1.75 0.98 0.100 32  
 PUBLIC PARK A 2.82 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.563  
 SUBAREA AREA(ACRES) = 4.57 SUBAREA RUNOFF(CFS) = 7.02  
 EFFECTIVE AREA(ACRES) = 109.19 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 113.3 PEAK FLOW RATE(CFS) = 172.62

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4076.00 TO NODE 4120.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 729.80 DOWNSTREAM(FEET) = 729.30  
 FLOW LENGTH(FEET) = 176.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 69.0 INCH PIPE IS 51.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.33  
 ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 172.62  
 PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 21.32  
 LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4120.00 = 5242.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 IS CODE = 10  
 -----

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

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21  
 -----

```

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 425.00
ELEVATION DATA: UPSTREAM(FEET) = 795.00 DOWNSTREAM(FEET) = 790.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.276
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.272
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
SCHOOL A 4.60 0.98 0.600 32 11.28
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA RUNOFF(CFS) = 11.12
TOTAL AREA(ACRES) = 4.60 PEAK FLOW RATE(CFS) = 11.12

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*****
FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 51
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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 790.00 DOWNSTREAM(FEET) = 785.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 400.00 CHANNEL SLOPE = 0.0125
CHANNEL BASE(FEET) = 5.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.069
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
SCHOOL A 4.50 0.98 0.600 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.15
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.25
AVERAGE FLOW DEPTH(FEET) = 0.43 TRAVEL TIME(MIN.) = 1.27
Tc(MIN.) = 12.54
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 10.06
EFFECTIVE AREA(ACRES) = 9.10 AREA-AVERAGED Fm(INCH/HR) = 0.58
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 9.1 PEAK FLOW RATE(CFS) = 20.34

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.49 FLOW VELOCITY(FEET/SEC.) = 5.64
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 825.00 FEET.

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*****
FLOW PROCESS FROM NODE 3.00 TO NODE 4039.00 IS CODE = 51
-----

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```

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 762.36
CHANNEL LENGTH THRU SUBAREA(FEET) = 900.00 CHANNEL SLOPE = 0.0252

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CHANNEL BASE(FEET) = 5.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
* 100 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
SCHOOL A 26.30 0.98 0.600 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 47.21
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.23
AVERAGE FLOW DEPTH(FEET) = 0.63 TRAVEL TIME(MIN.) = 1.63
Tc(MIN.) = 14.17
SUBAREA AREA(ACRES) = 26.30 SUBAREA RUNOFF(CFS) = 53.67
EFFECTIVE AREA(ACRES) = 35.40 AREA-AVERAGED Fm(INCH/HR) = 0.59
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 35.4 PEAK FLOW RATE(CFS) = 72.25

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.78 FLOW VELOCITY(FEET/SEC.) = 10.39
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4039.00 = 1725.00 FEET.

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*****
FLOW PROCESS FROM NODE 4039.00 TO NODE 4039.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 14.17
* 100 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
MOBILE HOME PARK A 6.30 0.98 0.250 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.250
SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 14.79
EFFECTIVE AREA(ACRES) = 41.70 AREA-AVERAGED Fm(INCH/HR) = 0.53
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 41.7 PEAK FLOW RATE(CFS) = 87.04

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*****
FLOW PROCESS FROM NODE 4039.00 TO NODE 4040.00 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) = 762.36 DOWNSTREAM(FEET) = 760.10
FLOW LENGTH(FEET) = 987.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 43.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.40
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 87.04
PIPE TRAVEL TIME(MIN.) = 2.57 Tc(MIN.) = 16.74
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4040.00 = 2712.00 FEET.

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FLOW PROCESS FROM NODE 4040.00 TO NODE 4040.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 16.74
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.581
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"    A      12.63    0.98    0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 12.63      SUBAREA RUNOFF(CFS) = 23.80
EFFECTIVE AREA(ACRES) = 54.33    AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 54.3      PEAK FLOW RATE(CFS) = 100.64

*****
FLOW PROCESS FROM NODE 4040.00 TO NODE 4080.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 760.10  DOWNSTREAM(FEET) = 749.00
FLOW LENGTH(FEET) = 407.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.84
ESTIMATED PIPE DIAMETER(INCH) = 36.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 100.64
PIPE TRAVEL TIME(MIN.) = 0.40  Tc(MIN.) = 17.15
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4080.00 = 3119.00 FEET.

*****
FLOW PROCESS FROM NODE 4080.00 TO NODE 4080.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 17.15
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.544
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"    A      10.57    0.98    0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 10.57      SUBAREA RUNOFF(CFS) = 19.57
EFFECTIVE AREA(ACRES) = 64.90    AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 64.9      PEAK FLOW RATE(CFS) = 118.42

*****
FLOW PROCESS FROM NODE 4080.00 TO NODE 4082.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

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```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 749.00  DOWNSTREAM(FEET) = 748.50
FLOW LENGTH(FEET) = 345.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 52.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.82
ESTIMATED PIPE DIAMETER(INCH) = 66.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 118.42
PIPE TRAVEL TIME(MIN.) = 0.99  Tc(MIN.) = 18.13
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4082.00 = 3464.00 FEET.

*****
FLOW PROCESS FROM NODE 4082.00 TO NODE 4082.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 18.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.460
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL                A      1.87    0.98    0.100    32
PUBLIC PARK                A      1.27    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.403
SUBAREA AREA(ACRES) = 3.14      SUBAREA RUNOFF(CFS) = 5.84
EFFECTIVE AREA(ACRES) = 68.04    AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 68.0      PEAK FLOW RATE(CFS) = 119.35

*****
FLOW PROCESS FROM NODE 4082.00 TO NODE 4120.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 748.50  DOWNSTREAM(FEET) = 729.30
FLOW LENGTH(FEET) = 2619.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.89
ESTIMATED PIPE DIAMETER(INCH) = 51.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 119.35
PIPE TRAVEL TIME(MIN.) = 4.01  Tc(MIN.) = 22.14
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4120.00 = 6083.00 FEET.

*****
FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 22.14
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.182
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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"11+ DWELLINGS/ACRE"      A      11.55    0.98    0.200  32
PUBLIC PARK                A      10.51    0.98    0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.510
SUBAREA AREA(ACRES) = 22.06      SUBAREA RUNOFF(CFS) = 33.46
EFFECTIVE AREA(ACRES) = 90.10     AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 90.1         PEAK FLOW RATE(CFS) = 135.80

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*****
FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 IS CODE = 11
-----

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

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** MAIN STREAM CONFLUENCE DATA **
STREAM      Q      Tc      Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)  (ACRES)  NODE
1           135.80  22.14  2.182  0.98( 0.51) 0.52     90.1    1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4120.00 = 6083.00 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           172.62  21.32  2.233  0.95( 0.50) 0.53    109.2   4020.00
2           172.31  22.17  2.181  0.95( 0.50) 0.53    112.3   4000.00
3           170.86  22.68  2.151  0.95( 0.50) 0.53    113.3   4045.00
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4120.00 = 5242.00 FEET.

```

```

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc      Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)  (ACRES)  NODE
1           307.29  21.32  2.233  0.96( 0.50) 0.52    195.9   4020.00
2           308.12  22.14  2.182  0.96( 0.50) 0.52    202.3    1.00
3           308.00  22.17  2.181  0.96( 0.50) 0.52    202.4   4000.00
4           304.14  22.68  2.151  0.96( 0.50) 0.52    203.4   4045.00
TOTAL AREA(ACRES) = 203.4

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 308.12  Tc(MIN.) = 22.141
EFFECTIVE AREA(ACRES) = 202.31  AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 203.4
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4120.00 = 6083.00 FEET.

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*****
FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 IS CODE = 12
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>>>>CLEAR MEMORY BANK # 1 <<<<
-----

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*****
FLOW PROCESS FROM NODE 4120.00 TO NODE 4125.00 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) = 729.30  DOWNSTREAM(FEET) = 720.30
FLOW LENGTH(FEET) = 790.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 49.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.21
ESTIMATED PIPE DIAMETER(INCH) = 66.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 308.12
PIPE TRAVEL TIME(MIN.) = 0.81  Tc(MIN.) = 22.95
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4125.00 = 6873.00 FEET.

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```

*****
FLOW PROCESS FROM NODE 4125.00 TO NODE 4125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 22.95
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.136
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"    A      16.30    0.98    0.200  32
PUBLIC PARK              A      3.36    0.98    0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.311
SUBAREA AREA(ACRES) = 19.66      SUBAREA RUNOFF(CFS) = 32.42
EFFECTIVE AREA(ACRES) = 221.97   AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 223.1         PEAK FLOW RATE(CFS) = 329.92

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```

*****
FLOW PROCESS FROM NODE 4125.00 TO NODE 4126.00 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) = 720.30  DOWNSTREAM(FEET) = 714.40
FLOW LENGTH(FEET) = 683.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 55.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.63
ESTIMATED PIPE DIAMETER(INCH) = 69.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 329.92
PIPE TRAVEL TIME(MIN.) = 0.78  Tc(MIN.) = 23.73
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4126.00 = 7556.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 4126.00 TO NODE 4126.00 IS CODE = 81
-----

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```

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

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```

MAINLINE Tc(MIN.) = 23.73
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.094
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A      2.69    0.98    0.100  32

```

PUBLIC PARK A 4.25 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.559  
 SUBAREA AREA(ACRES) = 6.94 SUBAREA RUNOFF(CFS) = 9.67  
 EFFECTIVE AREA(ACRES) = 228.91 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 230.0 PEAK FLOW RATE(CFS) = 331.14

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4126.00 TO NODE 4145.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 714.40 DOWNSTREAM(FEET) = 713.90  
 FLOW LENGTH(FEET) = 120.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 81.0 INCH PIPE IS 62.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.27  
 ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 331.14  
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 23.91  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4145.00 = 7676.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4145.00 TO NODE 4145.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 -----  
 MAINLINE Tc(MIN.) = 23.91  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.084  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 26.70 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 26.70 SUBAREA RUNOFF(CFS) = 47.74  
 EFFECTIVE AREA(ACRES) = 255.61 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA(ACRES) = 256.7 PEAK FLOW RATE(CFS) = 376.96

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	377.70	23.09	2.128	0.96( 0.44)	0.46	249.2	4020.00
2	376.96	23.91	2.084	0.96( 0.45)	0.46	255.6	1.00
3	376.80	23.93	2.083	0.96( 0.45)	0.46	255.7	4000.00
4	372.24	24.45	2.057	0.96( 0.45)	0.46	256.7	4045.00

NEW PEAK FLOW DATA ARE:  
 PEAK FLOW RATE(CFS) = 377.70 Tc(MIN.) = 23.09  
 AREA-AVERAGED Fm(INCH/HR) = 0.44 AREA-AVERAGED Fp(INCH/HR) = 0.96  
 AREA-AVERAGED Ap = 0.46 EFFECTIVE AREA(ACRES) = 249.24

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4145.00 TO NODE 4145.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 -----  
 MAINLINE Tc(MIN.) = 23.09  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.128  
 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" A 2.09 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 2.09 SUBAREA RUNOFF(CFS) = 3.64  
 EFFECTIVE AREA(ACRES) = 251.33 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA(ACRES) = 258.8 PEAK FLOW RATE(CFS) = 381.33

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4145.00 TO NODE 4146.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 713.90 DOWNSTREAM(FEET) = 712.50  
 FLOW LENGTH(FEET) = 551.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 93.0 INCH PIPE IS 72.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.67  
 ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 381.33  
 PIPE TRAVEL TIME(MIN.) = 0.95 Tc(MIN.) = 24.04  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4146.00 = 8227.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4146.00 TO NODE 4146.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 -----  
 MAINLINE Tc(MIN.) = 24.04  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.077  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.06 0.98 0.100 32  
 PUBLIC PARK A 1.62 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.553  
 SUBAREA AREA(ACRES) = 2.68 SUBAREA RUNOFF(CFS) = 3.71  
 EFFECTIVE AREA(ACRES) = 254.01 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA(ACRES) = 261.5 PEAK FLOW RATE(CFS) = 381.33  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4146.00 TO NODE 4170.00 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) = 712.50 DOWNSTREAM(FEET) = 711.41
FLOW LENGTH(FEET) = 128.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.29
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 381.33
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 24.18
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4170.00 = 8355.00 FEET.

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*****
FLOW PROCESS FROM NODE 4170.00 TO NODE 4170.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.18
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.070
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      6.26     0.98     0.100   32
PUBLIC PARK             A      4.13     0.98     0.850   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.398
SUBAREA AREA(ACRES) = 10.39 SUBAREA RUNOFF(CFS) = 15.73
EFFECTIVE AREA(ACRES) = 264.40 AREA-AVERAGED Fm(INCH/HR) = 0.44
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 271.9 PEAK FLOW RATE(CFS) = 387.62

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*****
FLOW PROCESS FROM NODE 4170.00 TO NODE 4170.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.18
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.070
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A     19.56     0.98     0.100   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 19.56 SUBAREA RUNOFF(CFS) = 34.73
EFFECTIVE AREA(ACRES) = 283.96 AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 291.5 PEAK FLOW RATE(CFS) = 422.35

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*****
FLOW PROCESS FROM NODE 4170.00 TO NODE 4171.00 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) = 711.41 DOWNSTREAM(FEET) = 700.00
FLOW LENGTH(FEET) = 1251.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 60.6 INCHES

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PIPE-FLOW VELOCITY(FEET/SEC.) = 15.90
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 422.35
PIPE TRAVEL TIME(MIN.) = 1.31 Tc(MIN.) = 25.49
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4171.00 = 9606.00 FEET.

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*****
FLOW PROCESS FROM NODE 4171.00 TO NODE 4171.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.006
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      3.47     0.98     0.100   32
PUBLIC PARK             A      3.36     0.98     0.850   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.469
SUBAREA AREA(ACRES) = 6.83 SUBAREA RUNOFF(CFS) = 9.52
EFFECTIVE AREA(ACRES) = 290.79 AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 298.3 PEAK FLOW RATE(CFS) = 422.35
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 4171.00 TO NODE 4171.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.006
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A     35.70     0.98     0.100   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 35.70 SUBAREA RUNOFF(CFS) = 61.31
EFFECTIVE AREA(ACRES) = 326.49 AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 334.0 PEAK FLOW RATE(CFS) = 476.67

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*****
FLOW PROCESS FROM NODE 4171.00 TO NODE 4200.00 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) = 700.00 DOWNSTREAM(FEET) = 699.50
FLOW LENGTH(FEET) = 148.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 96.0 INCH PIPE IS 74.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.38
ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 476.67

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PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 25.71  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4200.00 = 9754.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4200.00 TO NODE 4200.00 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.) = 25.71  
 RAINFALL INTENSITY(INCH/HR) = 2.00  
 AREA-AVERAGED Fm(INCH/HR) = 0.38  
 AREA-AVERAGED Fp(INCH/HR) = 0.96  
 AREA-AVERAGED Ap = 0.40  
 EFFECTIVE STREAM AREA(ACRES) = 326.49  
 TOTAL STREAM AREA(ACRES) = 333.99  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 476.67

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4175.00 TO NODE 4180.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 561.00  
 ELEVATION DATA: UPSTREAM(FEET) = 723.50 DOWNSTREAM(FEET) = 720.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.249  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.276  
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	6.59	0.98	0.200	32	11.25

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA RUNOFF(CFS) = 18.28  
 TOTAL AREA(ACRES) = 6.59 PEAK FLOW RATE(CFS) = 18.28

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4180.00 TO NODE 4200.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 720.00 DOWNSTREAM(FEET) = 699.00  
 FLOW LENGTH(FEET) = 770.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 12.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.37  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 18.28  
 PIPE TRAVEL TIME(MIN.) = 1.13 Tc(MIN.) = 12.38  
 LONGEST FLOWPATH FROM NODE 4175.00 TO NODE 4200.00 = 1331.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4200.00 TO NODE 4200.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 12.38  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.094  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.10	0.98	0.850	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	5.15	0.98	0.500	32
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	5.38	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.394  
 SUBAREA AREA(ACRES) = 11.63 SUBAREA RUNOFF(CFS) = 28.36  
 EFFECTIVE AREA(ACRES) = 18.22 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.32  
 TOTAL AREA(ACRES) = 18.2 PEAK FLOW RATE(CFS) = 45.55

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4200.00 TO NODE 4200.00 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.) = 12.38  
 RAINFALL INTENSITY(INCH/HR) = 3.09  
 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.32  
 EFFECTIVE STREAM AREA(ACRES) = 18.22  
 TOTAL STREAM AREA(ACRES) = 18.22  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 45.55

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	476.67	25.71	1.996	0.96( 0.38)	0.40	326.5	4020.00
1	474.06	26.53	1.958	0.96( 0.39)	0.40	332.9	1.00
1	473.86	26.55	1.957	0.96( 0.39)	0.40	332.9	4000.00
1	468.45	27.07	1.935	0.96( 0.39)	0.40	334.0	4045.00
2	45.55	12.38	3.094	0.97( 0.32)	0.32	18.2	4175.00

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	431.45	12.38	3.094	0.96( 0.38)	0.39	175.4	4175.00



2	504.21	25.71	1.996	0.96 ( 0.38)	0.39	344.7	4020.00
3	500.99	26.53	1.958	0.96 ( 0.38)	0.40	351.1	1.00
4	500.77	26.55	1.957	0.96 ( 0.38)	0.40	351.2	4000.00
5	494.99	27.07	1.935	0.96 ( 0.38)	0.40	352.2	4045.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 504.21 Tc(MIN.) = 25.71  
EFFECTIVE AREA(ACRES) = 344.71 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 352.2  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4200.00 = 9754.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4200.00 TO NODE 4205.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 699.00 DOWNSTREAM(FEET) = 697.00  
FLOW LENGTH(FEET) = 499.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 96.0 INCH PIPE IS 72.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.37  
ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 504.21  
PIPE TRAVEL TIME(MIN.) = 0.67 Tc(MIN.) = 26.38  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4205.00 = 10253.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4205.00 TO NODE 4205.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 26.38  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.965  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	7.04	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 7.04 SUBAREA RUNOFF(CFS) = 11.21  
EFFECTIVE AREA(ACRES) = 351.75 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 359.3 PEAK FLOW RATE(CFS) = 504.21  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4205.00 TO NODE 4205.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 26.38  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.965  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	7.04	0.98	0.200	32

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	0.80	0.98	0.100	32
PUBLIC PARK	A	1.36	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.572  
SUBAREA AREA(ACRES) = 2.16 SUBAREA RUNOFF(CFS) = 2.74  
EFFECTIVE AREA(ACRES) = 353.91 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 361.4 PEAK FLOW RATE(CFS) = 505.66

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4205.00 TO NODE 4206.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 697.00 DOWNSTREAM(FEET) = 692.50  
FLOW LENGTH(FEET) = 1132.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 96.0 INCH PIPE IS 73.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.32  
ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 505.66  
PIPE TRAVEL TIME(MIN.) = 1.53 Tc(MIN.) = 27.91  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4206.00 = 11385.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4206.00 TO NODE 4206.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 27.91  
\* 100 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	A	1.30	0.98	0.100	32
PUBLIC PARK	A	2.16	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.568  
SUBAREA AREA(ACRES) = 3.46 SUBAREA RUNOFF(CFS) = 4.19  
EFFECTIVE AREA(ACRES) = 357.37 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 364.9 PEAK FLOW RATE(CFS) = 505.66  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4206.00 TO NODE 4235.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 692.50 DOWNSTREAM(FEET) = 692.00  
FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 102.0 INCH PIPE IS 83.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.22  
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 505.66  
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 28.24  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4235.00 = 11585.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 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.) = 28.24  
RAINFALL INTENSITY(INCH/HR) = 1.89  
AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.39  
EFFECTIVE STREAM AREA(ACRES) = 357.37  
TOTAL STREAM AREA(ACRES) = 364.87  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 505.66

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4210.00 TO NODE 4215.00 IS CODE = 21  
-----

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

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

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 945.00  
ELEVATION DATA: UPSTREAM(FEET) = 721.00 DOWNSTREAM(FEET) = 711.10

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.887  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.664  
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.)  
SCHOOL A 9.77 0.98 0.600 32 15.89  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA RUNOFF(CFS) = 18.28  
TOTAL AREA(ACRES) = 9.77 PEAK FLOW RATE(CFS) = 18.28

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4215.00 TO NODE 4235.00 IS CODE = 31  
-----

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

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 702.50 DOWNSTREAM(FEET) = 692.00  
FLOW LENGTH(FEET) = 1233.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.15  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 18.28  
PIPE TRAVEL TIME(MIN.) = 2.87 Tc(MIN.) = 18.76  
LONGEST FLOWPATH FROM NODE 4210.00 TO NODE 4235.00 = 2178.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 18.76  
\* 100 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  
SCHOOL A 1.82 0.98 0.600 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 19.00 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.235  
SUBAREA AREA(ACRES) = 20.82 SUBAREA RUNOFF(CFS) = 40.88  
EFFECTIVE AREA(ACRES) = 30.59 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 30.6 PEAK FLOW RATE(CFS) = 56.93

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 18.76  
\* 100 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  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 35.18 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 35.18 SUBAREA RUNOFF(CFS) = 70.15  
EFFECTIVE AREA(ACRES) = 65.77 AREA-AVERAGED Fm(INCH/HR) = 0.26  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.27  
TOTAL AREA(ACRES) = 65.8 PEAK FLOW RATE(CFS) = 127.09

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 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.) = 18.76  
RAINFALL INTENSITY(INCH/HR) = 2.41  
AREA-AVERAGED Fm(INCH/HR) = 0.26  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.27  
EFFECTIVE STREAM AREA(ACRES) = 65.77  
TOTAL STREAM AREA(ACRES) = 65.77  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 127.09

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	435.62	15.00	2.756	0.96 ( 0.38)	0.39	188.1	4175.00
1	505.66	28.24	1.886	0.96 ( 0.38)	0.39	357.4	4020.00
1	502.37	29.07	1.854	0.96 ( 0.38)	0.40	363.7	1.00
1	502.16	29.09	1.853	0.96 ( 0.38)	0.40	363.8	4000.00
1	496.53	29.63	1.832	0.96 ( 0.38)	0.40	364.9	4045.00
2	127.09	18.76	2.411	0.98 ( 0.26)	0.27	65.8	4210.00

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	553.63	15.00	2.756	0.97( 0.35)	0.36	240.7	4175.00
2	582.58	18.76	2.411	0.97( 0.35)	0.36	301.9	4210.00
3	601.70	28.24	1.886	0.96( 0.36)	0.37	423.1	4020.00
4	596.48	29.07	1.854	0.96( 0.36)	0.38	429.5	1.00
5	596.21	29.09	1.853	0.96( 0.36)	0.38	429.6	4000.00
6	589.37	29.63	1.832	0.96( 0.36)	0.38	430.6	4045.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 601.70 Tc(MIN.) = 28.24  
EFFECTIVE AREA(ACRES) = 423.14 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 430.6  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4235.00 = 11585.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4236.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 692.00 DOWNSTREAM(FEET) = 684.00  
FLOW LENGTH(FEET) = 1134.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 90.0 INCH PIPE IS 72.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.79  
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 601.70  
PIPE TRAVEL TIME(MIN.) = 1.20 Tc(MIN.) = 29.43  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4236.00 = 12719.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4236.00 TO NODE 4236.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 29.43  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.840  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 6.25 0.98 0.100 32

PUBLIC PARK A 0.85 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.190  
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 10.57  
EFFECTIVE AREA(ACRES) = 430.24 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 437.7 PEAK FLOW RATE(CFS) = 601.70  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4236.00 TO NODE 4236.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 29.43  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.840  
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" A 19.00 0.98 0.200 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 16.49 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 35.49 SUBAREA RUNOFF(CFS) = 53.75  
EFFECTIVE AREA(ACRES) = 465.73 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.36  
TOTAL AREA(ACRES) = 473.2 PEAK FLOW RATE(CFS) = 627.46

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4236.00 TO NODE 4280.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 684.00 DOWNSTREAM(FEET) = 683.30  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 96.0 INCH PIPE IS 77.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.40  
ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 627.46  
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 29.58  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4280.00 = 12849.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4280.00 TO NODE 4280.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 29.58  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.834  
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" A 2.50 0.98 0.200 32  
PUBLIC PARK A 32.54 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.804  
SUBAREA AREA(ACRES) = 35.04 SUBAREA RUNOFF(CFS) = 33.13  
EFFECTIVE AREA(ACRES) = 500.77 AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 508.3 PEAK FLOW RATE(CFS) = 658.24

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	642.33	16.38	2.615	0.96 (0.37)	0.39	318.3	4175.00
2	663.36	20.11	2.312	0.96 (0.37)	0.39	379.5	4210.00
3	658.24	29.58	1.834	0.96 (0.37)	0.39	500.8	4020.00
4	652.12	30.42	1.804	0.96 (0.38)	0.39	507.1	1.00
5	651.84	30.44	1.803	0.96 (0.38)	0.39	507.2	4000.00
6	644.42	30.98	1.784	0.96 (0.38)	0.39	508.3	4045.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 663.36 Tc(MIN.) = 20.11  
AREA-AVERAGED Fm(INCH/HR) = 0.37 AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.39 EFFECTIVE AREA(ACRES) = 379.53

\*\*\*\*\*

FLOW PROCESS FROM NODE 4280.00 TO NODE 4281.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 683.30 DOWNSTREAM(FEET) = 672.50  
FLOW LENGTH(FEET) = 1199.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 90.0 INCH PIPE IS 70.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.82  
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 663.36  
PIPE TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 21.23  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4281.00 = 14048.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4281.00 TO NODE 4281.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 21.23  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.238  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 3.14 0.98 0.100 32  
PUBLIC PARK A 2.03 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.394  
SUBAREA AREA(ACRES) = 5.17 SUBAREA RUNOFF(CFS) = 8.62  
EFFECTIVE AREA(ACRES) = 384.70 AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 513.4 PEAK FLOW RATE(CFS) = 663.36

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 4281.00 TO NODE 4300.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 672.50 DOWNSTREAM(FEET) = 672.00  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 108.0 INCH PIPE IS 80.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.07  
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 663.36  
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 21.40  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4300.00 = 14178.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4300.00 TO NODE 4300.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 21.40  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.228  
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" A 33.70 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 33.70 SUBAREA RUNOFF(CFS) = 61.65  
EFFECTIVE AREA(ACRES) = 418.40 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 547.1 PEAK FLOW RATE(CFS) = 704.73

\*\*\*\*\*

FLOW PROCESS FROM NODE 4300.00 TO NODE 4325.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 672.00 DOWNSTREAM(FEET) = 658.70  
FLOW LENGTH(FEET) = 1418.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 90.0 INCH PIPE IS 73.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.20  
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 704.73  
PIPE TRAVEL TIME(MIN.) = 1.30 Tc(MIN.) = 22.69  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4325.00 = 15596.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4325.00 TO NODE 4325.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.69  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.150  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 3.29 0.98 0.100 32  
 URBAN GOOD COVER  
 "TURF" A 1.86 0.97 1.000 33  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.425  
 SUBAREA AREA(ACRES) = 5.15 SUBAREA RUNOFF(CFS) = 8.05  
 EFFECTIVE AREA(ACRES) = 423.55 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA(ACRES) = 552.3 PEAK FLOW RATE(CFS) = 704.73  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4325.00 TO NODE 4325.00 IS CODE = 81

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

=====  
 MAINLINE Tc(MIN.) = 22.69  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.150  
 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" A 23.00 0.98 0.200 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 16.82 0.57 0.200 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 39.82 SUBAREA RUNOFF(CFS) = 71.32  
 EFFECTIVE AREA(ACRES) = 463.37 AREA-AVERAGED Fm(INCH/HR) = 0.34  
 AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA(ACRES) = 592.1 PEAK FLOW RATE(CFS) = 754.97

=====  
 END OF STUDY SUMMARY:  
 TOTAL AREA(ACRES) = 592.1 TC(MIN.) = 22.69  
 EFFECTIVE AREA(ACRES) = 463.37 AREA-AVERAGED Fm(INCH/HR)= 0.34  
 AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.357  
 PEAK FLOW RATE(CFS) = 754.97

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	744.50	18.97	2.395	0.95( 0.34)	0.36	402.2	4175.00
2	754.97	22.69	2.150	0.95( 0.34)	0.36	463.4	4210.00
3	733.94	32.17	1.744	0.95( 0.35)	0.37	584.6	4020.00
4	727.00	33.00	1.718	0.95( 0.35)	0.37	591.0	1.00
5	726.70	33.03	1.717	0.95( 0.35)	0.37	591.1	4000.00
6	718.96	33.57	1.700	0.95( 0.35)	0.37	592.1	4045.00

=====

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

Analysis prepared by:

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USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH  
FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

AREA-AVERAGED  
DURATION RAINFALL(INCH)  
5-MINUTES 0.35  
30-MINUTES 0.71  
1-HOUR 0.94  
3-HOUR 1.64  
6-HOUR 2.32  
24-HOUR 4.49

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* NMC-HAVEN \*  
\* 25-YR STUDY \*  
\* AREA 'N' WITH DIVERSION & NO LAKE \*  
\*\*\*\*\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4000.00 TO NODE 4005.00 IS CODE = 21  
-----

FILE NAME: HAVEN\_M.DAT  
TIME/DATE OF STUDY: 09:45 08/24/2011

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

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*  
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING  
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR  
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)  
=== =====  
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc

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

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 469.00  
ELEVATION DATA: UPSTREAM(FEET) = 790.50 DOWNSTREAM(FEET) = 787.60

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.594  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.399  
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  
"5-7 DWELLINGS/ACRE" A 2.44 0.98 0.500 32 12.59  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 4.20  
TOTAL AREA(ACRES) = 2.44 PEAK FLOW RATE(CFS) = 4.20

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4005.00 TO NODE 4010.00 IS CODE = 62  
-----

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

===== UPSTREAM ELEVATION(FEET) = 787.60 DOWNSTREAM ELEVATION(FEET) = 776.50  
STREET LENGTH(FEET) = 585.00 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



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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.29
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.77
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.42
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.34
STREET FLOW TRAVEL TIME(MIN.) = 2.85 Tc(MIN.) = 15.45
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.123
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" A 9.60 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 9.60 SUBAREA RUNOFF(CFS) = 14.13
EFFECTIVE AREA(ACRES) = 12.04 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 12.0 PEAK FLOW RATE(CFS) = 17.72

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.51
FLOW VELOCITY(FEET/SEC.) = 3.78 DEPTH*VELOCITY(FT*FT/SEC.) = 1.66
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4010.00 = 1054.00 FEET.

*****
FLOW PROCESS FROM NODE 4010.00 TO NODE 4015.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 770.50 DOWNSTREAM(FEET) = 766.00
FLOW LENGTH(FEET) = 685.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.56
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.72
PIPE TRAVEL TIME(MIN.) = 1.74 Tc(MIN.) = 17.19
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4015.00 = 1739.00 FEET.

*****
FLOW PROCESS FROM NODE 4015.00 TO NODE 4015.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 17.19
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.991
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" A 11.46 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.46 SUBAREA RUNOFF(CFS) = 15.51
EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.49

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AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 31.80
*****
FLOW PROCESS FROM NODE 4015.00 TO NODE 4015.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 17.19
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.991
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 2.05 0.98 0.100 32
PUBLIC PARK A 1.09 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.360
SUBAREA AREA(ACRES) = 3.14 SUBAREA RUNOFF(CFS) = 4.63
EFFECTIVE AREA(ACRES) = 26.64 AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 26.6 PEAK FLOW RATE(CFS) = 36.44

*****
FLOW PROCESS FROM NODE 4015.00 TO NODE 4016.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 766.00 DOWNSTREAM(FEET) = 761.50
FLOW LENGTH(FEET) = 344.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.11
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 36.44
PIPE TRAVEL TIME(MIN.) = 0.57 Tc(MIN.) = 17.75
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4016.00 = 2083.00 FEET.

*****
FLOW PROCESS FROM NODE 4016.00 TO NODE 4016.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 17.75
* 25 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
COMMERCIAL A 0.89 0.98 0.100 32
PUBLIC PARK A 1.26 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.540
SUBAREA AREA(ACRES) = 2.15 SUBAREA RUNOFF(CFS) = 2.76
EFFECTIVE AREA(ACRES) = 28.79 AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 28.8 PEAK FLOW RATE(CFS) = 38.28

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 4016.00 TO NODE 4025.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	761.50	DOWNSTREAM(FEET) =	761.30
FLOW LENGTH(FEET) =	166.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS	35.4	INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	4.11		
ESTIMATED PIPE DIAMETER(INCH) =	45.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	38.28		
PIPE TRAVEL TIME(MIN.) =	0.67	Tc(MIN.) =	18.43
LONGEST FLOWPATH FROM NODE	4000.00	TO NODE	4025.00 =
			2249.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4025.00 TO NODE 4025.00 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.) =	18.43
RAINFALL INTENSITY(INCH/HR) =	1.91
AREA-AVERAGED Fm(INCH/HR) =	0.48
AREA-AVERAGED Fp(INCH/HR) =	0.98
AREA-AVERAGED Ap =	0.49
EFFECTIVE STREAM AREA(ACRES) =	28.79
TOTAL STREAM AREA(ACRES) =	28.79
PEAK FLOW RATE(CFS) AT CONFLUENCE =	38.28

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4020.00 TO NODE 4022.00 IS CODE = 21  
-----

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) =	336.00		
ELEVATION DATA: UPSTREAM(FEET) =	776.00	DOWNSTREAM(FEET) =	774.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20						
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =	11.473					
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	2.538					
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						
"5-7 DWELLINGS/ACRE"	A	1.23	0.98	0.500	32	11.47
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.98					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.500					
SUBAREA RUNOFF(CFS) =	2.27					
TOTAL AREA(ACRES) =	1.23	PEAK FLOW RATE(CFS) =	2.27			

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4022.00 TO NODE 4025.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	768.32	DOWNSTREAM(FEET) =	761.30
FLOW LENGTH(FEET) =	1317.00	MANNING'S N =	0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO	24.000		
DEPTH OF FLOW IN 24.0 INCH PIPE IS	6.2	INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	3.55		
ESTIMATED PIPE DIAMETER(INCH) =	24.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	2.27		
PIPE TRAVEL TIME(MIN.) =	6.18	Tc(MIN.) =	17.65
LONGEST FLOWPATH FROM NODE	4020.00	TO NODE	4025.00 =
			1653.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4025.00 TO NODE 4025.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) =	17.65				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.959				
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"	A	12.42	0.98	0.500	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.97				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.500				
SUBAREA AREA(ACRES) =	12.42	SUBAREA RUNOFF(CFS) =	16.45		
EFFECTIVE AREA(ACRES) =	13.65	AREA-AVERAGED Fm(INCH/HR) =	0.49		
AREA-AVERAGED Fp(INCH/HR) =	0.98	AREA-AVERAGED Ap =	0.50		
TOTAL AREA(ACRES) =	13.6	PEAK FLOW RATE(CFS) =	18.08		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4025.00 TO NODE 4025.00 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) =	1.96
AREA-AVERAGED Fm(INCH/HR) =	0.49
AREA-AVERAGED Fp(INCH/HR) =	0.98
AREA-AVERAGED Ap =	0.50
EFFECTIVE STREAM AREA(ACRES) =	13.65
TOTAL STREAM AREA(ACRES) =	13.65
PEAK FLOW RATE(CFS) AT CONFLUENCE =	18.08

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	38.28	18.43	1.910	0.98( 0.48)	0.49	28.8	4000.00
2	18.08	17.65	1.959	0.98( 0.49)	0.50	13.6	4020.00

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	56.02	17.65	1.959	0.97 (0.48)	0.49	41.2	4020.00
2	55.75	18.43	1.910	0.97 (0.48)	0.49	42.4	4000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 56.02 Tc(MIN.) = 17.65  
EFFECTIVE AREA(ACRES) = 41.23 AREA-AVERAGED Fm(INCH/HR) = 0.48  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 42.4  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4025.00 = 2249.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4025.00 TO NODE 4026.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 761.30 DOWNSTREAM(FEET) = 745.80  
FLOW LENGTH(FEET) = 1141.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.21  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 56.02  
PIPE TRAVEL TIME(MIN.) = 1.70 Tc(MIN.) = 19.35  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4026.00 = 3390.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4026.00 TO NODE 4026.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.35  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.854  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	5.91	0.98	0.100	32
PUBLIC PARK	A	2.01	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.290  
SUBAREA AREA(ACRES) = 7.92 SUBAREA RUNOFF(CFS) = 11.20  
EFFECTIVE AREA(ACRES) = 49.15 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 62.22

\*\*\*\*\*

FLOW PROCESS FROM NODE 4026.00 TO NODE 4070.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 745.80 DOWNSTREAM(FEET) = 744.50

FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.20  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 62.22  
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 19.56  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4070.00 = 3520.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4070.00 TO NODE 4070.00 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.) = 19.56  
RAINFALL INTENSITY(INCH/HR) = 1.84  
AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.46  
EFFECTIVE STREAM AREA(ACRES) = 49.15  
TOTAL STREAM AREA(ACRES) = 50.36  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 62.22

\*\*\*\*\*

FLOW PROCESS FROM NODE 4045.00 TO NODE 4050.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 444.00  
ELEVATION DATA: UPSTREAM(FEET) = 772.80 DOWNSTREAM(FEET) = 770.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.273  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437  
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 "5-7 DWELLINGS/ACRE"	A	4.70	0.98	0.500	32	12.27

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 8.25  
TOTAL AREA(ACRES) = 4.70 PEAK FLOW RATE(CFS) = 8.25

\*\*\*\*\*

FLOW PROCESS FROM NODE 4050.00 TO NODE 4055.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 770.00 DOWNSTREAM ELEVATION(FEET) = 767.40  
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 HALFBSTREETS 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 ) = 15.09  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH( FEET ) = 0.50  
 HALFBSTREET FLOOD WIDTH( FEET ) = 19.02  
 AVERAGE FLOW VELOCITY( FEET/SEC. ) = 2.20  
 PRODUCT OF DEPTH&VELOCITY( FT\*FT/SEC. ) = 1.11  
 STREET FLOW TRAVEL TIME( MIN. ) = 3.91 Tc( MIN. ) = 16.19

\* 25 YEAR RAINFALL INTENSITY( INCH/HR ) = 2.064  
 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"	A	9.60	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR ) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA( ACRES ) = 9.60 SUBAREA RUNOFF( CFS ) = 13.62  
 EFFECTIVE AREA( ACRES ) = 14.30 AREA-AVERAGED Fm( INCH/HR ) = 0.49  
 AREA-AVERAGED Fp( INCH/HR ) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA( ACRES ) = 14.3 PEAK FLOW RATE( CFS ) = 20.29

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH( FEET ) = 0.55 HALFBSTREET FLOOD WIDTH( FEET ) = 21.45  
 FLOW VELOCITY( FEET/SEC. ) = 2.36 DEPTH\*VELOCITY( FT\*FT/SEC. ) = 1.29  
 LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4055.00 = 961.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4055.00 TO NODE 4060.00 IS CODE = 31

-----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM( FEET ) = 750.70 DOWNSTREAM( FEET ) = 749.60  
 FLOW LENGTH( FEET ) = 374.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.6 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC. ) = 4.90  
 ESTIMATED PIPE DIAMETER( INCH ) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS ) = 20.29  
 PIPE TRAVEL TIME( MIN. ) = 1.27 Tc( MIN. ) = 17.46  
 LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4060.00 = 1335.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4060.00 TO NODE 4060.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc( MIN. ) = 17.46  
 \* 25 YEAR RAINFALL INTENSITY( INCH/HR ) = 1.972

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	0.51	0.75	0.850	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	4.06	0.75	0.500	56
PUBLIC PARK	A	2.28	0.98	0.850	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	4.93	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR ) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.583  
 SUBAREA AREA( ACRES ) = 11.78 SUBAREA RUNOFF( CFS ) = 15.39  
 EFFECTIVE AREA( ACRES ) = 26.08 AREA-AVERAGED Fm( INCH/HR ) = 0.50  
 AREA-AVERAGED Fp( INCH/HR ) = 0.94 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA( ACRES ) = 26.1 PEAK FLOW RATE( CFS ) = 34.50

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4060.00 TO NODE 4065.00 IS CODE = 31

-----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM( FEET ) = 749.60 DOWNSTREAM( FEET ) = 748.60  
 FLOW LENGTH( FEET ) = 540.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.5 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC. ) = 4.78  
 ESTIMATED PIPE DIAMETER( INCH ) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS ) = 34.50  
 PIPE TRAVEL TIME( MIN. ) = 1.88 Tc( MIN. ) = 19.34  
 LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4065.00 = 1875.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4065.00 TO NODE 4065.00 IS CODE = 81

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

MAINLINE Tc( MIN. ) = 19.34  
 \* 25 YEAR RAINFALL INTENSITY( INCH/HR ) = 1.855  
 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	0.58	0.75	0.850	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	5.10	0.75	0.500	56
PUBLIC PARK	A	0.74	0.98	0.850	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	4.07	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR ) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.544  
 SUBAREA AREA( ACRES ) = 10.49 SUBAREA RUNOFF( CFS ) = 13.13  
 EFFECTIVE AREA( ACRES ) = 36.57 AREA-AVERAGED Fm( INCH/HR ) = 0.49  
 AREA-AVERAGED Fp( INCH/HR ) = 0.91 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA( ACRES ) = 36.6 PEAK FLOW RATE( CFS ) = 44.87

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4065.00 TO NODE 4066.00 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) = 748.60 DOWNSTREAM(FEET) = 745.00
FLOW LENGTH(FEET) = 585.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.95
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 44.87
PIPE TRAVEL TIME(MIN.) = 1.23 Tc(MIN.) = 20.57
LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4066.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 4066.00 TO NODE 4066.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.57
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.788
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 2.13 0.75 0.100 56
COMMERCIAL A 3.00 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.88
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.13 SUBAREA RUNOFF(CFS) = 7.85
EFFECTIVE AREA(ACRES) = 41.70 AREA-AVERAGED Fm(INCH/HR) = 0.44
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 41.7 PEAK FLOW RATE(CFS) = 50.51

*****
FLOW PROCESS FROM NODE 4066.00 TO NODE 4070.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 745.00 DOWNSTREAM(FEET) = 744.50
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.91
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 50.51
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 20.88
LONGEST FLOWPATH FROM NODE 4045.00 TO NODE 4070.00 = 2590.00 FEET.

*****
FLOW PROCESS FROM NODE 4070.00 TO NODE 4070.00 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.) = 20.88

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RAINFALL INTENSITY(INCH/HR) = 1.77
AREA-AVERAGED Fm(INCH/HR) = 0.44
AREA-AVERAGED Fp(INCH/HR) = 0.91
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA(ACRES) = 41.70
TOTAL STREAM AREA(ACRES) = 41.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 50.51

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 62.22 19.56 1.842 0.97( 0.45) 0.46 49.2 4020.00
1 61.77 20.34 1.800 0.97( 0.45) 0.46 50.4 4000.00
2 50.51 20.88 1.772 0.91( 0.44) 0.49 41.7 4045.00

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
1 112.06 19.56 1.842 0.95( 0.45) 0.47 88.2 4020.00
2 112.00 20.34 1.800 0.95( 0.45) 0.47 91.0 4000.00
3 110.98 20.88 1.772 0.95( 0.45) 0.47 92.1 4045.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 112.06 Tc(MIN.) = 19.56
EFFECTIVE AREA(ACRES) = 88.22 AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 92.1
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4070.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE 4070.00 TO NODE 4071.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 744.50 DOWNSTREAM(FEET) = 740.50
FLOW LENGTH(FEET) = 566.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 38.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.39
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 112.06
PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 20.47
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4071.00 = 4086.00 FEET.

*****
FLOW PROCESS FROM NODE 4071.00 TO NODE 4071.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.47
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.793
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

```

LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
COMMERCIAL            A            0.85        0.98        0.100        32  
PUBLIC PARK            A            1.45        0.98        0.850        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.573  
SUBAREA AREA(ACRES) = 2.30        SUBAREA RUNOFF(CFS) = 2.56  
EFFECTIVE AREA(ACRES) = 90.52    AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.95    AREA-AVERAGED Ap = 0.47  
TOTAL AREA(ACRES) = 94.4        PEAK FLOW RATE(CFS) = 112.06  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

PIPE-FLOW(CFS) = 121.26  
PIPE TRAVEL TIME(MIN.) = 1.10    Tc(MIN.) = 21.82  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4076.00 = 5066.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4076.00 TO NODE 4076.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 21.82  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.725  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp        Ap        SCS  
LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
COMMERCIAL            A            1.75        0.98        0.100        32  
PUBLIC PARK            A            2.82        0.98        0.850        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.563  
SUBAREA AREA(ACRES) = 4.57        SUBAREA RUNOFF(CFS) = 4.84  
EFFECTIVE AREA(ACRES) = 109.50    AREA-AVERAGED Fm(INCH/HR) = 0.50  
AREA-AVERAGED Fp(INCH/HR) = 0.95    AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 113.3        PEAK FLOW RATE(CFS) = 121.26  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4076.00 TO NODE 4120.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 729.80    DOWNSTREAM(FEET) = 729.30  
FLOW LENGTH(FEET) = 176.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 45.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.61  
ESTIMATED PIPE DIAMETER(INCH) = 60.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 121.26  
PIPE TRAVEL TIME(MIN.) = 0.39    Tc(MIN.) = 22.21  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4120.00 = 5242.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 IS CODE = 10  
-----

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 425.00  
ELEVATION DATA: UPSTREAM(FEET) = 795.00    DOWNSTREAM(FEET) = 790.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.276

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4071.00 TO NODE 4075.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 740.50    DOWNSTREAM(FEET) = 740.00  
FLOW LENGTH(FEET) = 125.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 54.0 INCH PIPE IS 42.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.44  
ESTIMATED PIPE DIAMETER(INCH) = 54.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 112.06  
PIPE TRAVEL TIME(MIN.) = 0.25    Tc(MIN.) = 20.72  
LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4075.00 = 4211.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4075.00 TO NODE 4075.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 20.72  
\* 25 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  
PUBLIC PARK            B            2.41        0.75        0.850        56  
PUBLIC PARK            A            12.00        0.98        0.850        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.94  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 14.41        SUBAREA RUNOFF(CFS) = 12.76  
EFFECTIVE AREA(ACRES) = 104.93    AREA-AVERAGED Fm(INCH/HR) = 0.50  
AREA-AVERAGED Fp(INCH/HR) = 0.94    AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 108.8        PEAK FLOW RATE(CFS) = 121.26

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4075.00 TO NODE 4076.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 740.00    DOWNSTREAM(FEET) = 729.80  
FLOW LENGTH(FEET) = 855.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.93  
ESTIMATED PIPE DIAMETER(INCH) = 45.00    NUMBER OF PIPES = 1



\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.564  
 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.)  
 SCHOOL A 4.60 0.98 0.600 32 11.28  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 SUBAREA RUNOFF(CFS) = 8.19  
 TOTAL AREA(ACRES) = 4.60 PEAK FLOW RATE(CFS) = 8.19

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 34.05  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.37  
 AVERAGE FLOW DEPTH(FEET) = 0.53 TRAVEL TIME(MIN.) = 1.79  
 Tc(MIN.) = 14.46  
 SUBAREA AREA(ACRES) = 26.30 SUBAREA RUNOFF(CFS) = 38.43  
 EFFECTIVE AREA(ACRES) = 35.40 AREA-AVERAGED Fm(INCH/HR) = 0.59  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.60  
 TOTAL AREA(ACRES) = 35.4 PEAK FLOW RATE(CFS) = 51.73

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 51  
 -----

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.66 FLOW VELOCITY(FEET/SEC.) = 9.46  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4039.00 = 1725.00 FEET.

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

ELEVATION DATA: UPSTREAM(FEET) = 790.00 DOWNSTREAM(FEET) = 785.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 400.00 CHANNEL SLOPE = 0.0125  
 CHANNEL BASE(FEET) = 5.00 "Z" FACTOR = 5.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00  
 \* 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  
 SCHOOL A 4.50 0.98 0.600 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.85  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.79  
 AVERAGE FLOW DEPTH(FEET) = 0.36 TRAVEL TIME(MIN.) = 1.39  
 Tc(MIN.) = 12.67  
 SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 7.31  
 EFFECTIVE AREA(ACRES) = 9.10 AREA-AVERAGED Fm(INCH/HR) = 0.58  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.60  
 TOTAL AREA(ACRES) = 9.1 PEAK FLOW RATE(CFS) = 14.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.41 FLOW VELOCITY(FEET/SEC.) = 5.13  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 825.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4039.00 TO NODE 4039.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 14.46  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.209  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 MOBILE HOME PARK A 6.30 0.98 0.250 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.250  
 SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 11.14  
 EFFECTIVE AREA(ACRES) = 41.70 AREA-AVERAGED Fm(INCH/HR) = 0.53  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.55  
 TOTAL AREA(ACRES) = 41.7 PEAK FLOW RATE(CFS) = 62.87

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4039.00 TO NODE 4040.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 762.36 DOWNSTREAM(FEET) = 760.10  
 FLOW LENGTH(FEET) = 987.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.91  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 62.87  
 PIPE TRAVEL TIME(MIN.) = 2.78 Tc(MIN.) = 17.24  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4040.00 = 2712.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4040.00 TO NODE 4040.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 17.24  
 \* 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  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE"        A            12.63        0.98        0.500       32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 12.63        SUBAREA RUNOFF(CFS) = 17.05  
 EFFECTIVE AREA(ACRES) = 54.33        AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.98        AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 54.3            PEAK FLOW RATE(CFS) = 71.61

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4040.00 TO NODE 4080.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 760.10    DOWNSTREAM(FEET) = 749.00  
 FLOW LENGTH(FEET) = 407.00    MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.70  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00        NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 71.61  
 PIPE TRAVEL TIME(MIN.) = 0.43        Tc(MIN.) = 17.68  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4080.00 = 3119.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4080.00 TO NODE 4080.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 17.68  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.958  
 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"        A            10.57        0.98        0.500       32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 10.57        SUBAREA RUNOFF(CFS) = 13.99  
 EFFECTIVE AREA(ACRES) = 64.90        AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.98        AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 64.9            PEAK FLOW RATE(CFS) = 84.16

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4080.00 TO NODE 4082.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 749.00    DOWNSTREAM(FEET) = 748.50  
 FLOW LENGTH(FEET) = 345.00    MANNING'S N = 0.013  
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.42  
 ESTIMATED PIPE DIAMETER(INCH) = 60.00        NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 84.16

PIPE TRAVEL TIME(MIN.) = 1.06        Tc(MIN.) = 18.74  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4082.00 = 3464.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4082.00 TO NODE 4082.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 18.74  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.891  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp            Ap        SCS  
 LAND USE                    GROUP    (ACRES)   (INCH/HR)   (DECIMAL)   CN  
 COMMERCIAL                    A            1.87        0.98        0.100       32  
 PUBLIC PARK                    A            1.27        0.98        0.850       32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.403  
 SUBAREA AREA(ACRES) = 3.14        SUBAREA RUNOFF(CFS) = 4.23  
 EFFECTIVE AREA(ACRES) = 68.04        AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98        AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 68.0            PEAK FLOW RATE(CFS) = 84.46

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4082.00 TO NODE 4120.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 748.50    DOWNSTREAM(FEET) = 729.30  
 FLOW LENGTH(FEET) = 2619.00    MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 32.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.00  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00        NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 84.46  
 PIPE TRAVEL TIME(MIN.) = 4.36        Tc(MIN.) = 23.10  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4120.00 = 6083.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 23.10  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.667  
 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"        A            11.55        0.98        0.200       32  
 PUBLIC PARK                    A            10.51        0.98        0.850       32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.510  
 SUBAREA AREA(ACRES) = 22.06        SUBAREA RUNOFF(CFS) = 23.24  
 EFFECTIVE AREA(ACRES) = 90.10        AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98        AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 90.1            PEAK FLOW RATE(CFS) = 94.03

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 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	94.03	23.10	1.667	0.98 (0.51)	0.52	90.1	1.00

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4120.00 = 6083.00 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	121.26	22.21	1.707	0.95 (0.50)	0.53	109.5	4020.00
2	120.78	22.98	1.673	0.95 (0.50)	0.53	112.3	4000.00
3	119.51	23.53	1.649	0.95 (0.50)	0.53	113.3	4045.00

LONGEST FLOWPATH FROM NODE 4000.00 TO NODE 4120.00 = 5242.00 FEET.

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	214.76	22.21	1.707	0.96 (0.50)	0.52	196.1	4020.00
2	214.74	22.98	1.673	0.96 (0.50)	0.52	201.9	4000.00
3	214.53	23.10	1.667	0.96 (0.50)	0.52	202.6	1.00
4	212.07	23.53	1.649	0.96 (0.50)	0.52	203.4	4045.00

TOTAL AREA(ACRES) = 203.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 214.76 Tc(MIN.) = 22.205  
EFFECTIVE AREA(ACRES) = 196.11 AREA-AVERAGED Fm(INCH/HR) = 0.50  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 203.4  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4120.00 = 6083.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4120.00 TO NODE 4120.00 IS CODE = 12

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4120.00 TO NODE 4125.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 729.30 DOWNSTREAM(FEET) = 720.30  
FLOW LENGTH(FEET) = 790.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.75  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 214.76  
PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 23.10

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4125.00 = 6873.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4125.00 TO NODE 4125.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 23.10  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.668  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ LAND USE SCS SOIL GROUP AREA (ACRES) Fp (INCH/HR) Ap (DECIMAL) SCS CN  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 16.30 0.98 0.200 32  
PUBLIC PARK A 3.36 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.311  
SUBAREA AREA(ACRES) = 19.66 SUBAREA RUNOFF(CFS) = 24.14  
EFFECTIVE AREA(ACRES) = 215.77 AREA-AVERAGED Fm(INCH/HR) = 0.48  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 223.1 PEAK FLOW RATE(CFS) = 229.77

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4125.00 TO NODE 4126.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 720.30 DOWNSTREAM(FEET) = 714.40  
FLOW LENGTH(FEET) = 683.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 63.0 INCH PIPE IS 45.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.63  
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 229.77  
PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 23.93  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4126.00 = 7556.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4126.00 TO NODE 4126.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 23.93  
\* 25 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  
COMMERCIAL A 2.69 0.98 0.100 32  
PUBLIC PARK A 4.25 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.559  
SUBAREA AREA(ACRES) = 6.94 SUBAREA RUNOFF(CFS) = 6.79  
EFFECTIVE AREA(ACRES) = 222.71 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.51  
TOTAL AREA(ACRES) = 230.0 PEAK FLOW RATE(CFS) = 229.77  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4126.00 TO NODE 4145.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	714.40	DOWNSTREAM(FEET) =	713.90
FLOW LENGTH(FEET) =	120.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	69.0 INCH PIPE IS	56.1 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	10.16		
ESTIMATED PIPE DIAMETER(INCH) =	69.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	229.77		
PIPE TRAVEL TIME(MIN.) =	0.20	Tc(MIN.) =	24.13
LONGEST FLOWPATH FROM NODE	1.00 TO NODE	4145.00 =	7676.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4145.00 TO NODE 4145.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) =	24.13				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.624				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	26.70	0.98	0.100	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100					
SUBAREA AREA(ACRES) =	26.70	SUBAREA RUNOFF(CFS) =	36.69		
EFFECTIVE AREA(ACRES) =	249.41	AREA-AVERAGED Fm(INCH/HR) =	0.44		
AREA-AVERAGED Fp(INCH/HR) =	0.96	AREA-AVERAGED Ap =	0.46		
TOTAL AREA(ACRES) =	256.7	PEAK FLOW RATE(CFS) =	264.82		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4145.00 TO NODE 4145.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) =	24.13				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.624				
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"	A	2.09	0.98	0.200	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA(ACRES) =	2.09	SUBAREA RUNOFF(CFS) =	2.69		
EFFECTIVE AREA(ACRES) =	251.50	AREA-AVERAGED Fm(INCH/HR) =	0.44		
AREA-AVERAGED Fp(INCH/HR) =	0.96	AREA-AVERAGED Ap =	0.46		
TOTAL AREA(ACRES) =	258.8	PEAK FLOW RATE(CFS) =	267.51		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4145.00 TO NODE 4146.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	713.90	DOWNSTREAM(FEET) =	712.50
FLOW LENGTH(FEET) =	551.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	81.0 INCH PIPE IS	64.0 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	8.83		
ESTIMATED PIPE DIAMETER(INCH) =	81.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	267.51		
PIPE TRAVEL TIME(MIN.) =	1.04	Tc(MIN.) =	25.17
LONGEST FLOWPATH FROM NODE	1.00 TO NODE	4146.00 =	8227.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4146.00 TO NODE 4146.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) =	25.17				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.584				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	1.06	0.98	0.100	32
PUBLIC PARK	A	1.62	0.98	0.850	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.553					
SUBAREA AREA(ACRES) =	2.68	SUBAREA RUNOFF(CFS) =	2.52		
EFFECTIVE AREA(ACRES) =	254.18	AREA-AVERAGED Fm(INCH/HR) =	0.44		
AREA-AVERAGED Fp(INCH/HR) =	0.96	AREA-AVERAGED Ap =	0.46		
TOTAL AREA(ACRES) =	261.5	PEAK FLOW RATE(CFS) =	267.51		
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE					

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4146.00 TO NODE 4170.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	712.50	DOWNSTREAM(FEET) =	711.41
FLOW LENGTH(FEET) =	128.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	66.0 INCH PIPE IS	49.4 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	14.02		
ESTIMATED PIPE DIAMETER(INCH) =	66.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	267.51		
PIPE TRAVEL TIME(MIN.) =	0.15	Tc(MIN.) =	25.32
LONGEST FLOWPATH FROM NODE	1.00 TO NODE	4170.00 =	8355.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4170.00 TO NODE 4170.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) =	25.32				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.578				
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    A      6.26     0.98       0.100      32
PUBLIC PARK   A      4.13     0.98       0.850      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.398
SUBAREA AREA(ACRES) = 10.39      SUBAREA RUNOFF(CFS) = 11.13
EFFECTIVE AREA(ACRES) = 264.57  AREA-AVERAGED Fm(INCH/HR) = 0.44
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 271.9        PEAK FLOW RATE(CFS) = 270.65

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*****
FLOW PROCESS FROM NODE 4170.00 TO NODE 4170.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.32
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.578
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A      19.56   0.98    0.100   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 19.56      SUBAREA RUNOFF(CFS) = 26.06
EFFECTIVE AREA(ACRES) = 284.13  AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 291.5        PEAK FLOW RATE(CFS) = 296.71

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*****
FLOW PROCESS FROM NODE 4170.00 TO NODE 4171.00 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) = 711.41  DOWNSTREAM(FEET) = 700.00
FLOW LENGTH(FEET) = 1251.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 52.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.59
ESTIMATED PIPE DIAMETER(INCH) = 66.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 296.71
PIPE TRAVEL TIME(MIN.) = 1.43  Tc(MIN.) = 26.75
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4171.00 = 9606.00 FEET.

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*****
FLOW PROCESS FROM NODE 4171.00 TO NODE 4171.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 26.75
* 25 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
COMMERCIAL          A      3.47   0.98    0.100   32
PUBLIC PARK         A      3.36   0.98    0.850   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97

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SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.469
SUBAREA AREA(ACRES) = 6.83      SUBAREA RUNOFF(CFS) = 6.58
EFFECTIVE AREA(ACRES) = 290.96  AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 298.3        PEAK FLOW RATE(CFS) = 296.71
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 4171.00 TO NODE 4171.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 26.75
* 25 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
COMMERCIAL          A      35.70   0.98    0.100   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 35.70      SUBAREA RUNOFF(CFS) = 45.93
EFFECTIVE AREA(ACRES) = 326.66  AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 334.0        PEAK FLOW RATE(CFS) = 336.14

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*****
FLOW PROCESS FROM NODE 4171.00 TO NODE 4200.00 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) = 700.00  DOWNSTREAM(FEET) = 699.50
FLOW LENGTH(FEET) = 148.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 84.0 INCH PIPE IS 65.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.42
ESTIMATED PIPE DIAMETER(INCH) = 84.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 336.14
PIPE TRAVEL TIME(MIN.) = 0.24  Tc(MIN.) = 26.99
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4200.00 = 9754.00 FEET.

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*****
FLOW PROCESS FROM NODE 4200.00 TO NODE 4200.00 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.) = 26.99
RAINFALL INTENSITY(INCH/HR) = 1.52
AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.96
AREA-AVERAGED Ap = 0.40
EFFECTIVE STREAM AREA(ACRES) = 326.66
TOTAL STREAM AREA(ACRES) = 333.99
PEAK FLOW RATE(CFS) AT CONFLUENCE = 336.14

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\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4175.00 TO NODE 4180.00 IS CODE = 21  
 -----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 561.00  
 ELEVATION DATA: UPSTREAM(FEET) = 723.50 DOWNSTREAM(FEET) = 720.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.249  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.568  
 SUBAREA Tc AND LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 6.59 0.98 0.200 32 11.25  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA RUNOFF(CFS) = 14.07  
 TOTAL AREA(ACRES) = 6.59 PEAK FLOW RATE(CFS) = 14.07

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4180.00 TO NODE 4200.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 720.00 DOWNSTREAM(FEET) = 699.00  
 FLOW LENGTH(FEET) = 770.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 10.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.63  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 14.07  
 PIPE TRAVEL TIME(MIN.) = 1.21 Tc(MIN.) = 12.46  
 LONGEST FLOWPATH FROM NODE 4175.00 TO NODE 4200.00 = 1331.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4200.00 TO NODE 4200.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 12.46  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.415  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 PUBLIC PARK A 1.10 0.98 0.850 32  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 5.15 0.98 0.500 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 5.38 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.394  
 SUBAREA AREA(ACRES) = 11.63 SUBAREA RUNOFF(CFS) = 21.26

EFFECTIVE AREA(ACRES) = 18.22 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.32  
 TOTAL AREA(ACRES) = 18.2 PEAK FLOW RATE(CFS) = 34.43

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4200.00 TO NODE 4200.00 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.) = 12.46  
 RAINFALL INTENSITY(INCH/HR) = 2.42  
 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.32  
 EFFECTIVE STREAM AREA(ACRES) = 18.22  
 TOTAL STREAM AREA(ACRES) = 18.22  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 34.43

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	336.14	26.99	1.519	0.96( 0.38)	0.40	326.7	4020.00
1	333.62	27.78	1.493	0.96( 0.39)	0.40	332.4	4000.00
1	333.08	27.90	1.489	0.96( 0.39)	0.40	333.1	1.00
1	329.77	28.33	1.475	0.96( 0.39)	0.40	334.0	4045.00
2	34.43	12.46	2.415	0.97( 0.32)	0.32	18.2	4175.00

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	312.08	12.46	2.415	0.96( 0.38)	0.39	169.0	4175.00
2	355.87	26.99	1.519	0.96( 0.38)	0.39	344.9	4020.00
3	352.92	27.78	1.493	0.96( 0.38)	0.40	350.6	4000.00
4	352.31	27.90	1.489	0.96( 0.38)	0.40	351.4	1.00
5	348.78	28.33	1.475	0.96( 0.38)	0.40	352.2	4045.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 355.87 Tc(MIN.) = 26.99  
 EFFECTIVE AREA(ACRES) = 344.88 AREA-AVERAGED Fm(INCH/HR) = 0.38  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
 TOTAL AREA(ACRES) = 352.2  
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4200.00 = 9754.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 4200.00 TO NODE 4205.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 699.00 DOWNSTREAM(FEET) = 697.00

FLOW LENGTH(FEET) = 499.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 84.0 INCH PIPE IS 63.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.32  
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 355.87  
PIPE TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 27.72  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4205.00 = 10253.00 FEET.

PIPE-FLOW VELOCITY(FEET/SEC.) = 11.28  
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 356.02  
PIPE TRAVEL TIME(MIN.) = 1.67 Tc(MIN.) = 29.40  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4206.00 = 11385.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4205.00 TO NODE 4205.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 27.72  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.495  
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" A 7.04 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 7.04 SUBAREA RUNOFF(CFS) = 8.23  
EFFECTIVE AREA(ACRES) = 351.92 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 359.3 PEAK FLOW RATE(CFS) = 355.87  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4206.00 TO NODE 4206.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 29.40  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.443  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.30 0.98 0.100 32  
PUBLIC PARK A 2.16 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.568  
SUBAREA AREA(ACRES) = 3.46 SUBAREA RUNOFF(CFS) = 2.77  
EFFECTIVE AREA(ACRES) = 357.54 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 364.9 PEAK FLOW RATE(CFS) = 356.02  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4205.00 TO NODE 4205.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 27.72  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.495  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.80 0.98 0.100 32  
PUBLIC PARK A 1.36 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.572  
SUBAREA AREA(ACRES) = 2.16 SUBAREA RUNOFF(CFS) = 1.82  
EFFECTIVE AREA(ACRES) = 354.08 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 361.4 PEAK FLOW RATE(CFS) = 356.02

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4206.00 TO NODE 4235.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 692.50 DOWNSTREAM(FEET) = 692.00  
FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 90.0 INCH PIPE IS 72.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.40  
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 356.02  
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 29.75  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4235.00 = 11585.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4205.00 TO NODE 4206.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 697.00 DOWNSTREAM(FEET) = 692.50  
FLOW LENGTH(FEET) = 1132.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 84.0 INCH PIPE IS 64.2 INCHES

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 IS CODE = 1  
-----

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

-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 29.75  
RAINFALL INTENSITY(INCH/HR) = 1.43  
AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.39  
EFFECTIVE STREAM AREA(ACRES) = 357.54  
TOTAL STREAM AREA(ACRES) = 364.87  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 356.02



\*\*\*\*\*  
FLOW PROCESS FROM NODE 4210.00 TO NODE 4215.00 IS CODE = 21  
-----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 945.00  
ELEVATION DATA: UPSTREAM(FEET) = 721.00 DOWNSTREAM(FEET) = 711.10

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.887  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.087  
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.)  
SCHOOL A 9.77 0.98 0.600 32 15.89  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA RUNOFF(CFS) = 13.21  
TOTAL AREA(ACRES) = 9.77 PEAK FLOW RATE(CFS) = 13.21

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4215.00 TO NODE 4235.00 IS CODE = 31  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 702.50 DOWNSTREAM(FEET) = 692.00  
FLOW LENGTH(FEET) = 1233.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.75  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 13.21  
PIPE TRAVEL TIME(MIN.) = 3.04 Tc(MIN.) = 18.93  
LONGEST FLOWPATH FROM NODE 4210.00 TO NODE 4235.00 = 2178.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 18.93  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.879  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
SCHOOL A 1.82 0.98 0.600 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 19.00 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.235  
SUBAREA AREA(ACRES) = 20.82 SUBAREA RUNOFF(CFS) = 30.92  
EFFECTIVE AREA(ACRES) = 30.59 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.35

TOTAL AREA(ACRES) = 30.6 PEAK FLOW RATE(CFS) = 42.29

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 IS CODE = 81  
-----

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

MAINLINE Tc(MIN.) = 18.93  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.879  
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" A 35.18 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 35.18 SUBAREA RUNOFF(CFS) = 53.32  
EFFECTIVE AREA(ACRES) = 65.77 AREA-AVERAGED Fm(INCH/HR) = 0.26  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.27  
TOTAL AREA(ACRES) = 65.8 PEAK FLOW RATE(CFS) = 95.61

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4235.00 TO NODE 4235.00 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.) = 18.93  
RAINFALL INTENSITY(INCH/HR) = 1.88  
AREA-AVERAGED Fm(INCH/HR) = 0.26  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.27  
EFFECTIVE STREAM AREA(ACRES) = 65.77  
TOTAL STREAM AREA(ACRES) = 65.77  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 95.61

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	314.13	15.31	2.134	0.96( 0.37)	0.39	181.6	4175.00
1	356.02	29.75	1.433	0.96( 0.38)	0.39	357.5	4020.00
1	353.14	30.55	1.410	0.96( 0.38)	0.40	363.3	4000.00
1	352.55	30.67	1.407	0.96( 0.38)	0.40	364.0	1.00
1	349.10	31.10	1.395	0.96( 0.38)	0.40	364.9	4045.00
2	95.61	18.93	1.879	0.98( 0.26)	0.27	65.8	4210.00

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	403.67	15.31	2.134	0.97( 0.35)	0.36	234.8	4175.00
2	420.25	18.93	1.879	0.97( 0.35)	0.36	291.5	4210.00



3	425.21	29.75	1.433	0.96 ( 0.36)	0.37	423.3	4020.00
4	420.99	30.55	1.410	0.96 ( 0.36)	0.38	429.1	4000.00
5	420.20	30.67	1.407	0.96 ( 0.36)	0.38	429.8	1.00
6	416.06	31.10	1.395	0.96 ( 0.36)	0.38	430.6	4045.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 425.21 Tc(MIN.) = 29.75  
EFFECTIVE AREA(ACRES) = 423.31 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 430.6  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4235.00 = 11585.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4235.00 TO NODE 4236.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 692.00 DOWNSTREAM(FEET) = 684.00  
FLOW LENGTH(FEET) = 1134.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 61.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.65  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 425.21  
PIPE TRAVEL TIME(MIN.) = 1.29 Tc(MIN.) = 31.04  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4236.00 = 12719.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4236.00 TO NODE 4236.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 31.04  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.397  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	6.25	0.98	0.100	32
PUBLIC PARK	A	0.85	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.190  
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 7.74  
EFFECTIVE AREA(ACRES) = 430.41 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 437.7 PEAK FLOW RATE(CFS) = 425.21  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 4236.00 TO NODE 4236.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 31.04  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.397  
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"	A	2.50	0.98	0.200	32
PUBLIC PARK	A	32.54	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.804

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	19.00	0.98	0.200	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	16.49	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 35.49 SUBAREA RUNOFF(CFS) = 39.59  
EFFECTIVE AREA(ACRES) = 465.90 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.36  
TOTAL AREA(ACRES) = 473.2 PEAK FLOW RATE(CFS) = 441.80

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	427.05	16.62	2.031	0.95 ( 0.32)	0.34	277.4	4175.00
2	444.91	20.22	1.806	0.95 ( 0.33)	0.34	334.1	4210.00
3	441.80	31.04	1.397	0.96 ( 0.34)	0.36	465.9	4020.00
4	437.60	31.84	1.375	0.96 ( 0.34)	0.36	471.7	4000.00
5	436.82	31.96	1.372	0.96 ( 0.34)	0.36	472.4	1.00
6	432.59	32.42	1.361	0.96 ( 0.35)	0.36	473.2	4045.00

NEW PEAK FLOW DATA ARE:  
PEAK FLOW RATE(CFS) = 444.91 Tc(MIN.) = 20.22  
AREA-AVERAGED Fm(INCH/HR) = 0.33 AREA-AVERAGED Fp(INCH/HR) = 0.95  
AREA-AVERAGED Ap = 0.34 EFFECTIVE AREA(ACRES) = 334.13

\*\*\*\*\*

FLOW PROCESS FROM NODE 4236.00 TO NODE 4280.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 684.00 DOWNSTREAM(FEET) = 683.30  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 87.0 INCH PIPE IS 65.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.41  
ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 444.91  
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 20.38  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4280.00 = 12849.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4280.00 TO NODE 4280.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.38  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.797  
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"	A	2.50	0.98	0.200	32
PUBLIC PARK	A	32.54	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.804

SUBAREA AREA(ACRES) = 35.04 SUBAREA RUNOFF(CFS) = 31.97  
EFFECTIVE AREA(ACRES) = 369.17 AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 508.3 PEAK FLOW RATE(CFS) = 474.30

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4280.00 TO NODE 4281.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 683.30 DOWNSTREAM(FEET) = 672.50  
FLOW LENGTH(FEET) = 1199.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 60.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.53  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 474.30  
PIPE TRAVEL TIME(MIN.) = 1.21 Tc(MIN.) = 21.59  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4281.00 = 14048.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4281.00 TO NODE 4281.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 21.59  
\* 25 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  
COMMERCIAL A 3.14 0.98 0.100 32  
PUBLIC PARK A 2.03 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.394  
SUBAREA AREA(ACRES) = 5.17 SUBAREA RUNOFF(CFS) = 6.29  
EFFECTIVE AREA(ACRES) = 374.34 AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 513.4 PEAK FLOW RATE(CFS) = 474.30  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4281.00 TO NODE 4300.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 672.50 DOWNSTREAM(FEET) = 672.00  
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 93.0 INCH PIPE IS 73.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.90  
ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 474.30  
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 21.78  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4300.00 = 14178.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 4300.00 TO NODE 4300.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 21.78  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.728  
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" A 33.70 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 33.70 SUBAREA RUNOFF(CFS) = 46.48  
EFFECTIVE AREA(ACRES) = 408.04 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 547.1 PEAK FLOW RATE(CFS) = 503.84

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4300.00 TO NODE 4325.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 672.00 DOWNSTREAM(FEET) = 658.70  
FLOW LENGTH(FEET) = 1418.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 62.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.93  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 503.84  
PIPE TRAVEL TIME(MIN.) = 1.40 Tc(MIN.) = 23.17  
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4325.00 = 15596.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4325.00 TO NODE 4325.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 23.17  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.664  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 3.29 0.98 0.100 32  
URBAN GOOD COVER  
"TURF" A 1.86 0.97 1.000 33  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.425  
SUBAREA AREA(ACRES) = 5.15 SUBAREA RUNOFF(CFS) = 5.80  
EFFECTIVE AREA(ACRES) = 413.19 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 552.3 PEAK FLOW RATE(CFS) = 503.84  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 4325.00 TO NODE 4325.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 23.17

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.664

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

"11+ DWELLINGS/ACRE"	A	23.00	0.98	0.200	32
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RESIDENTIAL

"11+ DWELLINGS/ACRE"	C	16.82	0.57	0.200	69
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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200

SUBAREA AREA(ACRES) = 39.82 SUBAREA RUNOFF(CFS) = 53.90

EFFECTIVE AREA(ACRES) = 453.01 AREA-AVERAGED Fm(INCH/HR) = 0.34

AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.36

TOTAL AREA(ACRES) = 592.1 PEAK FLOW RATE(CFS) = 540.33  
-----

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 592.1 TC(MIN.) = 23.17

EFFECTIVE AREA(ACRES) = 453.01 AREA-AVERAGED Fm(INCH/HR) = 0.34

AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.356

PEAK FLOW RATE(CFS) = 540.33  
-----

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	536.12	19.60	1.840	0.95( 0.34)	0.35	396.3	4175.00
2	540.33	23.17	1.664	0.95( 0.34)	0.36	453.0	4210.00
3	511.79	34.02	1.322	0.95( 0.35)	0.37	584.8	4020.00
4	506.13	34.85	1.303	0.95( 0.35)	0.37	590.5	4000.00
5	505.19	34.97	1.300	0.95( 0.35)	0.37	591.3	1.00
6	500.44	35.43	1.290	0.95( 0.35)	0.37	592.1	4045.00

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END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* HELLMAN - SOUTH OF CHINO \*  
\* 10-YR STUDY \*  
\* AREA 'G' \*  
\*\*\*\*\*

FILE NAME: HLM-D.DAT  
TIME/DATE OF STUDY: 17:40 10/16/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GUTTER LIP (FT)	GEOMETRIES 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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1200.00 TO NODE 1202.00 IS CODE = 21  
-----

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

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 933.00  
ELEVATION DATA: UPSTREAM(FEET) = 747.90 DOWNSTREAM(FEET) = 742.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.509  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.735  
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  
"5-7 DWELLINGS/ACRE" A 9.74 0.98 0.500 32 16.51  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 10.94  
TOTAL AREA(ACRES) = 9.74 PEAK FLOW RATE(CFS) = 10.94

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1202.00 TO NODE 1204.00 IS CODE = 62  
-----

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

===== UPSTREAM ELEVATION(FEET) = 742.00 DOWNSTREAM ELEVATION(FEET) = 739.50  
STREET LENGTH(FEET) = 484.00 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) = 16.99  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.52  
HALFSTREET FLOOD WIDTH(FEET) = 19.88  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.28  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.18  
STREET FLOW TRAVEL TIME(MIN.) = 3.54 Tc(MIN.) = 20.04  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.544

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" A 12.00 0.98 0.500 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 0.59 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.96  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 12.59 SUBAREA RUNOFF(CFS) = 12.09  
EFFECTIVE AREA(ACRES) = 22.33 AREA-AVERAGED Fm(INCH/HR) = 0.48

AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 22.3 PEAK FLOW RATE(CFS) = 21.35

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH( FEET) = 0.55 HALFSTREET FLOOD WIDTH( FEET) = 21.76  
FLOW VELOCITY( FEET/SEC.) = 2.41 DEPTH\*VELOCITY( FT\*FT/SEC.) = 1.33  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1204.00 = 1417.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1204.00 TO NODE 1206.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM( FEET) =	730.00	DOWNSTREAM( FEET) =	725.60
FLOW LENGTH( FEET) =	832.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS	22.1	INCHES	
PIPE-FLOW VELOCITY( FEET/SEC.) =	6.13		
ESTIMATED PIPE DIAMETER( INCH) =	27.00	NUMBER OF PIPES =	1
PIPE-FLOW( CFS) =	21.35		
PIPE TRAVEL TIME( MIN.) =	2.26	Tc( MIN.) =	22.31
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1206.00 =	2249.00	FEET.	

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1206.00 TO NODE 1206.00 IS CODE = 81

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

=====

MAINLINE Tc( MIN.) =	22.31				
* 10 YEAR RAINFALL INTENSITY( INCH/HR) =	1.448				
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"	A	6.87	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	6.38	0.57	0.500	69
PUBLIC PARK	A	2.12	0.98	0.850	32
PUBLIC PARK	C	2.17	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) =	0.77				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.586				
SUBAREA AREA( ACRES) =	17.54	SUBAREA RUNOFF( CFS) =	15.71		
EFFECTIVE AREA( ACRES) =	39.87	AREA-AVERAGED Fm( INCH/HR) =	0.47		
AREA-AVERAGED Fp( INCH/HR) =	0.87	AREA-AVERAGED Ap =	0.54		
TOTAL AREA( ACRES) =	39.9	PEAK FLOW RATE( CFS) =	35.13		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1206.00 TO NODE 1206.00 IS CODE = 81

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

=====

MAINLINE Tc( MIN.) =	22.31				
* 10 YEAR RAINFALL INTENSITY( INCH/HR) =	1.448				
SUBAREA LOSS RATE DATA( AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	( ACRES)	( INCH/HR)	( DECIMAL)	CN

COMMERCIAL	C	3.61	0.57	0.100	69
PUBLIC PARK	C	3.50	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) =	0.57				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.469				
SUBAREA AREA( ACRES) =	7.11	SUBAREA RUNOFF( CFS) =	7.57		
EFFECTIVE AREA( ACRES) =	46.98	AREA-AVERAGED Fm( INCH/HR) =	0.44		
AREA-AVERAGED Fp( INCH/HR) =	0.83	AREA-AVERAGED Ap =	0.53		
TOTAL AREA( ACRES) =	47.0	PEAK FLOW RATE( CFS) =	42.70		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1206.00 TO NODE 1214.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM( FEET) =	725.60	DOWNSTREAM( FEET) =	709.66
FLOW LENGTH( FEET) =	1284.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS	24.2	INCHES	
PIPE-FLOW VELOCITY( FEET/SEC.) =	10.07		
ESTIMATED PIPE DIAMETER( INCH) =	30.00	NUMBER OF PIPES =	1
PIPE-FLOW( CFS) =	42.70		
PIPE TRAVEL TIME( MIN.) =	2.13	Tc( MIN.) =	24.43
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1214.00 =	3533.00	FEET.	

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 IS CODE = 81

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

=====

MAINLINE Tc( MIN.) =	24.43				
* 10 YEAR RAINFALL INTENSITY( INCH/HR) =	1.371				
SUBAREA LOSS RATE DATA( AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	( ACRES)	( INCH/HR)	( DECIMAL)	CN
COMMERCIAL	C	2.63	0.57	0.100	69
PUBLIC PARK	C	2.52	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) =	0.57				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.467				
SUBAREA AREA( ACRES) =	5.15	SUBAREA RUNOFF( CFS) =	5.13		
EFFECTIVE AREA( ACRES) =	52.13	AREA-AVERAGED Fm( INCH/HR) =	0.42		
AREA-AVERAGED Fp( INCH/HR) =	0.81	AREA-AVERAGED Ap =	0.52		
TOTAL AREA( ACRES) =	52.1	PEAK FLOW RATE( CFS) =	44.57		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 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.) =	24.43
RAINFALL INTENSITY( INCH/HR) =	1.37
AREA-AVERAGED Fm( INCH/HR) =	0.42
AREA-AVERAGED Fp( INCH/HR) =	0.81
AREA-AVERAGED Ap =	0.52
EFFECTIVE STREAM AREA( ACRES) =	52.13

TOTAL STREAM AREA(ACRES) = 52.13  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 44.57

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1208.00 TO NODE 1210.00 IS CODE = 21  
 -----

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 976.00  
 ELEVATION DATA: UPSTREAM(FEET) = 734.70 DOWNSTREAM(FEET) = 729.70

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.701  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.941  
 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						
"5-7 DWELLINGS/ACRE"	C	3.65	0.57	0.500	69	17.53
COMMERCIAL	C	0.50	0.57	0.100	69	13.70
RESIDENTIAL						
"5-7 DWELLINGS/ACRE"	A	4.39	0.98	0.500	32	17.53

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.477  
 SUBAREA RUNOFF(CFS) = 12.03  
 TOTAL AREA(ACRES) = 8.54 PEAK FLOW RATE(CFS) = 12.03

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1210.00 TO NODE 1214.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 723.50 DOWNSTREAM(FEET) = 709.66  
 FLOW LENGTH(FEET) = 948.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.77  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 12.03  
 PIPE TRAVEL TIME(MIN.) = 2.03 Tc(MIN.) = 15.73  
 LONGEST FLOWPATH FROM NODE 1208.00 TO NODE 1214.00 = 1924.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 15.73  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.786  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.50	0.57	0.100	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	4.44	0.57	0.500	69

RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 8.94 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.486  
 SUBAREA AREA(ACRES) = 13.88 SUBAREA RUNOFF(CFS) = 17.23  
 EFFECTIVE AREA(ACRES) = 22.42 AREA-AVERAGED Fm(INCH/HR) = 0.39  
 AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 22.4 PEAK FLOW RATE(CFS) = 28.08

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 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.) = 15.73  
 RAINFALL INTENSITY(INCH/HR) = 1.79  
 AREA-AVERAGED Fm(INCH/HR) = 0.39  
 AREA-AVERAGED Fp(INCH/HR) = 0.82  
 AREA-AVERAGED Ap = 0.48  
 EFFECTIVE STREAM AREA(ACRES) = 22.42  
 TOTAL STREAM AREA(ACRES) = 22.42  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 28.08

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	44.57	24.43	1.371	0.81( 0.42)	0.52	52.1	1200.00
2	28.08	15.73	1.786	0.82( 0.39)	0.48	22.4	1208.00

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	69.30	15.73	1.786	0.81( 0.41)	0.51	56.0	1208.00
2	64.29	24.43	1.371	0.81( 0.41)	0.51	74.6	1200.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 69.30 Tc(MIN.) = 15.73  
 EFFECTIVE AREA(ACRES) = 55.99 AREA-AVERAGED Fm(INCH/HR) = 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.81 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 74.6  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1214.00 = 3533.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1214.00 TO NODE 1216.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 709.66 DOWNSTREAM(FEET) = 706.06  
 FLOW LENGTH(FEET) = 1211.00 MANNING'S N = 0.013



DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.72  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 69.30  
 PIPE TRAVEL TIME(MIN.) = 3.00 Tc(MIN.) = 18.74  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1216.00 = 4744.00 FEET.

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.884  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.712  
 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  
 "5-7 DWELLINGS/ACRE" A 7.45 0.98 0.500 32 16.88  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 8.21  
 TOTAL AREA(ACRES) = 7.45 PEAK FLOW RATE(CFS) = 8.21

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 18.74  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.608  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 2.15 0.98 0.100 32  
 URBAN GOOD COVER  
 "TURF" A 1.17 0.97 1.000 33  
 COMMERCIAL C 1.30 0.57 0.100 69  
 URBAN GOOD COVER  
 "TURF" C 0.33 0.52 1.000 72  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.86  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373  
 SUBAREA AREA(ACRES) = 4.95 SUBAREA RUNOFF(CFS) = 5.73  
 EFFECTIVE AREA(ACRES) = 60.94 AREA-AVERAGED Fm(INCH/HR) = 0.40  
 AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 79.5 PEAK FLOW RATE(CFS) = 69.30  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1220.00 TO NODE 1222.00 IS CODE = 62  
 -----

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

UPSTREAM ELEVATION(FEET) = 747.30 DOWNSTREAM ELEVATION(FEET) = 740.80  
 STREET LENGTH(FEET) = 552.00 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) = 10.57

STRETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.41  
 HALFSTREET FLOOD WIDTH(FEET) = 13.79  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.79  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.14  
 STREET FLOW TRAVEL TIME(MIN.) = 3.29 Tc(MIN.) = 20.18  
 \* 10 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  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 4.99 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 4.99 SUBAREA RUNOFF(CFS) = 4.72  
 EFFECTIVE AREA(ACRES) = 12.44 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 12.4 PEAK FLOW RATE(CFS) = 11.77

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.41  
 FLOW VELOCITY(FEET/SEC.) = 2.87 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.21  
 LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1222.00 = 1437.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 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.) = 18.74  
 RAINFALL INTENSITY(INCH/HR) = 1.61  
 AREA-AVERAGED Fm(INCH/HR) = 0.40  
 AREA-AVERAGED Fp(INCH/HR) = 0.82  
 AREA-AVERAGED Ap = 0.49  
 EFFECTIVE STREAM AREA(ACRES) = 60.94  
 TOTAL STREAM AREA(ACRES) = 79.50  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 69.30

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1218.00 TO NODE 1220.00 IS CODE = 21  
 -----

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 885.00  
 ELEVATION DATA: UPSTREAM(FEET) = 751.80 DOWNSTREAM(FEET) = 747.30

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*****
FLOW PROCESS FROM NODE 1222.00 TO NODE 1224.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 734.80 DOWNSTREAM(FEET) = 730.30
FLOW LENGTH(FEET) = 587.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.19
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.77
PIPE TRAVEL TIME(MIN.) = 1.58 Tc(MIN.) = 21.76
LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1224.00 = 2024.00 FEET.

*****
FLOW PROCESS FROM NODE 1224.00 TO NODE 1224.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.76
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.470
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" A 18.00 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 18.00 SUBAREA RUNOFF(CFS) = 15.92
EFFECTIVE AREA(ACRES) = 30.44 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 30.4 PEAK FLOW RATE(CFS) = 26.93

*****
FLOW PROCESS FROM NODE 1224.00 TO NODE 1226.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 730.30 DOWNSTREAM(FEET) = 725.20
FLOW LENGTH(FEET) = 436.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.97
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.93
PIPE TRAVEL TIME(MIN.) = 0.81 Tc(MIN.) = 22.57
LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1226.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 1226.00 TO NODE 1226.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.57

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* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.438
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" A 7.68 0.98 0.500 32
PUBLIC PARK A 5.74 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.650
SUBAREA AREA(ACRES) = 13.42 SUBAREA RUNOFF(CFS) = 9.72
EFFECTIVE AREA(ACRES) = 43.86 AREA-AVERAGED Fm(INCH/HR) = 0.53
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 43.9 PEAK FLOW RATE(CFS) = 35.77

*****
FLOW PROCESS FROM NODE 1226.00 TO NODE 1228.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 725.20 DOWNSTREAM(FEET) = 721.80
FLOW LENGTH(FEET) = 427.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.37
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 35.77
PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 23.42
LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1228.00 = 2887.00 FEET.

*****
FLOW PROCESS FROM NODE 1228.00 TO NODE 1228.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.42
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.407
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" A 13.38 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 13.38 SUBAREA RUNOFF(CFS) = 11.07
EFFECTIVE AREA(ACRES) = 57.24 AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 57.2 PEAK FLOW RATE(CFS) = 45.60

*****
FLOW PROCESS FROM NODE 1228.00 TO NODE 1216.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 721.80 DOWNSTREAM(FEET) = 706.06
FLOW LENGTH(FEET) = 571.00 MANNING'S N = 0.013

```

DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.94  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 45.60  
 PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 24.10  
 LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1216.00 = 3458.00 FEET.

1	128.73	18.74	1.608	0.90( 0.46)	0.51	121.2	1208.00
2	126.93	24.10	1.383	0.90( 0.46)	0.51	149.9	1218.00
3	117.72	27.47	1.279	0.90( 0.46)	0.51	157.0	1200.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 128.73 Tc(MIN.) = 18.74  
 EFFECTIVE AREA(ACRES) = 121.22 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 157.0  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1216.00 = 4744.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 24.10  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.383  
 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" A 20.29 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 20.29 SUBAREA RUNOFF(CFS) = 16.35  
 EFFECTIVE AREA(ACRES) = 77.53 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 77.5 PEAK FLOW RATE(CFS) = 60.71

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 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.) = 24.10  
 RAINFALL INTENSITY(INCH/HR) = 1.38  
 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.53  
 EFFECTIVE STREAM AREA(ACRES) = 77.53  
 TOTAL STREAM AREA(ACRES) = 77.53  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 60.71

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	69.30	18.74	1.608	0.82( 0.40)	0.49	60.9	1208.00
1	64.29	27.47	1.279	0.81( 0.41)	0.50	79.5	1200.00
2	60.71	24.10	1.383	0.98( 0.51)	0.53	77.5	1218.00

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	69.30	18.74	1.608	0.82( 0.40)	0.49	60.9	1208.00
1	64.29	27.47	1.279	0.81( 0.41)	0.50	79.5	1200.00
2	60.71	24.10	1.383	0.98( 0.51)	0.53	77.5	1218.00

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1230.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 706.06 DOWNSTREAM(FEET) = 702.46  
 FLOW LENGTH(FEET) = 1548.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 49.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.13  
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 128.73  
 PIPE TRAVEL TIME(MIN.) = 3.62 Tc(MIN.) = 22.36  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1230.00 = 6292.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1230.00 TO NODE 1230.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.36  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.447  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 3.60 0.98 0.100 32  
 PUBLIC PARK A 1.94 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.363  
 SUBAREA AREA(ACRES) = 5.54 SUBAREA RUNOFF(CFS) = 5.45  
 EFFECTIVE AREA(ACRES) = 126.76 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 162.6 PEAK FLOW RATE(CFS) = 128.73  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1230.00 TO NODE 1230.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.36  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.447  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL A 5.27 0.98 0.100 32  
PUBLIC PARK A 1.67 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.280  
SUBAREA AREA(ACRES) = 6.94 SUBAREA RUNOFF(CFS) = 7.33  
EFFECTIVE AREA(ACRES) = 133.70 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 169.5 PEAK FLOW RATE(CFS) = 128.73  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

PUBLIC PARK A 2.28 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.532  
SUBAREA AREA(ACRES) = 3.96 SUBAREA RUNOFF(CFS) = 3.00  
EFFECTIVE AREA(ACRES) = 140.49 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 176.3 PEAK FLOW RATE(CFS) = 128.73  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1230.00 TO NODE 1230.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 22.36  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.447  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 2.18 0.98 0.100 32  
PUBLIC PARK A 0.65 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.272  
SUBAREA AREA(ACRES) = 2.83 SUBAREA RUNOFF(CFS) = 3.01  
EFFECTIVE AREA(ACRES) = 136.53 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 172.3 PEAK FLOW RATE(CFS) = 128.73  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1230.00 TO NODE 1433.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 702.46 DOWNSTREAM(FEET) = 698.90  
FLOW LENGTH(FEET) = 1158.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 46.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.93  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 128.73  
PIPE TRAVEL TIME(MIN.) = 2.43 Tc(MIN.) = 24.79  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1433.00 = 7450.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1433.00 TO NODE 1433.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 24.79  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.360  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.68 0.98 0.100 32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1433.00 TO NODE 1434.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 698.90 DOWNSTREAM(FEET) = 698.40  
FLOW LENGTH(FEET) = 170.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.77  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 128.73  
PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 25.15  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1434.00 = 7620.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1434.00 TO NODE 1434.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 25.15  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.348  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 1.43 0.98 0.850 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 7.50 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.556  
SUBAREA AREA(ACRES) = 8.93 SUBAREA RUNOFF(CFS) = 6.47  
EFFECTIVE AREA(ACRES) = 149.42 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 185.2 PEAK FLOW RATE(CFS) = 128.73  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1434.00 TO NODE 1434.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 25.15  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.348  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 2.80 0.98 0.850 32

RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 15.00 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.555  
 SUBAREA AREA(ACRES) = 17.80 SUBAREA RUNOFF(CFS) = 12.92  
 EFFECTIVE AREA(ACRES) = 167.22 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 203.0 PEAK FLOW RATE(CFS) = 133.88

SUBAREA AREA(ACRES) = 4.18 SUBAREA RUNOFF(CFS) = 2.99  
 EFFECTIVE AREA(ACRES) = 172.28 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 208.1 PEAK FLOW RATE(CFS) = 134.87  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1437.00 TO NODE 1438.00 IS CODE = 31

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1434.00 TO NODE 1434.00 IS CODE = 81

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

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

-----  
 ELEVATION DATA: UPSTREAM(FEET) = 680.07 DOWNSTREAM(FEET) = 680.00  
 FLOW LENGTH(FEET) = 80.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.03  
 ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 134.87  
 PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 26.72  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1438.00 = 8858.00 FEET.

MAINLINE Tc(MIN.) = 25.15  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.348  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.88 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 0.88 SUBAREA RUNOFF(CFS) = 0.99  
 EFFECTIVE AREA(ACRES) = 168.10 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 203.9 PEAK FLOW RATE(CFS) = 134.87

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 81

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1434.00 TO NODE 1437.00 IS CODE = 31

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

-----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 698.40 DOWNSTREAM(FEET) = 680.07  
 FLOW LENGTH(FEET) = 1158.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.85  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 134.87  
 PIPE TRAVEL TIME(MIN.) = 1.30 Tc(MIN.) = 26.45  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1437.00 = 8778.00 FEET.

-----  
 MAINLINE Tc(MIN.) = 26.72  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.300  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	0.47	0.98	0.850	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	18.00	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.509  
 SUBAREA AREA(ACRES) = 18.47 SUBAREA RUNOFF(CFS) = 13.36  
 EFFECTIVE AREA(ACRES) = 190.75 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 226.6 PEAK FLOW RATE(CFS) = 143.93

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 10

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1437.00 TO NODE 1437.00 IS CODE = 81

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

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

-----  
 MAINLINE Tc(MIN.) = 26.45  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.308  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.80 0.98 0.100 32  
 PUBLIC PARK A 2.38 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1400.00 TO NODE 1402.00 IS CODE = 21

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

-----  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 976.00  
 ELEVATION DATA: UPSTREAM(FEET) = 724.50 DOWNSTREAM(FEET) = 715.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.420  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.808  
 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						
"5-7 DWELLINGS/ACRE"	A	8.73	0.98	0.500	32	15.42

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 10.37  
 TOTAL AREA(ACRES) = 8.73 PEAK FLOW RATE(CFS) = 10.37

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1402.00 TO NODE 1404.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 =====  
 UPSTREAM ELEVATION(FEET) = 715.00 DOWNSTREAM ELEVATION(FEET) = 706.50  
 STREET LENGTH(FEET) = 443.00 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) = 16.13  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.43  
 HALFSTREET FLOOD WIDTH(FEET) = 14.88  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.71  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.59  
 STREET FLOW TRAVEL TIME(MIN.) = 1.99 Tc(MIN.) = 17.41

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.681  
 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"	A	10.71	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 10.71 SUBAREA RUNOFF(CFS) = 11.50  
 EFFECTIVE AREA(ACRES) = 19.44 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 20.88

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 16.52  
 FLOW VELOCITY(FEET/SEC.) = 3.97 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.82  
 LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1404.00 = 1419.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1404.00 TO NODE 1406.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 706.50 DOWNSTREAM(FEET) = 704.10  
 FLOW LENGTH(FEET) = 832.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.85  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 20.88  
 PIPE TRAVEL TIME(MIN.) = 2.86 Tc(MIN.) = 20.27  
 LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1406.00 = 2251.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1406.00 TO NODE 1406.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 20.27  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.534  
 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"	A	11.19	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 11.19 SUBAREA RUNOFF(CFS) = 10.54  
 EFFECTIVE AREA(ACRES) = 30.63 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 30.6 PEAK FLOW RATE(CFS) = 28.86

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1406.00 TO NODE 1406.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 20.27  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.534  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.61	0.98	0.850	32
PUBLIC PARK	C	1.24	0.57	0.850	69
COMMERCIAL	A	1.81	0.98	0.100	32
COMMERCIAL	C	1.33	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457  
 SUBAREA AREA(ACRES) = 5.99 SUBAREA RUNOFF(CFS) = 6.31  
 EFFECTIVE AREA(ACRES) = 36.62 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 36.6 PEAK FLOW RATE(CFS) = 35.17



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*****
FLOW PROCESS FROM NODE 1406.00 TO NODE 1412.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 704.10 DOWNSTREAM(FEET) = 689.26
FLOW LENGTH(FEET) = 1225.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.74
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 35.17
PIPE TRAVEL TIME(MIN.) = 2.10 Tc(MIN.) = 22.36
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1412.00 = 3476.00 FEET.

*****
FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.36
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.446
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 2.96 0.98 0.100 32
PUBLIC PARK A 2.76 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462
SUBAREA AREA(ACRES) = 5.72 SUBAREA RUNOFF(CFS) = 5.13
EFFECTIVE AREA(ACRES) = 42.34 AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 42.3 PEAK FLOW RATE(CFS) = 37.39

*****
FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 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.) = 22.36
RAINFALL INTENSITY(INCH/HR) = 1.45
AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.95
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA(ACRES) = 42.34
TOTAL STREAM AREA(ACRES) = 42.34
PEAK FLOW RATE(CFS) AT CONFLUENCE = 37.39

*****
FLOW PROCESS FROM NODE 1408.00 TO NODE 1410.00 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) = 967.00
ELEVATION DATA: UPSTREAM(FEET) = 720.25 DOWNSTREAM(FEET) = 713.10

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.519
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.956
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
"5-7 DWELLINGS/ACRE" A 2.26 0.98 0.500 32 16.23
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 3.27 0.98 0.200 32 13.52
PUBLIC PARK A 3.21 0.98 0.850 32 20.15
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.516
SUBAREA RUNOFF(CFS) = 11.43
TOTAL AREA(ACRES) = 8.74 PEAK FLOW RATE(CFS) = 11.43

*****
FLOW PROCESS FROM NODE 1410.00 TO NODE 1411.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 713.10 DOWNSTREAM ELEVATION(FEET) = 704.70
STREET LENGTH(FEET) = 442.00 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) = 17.97
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.59
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.80
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.68
STREET FLOW TRAVEL TIME(MIN.) = 1.94 Tc(MIN.) = 15.46
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.805
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" A 9.03 0.98 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 9.03 SUBAREA RUNOFF(CFS) = 13.09
EFFECTIVE AREA(ACRES) = 17.77 AREA-AVERAGED Fm(INCH/HR) = 0.35
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.36

```



TOTAL AREA(ACRES) = 17.8 PEAK FLOW RATE(CFS) = 23.33

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 17.38  
FLOW VELOCITY(FEET/SEC.) = 4.03 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.91  
LONGEST FLOWPATH FROM NODE 1408.00 TO NODE 1411.00 = 1409.00 FEET.

PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.91

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	37.39	22.36	1.446	0.95( 0.47)	0.49	42.3	1400.00
2	35.91	17.17	1.695	0.98( 0.29)	0.30	28.4	1408.00

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	71.89	17.17	1.695	0.96( 0.38)	0.40	60.9	1408.00
2	66.95	22.36	1.446	0.96( 0.39)	0.41	70.7	1400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 71.89 Tc(MIN.) = 17.17  
EFFECTIVE AREA(ACRES) = 60.91 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.40  
TOTAL AREA(ACRES) = 70.7  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1412.00 = 3476.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1412.00 TO NODE 1413.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 689.26 DOWNSTREAM(FEET) = 685.10  
FLOW LENGTH(FEET) = 1154.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.34  
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 71.89  
PIPE TRAVEL TIME(MIN.) = 2.62 Tc(MIN.) = 19.79  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1413.00 = 4630.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1413.00 TO NODE 1413.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 19.79  
\* 10 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  
COMMERCIAL A 3.47 0.98 0.100 32  
PUBLIC PARK A 2.47 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.412  
SUBAREA AREA(ACRES) = 5.94 SUBAREA RUNOFF(CFS) = 6.17  
EFFECTIVE AREA(ACRES) = 66.85 AREA-AVERAGED Fm(INCH/HR) = 0.39  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.40

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1411.00 TO NODE 1412.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 695.20 DOWNSTREAM(FEET) = 689.26  
FLOW LENGTH(FEET) = 760.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.39  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 23.33  
PIPE TRAVEL TIME(MIN.) = 1.71 Tc(MIN.) = 17.17  
LONGEST FLOWPATH FROM NODE 1408.00 TO NODE 1412.00 = 2169.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 17.17  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.695  
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" A 10.63 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 10.63 SUBAREA RUNOFF(CFS) = 14.35  
EFFECTIVE AREA(ACRES) = 28.40 AREA-AVERAGED Fm(INCH/HR) = 0.29  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.30  
TOTAL AREA(ACRES) = 28.4 PEAK FLOW RATE(CFS) = 35.91

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 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.) = 17.17  
RAINFALL INTENSITY(INCH/HR) = 1.69  
AREA-AVERAGED Fm(INCH/HR) = 0.29  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.30  
EFFECTIVE STREAM AREA(ACRES) = 28.40  
TOTAL STREAM AREA(ACRES) = 28.40

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TOTAL AREA(ACRES) = 76.7 PEAK FLOW RATE(CFS) = 71.89
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 1413.00 TO NODE 1414.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 685.10 DOWNSTREAM(FEET) = 684.70
FLOW LENGTH(FEET) = 115.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.23
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 71.89
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 20.05
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1414.00 = 4745.00 FEET.

*****
FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 20.05
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.544
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.47 0.98 0.100 32
PUBLIC PARK A 0.31 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.398
SUBAREA AREA(ACRES) = 0.78 SUBAREA RUNOFF(CFS) = 0.81
EFFECTIVE AREA(ACRES) = 67.63 AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 77.5 PEAK FLOW RATE(CFS) = 71.89
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 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.) = 20.05
RAINFALL INTENSITY(INCH/HR) = 1.54
AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.96
AREA-AVERAGED Ap = 0.40
EFFECTIVE STREAM AREA(ACRES) = 67.63
TOTAL STREAM AREA(ACRES) = 77.46
PEAK FLOW RATE(CFS) AT CONFLUENCE = 71.89

*****
FLOW PROCESS FROM NODE 1416.00 TO NODE 1418.00 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) = 808.00
ELEVATION DATA: UPSTREAM(FEET) = 723.95 DOWNSTREAM(FEET) = 719.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.882
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.776
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 A 0.48 0.98 0.850 32 19.72
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 9.00 0.98 0.500 32 15.88
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.518
SUBAREA RUNOFF(CFS) = 10.85
TOTAL AREA(ACRES) = 9.48 PEAK FLOW RATE(CFS) = 10.85

*****
FLOW PROCESS FROM NODE 1418.00 TO NODE 1420.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 719.30 DOWNSTREAM(FEET) = 716.00
FLOW LENGTH(FEET) = 1042.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.35
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.85
PIPE TRAVEL TIME(MIN.) = 3.99 Tc(MIN.) = 19.87
LONGEST FLOWPATH FROM NODE 1416.00 TO NODE 1420.00 = 1850.00 FEET.

*****
FLOW PROCESS FROM NODE 1420.00 TO NODE 1420.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 19.87
* 10 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
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 18.91 0.98 0.500 32
PUBLIC PARK A 5.71 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.581
SUBAREA AREA(ACRES) = 24.62 SUBAREA RUNOFF(CFS) = 21.84
EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.56
TOTAL AREA(ACRES) = 34.1 PEAK FLOW RATE(CFS) = 30.78

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\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1420.00 TO NODE 1414.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 716.00 DOWNSTREAM(FEET) = 684.71  
 FLOW LENGTH(FEET) = 1225.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.35  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 30.78  
 PIPE TRAVEL TIME(MIN.) = 1.65 Tc(MIN.) = 21.53  
 LONGEST FLOWPATH FROM NODE 1416.00 TO NODE 1414.00 = 3075.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 21.53  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.480  
 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"	A	6.57	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.00	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 9.57 SUBAREA RUNOFF(CFS) = 9.10  
 EFFECTIVE AREA(ACRES) = 43.67 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.55  
 TOTAL AREA(ACRES) = 43.7 PEAK FLOW RATE(CFS) = 37.65

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 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.) = 21.53  
 RAINFALL INTENSITY(INCH/HR) = 1.48  
 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.95  
 AREA-AVERAGED Ap = 0.55  
 EFFECTIVE STREAM AREA(ACRES) = 43.67  
 TOTAL STREAM AREA(ACRES) = 43.67  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 37.65

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
------------------	------------	--------------	------------------------	---------------------	----	---------------	-------------------

1	71.89	20.05	1.544	0.96( 0.39)	0.40	67.6	1408.00
1	66.95	25.34	1.342	0.96( 0.40)	0.41	77.5	1400.00
2	37.65	21.53	1.480	0.95( 0.52)	0.55	43.7	1416.00

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	109.32	20.05	1.544	0.96( 0.44)	0.46	108.3	1408.00
2	108.16	21.53	1.480	0.96( 0.44)	0.46	114.0	1416.00
3	99.18	25.34	1.342	0.96( 0.44)	0.46	121.1	1400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 109.32 Tc(MIN.) = 20.05  
 EFFECTIVE AREA(ACRES) = 108.31 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA(ACRES) = 121.1  
 LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1414.00 = 4745.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1414.00 TO NODE 1435.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 684.71 DOWNSTREAM(FEET) = 683.09  
 FLOW LENGTH(FEET) = 487.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.91  
 ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 109.32  
 PIPE TRAVEL TIME(MIN.) = 1.03 Tc(MIN.) = 21.08  
 LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1435.00 = 5232.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1435.00 TO NODE 1435.00 IS CODE = 81  
 -----

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

=====

MAINLINE Tc(MIN.) = 21.08  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.499  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.87	0.57	0.100	69
PUBLIC PARK	C	0.86	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.336  
 SUBAREA AREA(ACRES) = 2.73 SUBAREA RUNOFF(CFS) = 3.21  
 EFFECTIVE AREA(ACRES) = 111.04 AREA-AVERAGED Fm(INCH/HR) = 0.43  
 AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 123.9 PEAK FLOW RATE(CFS) = 109.32  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1435.00 TO NODE 1435.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 21.08  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.499  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 2.34 0.98 0.100 32  
PUBLIC PARK A 1.34 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373  
SUBAREA AREA(ACRES) = 3.68 SUBAREA RUNOFF(CFS) = 3.76  
EFFECTIVE AREA(ACRES) = 114.72 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 127.5 PEAK FLOW RATE(CFS) = 110.51

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1435.00 TO NODE 1436.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 683.09 DOWNSTREAM(FEET) = 680.30  
FLOW LENGTH(FEET) = 1164.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 45.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.98  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 110.51  
PIPE TRAVEL TIME(MIN.) = 2.78 Tc(MIN.) = 23.86  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1436.00 = 6396.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1436.00 TO NODE 1436.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 23.86  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.391  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK C 0.70 0.57 0.850 69  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 11.11 0.57 0.500 69  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 14.80 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.509  
SUBAREA AREA(ACRES) = 26.61 SUBAREA RUNOFF(CFS) = 23.69  
EFFECTIVE AREA(ACRES) = 141.33 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 154.1 PEAK FLOW RATE(CFS) = 123.12

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1436.00 TO NODE 1438.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 680.30 DOWNSTREAM(FEET) = 680.00  
FLOW LENGTH(FEET) = 83.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 44.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.32  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 123.12  
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 24.02  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1438.00 = 6479.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 24.02  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.385  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 2.57 0.98 0.100 32  
PUBLIC PARK A 1.70 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.399  
SUBAREA AREA(ACRES) = 4.27 SUBAREA RUNOFF(CFS) = 3.83  
EFFECTIVE AREA(ACRES) = 145.60 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 158.4 PEAK FLOW RATE(CFS) = 126.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 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	126.22	24.02	1.385	0.92( 0.42)	0.46	145.6	1408.00
2	124.18	25.50	1.337	0.92( 0.42)	0.46	151.3	1416.00
3	114.02	29.43	1.226	0.92( 0.43)	0.46	158.4	1400.00

LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1438.00 = 6479.00 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	143.93	26.72	1.300	0.92( 0.46)	0.50	190.8	1208.00
2	138.43	32.10	1.164	0.92( 0.46)	0.50	219.4	1218.00
3	128.66	35.66	1.093	0.92( 0.46)	0.50	226.6	1200.00

LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1438.00 = 8858.00 FEET.

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	268.85	24.02	1.385	0.92 ( 0.44)	0.48	317.1	1408.00
2	267.60	25.50	1.337	0.92 ( 0.44)	0.48	333.4	1416.00
3	264.98	26.72	1.300	0.92 ( 0.45)	0.48	344.3	1208.00
4	255.17	29.43	1.226	0.92 ( 0.45)	0.48	363.6	1400.00
5	243.60	32.10	1.164	0.92 ( 0.45)	0.49	377.8	1218.00
6	223.65	35.66	1.093	0.92 ( 0.45)	0.49	385.0	1200.00
TOTAL AREA(ACRES) =		385.0					

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 268.85 Tc(MIN.) = 24.024  
EFFECTIVE AREA(ACRES) = 317.12 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 385.0  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1438.00 = 8858.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 12  
-----

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1438.00 TO NODE 1440.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 679.57 DOWNSTREAM(FEET) = 676.80  
FLOW LENGTH(FEET) = 519.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 54.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.77  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 268.85  
PIPE TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 24.76  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1440.00 = 9377.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1440.00 TO NODE 1440.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 24.76  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.361  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.57	0.98	0.100	32
PUBLIC PARK	A	0.90	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.559  
SUBAREA AREA(ACRES) = 1.47 SUBAREA RUNOFF(CFS) = 1.08  
EFFECTIVE AREA(ACRES) = 318.59 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.48

TOTAL AREA(ACRES) = 386.5 PEAK FLOW RATE(CFS) = 268.85  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1440.00 TO NODE 1440.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 24.76  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.361  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	14.37	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 14.37 SUBAREA RUNOFF(CFS) = 15.08  
EFFECTIVE AREA(ACRES) = 332.96 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.47  
TOTAL AREA(ACRES) = 400.8 PEAK FLOW RATE(CFS) = 277.92

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1440.00 TO NODE 1442.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 676.80 DOWNSTREAM(FEET) = 674.80  
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 78.0 INCH PIPE IS 59.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.26  
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 277.92  
PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 25.65  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1442.00 = 9927.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1442.00 TO NODE 1442.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 25.65  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.332  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.75	0.98	0.100	32
PUBLIC PARK	A	1.00	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.529  
SUBAREA AREA(ACRES) = 1.75 SUBAREA RUNOFF(CFS) = 1.29  
EFFECTIVE AREA(ACRES) = 334.71 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.47  
TOTAL AREA(ACRES) = 402.6 PEAK FLOW RATE(CFS) = 277.92  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1442.00 TO NODE 1442.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 25.65  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.332  
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" A 13.37 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 13.37 SUBAREA RUNOFF(CFS) = 13.68  
EFFECTIVE AREA(ACRES) = 348.08 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 415.9 PEAK FLOW RATE(CFS) = 284.31

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1442.00 TO NODE 1442.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 25.65  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.332  
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" A 16.54 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 16.54 SUBAREA RUNOFF(CFS) = 16.93  
EFFECTIVE AREA(ACRES) = 364.62 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 432.5 PEAK FLOW RATE(CFS) = 301.24

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1442.00 TO NODE 1444.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 674.80 DOWNSTREAM(FEET) = 673.00  
FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.0 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC. ) = 11.38  
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 301.24  
PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 26.24  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1444.00 = 10327.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1444.00 TO NODE 1444.00 IS CODE = 81  
-----

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
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-----  
MAINLINE Tc(MIN.) = 26.24  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.314  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.56 0.98 0.100 32  
PUBLIC PARK A 0.90 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.562  
SUBAREA AREA(ACRES) = 1.46 SUBAREA RUNOFF(CFS) = 1.01  
EFFECTIVE AREA(ACRES) = 366.08 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 433.9 PEAK FLOW RATE(CFS) = 301.24  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1444.00 TO NODE 1444.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 26.24  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.314  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 5.38 0.98 0.850 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 10.00 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427  
SUBAREA AREA(ACRES) = 15.38 SUBAREA RUNOFF(CFS) = 12.42  
EFFECTIVE AREA(ACRES) = 381.46 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 449.3 PEAK FLOW RATE(CFS) = 308.78

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1444.00 TO NODE 1444.00 IS CODE = 81  
-----

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

-----  
MAINLINE Tc(MIN.) = 26.24  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.314  
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" A 0.85 0.98 0.200 32  
PUBLIC PARK A 6.16 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.771  
SUBAREA AREA(ACRES) = 7.01 SUBAREA RUNOFF(CFS) = 3.55  
EFFECTIVE AREA(ACRES) = 388.47 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45



TOTAL AREA(ACRES) = 456.3 PEAK FLOW RATE(CFS) = 312.33

\*\*\*\*\*

FLOW PROCESS FROM NODE 1444.00 TO NODE 1446.00 IS CODE = 31

-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 668.10  
FLOW LENGTH(FEET) = 1150.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 78.0 INCH PIPE IS 61.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.14  
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 312.33  
PIPE TRAVEL TIME(MIN.) = 1.72 Tc(MIN.) = 27.96  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1446.00 = 11477.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1446.00 TO NODE 1446.00 IS CODE = 81

-----

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

=====

MAINLINE Tc(MIN.) = 27.96  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.265  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	2.80	0.98	0.850	32
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	11.54	0.98	0.200	32
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	0.87	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.96  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.320  
SUBAREA AREA(ACRES) = 15.21 SUBAREA RUNOFF(CFS) = 13.11  
EFFECTIVE AREA(ACRES) = 403.68 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 471.5 PEAK FLOW RATE(CFS) = 312.33  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 1446.00 TO NODE 1446.00 IS CODE = 81

-----

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

=====

MAINLINE Tc(MIN.) = 27.96  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.265  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	6.48	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 6.48 SUBAREA RUNOFF(CFS) = 6.24  
EFFECTIVE AREA(ACRES) = 410.16 AREA-AVERAGED Fm(INCH/HR) = 0.41

AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 478.0 PEAK FLOW RATE(CFS) = 314.51

\*\*\*\*\*

FLOW PROCESS FROM NODE 1446.00 TO NODE 1447.00 IS CODE = 31

-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 668.10 DOWNSTREAM(FEET) = 668.00  
FLOW LENGTH(FEET) = 104.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 102.0 INCH PIPE IS 83.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.34  
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 314.51  
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 28.23  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1447.00 = 11581.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1447.00 TO NODE 1447.00 IS CODE = 81

-----

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

=====

MAINLINE Tc(MIN.) = 28.23  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.258  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.63	0.98	0.100	32
PUBLIC PARK	A	2.14	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.526  
SUBAREA AREA(ACRES) = 3.77 SUBAREA RUNOFF(CFS) = 2.53  
EFFECTIVE AREA(ACRES) = 413.93 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 481.8 PEAK FLOW RATE(CFS) = 314.51  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 1447.00 TO NODE 1448.00 IS CODE = 31

-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 668.00 DOWNSTREAM(FEET) = 667.90  
FLOW LENGTH(FEET) = 76.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 102.0 INCH PIPE IS 72.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.30  
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 314.51  
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 28.40  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1448.00 = 11657.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1448.00 TO NODE 1448.00 IS CODE = 10

-----



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

=====

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1448.10 TO NODE 1449.00 IS CODE = 21

-----

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 780.00  
ELEVATION DATA: UPSTREAM(FEET) = 690.40 DOWNSTREAM(FEET) = 682.80

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.993  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.705  
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 A 4.79 0.98 0.850 32 17.50  
RESIDENTIAL(ARID)  
"1 DWELLING/ACRE" A 3.20 0.75 0.800 32/62 16.99  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.830  
SUBAREA RUNOFF(CFS) = 6.96  
TOTAL AREA(ACRES) = 7.99 PEAK FLOW RATE(CFS) = 6.96

\*\*\*\*\*

FLOW PROCESS FROM NODE 1449.00 TO NODE 1450.00 IS CODE = 31

-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 673.80 DOWNSTREAM(FEET) = 673.00  
FLOW LENGTH(FEET) = 285.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.73  
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 6.96  
PIPE TRAVEL TIME(MIN.) = 1.27 Tc(MIN.) = 18.27  
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1450.00 = 1065.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1450.00 TO NODE 1450.00 IS CODE = 81

-----

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

=====

MAINLINE Tc(MIN.) = 18.27  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.633  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 3.09 0.98 0.850 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 8.00 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.381

SUBAREA AREA(ACRES) = 11.09 SUBAREA RUNOFF(CFS) = 12.59  
EFFECTIVE AREA(ACRES) = 19.08 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.57  
TOTAL AREA(ACRES) = 19.1 PEAK FLOW RATE(CFS) = 19.03

\*\*\*\*\*

FLOW PROCESS FROM NODE 1450.00 TO NODE 1452.00 IS CODE = 31

-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 671.30  
FLOW LENGTH(FEET) = 422.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.55  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 19.03  
PIPE TRAVEL TIME(MIN.) = 1.27 Tc(MIN.) = 19.53  
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1452.00 = 1487.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1452.00 TO NODE 1452.00 IS CODE = 81

-----

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

=====

MAINLINE Tc(MIN.) = 19.53  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.569  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.40 0.98 0.100 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 6.80 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.183  
SUBAREA AREA(ACRES) = 8.20 SUBAREA RUNOFF(CFS) = 10.26  
EFFECTIVE AREA(ACRES) = 27.28 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 27.3 PEAK FLOW RATE(CFS) = 28.19

\*\*\*\*\*

FLOW PROCESS FROM NODE 1452.00 TO NODE 1452.00 IS CODE = 81

-----

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

=====

MAINLINE Tc(MIN.) = 19.53  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.569  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.28 0.98 0.100 32  
PUBLIC PARK A 1.00 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.686  
SUBAREA AREA(ACRES) = 1.28 SUBAREA RUNOFF(CFS) = 1.04  
EFFECTIVE AREA(ACRES) = 28.56 AREA-AVERAGED Fm(INCH/HR) = 0.43

AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 28.6 PEAK FLOW RATE(CFS) = 29.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1452.00 TO NODE 1454.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 671.30 DOWNSTREAM(FEET) = 670.93  
FLOW LENGTH(FEET) = 127.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.43  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 29.22  
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 19.92  
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1454.00 = 1614.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1454.00 TO NODE 1454.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.92  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.550  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.84 0.98 0.100 32  
PUBLIC PARK A 0.66 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430  
SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 1.53  
EFFECTIVE AREA(ACRES) = 30.06 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 30.1 PEAK FLOW RATE(CFS) = 30.28

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1454.00 TO NODE 1456.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 670.93 DOWNSTREAM(FEET) = 669.15  
FLOW LENGTH(FEET) = 836.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.88  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 30.28  
PIPE TRAVEL TIME(MIN.) = 2.86 Tc(MIN.) = 22.78  
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1456.00 = 2450.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1456.00 TO NODE 1456.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 22.78  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.430  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.42 0.98 0.100 32  
PUBLIC PARK A 0.33 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430  
SUBAREA AREA(ACRES) = 0.75 SUBAREA RUNOFF(CFS) = 0.68  
EFFECTIVE AREA(ACRES) = 30.81 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 30.8 PEAK FLOW RATE(CFS) = 30.28  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1456.00 TO NODE 1448.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 669.15 DOWNSTREAM(FEET) = 667.90  
FLOW LENGTH(FEET) = 186.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.39  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 30.28  
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 23.20  
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1448.00 = 2636.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1448.00 TO NODE 1448.00 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	30.28	23.20	1.415	0.93( 0.43)	0.46	30.8	1448.10

LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1448.00 = 2636.00 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	314.51	28.40	1.253	0.93( 0.41)	0.44	413.9	1408.00
2	311.22	29.90	1.215	0.93( 0.42)	0.45	430.2	1416.00
3	307.08	31.12	1.186	0.93( 0.42)	0.45	441.1	1208.00
4	294.91	33.88	1.127	0.93( 0.42)	0.45	460.5	1400.00
5	281.35	36.59	1.076	0.93( 0.42)	0.45	474.6	1218.00
6	259.29	40.28	1.016	0.93( 0.42)	0.45	481.8	1200.00

LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1448.00 = 11657.00 FEET.

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

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
--------	---	----	-----------	--------	----	----	-----------

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	336.68	23.20	1.415	0.93( 0.42)	0.45	368.9 1448.10
2	339.81	28.40	1.253	0.93( 0.42)	0.45	444.7 1408.00
3	335.35	29.90	1.215	0.93( 0.42)	0.45	461.0 1416.00
4	330.32	31.12	1.186	0.93( 0.42)	0.45	471.9 1208.00
5	316.33	33.88	1.127	0.93( 0.42)	0.45	491.3 1400.00
6	301.21	36.59	1.076	0.93( 0.42)	0.45	505.4 1218.00
7	277.30	40.28	1.016	0.93( 0.42)	0.45	512.6 1200.00
TOTAL AREA(ACRES) =		512.6				

PEAK FLOW RATE(CFS) = 339.81

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	336.68	23.39	1.408	0.93( 0.41)	0.45	372.0	1448.10
2	339.81	28.60	1.248	0.93( 0.41)	0.45	447.9	1408.00
3	335.35	30.10	1.210	0.93( 0.42)	0.45	464.2	1416.00
4	330.32	31.32	1.182	0.93( 0.42)	0.45	475.0	1208.00
5	316.33	34.08	1.123	0.93( 0.42)	0.45	494.4	1400.00
6	301.21	36.79	1.073	0.93( 0.42)	0.45	508.6	1218.00
7	277.30	40.48	1.013	0.93( 0.42)	0.45	515.7	1200.00

END OF RATIONAL METHOD ANALYSIS

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 339.81 Tc(MIN.) = 28.405  
EFFECTIVE AREA(ACRES) = 444.74 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 512.6  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1448.00 = 11657.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1448.00 TO NODE 1458.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM( FEET) = 667.90 DOWNSTREAM( FEET) = 667.70  
FLOW LENGTH( FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 93.0 INCH PIPE IS 72.8 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC.) = 8.58  
ESTIMATED PIPE DIAMETER( INCH) = 93.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 339.81  
PIPE TRAVEL TIME( MIN.) = 0.19 Tc( MIN.) = 28.60  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1458.00 = 11757.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1458.00 TO NODE 1458.00 IS CODE = 81

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

MAINLINE Tc( MIN.) = 28.60  
\* 10 YEAR RAINFALL INTENSITY( INCH/HR) = 1.248  
SUBAREA LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.68	0.57	0.100	69
PUBLIC PARK	C	1.46	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.449  
SUBAREA AREA( ACRES) = 3.14 SUBAREA RUNOFF( CFS) = 2.81  
EFFECTIVE AREA( ACRES) = 447.88 AREA-AVERAGED Fm( INCH/HR) = 0.41  
AREA-AVERAGED Fp( INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA( ACRES) = 515.7 PEAK FLOW RATE( CFS) = 339.81  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF STUDY SUMMARY:  
TOTAL AREA( ACRES) = 515.7 TC( MIN.) = 28.60  
EFFECTIVE AREA( ACRES) = 447.88 AREA-AVERAGED Fm( INCH/HR) = 0.41  
AREA-AVERAGED Fp( INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.446



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* HELLMAN - SOUTH OF CHINO \*  
\* 100-YR STUDY \*  
\* AREA 'G' \*  
\*\*\*\*\*

FILE NAME: HLM-D.DAT  
TIME/DATE OF STUDY: 17:38 10/16/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====  
--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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- / SIDE / SIDE / WAY	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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1200.00 TO NODE 1202.00 IS CODE = 21  
-----

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

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 933.00  
ELEVATION DATA: UPSTREAM(FEET) = 747.90 DOWNSTREAM(FEET) = 742.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.509  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.603  
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  
"5-7 DWELLINGS/ACRE" A 9.74 0.98 0.500 32 16.51  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 18.54  
TOTAL AREA(ACRES) = 9.74 PEAK FLOW RATE(CFS) = 18.54

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1202.00 TO NODE 1204.00 IS CODE = 62  
-----

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

===== UPSTREAM ELEVATION(FEET) = 742.00 DOWNSTREAM ELEVATION(FEET) = 739.50  
STREET LENGTH(FEET) = 484.00 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) = 29.15  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.60  
HALFSTREET FLOOD WIDTH(FEET) = 24.57  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.57  
STREET FLOW TRAVEL TIME(MIN.) = 3.09 Tc(MIN.) = 19.60  
\* 100 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  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 12.00 0.98 0.500 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 0.59 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.96  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 12.59 SUBAREA RUNOFF(CFS) = 21.19  
EFFECTIVE AREA(ACRES) = 22.33 AREA-AVERAGED Fm(INCH/HR) = 0.48

AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 22.3 PEAK FLOW RATE(CFS) = 37.50

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.65 HALFSTREET FLOOD WIDTH(FEET) = 27.15  
FLOW VELOCITY(FEET/SEC.) = 2.77 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.79  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1204.00 = 1417.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1204.00 TO NODE 1206.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 730.00 DOWNSTREAM(FEET) = 725.60  
FLOW LENGTH(FEET) = 832.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.26  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 37.50  
PIPE TRAVEL TIME(MIN.) = 1.91 Tc(MIN.) = 21.51  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1206.00 = 2249.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1206.00 TO NODE 1206.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 21.51  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.221  
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"	A	6.87	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	6.38	0.57	0.500	69
PUBLIC PARK	A	2.12	0.98	0.850	32
PUBLIC PARK	C	2.17	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.77  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.586  
SUBAREA AREA(ACRES) = 17.54 SUBAREA RUNOFF(CFS) = 27.90  
EFFECTIVE AREA(ACRES) = 39.87 AREA-AVERAGED Fm(INCH/HR) = 0.47  
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.54  
TOTAL AREA(ACRES) = 39.9 PEAK FLOW RATE(CFS) = 62.84

\*\*\*\*\*

FLOW PROCESS FROM NODE 1206.00 TO NODE 1206.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 21.51  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.221  
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"	A	6.87	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	6.38	0.57	0.500	69
PUBLIC PARK	A	2.12	0.98	0.850	32
PUBLIC PARK	C	2.17	0.57	0.850	69

COMMERCIAL C 3.61 0.57 0.100 69  
PUBLIC PARK C 3.50 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.469  
SUBAREA AREA(ACRES) = 7.11 SUBAREA RUNOFF(CFS) = 12.51  
EFFECTIVE AREA(ACRES) = 46.98 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 47.0 PEAK FLOW RATE(CFS) = 75.35

\*\*\*\*\*

FLOW PROCESS FROM NODE 1206.00 TO NODE 1214.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 725.60 DOWNSTREAM(FEET) = 709.66  
FLOW LENGTH(FEET) = 1284.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.84  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 75.35  
PIPE TRAVEL TIME(MIN.) = 1.81 Tc(MIN.) = 23.32  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1214.00 = 3533.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 23.32  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.116  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	2.63	0.57	0.100	69
PUBLIC PARK	C	2.52	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467  
SUBAREA AREA(ACRES) = 5.15 SUBAREA RUNOFF(CFS) = 8.58  
EFFECTIVE AREA(ACRES) = 52.13 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.81 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 52.1 PEAK FLOW RATE(CFS) = 79.49

\*\*\*\*\*

FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 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.) = 23.32  
RAINFALL INTENSITY(INCH/HR) = 2.12  
AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.81  
AREA-AVERAGED Ap = 0.52  
EFFECTIVE STREAM AREA(ACRES) = 52.13

TOTAL STREAM AREA(ACRES) = 52.13  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 79.49

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1208.00 TO NODE 1210.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 976.00  
ELEVATION DATA: UPSTREAM(FEET) = 734.70 DOWNSTREAM(FEET) = 729.70

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.701  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.911  
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  
"5-7 DWELLINGS/ACRE" C 3.65 0.57 0.500 69 17.53  
COMMERCIAL C 0.50 0.57 0.100 69 13.70  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 4.39 0.98 0.500 32 17.53  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.477  
SUBAREA RUNOFF(CFS) = 19.49  
TOTAL AREA(ACRES) = 8.54 PEAK FLOW RATE(CFS) = 19.49

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1210.00 TO NODE 1214.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 723.50 DOWNSTREAM(FEET) = 709.66  
FLOW LENGTH(FEET) = 948.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.06  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 19.49  
PIPE TRAVEL TIME(MIN.) = 1.74 Tc(MIN.) = 15.44  
LONGEST FLOWPATH FROM NODE 1208.00 TO NODE 1214.00 = 1924.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 15.44  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.709  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.50 0.57 0.100 69  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 4.44 0.57 0.500 69

RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 8.94 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.486  
SUBAREA AREA(ACRES) = 13.88 SUBAREA RUNOFF(CFS) = 28.76  
EFFECTIVE AREA(ACRES) = 22.42 AREA-AVERAGED Fm(INCH/HR) = 0.39  
AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 22.4 PEAK FLOW RATE(CFS) = 46.70

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 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.) = 15.44  
RAINFALL INTENSITY(INCH/HR) = 2.71  
AREA-AVERAGED Fm(INCH/HR) = 0.39  
AREA-AVERAGED Fp(INCH/HR) = 0.82  
AREA-AVERAGED Ap = 0.48  
EFFECTIVE STREAM AREA(ACRES) = 22.42  
TOTAL STREAM AREA(ACRES) = 22.42  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 46.70

\*\* CONFLUENCE DATA \*\*  
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
1 79.49 23.32 2.116 0.81( 0.42) 0.52 52.1 1200.00  
2 46.70 15.44 2.709 0.82( 0.39) 0.48 22.4 1208.00

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  
1 117.79 15.44 2.709 0.81( 0.41) 0.51 56.9 1208.00  
2 114.22 23.32 2.116 0.81( 0.41) 0.51 74.6 1200.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 117.79 Tc(MIN.) = 15.44  
EFFECTIVE AREA(ACRES) = 56.95 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.81 AREA-AVERAGED Ap = 0.51  
TOTAL AREA(ACRES) = 74.6  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1214.00 = 3533.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1214.00 TO NODE 1216.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 709.66 DOWNSTREAM(FEET) = 706.06  
FLOW LENGTH(FEET) = 1211.00 MANNING'S N = 0.013



DEPTH OF FLOW IN 60.0 INCH PIPE IS 43.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.73  
 ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 117.79  
 PIPE TRAVEL TIME(MIN.) = 2.61 Tc(MIN.) = 18.05  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1216.00 = 4744.00 FEET.

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.884  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.568  
 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 "5-7 DWELLINGS/ACRE"	A	7.45	0.98	0.500	32	16.88

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 13.95  
 TOTAL AREA(ACRES) = 7.45 PEAK FLOW RATE(CFS) = 13.95

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 IS CODE = 81  
 -----

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

MAINLINE Tc(MIN.) = 18.05  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.467  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.15	0.98	0.100	32
URBAN GOOD COVER "TURF"	A	1.17	0.97	1.000	33
COMMERCIAL	C	1.30	0.57	0.100	69
URBAN GOOD COVER "TURF"	C	0.33	0.52	1.000	72

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.86  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373  
 SUBAREA AREA(ACRES) = 4.95 SUBAREA RUNOFF(CFS) = 9.56  
 EFFECTIVE AREA(ACRES) = 61.90 AREA-AVERAGED Fm(INCH/HR) = 0.40  
 AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 79.5 PEAK FLOW RATE(CFS) = 117.79  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1220.00 TO NODE 1222.00 IS CODE = 62  
 -----

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

UPSTREAM ELEVATION(FEET) = 747.30 DOWNSTREAM ELEVATION(FEET) = 740.80  
 STREET LENGTH(FEET) = 552.00 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) = 18.10

STRETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.47  
 HALFSTREET FLOOD WIDTH(FEET) = 17.23  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.18  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.50  
 STREET FLOW TRAVEL TIME(MIN.) = 2.89 Tc(MIN.) = 19.77  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.336

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"	A	4.99	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 4.99 SUBAREA RUNOFF(CFS) = 8.30  
 EFFECTIVE AREA(ACRES) = 12.44 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 12.4 PEAK FLOW RATE(CFS) = 20.69

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 18.24  
 FLOW VELOCITY(FEET/SEC.) = 3.27 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.60  
 LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1222.00 = 1437.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 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.) = 18.05  
 RAINFALL INTENSITY(INCH/HR) = 2.47  
 AREA-AVERAGED Fm(INCH/HR) = 0.40  
 AREA-AVERAGED Fp(INCH/HR) = 0.82  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA(ACRES) = 61.90  
 TOTAL STREAM AREA(ACRES) = 79.50  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 117.79

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1218.00 TO NODE 1220.00 IS CODE = 21  
 -----

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 885.00  
 ELEVATION DATA: UPSTREAM(FEET) = 751.80 DOWNSTREAM(FEET) = 747.30

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*****
FLOW PROCESS FROM NODE 1222.00 TO NODE 1224.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 734.80 DOWNSTREAM(FEET) = 730.30
FLOW LENGTH(FEET) = 587.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.19
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.69
PIPE TRAVEL TIME(MIN.) = 1.36 Tc(MIN.) = 21.13
LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1224.00 = 2024.00 FEET.
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*****
FLOW PROCESS FROM NODE 1224.00 TO NODE 1224.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.244
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" A 18.00 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 18.00 SUBAREA RUNOFF(CFS) = 28.46
EFFECTIVE AREA(ACRES) = 30.44 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 30.4 PEAK FLOW RATE(CFS) = 48.13
```

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*****
FLOW PROCESS FROM NODE 1224.00 TO NODE 1226.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 730.30 DOWNSTREAM(FEET) = 725.20
FLOW LENGTH(FEET) = 436.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.32
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 48.13
PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 21.84
LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1226.00 = 2460.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 1226.00 TO NODE 1226.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.84
```

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* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.201
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" A 7.68 0.98 0.500 32
PUBLIC PARK A 5.74 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.650
SUBAREA AREA(ACRES) = 13.42 SUBAREA RUNOFF(CFS) = 18.93
EFFECTIVE AREA(ACRES) = 43.86 AREA-AVERAGED Fm(INCH/HR) = 0.53
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 43.9 PEAK FLOW RATE(CFS) = 65.86
```

```
*****
FLOW PROCESS FROM NODE 1226.00 TO NODE 1228.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 725.20 DOWNSTREAM(FEET) = 721.80
FLOW LENGTH(FEET) = 427.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.58
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 65.86
PIPE TRAVEL TIME(MIN.) = 0.74 Tc(MIN.) = 22.58
LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1228.00 = 2887.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 1228.00 TO NODE 1228.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.58
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.157
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" A 13.38 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 13.38 SUBAREA RUNOFF(CFS) = 20.10
EFFECTIVE AREA(ACRES) = 57.24 AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 57.2 PEAK FLOW RATE(CFS) = 84.24
```

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*****
FLOW PROCESS FROM NODE 1228.00 TO NODE 1216.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 721.80 DOWNSTREAM(FEET) = 706.06
FLOW LENGTH(FEET) = 571.00 MANNING'S N = 0.013
```

DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.52  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 84.24  
 PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 23.16  
 LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1216.00 = 3458.00 FEET.

1	224.08	18.05	2.467	0.90( 0.46)	0.51	122.3	1208.00
2	227.96	23.16	2.124	0.90( 0.46)	0.51	150.7	1218.00
3	216.77	25.99	1.982	0.90( 0.46)	0.51	157.0	1200.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 227.96 Tc(MIN.) = 23.16  
 EFFECTIVE AREA(ACRES) = 150.75 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 157.0  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1216.00 = 4744.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 23.16  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.124  
 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" A 20.29 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 20.29 SUBAREA RUNOFF(CFS) = 29.89  
 EFFECTIVE AREA(ACRES) = 77.53 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 77.5 PEAK FLOW RATE(CFS) = 112.46

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 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.) = 23.16  
 RAINFALL INTENSITY(INCH/HR) = 2.12  
 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.53  
 EFFECTIVE STREAM AREA(ACRES) = 77.53  
 TOTAL STREAM AREA(ACRES) = 77.53  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 112.46

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	117.79	18.05	2.467	0.82( 0.40)	0.50	61.9	1208.00
1	114.22	25.99	1.982	0.81( 0.41)	0.50	79.5	1200.00
2	112.46	23.16	2.124	0.98( 0.51)	0.53	77.5	1218.00

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	117.79	18.05	2.467	0.82( 0.40)	0.50	61.9	1208.00
1	114.22	25.99	1.982	0.81( 0.41)	0.50	79.5	1200.00
2	112.46	23.16	2.124	0.98( 0.51)	0.53	77.5	1218.00

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1230.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 706.06 DOWNSTREAM(FEET) = 702.46  
 FLOW LENGTH(FEET) = 1548.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 78.0 INCH PIPE IS 60.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.23  
 ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 227.96  
 PIPE TRAVEL TIME(MIN.) = 3.14 Tc(MIN.) = 26.29  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1230.00 = 6292.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1230.00 TO NODE 1230.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.29  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.969  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 3.60 0.98 0.100 32  
 PUBLIC PARK A 1.94 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.363  
 SUBAREA AREA(ACRES) = 5.54 SUBAREA RUNOFF(CFS) = 8.05  
 EFFECTIVE AREA(ACRES) = 156.29 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 162.6 PEAK FLOW RATE(CFS) = 227.96  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1230.00 TO NODE 1230.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.29  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.969  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL A 5.27 0.98 0.100 32  
PUBLIC PARK A 1.67 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.280  
SUBAREA AREA(ACRES) = 6.94 SUBAREA RUNOFF(CFS) = 10.59  
EFFECTIVE AREA(ACRES) = 163.23 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 169.5 PEAK FLOW RATE(CFS) = 227.96  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

PUBLIC PARK A 2.28 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.532  
SUBAREA AREA(ACRES) = 3.96 SUBAREA RUNOFF(CFS) = 4.85  
EFFECTIVE AREA(ACRES) = 170.02 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 176.3 PEAK FLOW RATE(CFS) = 227.96  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1230.00 TO NODE 1230.00 IS CODE = 81  
-----

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

=====

MAINLINE Tc(MIN.) = 26.29  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.969  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.18	0.98	0.100	32
PUBLIC PARK	A	0.65	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.272  
SUBAREA AREA(ACRES) = 2.83 SUBAREA RUNOFF(CFS) = 4.34  
EFFECTIVE AREA(ACRES) = 166.06 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 172.3 PEAK FLOW RATE(CFS) = 227.96  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1433.00 TO NODE 1434.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 698.90 DOWNSTREAM(FEET) = 698.40  
FLOW LENGTH(FEET) = 170.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 75.0 INCH PIPE IS 57.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.00  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 227.96  
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 28.71  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1434.00 = 7620.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1434.00 TO NODE 1434.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 28.71  
\* 100 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
PUBLIC PARK	A	1.43	0.98	0.850	32
RESIDENTIAL	A	7.50	0.98	0.500	32

"5-7 DWELLINGS/ACRE"  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.556  
SUBAREA AREA(ACRES) = 8.93 SUBAREA RUNOFF(CFS) = 10.65  
EFFECTIVE AREA(ACRES) = 178.95 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 185.2 PEAK FLOW RATE(CFS) = 227.96  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1230.00 TO NODE 1433.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 702.46 DOWNSTREAM(FEET) = 698.90  
FLOW LENGTH(FEET) = 1158.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.18  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 227.96  
PIPE TRAVEL TIME(MIN.) = 2.10 Tc(MIN.) = 28.40  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1433.00 = 7450.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1434.00 TO NODE 1434.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 28.71  
\* 100 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
PUBLIC PARK	A	2.80	0.98	0.850	32

RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 15.00 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.555  
 SUBAREA AREA(ACRES) = 17.80 SUBAREA RUNOFF(CFS) = 21.25  
 EFFECTIVE AREA(ACRES) = 196.75 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 203.0 PEAK FLOW RATE(CFS) = 249.11

SUBAREA AREA(ACRES) = 4.18 SUBAREA RUNOFF(CFS) = 4.93  
 EFFECTIVE AREA(ACRES) = 201.81 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 208.1 PEAK FLOW RATE(CFS) = 250.51  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1437.00 TO NODE 1438.00 IS CODE = 31

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1434.00 TO NODE 1434.00 IS CODE = 81

-----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 28.71  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.867  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.88 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 0.88 SUBAREA RUNOFF(CFS) = 1.40  
 EFFECTIVE AREA(ACRES) = 197.63 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 203.9 PEAK FLOW RATE(CFS) = 250.51

ELEVATION DATA: UPSTREAM(FEET) = 680.07 DOWNSTREAM(FEET) = 680.00  
 FLOW LENGTH(FEET) = 80.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 96.0 INCH PIPE IS 76.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.80  
 ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 250.51  
 PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 30.05  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1438.00 = 8858.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 81

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1434.00 TO NODE 1437.00 IS CODE = 31

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 698.40 DOWNSTREAM(FEET) = 680.07  
 FLOW LENGTH(FEET) = 1158.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.37  
 ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 250.51  
 PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 29.82  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1437.00 = 8778.00 FEET.

MAINLINE Tc(MIN.) = 30.05  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.817  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 PUBLIC PARK A 0.47 0.98 0.850 32  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 18.00 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.509  
 SUBAREA AREA(ACRES) = 18.47 SUBAREA RUNOFF(CFS) = 21.96  
 EFFECTIVE AREA(ACRES) = 220.28 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 226.6 PEAK FLOW RATE(CFS) = 268.39

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	271.09	24.96	2.031	0.92( 0.46)	0.50	191.9	1208.00
2	268.39	30.05	1.817	0.92( 0.46)	0.50	220.3	1218.00
3	256.32	32.96	1.719	0.92( 0.46)	0.50	226.6	1200.00

NEW PEAK FLOW DATA ARE:  
 PEAK FLOW RATE(CFS) = 271.09 Tc(MIN.) = 24.96  
 AREA-AVERAGED Fm(INCH/HR) = 0.46 AREA-AVERAGED Fp(INCH/HR) = 0.92  
 AREA-AVERAGED Ap = 0.50 EFFECTIVE AREA(ACRES) = 191.87

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 10

-----  
 >>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

```

=====
*****
FLOW PROCESS FROM NODE 1400.00 TO NODE 1402.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 976.00
ELEVATION DATA: UPSTREAM(FEET) = 724.50 DOWNSTREAM(FEET) = 715.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.420
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.712
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
"5-7 DWELLINGS/ACRE" A 8.73 0.98 0.500 32 15.42
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 17.47
TOTAL AREA(ACRES) = 8.73 PEAK FLOW RATE(CFS) = 17.47

*****
FLOW PROCESS FROM NODE 1402.00 TO NODE 1404.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
UPSTREAM ELEVATION(FEET) = 715.00 DOWNSTREAM ELEVATION(FEET) = 706.50
STREET LENGTH(FEET) = 443.00 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) = 27.38
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.49
HALFSTREET FLOOD WIDTH(FEET) = 18.48
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.22
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.08
STREET FLOW TRAVEL TIME(MIN.) = 1.75 Tc(MIN.) = 17.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.542
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" A 10.71 0.98 0.500 32

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 10.71 SUBAREA RUNOFF(CFS) = 19.81
EFFECTIVE AREA(ACRES) = 19.44 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 35.95

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.59
FLOW VELOCITY(FEET/SEC.) = 4.52 DEPTH*VELOCITY(FT*FT/SEC.) = 2.40
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1404.00 = 1419.00 FEET.

*****
FLOW PROCESS FROM NODE 1404.00 TO NODE 1406.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 706.50 DOWNSTREAM(FEET) = 704.10
FLOW LENGTH(FEET) = 832.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.70
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 35.95
PIPE TRAVEL TIME(MIN.) = 2.43 Tc(MIN.) = 19.60
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1406.00 = 2251.00 FEET.

*****
FLOW PROCESS FROM NODE 1406.00 TO NODE 1406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 19.60
* 100 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
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 11.19 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.19 SUBAREA RUNOFF(CFS) = 18.74
EFFECTIVE AREA(ACRES) = 30.63 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 30.6 PEAK FLOW RATE(CFS) = 51.29

*****
FLOW PROCESS FROM NODE 1406.00 TO NODE 1406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 19.60
* 100 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

```



PUBLIC PARK A 1.61 0.98 0.850 32  
PUBLIC PARK C 1.24 0.57 0.850 69  
COMMERCIAL A 1.81 0.98 0.100 32  
COMMERCIAL C 1.33 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457  
SUBAREA AREA(ACRES) = 5.99 SUBAREA RUNOFF(CFS) = 10.69  
EFFECTIVE AREA(ACRES) = 36.62 AREA-AVERAGED Fm(INCH/HR) = 0.47  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 36.6 PEAK FLOW RATE(CFS) = 61.98

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1406.00 TO NODE 1412.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM( FEET) = 704.10 DOWNSTREAM( FEET) = 689.26  
FLOW LENGTH( FEET) = 1225.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.5 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC.) = 11.13  
ESTIMATED PIPE DIAMETER( INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 61.98  
PIPE TRAVEL TIME( MIN.) = 1.83 Tc( MIN.) = 21.44  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1412.00 = 3476.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc( MIN.) = 21.44  
\* 100 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  
COMMERCIAL A 2.96 0.98 0.100 32  
PUBLIC PARK A 2.76 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462  
SUBAREA AREA( ACRES) = 5.72 SUBAREA RUNOFF( CFS) = 9.14  
EFFECTIVE AREA( ACRES) = 42.34 AREA-AVERAGED Fm( INCH/HR) = 0.47  
AREA-AVERAGED Fp( INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.49  
TOTAL AREA( ACRES) = 42.3 PEAK FLOW RATE( CFS) = 67.08

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 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.) = 21.44  
RAINFALL INTENSITY( INCH/HR) = 2.23  
AREA-AVERAGED Fm( INCH/HR) = 0.47  
AREA-AVERAGED Fp( INCH/HR) = 0.95

AREA-AVERAGED Ap = 0.49  
EFFECTIVE STREAM AREA( ACRES) = 42.34  
TOTAL STREAM AREA( ACRES) = 42.34  
PEAK FLOW RATE( CFS) AT CONFLUENCE = 67.08

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1408.00 TO NODE 1410.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH( FEET) = 967.00  
ELEVATION DATA: UPSTREAM( FEET) = 720.25 DOWNSTREAM( FEET) = 713.10

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc( MIN.) = 13.519  
\* 100 YEAR RAINFALL INTENSITY( INCH/HR) = 2.934  
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  
"5-7 DWELLINGS/ACRE" A 2.26 0.98 0.500 32 16.23  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 3.27 0.98 0.200 32 13.52  
PUBLIC PARK A 3.21 0.98 0.850 32 20.15  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.516  
SUBAREA RUNOFF( CFS) = 19.12  
TOTAL AREA( ACRES) = 8.74 PEAK FLOW RATE( CFS) = 19.12

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1410.00 TO NODE 1411.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
-----  
UPSTREAM ELEVATION( FEET) = 713.10 DOWNSTREAM ELEVATION( FEET) = 704.70  
STREET LENGTH( FEET) = 442.00 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) = 29.42  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH( FEET) = 0.50  
HALFSTREET FLOOD WIDTH( FEET) = 19.02  
AVERAGE FLOW VELOCITY( FEET/SEC.) = 4.29  
PRODUCT OF DEPTH&VELOCITY( FT\*FT/SEC.) = 2.16  
STREET FLOW TRAVEL TIME( MIN.) = 1.72 Tc( MIN.) = 15.23



```

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.731
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"  A      9.03    0.98    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 9.03      SUBAREA RUNOFF(CFS) = 20.61
EFFECTIVE AREA(ACRES) = 17.77   AREA-AVERAGED Fm(INCH/HR) = 0.35
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 17.8        PEAK FLOW RATE(CFS) = 38.14

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.54  HALFSTREET FLOOD WIDTH(FEET) = 21.13
FLOW VELOCITY(FEET/SEC.) = 4.56  DEPTH*VELOCITY(FT*FT/SEC.) = 2.46
LONGEST FLOWPATH FROM NODE 1408.00 TO NODE 1411.00 = 1409.00 FEET.

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```

*****
FLOW PROCESS FROM NODE 1411.00 TO NODE 1412.00 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) = 695.20  DOWNSTREAM(FEET) = 689.26
FLOW LENGTH(FEET) = 760.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.40
ESTIMATED PIPE DIAMETER(INCH) = 33.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.14
PIPE TRAVEL TIME(MIN.) = 1.51  Tc(MIN.) = 16.74
LONGEST FLOWPATH FROM NODE 1408.00 TO NODE 1412.00 = 2169.00 FEET.

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```

*****
FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.74
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.581
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"  A     10.63    0.98    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 10.63      SUBAREA RUNOFF(CFS) = 22.83
EFFECTIVE AREA(ACRES) = 28.40   AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 28.4        PEAK FLOW RATE(CFS) = 58.56

```

```

*****
FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 IS CODE = 1
-----

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```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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```

>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 16.74
RAINFALL INTENSITY(INCH/HR) = 2.58
AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.30
EFFECTIVE STREAM AREA(ACRES) = 28.40
TOTAL STREAM AREA(ACRES) = 28.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 58.56

```

```

** CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap      Ae  HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR) (ACRES)  NODE
1           67.08  21.44  2.225  0.95( 0.47) 0.49  42.3  1400.00
2           58.56  16.74  2.581  0.98( 0.29) 0.30  28.4  1408.00

```

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

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```

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap      Ae  HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR) (ACRES)  NODE
1           121.53  16.74  2.581  0.96( 0.38) 0.40  61.5  1408.00
2           116.54  21.44  2.225  0.96( 0.39) 0.41  70.7  1400.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 121.53  Tc(MIN.) = 16.74
EFFECTIVE AREA(ACRES) = 61.47  AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 70.7
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1412.00 = 3476.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 1412.00 TO NODE 1413.00 IS CODE = 31
-----

```

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 689.26  DOWNSTREAM(FEET) = 685.10
FLOW LENGTH(FEET) = 1154.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.30
ESTIMATED PIPE DIAMETER(INCH) = 57.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 121.53
PIPE TRAVEL TIME(MIN.) = 2.32  Tc(MIN.) = 19.06
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1413.00 = 4630.00 FEET.

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```

*****
FLOW PROCESS FROM NODE 1413.00 TO NODE 1413.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.06

```

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.388  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 3.47 0.98 0.100 32  
PUBLIC PARK A 2.47 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.412  
SUBAREA AREA(ACRES) = 5.94 SUBAREA RUNOFF(CFS) = 10.62  
EFFECTIVE AREA(ACRES) = 67.41 AREA-AVERAGED Fm(INCH/HR) = 0.39  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.40  
TOTAL AREA(ACRES) = 76.7 PEAK FLOW RATE(CFS) = 121.53  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1413.00 TO NODE 1414.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 685.10 DOWNSTREAM(FEET) = 684.70  
FLOW LENGTH(FEET) = 115.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 44.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.16  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 121.53  
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 19.29  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1414.00 = 4745.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
=====

MAINLINE Tc(MIN.) = 19.29  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.370  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.47 0.98 0.100 32  
PUBLIC PARK A 0.31 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.398  
SUBAREA AREA(ACRES) = 0.78 SUBAREA RUNOFF(CFS) = 1.39  
EFFECTIVE AREA(ACRES) = 68.19 AREA-AVERAGED Fm(INCH/HR) = 0.39  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.40  
TOTAL AREA(ACRES) = 77.5 PEAK FLOW RATE(CFS) = 121.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 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) = 2.37  
AREA-AVERAGED Fm(INCH/HR) = 0.39  
AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.40  
EFFECTIVE STREAM AREA(ACRES) = 68.19  
TOTAL STREAM AREA(ACRES) = 77.46  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 121.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1416.00 TO NODE 1418.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 808.00  
ELEVATION DATA: UPSTREAM(FEET) = 723.95 DOWNSTREAM(FEET) = 719.30

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.882  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.664  
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 A 0.48 0.98 0.850 32 19.72  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 9.00 0.98 0.500 32 15.88  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.518  
SUBAREA RUNOFF(CFS) = 18.42  
TOTAL AREA(ACRES) = 9.48 PEAK FLOW RATE(CFS) = 18.42

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1418.00 TO NODE 1420.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 719.30 DOWNSTREAM(FEET) = 716.00  
FLOW LENGTH(FEET) = 1042.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.00  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 18.42  
PIPE TRAVEL TIME(MIN.) = 3.47 Tc(MIN.) = 19.36  
LONGEST FLOWPATH FROM NODE 1416.00 TO NODE 1420.00 = 1850.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1420.00 TO NODE 1420.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
=====

MAINLINE Tc(MIN.) = 19.36  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.366  
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" A 18.91 0.98 0.500 32  
 PUBLIC PARK A 5.71 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.581  
 SUBAREA AREA(ACRES) = 24.62 SUBAREA RUNOFF(CFS) = 39.87  
 EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.55  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.56  
 TOTAL AREA(ACRES) = 34.1 PEAK FLOW RATE(CFS) = 55.75

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1420.00 TO NODE 1414.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 716.00 DOWNSTREAM(FEET) = 684.71  
 FLOW LENGTH(FEET) = 1225.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.33  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 55.75  
 PIPE TRAVEL TIME(MIN.) = 1.42 Tc(MIN.) = 20.78  
 LONGEST FLOWPATH FROM NODE 1416.00 TO NODE 1414.00 = 3075.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 20.78  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.267  
 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"	A	6.57	0.98	0.500	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	3.00	0.57	0.500	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 9.57 SUBAREA RUNOFF(CFS) = 15.88  
 EFFECTIVE AREA(ACRES) = 43.67 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.55  
 TOTAL AREA(ACRES) = 43.7 PEAK FLOW RATE(CFS) = 68.60

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 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.) = 20.78  
 RAINFALL INTENSITY(INCH/HR) = 2.27

AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.95  
 AREA-AVERAGED Ap = 0.55  
 EFFECTIVE STREAM AREA(ACRES) = 43.67  
 TOTAL STREAM AREA(ACRES) = 43.67  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 68.60

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	121.80	19.29	2.370	0.96( 0.39)	0.40	68.2	1408.00
1	117.42	24.00	2.080	0.96( 0.40)	0.41	77.5	1400.00
2	68.60	20.78	2.267	0.95( 0.52)	0.55	43.7	1416.00

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	189.26	19.29	2.370	0.96( 0.44)	0.46	108.7	1408.00
2	189.01	20.78	2.267	0.96( 0.44)	0.46	114.8	1416.00
3	178.64	24.00	2.080	0.96( 0.44)	0.46	121.1	1400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 189.26 Tc(MIN.) = 19.29  
 EFFECTIVE AREA(ACRES) = 108.74 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA(ACRES) = 121.1  
 LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1414.00 = 4745.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1414.00 TO NODE 1435.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 684.71 DOWNSTREAM(FEET) = 683.09  
 FLOW LENGTH(FEET) = 487.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 69.0 INCH PIPE IS 51.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.03  
 ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 189.26  
 PIPE TRAVEL TIME(MIN.) = 0.90 Tc(MIN.) = 20.19  
 LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1435.00 = 5232.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1435.00 TO NODE 1435.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 20.19  
 \* 100 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
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	6.57	0.98	0.500	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	3.00	0.57	0.500	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 9.57 SUBAREA RUNOFF(CFS) = 15.88  
 EFFECTIVE AREA(ACRES) = 43.67 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.55  
 TOTAL AREA(ACRES) = 43.7 PEAK FLOW RATE(CFS) = 68.60

COMMERCIAL C 1.87 0.57 0.100 69  
PUBLIC PARK C 0.86 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.336  
SUBAREA AREA(ACRES) = 2.73 SUBAREA RUNOFF(CFS) = 5.20  
EFFECTIVE AREA(ACRES) = 111.47 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 123.9 PEAK FLOW RATE(CFS) = 189.26  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

"5-7 DWELLINGS/ACRE" C 11.11 0.57 0.500 69  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 14.80 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.509  
SUBAREA AREA(ACRES) = 26.61 SUBAREA RUNOFF(CFS) = 41.95  
EFFECTIVE AREA(ACRES) = 141.76 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 154.1 PEAK FLOW RATE(CFS) = 220.74

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1435.00 TO NODE 1435.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 20.19  
\* 100 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	A	2.34	0.98	0.100	32
PUBLIC PARK	A	1.34	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373  
SUBAREA AREA(ACRES) = 3.68 SUBAREA RUNOFF(CFS) = 6.43  
EFFECTIVE AREA(ACRES) = 115.15 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 127.5 PEAK FLOW RATE(CFS) = 194.64

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1435.00 TO NODE 1436.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 683.09 DOWNSTREAM(FEET) = 680.30  
FLOW LENGTH(FEET) = 1164.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 58.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.93  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 194.64  
PIPE TRAVEL TIME(MIN.) = 2.45 Tc(MIN.) = 22.64  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1436.00 = 6396.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1436.00 TO NODE 1436.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 22.64  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.154  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	C	0.70	0.57	0.850	69
RESIDENTIAL					

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1436.00 TO NODE 1438.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 680.30 DOWNSTREAM(FEET) = 680.00  
FLOW LENGTH(FEET) = 83.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 54.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.69  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 220.74  
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 22.78  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1438.00 = 6479.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 22.78  
\* 100 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	A	2.57	0.98	0.100	32
PUBLIC PARK	A	1.70	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.399  
SUBAREA AREA(ACRES) = 4.27 SUBAREA RUNOFF(CFS) = 6.75  
EFFECTIVE AREA(ACRES) = 146.03 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 158.4 PEAK FLOW RATE(CFS) = 226.46

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 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	226.46	22.78	2.145	0.92( 0.42)	0.46	146.0	1408.00
2	224.54	24.27	2.066	0.92( 0.43)	0.46	152.1	1416.00
3	212.26	27.52	1.915	0.92( 0.43)	0.46	158.4	1400.00

LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1438.00 = 6479.00 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	271.09	24.96	2.031	0.92 ( 0.46)	0.50	191.9	1208.00
2	268.39	30.05	1.817	0.92 ( 0.46)	0.50	220.3	1218.00
3	256.32	32.96	1.719	0.92 ( 0.46)	0.50	226.6	1200.00

LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1438.00 = 8858.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	491.93	22.78	2.145	0.92 ( 0.44)	0.48	321.2	1408.00
2	493.93	24.27	2.066	0.92 ( 0.45)	0.48	338.7	1416.00
3	493.03	24.96	2.031	0.92 ( 0.45)	0.48	345.3	1208.00
4	481.99	27.52	1.915	0.92 ( 0.45)	0.48	364.6	1400.00
5	466.60	30.05	1.817	0.92 ( 0.45)	0.49	378.7	1218.00
6	440.58	32.96	1.719	0.92 ( 0.45)	0.49	385.0	1200.00

TOTAL AREA(ACRES) = 385.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 493.93 Tc(MIN.) = 24.268  
EFFECTIVE AREA(ACRES) = 338.65 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 385.0  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1438.00 = 8858.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

\*\*\*\*\*

FLOW PROCESS FROM NODE 1438.00 TO NODE 1440.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 679.57 DOWNSTREAM(FEET) = 676.80  
FLOW LENGTH(FEET) = 519.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 90.0 INCH PIPE IS 68.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.68  
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 493.93  
PIPE TRAVEL TIME(MIN.) = 0.63 Tc(MIN.) = 24.90  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1440.00 = 9377.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1440.00 TO NODE 1440.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 24.90  
\* 100 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
COMMERCIAL	A	0.57	0.98	0.100	32
PUBLIC PARK	A	0.90	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.559  
SUBAREA AREA(ACRES) = 1.47 SUBAREA RUNOFF(CFS) = 1.97  
EFFECTIVE AREA(ACRES) = 340.12 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 386.5 PEAK FLOW RATE(CFS) = 493.93  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 1440.00 TO NODE 1440.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*

MAINLINE Tc(MIN.) = 24.90

\* 100 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
RESIDENTIAL	A	14.37	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 14.37 SUBAREA RUNOFF(CFS) = 23.78  
EFFECTIVE AREA(ACRES) = 354.49 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.47  
TOTAL AREA(ACRES) = 400.8 PEAK FLOW RATE(CFS) = 510.04

\*\*\*\*\*

FLOW PROCESS FROM NODE 1440.00 TO NODE 1442.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 676.80 DOWNSTREAM(FEET) = 674.80  
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 96.0 INCH PIPE IS 76.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.83  
ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 510.04  
PIPE TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 25.68  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1442.00 = 9927.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1442.00 TO NODE 1442.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 25.68  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.997

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          5      515.89  31.47    1.767  0.92( 0.42)  0.46    426.2  1218.00
COMMERCIAL    A        0.75     0.98     0.100     32          6      487.68  34.41    1.675  0.92( 0.42)  0.46    432.5  1200.00
PUBLIC PARK   A        1.00     0.98     0.850     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.529
SUBAREA AREA(ACRES) = 1.75 SUBAREA RUNOFF(CFS) = 2.33
EFFECTIVE AREA(ACRES) = 356.24 AREA-AVERAGED Fm(INCH/HR) = 0.44
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 402.6 PEAK FLOW RATE(CFS) = 510.04
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 1442.00 TO NODE 1442.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.68
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.997
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"  A      13.37   0.98   0.200   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 13.37 SUBAREA RUNOFF(CFS) = 21.68
EFFECTIVE AREA(ACRES) = 369.61 AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 415.9 PEAK FLOW RATE(CFS) = 522.23

*****
FLOW PROCESS FROM NODE 1442.00 TO NODE 1442.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.68
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.997
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"  A      16.54   0.98   0.200   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 16.54 SUBAREA RUNOFF(CFS) = 26.82
EFFECTIVE AREA(ACRES) = 386.15 AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 432.5 PEAK FLOW RATE(CFS) = 549.06

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap  Ae  HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1      549.20  24.19  2.070  0.92( 0.41)  0.45  368.7  1408.00
2      549.06  25.68  1.997  0.93( 0.42)  0.45  386.2  1416.00
3      547.10  26.36  1.965  0.93( 0.42)  0.45  392.8  1208.00
4      533.36  28.94  1.859  0.92( 0.42)  0.45  412.1  1400.00

*****
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) = 549.20 Tc(MIN.) = 24.19
AREA-AVERAGED Fm(INCH/HR) = 0.41 AREA-AVERAGED Fp(INCH/HR) = 0.92
AREA-AVERAGED Ap = 0.45 EFFECTIVE AREA(ACRES) = 368.67

*****
FLOW PROCESS FROM NODE 1442.00 TO NODE 1444.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 674.80 DOWNSTREAM(FEET) = 673.00
FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 96.0 INCH PIPE IS 74.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.14
ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 549.20
PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 24.70
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1444.00 = 10327.00 FEET.

*****
FLOW PROCESS FROM NODE 1444.00 TO NODE 1444.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.70
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.044
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE           GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A        0.56     0.98     0.100     32
PUBLIC PARK         A        0.90     0.98     0.850     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.562
SUBAREA AREA(ACRES) = 1.46 SUBAREA RUNOFF(CFS) = 1.97
EFFECTIVE AREA(ACRES) = 370.13 AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 433.9 PEAK FLOW RATE(CFS) = 549.20
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 1444.00 TO NODE 1444.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.70
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.044
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE           GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK         A        5.38     0.98     0.850     32
RESIDENTIAL
"11+ DWELLINGS/ACRE"  A      10.00   0.98   0.200   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

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SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427  
SUBAREA AREA(ACRES) = 15.38 SUBAREA RUNOFF(CFS) = 22.53  
EFFECTIVE AREA(ACRES) = 385.51 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 449.3 PEAK FLOW RATE(CFS) = 565.18

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.96  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.320  
SUBAREA AREA(ACRES) = 15.21 SUBAREA RUNOFF(CFS) = 22.83  
EFFECTIVE AREA(ACRES) = 407.73 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 471.5 PEAK FLOW RATE(CFS) = 573.34  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1444.00 TO NODE 1444.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 24.70  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.044  
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" A 0.85 0.98 0.200 32  
PUBLIC PARK A 6.16 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.771  
SUBAREA AREA(ACRES) = 7.01 SUBAREA RUNOFF(CFS) = 8.15  
EFFECTIVE AREA(ACRES) = 392.52 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 456.3 PEAK FLOW RATE(CFS) = 573.34

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1446.00 TO NODE 1446.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 26.15  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.975  
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" A 6.48 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 6.48 SUBAREA RUNOFF(CFS) = 10.38  
EFFECTIVE AREA(ACRES) = 414.21 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 478.0 PEAK FLOW RATE(CFS) = 582.16

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1444.00 TO NODE 1446.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 668.10  
FLOW LENGTH(FEET) = 1150.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 102.0 INCH PIPE IS 73.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.16  
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 573.34  
PIPE TRAVEL TIME(MIN.) = 1.46 Tc(MIN.) = 26.15  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1446.00 = 11477.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1446.00 TO NODE 1447.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 668.10 DOWNSTREAM(FEET) = 668.00  
FLOW LENGTH(FEET) = 104.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 132.0 INCH PIPE IS 100.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.49  
ESTIMATED PIPE DIAMETER(INCH) = 132.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 582.16  
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 26.38  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1447.00 = 11581.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1446.00 TO NODE 1446.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 26.15  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.975  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 2.80 0.98 0.850 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 11.54 0.98 0.200 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 0.87 0.57 0.200 69

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1447.00 TO NODE 1447.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 26.38  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.965  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.63 0.98 0.100 32  
PUBLIC PARK A 2.14 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.526



SUBAREA AREA(ACRES) = 3.77 SUBAREA RUNOFF(CFS) = 4.93  
 EFFECTIVE AREA(ACRES) = 417.98 AREA-AVERAGED Fm(INCH/HR) = 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 481.8 PEAK FLOW RATE(CFS) = 583.20

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1447.00 TO NODE 1448.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
 ELEVATION DATA: UPSTREAM(FEET) = 668.00 DOWNSTREAM(FEET) = 667.90  
 FLOW LENGTH(FEET) = 76.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 126.0 INCH PIPE IS 93.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.47  
 ESTIMATED PIPE DIAMETER(INCH) = 126.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 583.20  
 PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 26.53  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1448.00 = 11657.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1448.00 TO NODE 1448.00 IS CODE = 10  
 -----

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1448.10 TO NODE 1449.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 780.00  
 ELEVATION DATA: UPSTREAM(FEET) = 690.40 DOWNSTREAM(FEET) = 682.80

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.993  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.558  
 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	A	4.79	0.98	0.850	32	17.50
RESIDENTIAL(ARID)						
"1 DWELLING/ACRE"	A	3.20	0.75	0.800	32/62	16.99

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.830  
 SUBAREA RUNOFF(CFS) = 13.09  
 TOTAL AREA(ACRES) = 7.99 PEAK FLOW RATE(CFS) = 13.09

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1449.00 TO NODE 1450.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
 ELEVATION DATA: UPSTREAM(FEET) = 673.80 DOWNSTREAM(FEET) = 673.00

FLOW LENGTH(FEET) = 285.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.39  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 13.09  
 PIPE TRAVEL TIME(MIN.) = 1.08 Tc(MIN.) = 18.08  
 LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1450.00 = 1065.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1450.00 TO NODE 1450.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
 MAINLINE Tc(MIN.) = 18.08  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.465  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	3.09	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	8.00	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.381  
 SUBAREA AREA(ACRES) = 11.09 SUBAREA RUNOFF(CFS) = 20.89  
 EFFECTIVE AREA(ACRES) = 19.08 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.57  
 TOTAL AREA(ACRES) = 19.1 PEAK FLOW RATE(CFS) = 33.32

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1450.00 TO NODE 1452.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
 ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 671.30  
 FLOW LENGTH(FEET) = 422.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.35  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 33.32  
 PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 19.18  
 LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1452.00 = 1487.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1452.00 TO NODE 1452.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
 MAINLINE Tc(MIN.) = 19.18  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.379  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.40	0.98	0.100	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	6.80	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.183  
SUBAREA AREA(ACRES) = 8.20 SUBAREA RUNOFF(CFS) = 16.24  
EFFECTIVE AREA(ACRES) = 27.28 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 27.3 PEAK FLOW RATE(CFS) = 48.07

EFFECTIVE AREA(ACRES) = 30.06 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 30.1 PEAK FLOW RATE(CFS) = 52.00

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1454.00 TO NODE 1456.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 670.93 DOWNSTREAM(FEET) = 669.15  
FLOW LENGTH(FEET) = 836.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.46  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 52.00  
PIPE TRAVEL TIME(MIN.) = 2.55 Tc(MIN.) = 22.08  
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1456.00 = 2450.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1456.00 TO NODE 1456.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 22.08  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.186  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.42	0.98	0.100	32
PUBLIC PARK	A	0.33	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430  
SUBAREA AREA(ACRES) = 0.75 SUBAREA RUNOFF(CFS) = 1.19  
EFFECTIVE AREA(ACRES) = 30.81 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 30.8 PEAK FLOW RATE(CFS) = 52.00  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1456.00 TO NODE 1448.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 669.15 DOWNSTREAM(FEET) = 667.90  
FLOW LENGTH(FEET) = 186.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 26.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.62  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 52.00  
PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 22.44  
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1448.00 = 2636.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1448.00 TO NODE 1448.00 IS CODE = 11

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1452.00 TO NODE 1452.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 19.18  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.379  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.28	0.98	0.100	32
PUBLIC PARK	A	1.00	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.686  
SUBAREA AREA(ACRES) = 1.28 SUBAREA RUNOFF(CFS) = 1.97  
EFFECTIVE AREA(ACRES) = 28.56 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 28.6 PEAK FLOW RATE(CFS) = 50.04

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1452.00 TO NODE 1454.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 671.30 DOWNSTREAM(FEET) = 670.93  
FLOW LENGTH(FEET) = 127.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 33.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.10  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 50.04  
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 19.53  
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1454.00 = 1614.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1454.00 TO NODE 1454.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 19.53  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.353  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.84	0.98	0.100	32
PUBLIC PARK	A	0.66	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430  
SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 2.61

-----  
>>>>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	52.00	22.44	2.165	0.93 ( 0.43)	0.46	30.8	1448.10

LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1448.00 = 2636.00 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	583.20	26.53	1.958	0.93 ( 0.41)	0.45	418.0	1408.00
2	581.78	28.02	1.895	0.93 ( 0.42)	0.45	435.5	1416.00
3	579.35	28.71	1.867	0.93 ( 0.42)	0.45	442.1	1208.00
4	563.80	31.33	1.772	0.93 ( 0.42)	0.45	461.4	1400.00
5	545.26	33.88	1.691	0.93 ( 0.42)	0.45	475.5	1218.00
6	516.10	36.86	1.608	0.93 ( 0.42)	0.45	481.8	1200.00

LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1448.00 = 11657.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	611.39	22.44	2.165	0.93 ( 0.42)	0.45	384.3	1448.10
2	628.99	26.53	1.958	0.93 ( 0.42)	0.45	448.8	1408.00
3	625.68	28.02	1.895	0.93 ( 0.42)	0.45	466.3	1416.00
4	622.43	28.71	1.867	0.93 ( 0.42)	0.45	472.9	1208.00
5	604.02	31.33	1.772	0.93 ( 0.42)	0.45	492.2	1400.00
6	583.04	33.88	1.691	0.93 ( 0.42)	0.45	506.3	1218.00
7	551.38	36.86	1.608	0.93 ( 0.42)	0.45	512.6	1200.00

TOTAL AREA(ACRES) = 512.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 628.99 Tc(MIN.) = 26.534  
EFFECTIVE AREA(ACRES) = 448.79 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 512.6  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1448.00 = 11657.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1448.00 TO NODE 1458.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 667.90 DOWNSTREAM(FEET) = 667.70  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 120.0 INCH PIPE IS 88.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.10  
ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 628.99  
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 26.70  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1458.00 = 11757.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1458.00 TO NODE 1458.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
-----

MAINLINE Tc(MIN.) = 26.70  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.951  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 1.68 0.57 0.100 69  
PUBLIC PARK C 1.46 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.449  
SUBAREA AREA(ACRES) = 3.14 SUBAREA RUNOFF(CFS) = 4.79  
EFFECTIVE AREA(ACRES) = 451.93 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 515.7 PEAK FLOW RATE(CFS) = 628.99  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

-----  
END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 515.7 TC(MIN.) = 26.70  
EFFECTIVE AREA(ACRES) = 451.93 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.447  
PEAK FLOW RATE(CFS) = 628.99

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	611.39	22.61	2.155	0.93 ( 0.41)	0.45	387.4	1448.10
2	628.99	26.70	1.951	0.93 ( 0.41)	0.45	451.9	1408.00
3	625.68	28.19	1.888	0.93 ( 0.42)	0.45	469.4	1416.00
4	622.43	28.88	1.861	0.93 ( 0.42)	0.45	476.1	1208.00
5	604.02	31.50	1.766	0.93 ( 0.42)	0.45	495.3	1400.00
6	583.04	34.05	1.686	0.93 ( 0.42)	0.45	509.5	1218.00
7	551.38	37.03	1.603	0.93 ( 0.42)	0.45	515.7	1200.00

-----  
END OF RATIONAL METHOD ANALYSIS  
-----



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* HELLMAN - SOUTH OF CHINO \*  
\* 25-YR STUDY \*  
\* AREA 'G' \*  
\*\*\*\*\*

FILE NAME: HLM-D.DAT  
TIME/DATE OF STUDY: 17:42 10/16/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*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- / SIDE / SIDE / WAY	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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1200.00 TO NODE 1202.00 IS CODE = 21

-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 933.00  
ELEVATION DATA: UPSTREAM(FEET) = 747.90 DOWNSTREAM(FEET) = 742.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.509  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.040  
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						
"5-7 DWELLINGS/ACRE"	A	9.74	0.98	0.500	32	16.51
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500						
SUBAREA RUNOFF(CFS) = 13.61						
TOTAL AREA(ACRES) = 9.74 PEAK FLOW RATE(CFS) = 13.61						

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1202.00 TO NODE 1204.00 IS CODE = 62

----->>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

===== UPSTREAM ELEVATION(FEET) = 742.00 DOWNSTREAM ELEVATION(FEET) = 739.50  
STREET LENGTH(FEET) = 484.00 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) = 21.26  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.55  
HALFSTREET FLOOD WIDTH(FEET) = 21.68  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.42  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.33  
STREET FLOW TRAVEL TIME(MIN.) = 3.33 Tc(MIN.) = 19.84  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.827

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"	A	12.00	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	0.59	0.57	0.500	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.96					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500					

SUBAREA AREA(ACRES) = 12.59 SUBAREA RUNOFF(CFS) = 15.28  
EFFECTIVE AREA(ACRES) = 22.33 AREA-AVERAGED Fm(INCH/HR) = 0.48  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 22.3 PEAK FLOW RATE(CFS) = 27.02

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 23.87  
FLOW VELOCITY(FEET/SEC.) = 2.56 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.51  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1204.00 = 1417.00 FEET.

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	3.61	0.57	0.100	69
PUBLIC PARK	C	3.50	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.469					
SUBAREA AREA(ACRES) = 7.11 SUBAREA RUNOFF(CFS) = 9.30					
EFFECTIVE AREA(ACRES) = 46.98 AREA-AVERAGED Fm(INCH/HR) = 0.44					
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.53					
TOTAL AREA(ACRES) = 47.0 PEAK FLOW RATE(CFS) = 54.14					

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1204.00 TO NODE 1206.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 730.00 DOWNSTREAM(FEET) = 725.60  
FLOW LENGTH(FEET) = 832.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.56  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 27.02  
PIPE TRAVEL TIME(MIN.) = 2.11 Tc(MIN.) = 21.95  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1206.00 = 2249.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1206.00 TO NODE 1206.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 21.95  
\* 25 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
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	6.87	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	6.38	0.57	0.500	69
PUBLIC PARK	A	2.12	0.98	0.850	32
PUBLIC PARK	C	2.17	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.77					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.586					
SUBAREA AREA(ACRES) = 17.54 SUBAREA RUNOFF(CFS) = 19.98					
EFFECTIVE AREA(ACRES) = 39.87 AREA-AVERAGED Fm(INCH/HR) = 0.47					
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.54					
TOTAL AREA(ACRES) = 39.9 PEAK FLOW RATE(CFS) = 44.84					

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1206.00 TO NODE 1206.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 21.95  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719  
SUBAREA LOSS RATE DATA(AMC II):

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1206.00 TO NODE 1214.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 725.60 DOWNSTREAM(FEET) = 709.66  
FLOW LENGTH(FEET) = 1284.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.72  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 54.14  
PIPE TRAVEL TIME(MIN.) = 2.00 Tc(MIN.) = 23.95  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1214.00 = 3533.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 23.95  
\* 25 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
COMMERCIAL	C	2.63	0.57	0.100	69
PUBLIC PARK	C	2.52	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467					
SUBAREA AREA(ACRES) = 5.15 SUBAREA RUNOFF(CFS) = 6.34					
EFFECTIVE AREA(ACRES) = 52.13 AREA-AVERAGED Fm(INCH/HR) = 0.42					
AREA-AVERAGED Fp(INCH/HR) = 0.81 AREA-AVERAGED Ap = 0.52					
TOTAL AREA(ACRES) = 52.1 PEAK FLOW RATE(CFS) = 56.78					

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 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.) = 23.95  
RAINFALL INTENSITY(INCH/HR) = 1.63  
AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.81

AREA-AVERAGED  $A_p$  = 0.52  
 EFFECTIVE STREAM AREA(ACRES) = 52.13  
 TOTAL STREAM AREA(ACRES) = 52.13  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 56.78

RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 4.44 0.57 0.500 69  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 8.94 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.84  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.486  
 SUBAREA AREA(ACRES) = 13.88 SUBAREA RUNOFF(CFS) = 21.30  
 EFFECTIVE AREA(ACRES) = 22.42 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.39  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.82 AREA-AVERAGED  $A_p$  = 0.48  
 TOTAL AREA(ACRES) = 22.4 PEAK FLOW RATE(CFS) = 34.65

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1208.00 TO NODE 1210.00 IS CODE = 21  
 -----  
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 -----  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 976.00  
 ELEVATION DATA: UPSTREAM(FEET) = 734.70 DOWNSTREAM(FEET) = 729.70

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 IS CODE = 1  
 -----  
 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<  
 -----

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
 SUBAREA ANALYSIS USED MINIMUM  $T_c$ (MIN.) = 13.701  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.281  
 SUBAREA  $T_c$  AND LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA  $F_p$   $A_p$  SCS  $T_c$   
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 3.65 0.57 0.500 69 17.53  
 COMMERCIAL C 0.50 0.57 0.100 69 13.70  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 4.39 0.98 0.500 32 17.53  
 SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.79  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.477  
 SUBAREA RUNOFF(CFS) = 14.65  
 TOTAL AREA(ACRES) = 8.54 PEAK FLOW RATE(CFS) = 14.65

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 15.58  
 RAINFALL INTENSITY(INCH/HR) = 2.11  
 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.39  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.82  
 AREA-AVERAGED  $A_p$  = 0.48  
 EFFECTIVE STREAM AREA(ACRES) = 22.42  
 TOTAL STREAM AREA(ACRES) = 22.42  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 34.65

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	$T_c$ (MIN.)	Intensity (INCH/HR)	$F_p$ ( $F_m$ ) (INCH/HR)	$A_p$	$A_e$ (ACRES)	HEADWATER NODE
1	56.78	23.95	1.632	0.81( 0.42)	0.52	52.1	1200.00
2	34.65	15.58	2.112	0.82( 0.39)	0.48	22.4	1208.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO  
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	$T_c$ (MIN.)	Intensity (INCH/HR)	$F_p$ ( $F_m$ ) (INCH/HR)	$A_p$	$A_e$ (ACRES)	HEADWATER NODE
1	86.25	15.58	2.112	0.81( 0.41)	0.51	56.3	1208.00
2	81.75	23.95	1.632	0.81( 0.41)	0.51	74.6	1200.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 86.25  $T_c$ (MIN.) = 15.58  
 EFFECTIVE AREA(ACRES) = 56.34 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.41  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.81 AREA-AVERAGED  $A_p$  = 0.51  
 TOTAL AREA(ACRES) = 74.6  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1214.00 = 3533.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1214.00 TO NODE 1216.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1210.00 TO NODE 1214.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 723.50 DOWNSTREAM(FEET) = 709.66  
 FLOW LENGTH(FEET) = 948.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.40  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 14.65  
 PIPE TRAVEL TIME(MIN.) = 1.88  $T_c$ (MIN.) = 15.58  
 LONGEST FLOWPATH FROM NODE 1208.00 TO NODE 1214.00 = 1924.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1214.00 TO NODE 1214.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE  $T_c$ (MIN.) = 15.58  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.112  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA  $F_p$   $A_p$  SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 0.50 0.57 0.100 69



ELEVATION DATA: UPSTREAM(FEET) = 709.66 DOWNSTREAM(FEET) = 706.06  
 FLOW LENGTH(FEET) = 1211.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 41.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.02  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 86.25  
 PIPE TRAVEL TIME(MIN.) = 2.88 Tc(MIN.) = 18.46  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1216.00 = 4744.00 FEET.

ELEVATION DATA: UPSTREAM(FEET) = 751.80 DOWNSTREAM(FEET) = 747.30

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.884  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.012  
 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 "5-7 DWELLINGS/ACRE"	A	7.45	0.98	0.500	32	16.88

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 10.22  
 TOTAL AREA(ACRES) = 7.45 PEAK FLOW RATE(CFS) = 10.22

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.46  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.908  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL URBAN GOOD COVER	A	2.15	0.98	0.100	32
"TURF"	A	1.17	0.97	1.000	33
COMMERCIAL URBAN GOOD COVER	C	1.30	0.57	0.100	69
"TURF"	C	0.33	0.52	1.000	72

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.86  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373  
 SUBAREA AREA(ACRES) = 4.95 SUBAREA RUNOFF(CFS) = 7.07  
 EFFECTIVE AREA(ACRES) = 61.29 AREA-AVERAGED Fm(INCH/HR) = 0.40  
 AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 79.5 PEAK FLOW RATE(CFS) = 86.25  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1220.00 TO NODE 1222.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 747.30 DOWNSTREAM ELEVATION(FEET) = 740.80  
 STREET LENGTH(FEET) = 552.00 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) = 13.21

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.43  
 HALFSTREET FLOOD WIDTH(FEET) = 15.12  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.96  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.28  
 STREET FLOW TRAVEL TIME(MIN.) = 3.11 Tc(MIN.) = 20.00  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.818

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"	A	4.99	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 4.99 SUBAREA RUNOFF(CFS) = 5.98  
 EFFECTIVE AREA(ACRES) = 12.44 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 12.4 PEAK FLOW RATE(CFS) = 14.90

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.45 HALFSTREET FLOOD WIDTH(FEET) = 15.90

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 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.) = 18.46  
 RAINFALL INTENSITY(INCH/HR) = 1.91  
 AREA-AVERAGED Fm(INCH/HR) = 0.40  
 AREA-AVERAGED Fp(INCH/HR) = 0.82  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA(ACRES) = 61.29  
 TOTAL STREAM AREA(ACRES) = 79.50  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 86.25

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1218.00 TO NODE 1220.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 885.00

FLOW VELOCITY(FEET/SEC.) = 3.04 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.36  
LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1222.00 = 1437.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1222.00 TO NODE 1224.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 734.80 DOWNSTREAM(FEET) = 730.30  
FLOW LENGTH(FEET) = 587.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.63  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 14.90  
PIPE TRAVEL TIME(MIN.) = 1.47 Tc(MIN.) = 21.47  
LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1224.00 = 2024.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1224.00 TO NODE 1224.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
-----  
MAINLINE Tc(MIN.) = 21.47  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.742  
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" A 18.00 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 18.00 SUBAREA RUNOFF(CFS) = 20.33  
EFFECTIVE AREA(ACRES) = 30.44 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 30.4 PEAK FLOW RATE(CFS) = 34.38

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1224.00 TO NODE 1226.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 730.30 DOWNSTREAM(FEET) = 725.20  
FLOW LENGTH(FEET) = 436.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.56  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 34.38  
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 22.23  
LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1226.00 = 2460.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1226.00 TO NODE 1226.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 22.23  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.706  
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" A 7.68 0.98 0.500 32  
PUBLIC PARK A 5.74 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.650  
SUBAREA AREA(ACRES) = 13.42 SUBAREA RUNOFF(CFS) = 12.96  
EFFECTIVE AREA(ACRES) = 43.86 AREA-AVERAGED Fm(INCH/HR) = 0.53  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.55  
TOTAL AREA(ACRES) = 43.9 PEAK FLOW RATE(CFS) = 46.35

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1226.00 TO NODE 1228.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 725.20 DOWNSTREAM(FEET) = 721.80  
FLOW LENGTH(FEET) = 427.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.91  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 46.35  
PIPE TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 23.03  
LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1228.00 = 2887.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1228.00 TO NODE 1228.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
-----  
MAINLINE Tc(MIN.) = 23.03  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.671  
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" A 13.38 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 13.38 SUBAREA RUNOFF(CFS) = 14.25  
EFFECTIVE AREA(ACRES) = 57.24 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.54  
TOTAL AREA(ACRES) = 57.2 PEAK FLOW RATE(CFS) = 59.18

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1228.00 TO NODE 1216.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 721.80 DOWNSTREAM(FEET) = 706.06  
 FLOW LENGTH(FEET) = 571.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.93  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 59.18  
 PIPE TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 23.67  
 LONGEST FLOWPATH FROM NODE 1218.00 TO NODE 1216.00 = 3458.00 FEET.

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	162.16	18.46	1.908	0.90( 0.46)	0.51	121.7	1208.00
2	162.34	23.67	1.643	0.90( 0.46)	0.51	150.1	1218.00
3	152.31	26.83	1.524	0.90( 0.46)	0.51	157.0	1200.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 162.34 Tc(MIN.) = 23.67  
 EFFECTIVE AREA(ACRES) = 150.14 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 157.0  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1216.00 = 4744.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 23.67  
 \* 25 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  
 "5-7 DWELLINGS/ACRE" A 20.29 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 20.29 SUBAREA RUNOFF(CFS) = 21.11  
 EFFECTIVE AREA(ACRES) = 77.53 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 77.5 PEAK FLOW RATE(CFS) = 78.89

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1216.00 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.) = 23.67  
 RAINFALL INTENSITY(INCH/HR) = 1.64  
 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.53  
 EFFECTIVE STREAM AREA(ACRES) = 77.53  
 TOTAL STREAM AREA(ACRES) = 77.53  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 78.89

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	86.25	18.46	1.908	0.82( 0.40)	0.50	61.3	1208.00
1	81.75	26.83	1.524	0.81( 0.41)	0.50	79.5	1200.00
2	78.89	23.67	1.643	0.98( 0.51)	0.53	77.5	1218.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO  
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

\*\* PEAK FLOW RATE TABLE \*\*

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1216.00 TO NODE 1230.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 706.06 DOWNSTREAM(FEET) = 702.46  
 FLOW LENGTH(FEET) = 1548.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 69.0 INCH PIPE IS 53.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.57  
 ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 162.34  
 PIPE TRAVEL TIME(MIN.) = 3.41 Tc(MIN.) = 27.07  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1230.00 = 6292.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1230.00 TO NODE 1230.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 27.07  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.516  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 3.60 0.98 0.100 32  
 PUBLIC PARK A 1.94 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.363  
 SUBAREA AREA(ACRES) = 5.54 SUBAREA RUNOFF(CFS) = 5.80  
 EFFECTIVE AREA(ACRES) = 155.68 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 162.6 PEAK FLOW RATE(CFS) = 162.34  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1230.00 TO NODE 1230.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 27.07  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.516  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	5.27	0.98	0.100	32
PUBLIC PARK	A	1.67	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.280  
 SUBAREA AREA(ACRES) = 6.94 SUBAREA RUNOFF(CFS) = 7.76  
 EFFECTIVE AREA(ACRES) = 162.62 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 169.5 PEAK FLOW RATE(CFS) = 162.34  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	1.68	0.98	0.100	32
PUBLIC PARK	A	2.28	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.532  
 SUBAREA AREA(ACRES) = 3.96 SUBAREA RUNOFF(CFS) = 3.30  
 EFFECTIVE AREA(ACRES) = 169.41 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 176.3 PEAK FLOW RATE(CFS) = 162.34  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1230.00 TO NODE 1230.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 27.07  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.516  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.18	0.98	0.100	32
PUBLIC PARK	A	0.65	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.272  
 SUBAREA AREA(ACRES) = 2.83 SUBAREA RUNOFF(CFS) = 3.19  
 EFFECTIVE AREA(ACRES) = 165.45 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 172.3 PEAK FLOW RATE(CFS) = 162.34  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1230.00 TO NODE 1433.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 702.46 DOWNSTREAM(FEET) = 698.90  
 FLOW LENGTH(FEET) = 1158.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 66.0 INCH PIPE IS 49.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.43  
 ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 162.34  
 PIPE TRAVEL TIME(MIN.) = 2.29 Tc(MIN.) = 29.36  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1433.00 = 7450.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1433.00 TO NODE 1433.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 29.36  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.444  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.18	0.98	0.100	32
PUBLIC PARK	A	0.65	0.98	0.850	32

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1433.00 TO NODE 1434.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 698.90 DOWNSTREAM(FEET) = 698.40  
 FLOW LENGTH(FEET) = 170.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 66.0 INCH PIPE IS 50.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.27  
 ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 162.34  
 PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 29.70  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1434.00 = 7620.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1434.00 TO NODE 1434.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 29.70  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.434  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.43	0.98	0.850	32
RESIDENTIAL	A	7.50	0.98	0.500	32

"5-7 DWELLINGS/ACRE"  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.556  
 SUBAREA AREA(ACRES) = 8.93 SUBAREA RUNOFF(CFS) = 7.17  
 EFFECTIVE AREA(ACRES) = 178.34 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 185.2 PEAK FLOW RATE(CFS) = 162.34  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1434.00 TO NODE 1434.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 29.70  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.434  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.43	0.98	0.850	32
RESIDENTIAL	A	7.50	0.98	0.500	32

LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
PUBLIC PARK            A            2.80        0.98        0.850        32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE"    A            15.00        0.98        0.500        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.555  
SUBAREA AREA(ACRES) = 17.80        SUBAREA RUNOFF(CFS) = 14.30  
EFFECTIVE AREA(ACRES) = 196.14    AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.92    AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 203.0        PEAK FLOW RATE(CFS) = 171.79

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	173.85	24.50	1.610	0.92 (0.46)	0.50	167.7	1208.00
2	171.79	29.70	1.434	0.92 (0.46)	0.50	196.1	1218.00
3	161.86	33.04	1.345	0.91 (0.46)	0.50	203.0	1200.00

NEW PEAK FLOW DATA ARE:  
PEAK FLOW RATE(CFS) = 173.85    Tc(MIN.) = 24.50  
AREA-AVERAGED Fm(INCH/HR) = 0.46    AREA-AVERAGED Fp(INCH/HR) = 0.92  
AREA-AVERAGED Ap = 0.50    EFFECTIVE AREA(ACRES) = 167.75

\*\*\*\*\*

FLOW PROCESS FROM NODE 1434.00 TO NODE 1434.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 24.50  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.610  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/        SCS SOIL        AREA        Fp        Ap        SCS  
LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
COMMERCIAL            A            0.88        0.98        0.100        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 0.88        SUBAREA RUNOFF(CFS) = 1.20  
EFFECTIVE AREA(ACRES) = 168.63    AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.92    AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 203.9        PEAK FLOW RATE(CFS) = 175.05

\*\*\*\*\*

FLOW PROCESS FROM NODE 1434.00 TO NODE 1437.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 698.40    DOWNSTREAM(FEET) = 680.07  
FLOW LENGTH(FEET) = 1158.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.00  
ESTIMATED PIPE DIAMETER(INCH) = 51.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 175.05  
PIPE TRAVEL TIME(MIN.) = 1.21    Tc(MIN.) = 25.70  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1437.00 = 8778.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1437.00 TO NODE 1437.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 25.70  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.564  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/        SCS SOIL        AREA        Fp        Ap        SCS  
LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
COMMERCIAL            A            1.80        0.98        0.100        32  
PUBLIC PARK            A            2.38        0.98        0.850        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527  
SUBAREA AREA(ACRES) = 4.18        SUBAREA RUNOFF(CFS) = 3.95  
EFFECTIVE AREA(ACRES) = 172.81    AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.92    AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 208.1        PEAK FLOW RATE(CFS) = 175.05  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 1437.00 TO NODE 1438.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 680.07    DOWNSTREAM(FEET) = 680.00  
FLOW LENGTH(FEET) = 80.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 84.0 INCH PIPE IS 67.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.31  
ESTIMATED PIPE DIAMETER(INCH) = 84.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 175.05  
PIPE TRAVEL TIME(MIN.) = 0.25    Tc(MIN.) = 25.95  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1438.00 = 8858.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 25.95  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.555  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/        SCS SOIL        AREA        Fp        Ap        SCS  
LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
PUBLIC PARK            A            0.47        0.98        0.850        32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE"    A            18.00        0.98        0.500        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.509  
SUBAREA AREA(ACRES) = 18.47        SUBAREA RUNOFF(CFS) = 17.60  
EFFECTIVE AREA(ACRES) = 191.28    AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.92    AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 226.6        PEAK FLOW RATE(CFS) = 188.24

\*\*\*\*\*

FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 10

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-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
-----
*****
FLOW PROCESS FROM NODE 1400.00 TO NODE 1402.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 976.00
ELEVATION DATA: UPSTREAM(FEET) = 724.50 DOWNSTREAM(FEET) = 715.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.420
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.125
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
"5-7 DWELLINGS/ACRE" A 8.73 0.98 0.500 32 15.42
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 12.87
TOTAL AREA(ACRES) = 8.73 PEAK FLOW RATE(CFS) = 12.87
-----
*****
FLOW PROCESS FROM NODE 1402.00 TO NODE 1404.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
-----
UPSTREAM ELEVATION(FEET) = 715.00 DOWNSTREAM ELEVATION(FEET) = 706.50
STREET LENGTH(FEET) = 443.00 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) = 20.08
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.45
HALFSTREET FLOOD WIDTH(FEET) = 16.29
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.92
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.78
STREET FLOW TRAVEL TIME(MIN.) = 1.89 Tc(MIN.) = 17.30
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.983
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" A 10.71 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 10.71 SUBAREA RUNOFF(CFS) = 14.41
EFFECTIVE AREA(ACRES) = 19.44 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 26.16

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 18.16
FLOW VELOCITY(FEET/SEC.) = 4.17 DEPTH*VELOCITY(FT*FT/SEC.) = 2.03
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1404.00 = 1419.00 FEET.
-----
*****
FLOW PROCESS FROM NODE 1404.00 TO NODE 1406.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 706.50 DOWNSTREAM(FEET) = 704.10
FLOW LENGTH(FEET) = 832.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.17
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.16
PIPE TRAVEL TIME(MIN.) = 2.68 Tc(MIN.) = 19.99
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1406.00 = 2251.00 FEET.
-----
*****
FLOW PROCESS FROM NODE 1406.00 TO NODE 1406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 19.99
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.819
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" A 11.19 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.19 SUBAREA RUNOFF(CFS) = 13.41
EFFECTIVE AREA(ACRES) = 30.63 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 30.6 PEAK FLOW RATE(CFS) = 36.70
-----
*****
FLOW PROCESS FROM NODE 1406.00 TO NODE 1406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 19.99
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.819
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  
PUBLIC PARK A 1.61 0.98 0.850 32  
PUBLIC PARK C 1.24 0.57 0.850 69  
COMMERCIAL A 1.81 0.98 0.100 32  
COMMERCIAL C 1.33 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457  
SUBAREA AREA(ACRES) = 5.99 SUBAREA RUNOFF(CFS) = 7.84  
EFFECTIVE AREA(ACRES) = 36.62 AREA-AVERAGED Fm(INCH/HR) = 0.47  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 36.6 PEAK FLOW RATE(CFS) = 44.54

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1406.00 TO NODE 1412.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 704.10 DOWNSTREAM(FEET) = 689.26  
FLOW LENGTH(FEET) = 1225.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.34  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 44.54  
PIPE TRAVEL TIME(MIN.) = 1.97 Tc(MIN.) = 21.96  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1412.00 = 3476.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 21.96  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 2.96 0.98 0.100 32  
PUBLIC PARK A 2.76 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462  
SUBAREA AREA(ACRES) = 5.72 SUBAREA RUNOFF(CFS) = 6.53  
EFFECTIVE AREA(ACRES) = 42.34 AREA-AVERAGED Fm(INCH/HR) = 0.47  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 42.3 PEAK FLOW RATE(CFS) = 47.78

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 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.) = 21.96  
RAINFALL INTENSITY(INCH/HR) = 1.72

AREA-AVERAGED Fm(INCH/HR) = 0.47  
AREA-AVERAGED Fp(INCH/HR) = 0.95  
AREA-AVERAGED Ap = 0.49  
EFFECTIVE STREAM AREA(ACRES) = 42.34  
TOTAL STREAM AREA(ACRES) = 42.34  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 47.78

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1408.00 TO NODE 1410.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 967.00  
ELEVATION DATA: UPSTREAM(FEET) = 720.25 DOWNSTREAM(FEET) = 713.10

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.519  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.300  
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  
"5-7 DWELLINGS/ACRE" A 2.26 0.98 0.500 32 16.23  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 3.27 0.98 0.200 32 13.52  
PUBLIC PARK A 3.21 0.98 0.850 32 20.15  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.516  
SUBAREA RUNOFF(CFS) = 14.13  
TOTAL AREA(ACRES) = 8.74 PEAK FLOW RATE(CFS) = 14.13

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1410.00 TO NODE 1411.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
-----  
UPSTREAM ELEVATION(FEET) = 713.10 DOWNSTREAM ELEVATION(FEET) = 704.70  
STREET LENGTH(FEET) = 442.00 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) = 21.99  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.46  
HALFSTREET FLOOD WIDTH(FEET) = 16.91  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.00



PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.86  
 STREET FLOW TRAVEL TIME(MIN.) = 1.84 Tc(MIN.) = 15.36  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.130  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	9.03	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 9.03 SUBAREA RUNOFF(CFS) = 15.73  
 EFFECTIVE AREA(ACRES) = 17.77 AREA-AVERAGED Fm(INCH/HR) = 0.35  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA(ACRES) = 17.8 PEAK FLOW RATE(CFS) = 28.52

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 18.79  
 FLOW VELOCITY(FEET/SEC.) = 4.26 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.12  
 LONGEST FLOWPATH FROM NODE 1408.00 TO NODE 1411.00 = 1409.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1411.00 TO NODE 1412.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 695.20 DOWNSTREAM(FEET) = 689.26  
 FLOW LENGTH(FEET) = 760.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.84  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 28.52  
 PIPE TRAVEL TIME(MIN.) = 1.62 Tc(MIN.) = 16.98  
 LONGEST FLOWPATH FROM NODE 1408.00 TO NODE 1412.00 = 2169.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 16.98  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.006  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	10.63	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 10.63 SUBAREA RUNOFF(CFS) = 17.32  
 EFFECTIVE AREA(ACRES) = 28.40 AREA-AVERAGED Fm(INCH/HR) = 0.29  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.30  
 TOTAL AREA(ACRES) = 28.4 PEAK FLOW RATE(CFS) = 43.86

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1412.00 TO NODE 1412.00 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.) = 16.98  
 RAINFALL INTENSITY(INCH/HR) = 2.01  
 AREA-AVERAGED Fm(INCH/HR) = 0.29  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.30  
 EFFECTIVE STREAM AREA(ACRES) = 28.40  
 TOTAL STREAM AREA(ACRES) = 28.40  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 43.86

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	47.78	21.96	1.719	0.95( 0.47)	0.49	42.3	1400.00
2	43.86	16.98	2.006	0.98( 0.29)	0.30	28.4	1408.00

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	89.25	16.98	2.006	0.96( 0.38)	0.40	61.1	1408.00
2	84.30	21.96	1.719	0.96( 0.39)	0.41	70.7	1400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 89.25 Tc(MIN.) = 16.98  
 EFFECTIVE AREA(ACRES) = 61.13 AREA-AVERAGED Fm(INCH/HR) = 0.38  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA(ACRES) = 70.7  
 LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1412.00 = 3476.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1412.00 TO NODE 1413.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 689.26 DOWNSTREAM(FEET) = 685.10  
 FLOW LENGTH(FEET) = 1154.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.70  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 89.25  
 PIPE TRAVEL TIME(MIN.) = 2.50 Tc(MIN.) = 19.48  
 LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1413.00 = 4630.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1413.00 TO NODE 1413.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----

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=====
MAINLINE Tc(MIN.) = 19.48
* 25 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
COMMERCIAL          A      3.47   0.98   0.100  32
PUBLIC PARK         A      2.47   0.98   0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.412
SUBAREA AREA(ACRES) = 5.94      SUBAREA RUNOFF(CFS) = 7.73
EFFECTIVE AREA(ACRES) = 67.07  AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 76.7      PEAK FLOW RATE(CFS) = 89.25
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 1413.00 TO NODE 1414.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 685.10  DOWNSTREAM(FEET) = 684.70
FLOW LENGTH(FEET) = 115.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.57
ESTIMATED PIPE DIAMETER(INCH) = 51.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 89.25
PIPE TRAVEL TIME(MIN.) = 0.25  Tc(MIN.) = 19.73
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1414.00 = 4745.00 FEET.

*****
FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.73
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.833
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap    SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A      0.47   0.98   0.100  32
PUBLIC PARK         A      0.31   0.98   0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.398
SUBAREA AREA(ACRES) = 0.78      SUBAREA RUNOFF(CFS) = 1.01
EFFECTIVE AREA(ACRES) = 67.85  AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 77.5      PEAK FLOW RATE(CFS) = 89.25
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 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.) = 19.73
RAINFALL INTENSITY(INCH/HR) = 1.83
AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.96
AREA-AVERAGED Ap = 0.40
EFFECTIVE STREAM AREA(ACRES) = 67.85
TOTAL STREAM AREA(ACRES) = 77.46
PEAK FLOW RATE(CFS) AT CONFLUENCE = 89.25

*****
FLOW PROCESS FROM NODE 1416.00 TO NODE 1418.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 808.00
ELEVATION DATA: UPSTREAM(FEET) = 723.95  DOWNSTREAM(FEET) = 719.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.882
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.088
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         A      0.48   0.98   0.850  32  19.72
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  A      9.00   0.98   0.500  32  15.88
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.518
SUBAREA RUNOFF(CFS) = 13.51
TOTAL AREA(ACRES) = 9.48  PEAK FLOW RATE(CFS) = 13.51

*****
FLOW PROCESS FROM NODE 1418.00 TO NODE 1420.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 719.30  DOWNSTREAM(FEET) = 716.00
FLOW LENGTH(FEET) = 1042.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.64
ESTIMATED PIPE DIAMETER(INCH) = 27.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.51
PIPE TRAVEL TIME(MIN.) = 3.75  Tc(MIN.) = 19.63
LONGEST FLOWPATH FROM NODE 1416.00 TO NODE 1420.00 = 1850.00 FEET.

*****
FLOW PROCESS FROM NODE 1420.00 TO NODE 1420.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.63
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.839

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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					
"5-7 DWELLINGS/ACRE"	A	18.91	0.98	0.500	32
PUBLIC PARK	A	5.71	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.581  
SUBAREA AREA(ACRES) = 24.62 SUBAREA RUNOFF(CFS) = 28.19  
EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.55  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.56  
TOTAL AREA(ACRES) = 34.1 PEAK FLOW RATE(CFS) = 39.57

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
TIME OF CONCENTRATION(MIN.) = 21.17  
RAINFALL INTENSITY(INCH/HR) = 1.76  
AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.95  
AREA-AVERAGED Ap = 0.55  
EFFECTIVE STREAM AREA(ACRES) = 43.67  
TOTAL STREAM AREA(ACRES) = 43.67  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 48.55

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	89.25	19.73	1.833	0.96( 0.39)	0.40	67.9	1408.00
1	84.30	24.73	1.601	0.96( 0.40)	0.41	77.5	1400.00
2	48.55	21.17	1.757	0.95( 0.52)	0.55	43.7	1416.00

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	137.27	19.73	1.833	0.96( 0.44)	0.46	108.6	1408.00
2	136.37	21.17	1.757	0.96( 0.44)	0.46	114.3	1416.00
3	126.70	24.73	1.601	0.96( 0.44)	0.46	121.1	1400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 137.27 Tc(MIN.) = 19.73  
EFFECTIVE AREA(ACRES) = 108.55 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 121.1  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1414.00 = 4745.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1414.00 TO NODE 1435.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 684.71 DOWNSTREAM(FEET) = 683.09  
FLOW LENGTH(FEET) = 487.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.27  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 137.27  
PIPE TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 20.71  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1435.00 = 5232.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1435.00 TO NODE 1435.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.71  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.780

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1420.00 TO NODE 1414.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
ELEVATION DATA: UPSTREAM(FEET) = 716.00 DOWNSTREAM(FEET) = 684.71  
FLOW LENGTH(FEET) = 1225.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.24  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 39.57  
PIPE TRAVEL TIME(MIN.) = 1.54 Tc(MIN.) = 21.17  
LONGEST FLOWPATH FROM NODE 1416.00 TO NODE 1414.00 = 3075.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
MAINLINE Tc(MIN.) = 21.17  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.757

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"	A	6.57	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.00	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 9.57 SUBAREA RUNOFF(CFS) = 11.49  
EFFECTIVE AREA(ACRES) = 43.67 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.55  
TOTAL AREA(ACRES) = 43.7 PEAK FLOW RATE(CFS) = 48.55

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1414.00 TO NODE 1414.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<  
TOTAL NUMBER OF STREAMS = 2

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.87	0.57	0.100	69
PUBLIC PARK	C	0.86	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.336  
SUBAREA AREA(ACRES) = 2.73 SUBAREA RUNOFF(CFS) = 3.91  
EFFECTIVE AREA(ACRES) = 111.28 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 123.9 PEAK FLOW RATE(CFS) = 137.27  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
PUBLIC PARK	C	0.70	0.57	0.850	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	11.11	0.57	0.500	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	14.80	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.509  
SUBAREA AREA(ACRES) = 26.61 SUBAREA RUNOFF(CFS) = 30.08  
EFFECTIVE AREA(ACRES) = 141.57 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 154.1 PEAK FLOW RATE(CFS) = 157.29

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1435.00 TO NODE 1435.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 20.71  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.780  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.34	0.98	0.100	32
PUBLIC PARK	A	1.34	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373  
SUBAREA AREA(ACRES) = 3.68 SUBAREA RUNOFF(CFS) = 4.69  
EFFECTIVE AREA(ACRES) = 114.96 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 127.5 PEAK FLOW RATE(CFS) = 139.88

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1435.00 TO NODE 1436.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 683.09 DOWNSTREAM(FEET) = 680.30  
FLOW LENGTH(FEET) = 1164.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 48.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.43  
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 139.88  
PIPE TRAVEL TIME(MIN.) = 2.61 Tc(MIN.) = 23.32  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1436.00 = 6396.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1436.00 TO NODE 1436.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 23.32  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.658  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.34	0.98	0.100	32
PUBLIC PARK	A	1.34	0.98	0.850	32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1436.00 TO NODE 1438.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 680.30 DOWNSTREAM(FEET) = 680.00  
FLOW LENGTH(FEET) = 83.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 63.0 INCH PIPE IS 48.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.88  
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 157.29  
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 23.48  
LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1438.00 = 6479.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 23.48  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.651  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.57	0.98	0.100	32
PUBLIC PARK	A	1.70	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.399  
SUBAREA AREA(ACRES) = 4.27 SUBAREA RUNOFF(CFS) = 4.85  
EFFECTIVE AREA(ACRES) = 145.84 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 158.4 PEAK FLOW RATE(CFS) = 161.30

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 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

1 161.30 23.48 1.651 0.92( 0.42) 0.46 145.8 1408.00  
 2 159.37 24.92 1.593 0.92( 0.42) 0.46 151.6 1416.00  
 3 148.46 28.56 1.468 0.92( 0.43) 0.46 158.4 1400.00  
 LONGEST FLOWPATH FROM NODE 1400.00 TO NODE 1438.00 = 6479.00 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	188.24	25.95	1.555	0.92( 0.46)	0.50	191.3	1208.00
2	183.85	31.16	1.393	0.92( 0.46)	0.50	219.7	1218.00
3	172.90	34.53	1.310	0.92( 0.46)	0.50	226.6	1200.00

LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1438.00 = 8858.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	346.60	23.48	1.651	0.92( 0.44)	0.48	318.9	1408.00
2	346.46	24.92	1.593	0.92( 0.44)	0.48	335.3	1416.00
3	344.52	25.95	1.555	0.92( 0.45)	0.48	344.8	1208.00
4	334.50	28.56	1.468	0.92( 0.45)	0.48	363.9	1400.00
5	321.64	31.16	1.393	0.92( 0.45)	0.49	378.1	1218.00
6	298.83	34.53	1.310	0.92( 0.45)	0.49	385.0	1200.00

TOTAL AREA(ACRES) = 385.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 346.60 Tc(MIN.) = 23.479  
 EFFECTIVE AREA(ACRES) = 318.88 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 385.0  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1438.00 = 8858.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1438.00 TO NODE 1438.00 IS CODE = 12  
 -----  
 >>>>CLEAR MEMORY BANK # 1 <<<<<

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1438.00 TO NODE 1440.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 679.57 DOWNSTREAM(FEET) = 676.80  
 FLOW LENGTH(FEET) = 519.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 78.0 INCH PIPE IS 60.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.46  
 ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 346.60  
 PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 24.17  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1440.00 = 9377.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1440.00 TO NODE 1440.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 24.17  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.623  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.57 0.98 0.100 32  
 PUBLIC PARK A 0.90 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.559  
 SUBAREA AREA(ACRES) = 1.47 SUBAREA RUNOFF(CFS) = 1.43  
 EFFECTIVE AREA(ACRES) = 320.35 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 386.5 PEAK FLOW RATE(CFS) = 346.60  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1440.00 TO NODE 1440.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 24.17  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.623

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" A 14.37 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 14.37 SUBAREA RUNOFF(CFS) = 18.46  
 EFFECTIVE AREA(ACRES) = 334.72 AREA-AVERAGED Fm(INCH/HR) = 0.43  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 400.8 PEAK FLOW RATE(CFS) = 358.27

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1440.00 TO NODE 1442.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 676.80 DOWNSTREAM(FEET) = 674.80  
 FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 84.0 INCH PIPE IS 67.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.82  
 ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 358.27  
 PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 25.02  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1442.00 = 9927.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1442.00 TO NODE 1442.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.589  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.75 0.98 0.100 32  
 PUBLIC PARK A 1.00 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.529  
 SUBAREA AREA(ACRES) = 1.75 SUBAREA RUNOFF(CFS) = 1.69  
 EFFECTIVE AREA(ACRES) = 336.47 AREA-AVERAGED Fm(INCH/HR) = 0.43  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 402.6 PEAK FLOW RATE(CFS) = 358.27  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1442.00 TO NODE 1442.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 25.02  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.589  
 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" A 13.37 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 13.37 SUBAREA RUNOFF(CFS) = 16.78  
 EFFECTIVE AREA(ACRES) = 349.84 AREA-AVERAGED Fm(INCH/HR) = 0.42  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA(ACRES) = 415.9 PEAK FLOW RATE(CFS) = 366.75

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1442.00 TO NODE 1442.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 25.02  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.589  
 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" A 16.54 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 16.54 SUBAREA RUNOFF(CFS) = 20.76  
 EFFECTIVE AREA(ACRES) = 366.38 AREA-AVERAGED Fm(INCH/HR) = 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 432.5 PEAK FLOW RATE(CFS) = 387.51

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1442.00 TO NODE 1444.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 674.80 DOWNSTREAM(FEET) = 673.00  
 FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 84.0 INCH PIPE IS 65.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.02  
 ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 387.51  
 PIPE TRAVEL TIME(MIN.) = 0.55 Tc(MIN.) = 25.57  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1444.00 = 10327.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1444.00 TO NODE 1444.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 25.57  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.569  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.56 0.98 0.100 32  
 PUBLIC PARK A 0.90 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.562  
 SUBAREA AREA(ACRES) = 1.46 SUBAREA RUNOFF(CFS) = 1.34  
 EFFECTIVE AREA(ACRES) = 367.84 AREA-AVERAGED Fm(INCH/HR) = 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 433.9 PEAK FLOW RATE(CFS) = 387.51  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1444.00 TO NODE 1444.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 25.57  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.569  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 PUBLIC PARK A 5.38 0.98 0.850 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 10.00 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427  
 SUBAREA AREA(ACRES) = 15.38 SUBAREA RUNOFF(CFS) = 15.95  
 EFFECTIVE AREA(ACRES) = 383.22 AREA-AVERAGED Fm(INCH/HR) = 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 449.3 PEAK FLOW RATE(CFS) = 397.95

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1444.00 TO NODE 1444.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====



MAINLINE Tc(MIN.) = 25.57  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.569  
 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" A 0.85 0.98 0.200 32  
 PUBLIC PARK A 6.16 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.771  
 SUBAREA AREA(ACRES) = 7.01 SUBAREA RUNOFF(CFS) = 5.15  
 EFFECTIVE AREA(ACRES) = 390.23 AREA-AVERAGED Fm(INCH/HR) = 0.42  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 456.3 PEAK FLOW RATE(CFS) = 403.10

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1444.00 TO NODE 1446.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 668.10  
 FLOW LENGTH(FEET) = 1150.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 87.0 INCH PIPE IS 66.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.95  
 ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 403.10  
 PIPE TRAVEL TIME(MIN.) = 1.60 Tc(MIN.) = 27.18  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1446.00 = 11477.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1446.00 TO NODE 1446.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 27.18  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.512  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 PUBLIC PARK A 2.80 0.98 0.850 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 11.54 0.98 0.200 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 0.87 0.57 0.200 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.96  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.320  
 SUBAREA AREA(ACRES) = 15.21 SUBAREA RUNOFF(CFS) = 16.50  
 EFFECTIVE AREA(ACRES) = 405.44 AREA-AVERAGED Fm(INCH/HR) = 0.42  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 471.5 PEAK FLOW RATE(CFS) = 403.10  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1446.00 TO NODE 1446.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 27.18  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.512  
 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" A 6.48 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 6.48 SUBAREA RUNOFF(CFS) = 7.68  
 EFFECTIVE AREA(ACRES) = 411.92 AREA-AVERAGED Fm(INCH/HR) = 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.44  
 TOTAL AREA(ACRES) = 478.0 PEAK FLOW RATE(CFS) = 407.54

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1446.00 TO NODE 1447.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 668.10 DOWNSTREAM(FEET) = 668.00  
 FLOW LENGTH(FEET) = 104.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 114.0 INCH PIPE IS 89.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.82  
 ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 407.54  
 PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 27.43  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1447.00 = 11581.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1447.00 TO NODE 1447.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 27.43  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.504  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.63 0.98 0.100 32  
 PUBLIC PARK A 2.14 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.526  
 SUBAREA AREA(ACRES) = 3.77 SUBAREA RUNOFF(CFS) = 3.36  
 EFFECTIVE AREA(ACRES) = 415.69 AREA-AVERAGED Fm(INCH/HR) = 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 481.8 PEAK FLOW RATE(CFS) = 407.78

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1447.00 TO NODE 1448.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====



ELEVATION DATA: UPSTREAM(FEET) = 668.00 DOWNSTREAM(FEET) = 667.90  
 FLOW LENGTH(FEET) = 76.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 108.0 INCH PIPE IS 84.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.68  
 ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 407.78  
 PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 27.60  
 LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1448.00 = 11657.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1448.00 TO NODE 1448.00 IS CODE = 10  
 -----

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1448.10 TO NODE 1449.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 -----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 780.00  
 ELEVATION DATA: UPSTREAM(FEET) = 690.40 DOWNSTREAM(FEET) = 682.80

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.993  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.005  
 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	A	4.79	0.98	0.850	32	17.50
RESIDENTIAL(ARID)						
"1 DWELLING/ACRE"	A	3.20	0.75	0.800	32/62	16.99

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.830  
 SUBAREA RUNOFF(CFS) = 9.12  
 TOTAL AREA(ACRES) = 7.99 PEAK FLOW RATE(CFS) = 9.12

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1449.00 TO NODE 1450.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----

ELEVATION DATA: UPSTREAM(FEET) = 673.80 DOWNSTREAM(FEET) = 673.00  
 FLOW LENGTH(FEET) = 285.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.02  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 9.12  
 PIPE TRAVEL TIME(MIN.) = 1.18 Tc(MIN.) = 18.17  
 LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1450.00 = 1065.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1450.00 TO NODE 1450.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 18.17  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.926  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	3.09	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	8.00	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.381  
 SUBAREA AREA(ACRES) = 11.09 SUBAREA RUNOFF(CFS) = 15.51  
 EFFECTIVE AREA(ACRES) = 19.08 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.57  
 TOTAL AREA(ACRES) = 19.1 PEAK FLOW RATE(CFS) = 24.06

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1450.00 TO NODE 1452.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----

ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 671.30  
 FLOW LENGTH(FEET) = 422.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.73  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 24.06  
 PIPE TRAVEL TIME(MIN.) = 1.23 Tc(MIN.) = 19.40  
 LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1452.00 = 1487.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1452.00 TO NODE 1452.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 19.40  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.852  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.40	0.98	0.100	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	6.80	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.183  
 SUBAREA AREA(ACRES) = 8.20 SUBAREA RUNOFF(CFS) = 12.35  
 EFFECTIVE AREA(ACRES) = 27.28 AREA-AVERAGED Fm(INCH/HR) = 0.42  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 27.3 PEAK FLOW RATE(CFS) = 35.13

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1452.00 TO NODE 1452.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----

```

=====
MAINLINE Tc(MIN.) = 19.40
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.852
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A         0.28   0.98  0.100  32
PUBLIC PARK          A         1.00   0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.686
SUBAREA AREA(ACRES) = 1.28   SUBAREA RUNOFF(CFS) = 1.36
EFFECTIVE AREA(ACRES) = 28.56   AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.93   AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 28.6   PEAK FLOW RATE(CFS) = 36.50

*****
FLOW PROCESS FROM NODE 1452.00 TO NODE 1454.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 671.30   DOWNSTREAM(FEET) = 670.93
FLOW LENGTH(FEET) = 127.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.73
ESTIMATED PIPE DIAMETER(INCH) = 39.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 36.50
PIPE TRAVEL TIME(MIN.) = 0.37   Tc(MIN.) = 19.77
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1454.00 = 1614.00 FEET.

*****
FLOW PROCESS FROM NODE 1454.00 TO NODE 1454.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 19.77
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.831
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A         0.84   0.98  0.100  32
PUBLIC PARK          A         0.66   0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430
SUBAREA AREA(ACRES) = 1.50   SUBAREA RUNOFF(CFS) = 1.91
EFFECTIVE AREA(ACRES) = 30.06   AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.93   AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 30.1   PEAK FLOW RATE(CFS) = 37.87

*****
FLOW PROCESS FROM NODE 1454.00 TO NODE 1456.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 670.93   DOWNSTREAM(FEET) = 669.15

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FLOW LENGTH(FEET) = 836.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.15
ESTIMATED PIPE DIAMETER(INCH) = 42.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 37.87
PIPE TRAVEL TIME(MIN.) = 2.71   Tc(MIN.) = 22.48
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1456.00 = 2450.00 FEET.

*****
FLOW PROCESS FROM NODE 1456.00 TO NODE 1456.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 22.48
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.695
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A         0.42   0.98  0.100  32
PUBLIC PARK          A         0.33   0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430
SUBAREA AREA(ACRES) = 0.75   SUBAREA RUNOFF(CFS) = 0.86
EFFECTIVE AREA(ACRES) = 30.81   AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.93   AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 30.8   PEAK FLOW RATE(CFS) = 37.87
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 1456.00 TO NODE 1448.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 669.15   DOWNSTREAM(FEET) = 667.90
FLOW LENGTH(FEET) = 186.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.86
ESTIMATED PIPE DIAMETER(INCH) = 33.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 37.87
PIPE TRAVEL TIME(MIN.) = 0.39   Tc(MIN.) = 22.87
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1448.00 = 2636.00 FEET.

*****
FLOW PROCESS FROM NODE 1448.00 TO NODE 1448.00 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          37.87 22.87 1.677 0.93(0.43) 0.46 30.8 1448.10
LONGEST FLOWPATH FROM NODE 1448.10 TO NODE 1448.00 = 2636.00 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	407.78	27.60	1.499	0.93 ( 0.41)	0.45	415.7	1408.00
2	405.25	29.04	1.453	0.93 ( 0.42)	0.45	432.1	1416.00
3	401.70	30.08	1.423	0.93 ( 0.42)	0.45	441.6	1208.00
4	388.78	32.72	1.353	0.93 ( 0.42)	0.45	460.7	1400.00
5	373.38	35.38	1.291	0.93 ( 0.42)	0.45	474.9	1218.00
6	348.30	38.81	1.221	0.93 ( 0.42)	0.45	481.8	1200.00

LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1448.00 = 11657.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	431.52	22.87	1.677	0.93 ( 0.42)	0.45	375.3	1448.10
2	440.21	27.60	1.499	0.93 ( 0.42)	0.45	446.5	1408.00
3	436.32	29.04	1.453	0.93 ( 0.42)	0.45	462.9	1416.00
4	431.85	30.08	1.423	0.93 ( 0.42)	0.45	472.4	1208.00
5	416.79	32.72	1.353	0.93 ( 0.42)	0.45	491.5	1400.00
6	399.51	35.38	1.291	0.93 ( 0.42)	0.45	505.7	1218.00
7	372.31	38.81	1.221	0.93 ( 0.42)	0.45	512.6	1200.00

TOTAL AREA(ACRES) = 512.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 440.21 Tc(MIN.) = 27.597  
EFFECTIVE AREA(ACRES) = 446.50 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 512.6  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1448.00 = 11657.00 FEET.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.449  
SUBAREA AREA(ACRES) = 3.14 SUBAREA RUNOFF(CFS) = 3.50  
EFFECTIVE AREA(ACRES) = 449.64 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 515.7 PEAK FLOW RATE(CFS) = 440.21  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 515.7 TC(MIN.) = 27.78  
EFFECTIVE AREA(ACRES) = 449.64 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.446  
PEAK FLOW RATE(CFS) = 440.21

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	431.52	23.05	1.669	0.93 ( 0.41)	0.45	378.4	1448.10
2	440.21	27.78	1.493	0.93 ( 0.41)	0.45	449.6	1408.00
3	436.32	29.23	1.448	0.93 ( 0.42)	0.45	466.0	1416.00
4	431.85	30.26	1.418	0.93 ( 0.42)	0.45	475.6	1208.00
5	416.79	32.90	1.349	0.93 ( 0.42)	0.45	494.7	1400.00
6	399.51	35.56	1.287	0.93 ( 0.42)	0.45	508.9	1218.00
7	372.31	39.00	1.218	0.93 ( 0.42)	0.45	515.7	1200.00

END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1448.00 TO NODE 1458.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 667.90 DOWNSTREAM(FEET) = 667.70  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 102.0 INCH PIPE IS 80.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.13  
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 440.21  
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 27.78  
LONGEST FLOWPATH FROM NODE 1200.00 TO NODE 1458.00 = 11757.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1458.00 TO NODE 1458.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 27.78  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.493  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.68	0.57	0.100	69
PUBLIC PARK	C	1.46	0.57	0.850	69



\*\*\*\*\*  
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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* HELLMAN, NORTH OF CHINO \*  
\* 10-YR STUDY \*  
\* AREA 'F' \*  
\*\*\*\*\*

FILE NAME: HLM-U.DAT  
TIME/DATE OF STUDY: 17:33 10/16/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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- / SIDE / SIDE / WAY	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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\* FLOW PROCESS FROM NODE 1000.00 TO NODE 1002.00 IS CODE = 21 \*\*\*\*\*

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 981.00  
ELEVATION DATA: UPSTREAM(FEET) = 777.00 DOWNSTREAM(FEET) = 769.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.008  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.768  
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  
"5-7 DWELLINGS/ACRE" A 9.45 0.98 0.500 32 16.01  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 10.89  
TOTAL AREA(ACRES) = 9.45 PEAK FLOW RATE(CFS) = 10.89

\*\*\*\*\* FLOW PROCESS FROM NODE 1002.00 TO NODE 1004.00 IS CODE = 31 \*\*\*\*\*

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

===== ELEVATION DATA: UPSTREAM(FEET) = 759.50 DOWNSTREAM(FEET) = 757.70  
FLOW LENGTH(FEET) = 755.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.97  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 10.89  
PIPE TRAVEL TIME(MIN.) = 3.17 Tc(MIN.) = 19.18  
LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1004.00 = 1736.00 FEET.

\*\*\*\*\* FLOW PROCESS FROM NODE 1004.00 TO NODE 1004.00 IS CODE = 81 \*\*\*\*\*

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

===== MAINLINE Tc(MIN.) = 19.18  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.586  
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" A 7.87 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 7.87 SUBAREA RUNOFF(CFS) = 7.78  
EFFECTIVE AREA(ACRES) = 17.32 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 17.3 PEAK FLOW RATE(CFS) = 17.12

\*\*\*\*\* FLOW PROCESS FROM NODE 1004.00 TO NODE 1004.00 IS CODE = 81 \*\*\*\*\*

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

```

=====
MAINLINE Tc(MIN.) = 19.18
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.586
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A       1.90   0.98  0.100  32
PUBLIC PARK         A       1.78   0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA AREA(ACRES) = 3.68   SUBAREA RUNOFF(CFS) = 3.76
EFFECTIVE AREA(ACRES) = 21.00   AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.97   AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 21.0   PEAK FLOW RATE(CFS) = 20.88

*****
FLOW PROCESS FROM NODE 1004.00 TO NODE 1006.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 757.70 DOWNSTREAM(FEET) = 730.00
FLOW LENGTH(FEET) = 1204.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.75
ESTIMATED PIPE DIAMETER(INCH) = 21.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.88
PIPE TRAVEL TIME(MIN.) = 1.87   Tc(MIN.) = 21.04
LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1006.00 = 2940.00 FEET.

*****
FLOW PROCESS FROM NODE 1006.00 TO NODE 1006.00 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.) = 21.04
RAINFALL INTENSITY(INCH/HR) = 1.50
AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA(ACRES) = 21.00
TOTAL STREAM AREA(ACRES) = 21.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 20.88

*****
FLOW PROCESS FROM NODE 1008.00 TO NODE 1010.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 981.00
ELEVATION DATA: UPSTREAM(FEET) = 764.30 DOWNSTREAM(FEET) = 755.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

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SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.815
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.780
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.)
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   A       9.29   0.98  0.500  32  15.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 10.81
TOTAL AREA(ACRES) = 9.29   PEAK FLOW RATE(CFS) = 10.81

*****
FLOW PROCESS FROM NODE 1010.00 TO NODE 1006.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 746.30 DOWNSTREAM(FEET) = 730.00
FLOW LENGTH(FEET) = 540.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.34
ESTIMATED PIPE DIAMETER(INCH) = 18.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.81
PIPE TRAVEL TIME(MIN.) = 0.87   Tc(MIN.) = 16.69
LONGEST FLOWPATH FROM NODE 1008.00 TO NODE 1006.00 = 1521.00 FEET.

*****
FLOW PROCESS FROM NODE 1006.00 TO NODE 1006.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 16.69
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.724
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"   A       4.91   0.98  0.500  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 4.91   SUBAREA RUNOFF(CFS) = 5.46
EFFECTIVE AREA(ACRES) = 14.20   AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.97   AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 14.2   PEAK FLOW RATE(CFS) = 15.80

*****
FLOW PROCESS FROM NODE 1006.00 TO NODE 1006.00 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.) = 16.69
RAINFALL INTENSITY(INCH/HR) = 1.72

```

AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA(ACRES) = 14.20  
 TOTAL STREAM AREA(ACRES) = 14.20  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.80

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	20.88	21.04	1.500	0.97( 0.48)	0.49	21.0	1000.00
2	15.80	16.69	1.724	0.97( 0.49)	0.50	14.2	1008.00

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	36.00	16.69	1.724	0.97( 0.48)	0.50	30.9	1008.00
2	33.82	21.04	1.500	0.98( 0.48)	0.50	35.2	1000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 36.00 Tc(MIN.) = 16.69  
 EFFECTIVE AREA(ACRES) = 30.85 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 35.2  
 LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1006.00 = 2940.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1006.00 TO NODE 1012.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 730.00 DOWNSTREAM(FEET) = 726.00  
 FLOW LENGTH(FEET) = 44.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.91  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 36.00  
 PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 16.72  
 LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1012.00 = 2984.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1012.00 TO NODE 1012.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 16.72  
 \* 10 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	A	1.87	0.98	0.100	32
PUBLIC PARK	A	2.10	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.497  
 SUBAREA AREA(ACRES) = 3.97 SUBAREA RUNOFF(CFS) = 4.42  
 EFFECTIVE AREA(ACRES) = 34.82 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 39.2 PEAK FLOW RATE(CFS) = 38.79

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 39.2 TC(MIN.) = 16.72  
 EFFECTIVE AREA(ACRES) = 34.82 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.497  
 PEAK FLOW RATE(CFS) = 38.79

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	38.79	16.72	1.722	0.97( 0.48)	0.50	34.8	1008.00
2	35.77	21.08	1.499	0.98( 0.48)	0.50	39.2	1000.00

END OF RATIONAL METHOD ANALYSIS





\*\*\*\*\*  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* HELLMAN, NORTH OF CHINO \*  
\* 100-YR STUDY \*  
\* AREA 'F' \*  
\*\*\*\*\*

FILE NAME: HLM-U.DAT  
TIME/DATE OF STUDY: 17:31 10/16/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES LIP (FT)	MANHOLE 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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1000.00 TO NODE 1002.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 981.00  
ELEVATION DATA: UPSTREAM(FEET) = 777.00 DOWNSTREAM(FEET) = 769.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.008  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.651  
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  
"5-7 DWELLINGS/ACRE" A 9.45 0.98 0.500 32 16.01  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 18.40  
TOTAL AREA(ACRES) = 9.45 PEAK FLOW RATE(CFS) = 18.40

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1002.00 TO NODE 1004.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

===== ELEVATION DATA: UPSTREAM(FEET) = 759.50 DOWNSTREAM(FEET) = 757.70  
FLOW LENGTH(FEET) = 755.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.41  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 18.40  
PIPE TRAVEL TIME(MIN.) = 2.85 Tc(MIN.) = 18.86  
LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1004.00 = 1736.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1004.00 TO NODE 1004.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

===== MAINLINE Tc(MIN.) = 18.86  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.403  
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" A 7.87 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 7.87 SUBAREA RUNOFF(CFS) = 13.57  
EFFECTIVE AREA(ACRES) = 17.32 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 17.3 PEAK FLOW RATE(CFS) = 29.86

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1004.00 TO NODE 1004.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

```

=====
MAINLINE Tc(MIN.) = 18.86
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.403
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A       1.90   0.98  0.100  32
PUBLIC PARK         A       1.78   0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA AREA(ACRES) = 3.68   SUBAREA RUNOFF(CFS) = 6.46
EFFECTIVE AREA(ACRES) = 21.00   AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.97   AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 21.0   PEAK FLOW RATE(CFS) = 36.32

*****
FLOW PROCESS FROM NODE 1004.00 TO NODE 1006.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 757.70 DOWNSTREAM(FEET) = 730.00
FLOW LENGTH(FEET) = 1204.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.49
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 36.32
PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 20.47
LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1006.00 = 2940.00 FEET.

*****
FLOW PROCESS FROM NODE 1006.00 TO NODE 1006.00 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.) = 20.47
RAINFALL INTENSITY(INCH/HR) = 2.29
AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA(ACRES) = 21.00
TOTAL STREAM AREA(ACRES) = 21.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 36.32

*****
FLOW PROCESS FROM NODE 1008.00 TO NODE 1010.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 981.00
ELEVATION DATA: UPSTREAM(FEET) = 764.30 DOWNSTREAM(FEET) = 755.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

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SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.815
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.671
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
"5-7 DWELLINGS/ACRE" A       9.29   0.98  0.500  32  15.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 18.25
TOTAL AREA(ACRES) = 9.29   PEAK FLOW RATE(CFS) = 18.25

*****
FLOW PROCESS FROM NODE 1010.00 TO NODE 1006.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 746.30 DOWNSTREAM(FEET) = 730.00
FLOW LENGTH(FEET) = 540.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.74
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 18.25
PIPE TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 16.58
LONGEST FLOWPATH FROM NODE 1008.00 TO NODE 1006.00 = 1521.00 FEET.

*****
FLOW PROCESS FROM NODE 1006.00 TO NODE 1006.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 16.58
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.596
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" A       4.91   0.98  0.500  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 4.91   SUBAREA RUNOFF(CFS) = 9.32
EFFECTIVE AREA(ACRES) = 14.20   AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.97   AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 14.2   PEAK FLOW RATE(CFS) = 26.95

*****
FLOW PROCESS FROM NODE 1006.00 TO NODE 1006.00 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.) = 16.58
RAINFALL INTENSITY(INCH/HR) = 2.60

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AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA(ACRES) = 14.20  
 TOTAL STREAM AREA(ACRES) = 14.20  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 26.95

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	36.32	20.47	2.288	0.97( 0.48)	0.49	21.0	1000.00
2	26.95	16.58	2.596	0.97( 0.49)	0.50	14.2	1008.00

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	61.39	16.58	2.596	0.97( 0.48)	0.50	31.2	1008.00
2	59.33	20.47	2.288	0.98( 0.48)	0.50	35.2	1000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 61.39 Tc(MIN.) = 16.58  
 EFFECTIVE AREA(ACRES) = 31.21 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 35.2  
 LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1006.00 = 2940.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1006.00 TO NODE 1012.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 730.00 DOWNSTREAM(FEET) = 726.00  
 FLOW LENGTH(FEET) = 44.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 23.44  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 61.39  
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 16.61  
 LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1012.00 = 2984.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1012.00 TO NODE 1012.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.61  
 \* 100 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	A	1.87	0.98	0.100	32
PUBLIC PARK	A	2.10	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.497  
 SUBAREA AREA(ACRES) = 3.97 SUBAREA RUNOFF(CFS) = 7.53  
 EFFECTIVE AREA(ACRES) = 35.18 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 39.2 PEAK FLOW RATE(CFS) = 66.78

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 39.2 TC(MIN.) = 16.61  
 EFFECTIVE AREA(ACRES) = 35.18 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.496  
 PEAK FLOW RATE(CFS) = 66.78

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	66.78	16.61	2.593	0.98( 0.48)	0.50	35.2	1008.00
2	63.53	20.50	2.286	0.98( 0.48)	0.50	39.2	1000.00

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*
\* HELLMAN, NORTH OF CHINO \*
\* 25-YR STUDY \*
\* AREA 'F' \*

FILE NAME: HLM-U.DAT
TIME/DATE OF STUDY: 17:35 10/16/2011

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
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*
Table with columns: NO., HALF-CROWN WIDTH (FT), STREET-CROSSFALL (FT), IN-/OUT-/SIDE, PARK-/WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), LIP (FT), HIKE (FT), GEOMETRIES (FT), MANNING FACTOR (n)

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.00 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*
FLOW PROCESS FROM NODE 1000.00 TO NODE 1002.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 981.00
ELEVATION DATA: UPSTREAM(FEET) = 777.00 DOWNSTREAM(FEET) = 769.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.008
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.078
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
"5-7 DWELLINGS/ACRE" A 9.45 0.98 0.500 32 16.01
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 13.53
TOTAL AREA(ACRES) = 9.45 PEAK FLOW RATE(CFS) = 13.53

\*\*\*\*\*
FLOW PROCESS FROM NODE 1002.00 TO NODE 1004.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 759.50 DOWNSTREAM(FEET) = 757.70
FLOW LENGTH(FEET) = 755.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.10
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.53
PIPE TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 19.07
LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1004.00 = 1736.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 1004.00 TO NODE 1004.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.07
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.870
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" A 7.87 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 7.87 SUBAREA RUNOFF(CFS) = 9.80
EFFECTIVE AREA(ACRES) = 17.32 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 17.3 PEAK FLOW RATE(CFS) = 21.56

\*\*\*\*\*
FLOW PROCESS FROM NODE 1004.00 TO NODE 1004.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 19.07
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.870
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      1.90     0.98     0.100   32
PUBLIC PARK             A      1.78     0.98     0.850   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA AREA(ACRES) = 3.68      SUBAREA RUNOFF(CFS) = 4.70
EFFECTIVE AREA(ACRES) = 21.00   AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 21.0      PEAK FLOW RATE(CFS) = 26.26

*****
FLOW PROCESS FROM NODE 1004.00 TO NODE 1006.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 757.70 DOWNSTREAM(FEET) = 730.00
FLOW LENGTH(FEET) = 1204.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.53
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.26
PIPE TRAVEL TIME(MIN.) = 1.74 Tc(MIN.) = 20.81
LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1006.00 = 2940.00 FEET.

*****
FLOW PROCESS FROM NODE 1006.00 TO NODE 1006.00 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.) = 20.81
RAINFALL INTENSITY(INCH/HR) = 1.77
AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA(ACRES) = 21.00
TOTAL STREAM AREA(ACRES) = 21.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 26.26

*****
FLOW PROCESS FROM NODE 1008.00 TO NODE 1010.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 981.00
ELEVATION DATA: UPSTREAM(FEET) = 764.30 DOWNSTREAM(FEET) = 755.80

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.815
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.093
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
"5-7 DWELLINGS/ACRE"   A      9.29     0.98     0.500   32  15.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 13.42
TOTAL AREA(ACRES) = 9.29      PEAK FLOW RATE(CFS) = 13.42

*****
FLOW PROCESS FROM NODE 1010.00 TO NODE 1006.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 746.30 DOWNSTREAM(FEET) = 730.00
FLOW LENGTH(FEET) = 540.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.82
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.42
PIPE TRAVEL TIME(MIN.) = 0.83 Tc(MIN.) = 16.65
LONGEST FLOWPATH FROM NODE 1008.00 TO NODE 1006.00 = 1521.00 FEET.

*****
FLOW PROCESS FROM NODE 1006.00 TO NODE 1006.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 16.65
* 25 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
"5-7 DWELLINGS/ACRE"   A      4.91     0.98     0.500   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 4.91      SUBAREA RUNOFF(CFS) = 6.81
EFFECTIVE AREA(ACRES) = 14.20   AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 14.2      PEAK FLOW RATE(CFS) = 19.71

*****
FLOW PROCESS FROM NODE 1006.00 TO NODE 1006.00 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.) = 16.65  
 RAINFALL INTENSITY(INCH/HR) = 2.03  
 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA(ACRES) = 14.20  
 TOTAL STREAM AREA(ACRES) = 14.20  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.71

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	26.26	20.81	1.775	0.97( 0.48)	0.49	21.0	1000.00
2	19.71	16.65	2.030	0.97( 0.49)	0.50	14.2	1008.00

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	44.84	16.65	2.030	0.97( 0.48)	0.50	31.0	1008.00
2	42.71	20.81	1.775	0.98( 0.48)	0.50	35.2	1000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 44.84 Tc(MIN.) = 16.65  
 EFFECTIVE AREA(ACRES) = 31.00 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 35.2  
 LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1006.00 = 2940.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1006.00 TO NODE 1012.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 730.00 DOWNSTREAM(FEET) = 726.00  
 FLOW LENGTH(FEET) = 44.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 17.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 21.48  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 44.84  
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 16.68  
 LONGEST FLOWPATH FROM NODE 1000.00 TO NODE 1012.00 = 2984.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1012.00 TO NODE 1012.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.68  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.027  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL A 1.87 0.98 0.100 32  
 PUBLIC PARK A 2.10 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.497  
 SUBAREA AREA(ACRES) = 3.97 SUBAREA RUNOFF(CFS) = 5.51  
 EFFECTIVE AREA(ACRES) = 34.97 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 39.2 PEAK FLOW RATE(CFS) = 48.56

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 39.2 TC(MIN.) = 16.68  
 EFFECTIVE AREA(ACRES) = 34.97 AREA-AVERAGED Fm(INCH/HR) = 0.48  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.496  
 PEAK FLOW RATE(CFS) = 48.56

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	48.56	16.68	2.027	0.98( 0.48)	0.50	35.0	1008.00
2	45.46	20.85	1.773	0.98( 0.48)	0.50	39.2	1000.00

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*

\* MILL CREEK WITH DIVERSION FROM THE LAKES \*  
\* 10-YR STUDY \*  
\* AREA 'P' \*  
\*\*\*\*\*

FILE NAME: MCREEK\_M.DAT  
TIME/DATE OF STUDY: 09:55 08/24/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
  
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	18.0	12.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH

FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.30
30-MINUTES	0.61
1-HOUR	0.80
3-HOUR	1.38
6-HOUR	1.94
24-HOUR	3.65

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* FLOW PROCESS FROM NODE 5000.00 TO NODE 5002.00 IS CODE = 21 \*\*\*\*\*

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 900.00  
ELEVATION DATA: UPSTREAM(FEET) = 810.00 DOWNSTREAM(FEET) = 806.00 =====

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.646  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.945  
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 A 3.75 0.98 0.100 32 13.65  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 6.24  
TOTAL AREA(ACRES) = 3.75 PEAK FLOW RATE(CFS) = 6.24

\*\*\*\*\* FLOW PROCESS FROM NODE 5002.00 TO NODE 5004.00 IS CODE = 62 \*\*\*\*\*

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

===== UPSTREAM ELEVATION(FEET) = 806.00 DOWNSTREAM ELEVATION(FEET) = 804.00  
STREET LENGTH(FEET) = 700.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00 =====

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.03  
\*\*\*STREET FLOWING FULL\*\*\*  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.54  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.84  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.99  
 STREET FLOW TRAVEL TIME(MIN.) = 6.34 Tc(MIN.) = 19.99  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.547  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	11.83	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 11.83 SUBAREA RUNOFF(CFS) = 15.43  
 EFFECTIVE AREA(ACRES) = 15.58 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 20.33

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 FLOW VELOCITY(FEET/SEC.) = 2.14 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.26  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5004.00 = 1600.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5004.00 TO NODE 5006.00 IS CODE = 62

-----  
 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 =====  
 UPSTREAM ELEVATION(FEET) = 804.00 DOWNSTREAM ELEVATION(FEET) = 800.00  
 STREET LENGTH(FEET) = 530.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 27.66  
 \*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.57  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.23  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.83  
 STREET FLOW TRAVEL TIME(MIN.) = 2.73 Tc(MIN.) = 22.72  
 \* 10 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
COMMERCIAL	A	12.19	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 12.19 SUBAREA RUNOFF(CFS) = 14.65  
 EFFECTIVE AREA(ACRES) = 27.77 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 27.8 PEAK FLOW RATE(CFS) = 33.37

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 FLOW VELOCITY(FEET/SEC.) = 3.47 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.07  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5006.00 = 2130.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5006.00 TO NODE 5010.00 IS CODE = 31

-----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 793.00 DOWNSTREAM(FEET) = 784.00  
 FLOW LENGTH(FEET) = 670.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.76  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 33.37  
 PIPE TRAVEL TIME(MIN.) = 1.14 Tc(MIN.) = 23.86  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5010.00 = 2800.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5010.00 TO NODE 5010.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 23.86  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.391  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.27	0.98	0.850	32
COMMERCIAL	A	12.40	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.170  
 SUBAREA AREA(ACRES) = 13.67 SUBAREA RUNOFF(CFS) = 15.08  
 EFFECTIVE AREA(ACRES) = 41.44 AREA-AVERAGED Fm(INCH/HR) = 0.12  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.12  
 TOTAL AREA(ACRES) = 41.4 PEAK FLOW RATE(CFS) = 47.41

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5010.00 TO NODE 5010.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 23.86  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.391  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.61	0.98	0.100	32
PUBLIC PARK	A	0.16	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.256  
SUBAREA AREA(ACRES) = 0.77 SUBAREA RUNOFF(CFS) = 0.79  
EFFECTIVE AREA(ACRES) = 42.21 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.13  
TOTAL AREA(ACRES) = 42.2 PEAK FLOW RATE(CFS) = 48.20

EFFECTIVE AREA(ACRES) = 44.48 AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.14  
TOTAL AREA(ACRES) = 44.5 PEAK FLOW RATE(CFS) = 49.17  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5010.00 TO NODE 5010.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 23.86  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.391  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.61 0.98 0.100 32  
PUBLIC PARK A 0.51 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.442  
SUBAREA AREA(ACRES) = 1.12 SUBAREA RUNOFF(CFS) = 0.97  
EFFECTIVE AREA(ACRES) = 43.33 AREA-AVERAGED Fm(INCH/HR) = 0.13  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.13  
TOTAL AREA(ACRES) = 43.3 PEAK FLOW RATE(CFS) = 49.17

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5011.00 TO NODE 5012.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 782.48 DOWNSTREAM(FEET) = 780.95  
FLOW LENGTH(FEET) = 482.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.34  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 49.17  
PIPE TRAVEL TIME(MIN.) = 1.27 Tc(MIN.) = 26.39  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5012.00 = 3761.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5012.00 TO NODE 5012.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 26.39  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.310  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.53 0.98 0.100 32  
PUBLIC PARK A 0.36 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.403  
SUBAREA AREA(ACRES) = 0.89 SUBAREA RUNOFF(CFS) = 0.73  
EFFECTIVE AREA(ACRES) = 45.37 AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.15  
TOTAL AREA(ACRES) = 45.4 PEAK FLOW RATE(CFS) = 49.17  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5010.00 TO NODE 5011.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 784.00 DOWNSTREAM(FEET) = 782.48  
FLOW LENGTH(FEET) = 479.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.34  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 49.17  
PIPE TRAVEL TIME(MIN.) = 1.26 Tc(MIN.) = 25.12  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5011.00 = 3279.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5012.00 TO NODE 5015.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 780.95 DOWNSTREAM(FEET) = 779.48  
FLOW LENGTH(FEET) = 460.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.36  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 49.17  
PIPE TRAVEL TIME(MIN.) = 1.21 Tc(MIN.) = 27.60  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5015.00 = 4221.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5011.00 TO NODE 5011.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 25.12  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.349  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.63 0.98 0.100 32  
PUBLIC PARK A 0.52 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.439  
SUBAREA AREA(ACRES) = 1.15 SUBAREA RUNOFF(CFS) = 0.95

\*\*\*\*\*

FLOW PROCESS FROM NODE 5015.00 TO NODE 5015.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 27.60
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.275
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.46 0.98 0.100 32
PUBLIC PARK A 0.38 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.439
SUBAREA AREA(ACRES) = 0.84 SUBAREA RUNOFF(CFS) = 0.64
EFFECTIVE AREA(ACRES) = 46.21 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 46.2 PEAK FLOW RATE(CFS) = 49.17
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 5015.00 TO NODE 5020.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 779.48 DOWNSTREAM(FEET) = 760.54
FLOW LENGTH(FEET) = 1937.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.52
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 49.17
PIPE TRAVEL TIME(MIN.) = 3.39 Tc(MIN.) = 30.99
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5020.00 = 6158.00 FEET.

FLOW PROCESS FROM NODE 5020.00 TO NODE 5020.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 30.99
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.189
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.20 0.98 0.100 32
PUBLIC PARK A 1.11 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.460
SUBAREA AREA(ACRES) = 2.31 SUBAREA RUNOFF(CFS) = 1.54
EFFECTIVE AREA(ACRES) = 48.52 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 48.5 PEAK FLOW RATE(CFS) = 49.17
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 5020.00 TO NODE 5020.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 30.99
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.189
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
SCHOOL A 4.59 0.98 0.600 32
COMMERCIAL A 2.10 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.443
SUBAREA AREA(ACRES) = 6.69 SUBAREA RUNOFF(CFS) = 4.56
EFFECTIVE AREA(ACRES) = 55.21 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 55.2 PEAK FLOW RATE(CFS) = 49.40

FLOW PROCESS FROM NODE 5020.00 TO NODE 5114.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 760.54 DOWNSTREAM(FEET) = 748.44
FLOW LENGTH(FEET) = 1019.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.42
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 49.40
PIPE TRAVEL TIME(MIN.) = 1.63 Tc(MIN.) = 32.62
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5114.00 = 7177.00 FEET.

FLOW PROCESS FROM NODE 5114.00 TO NODE 5114.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 32.62
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.153
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.68 0.98 0.100 32
PUBLIC PARK A 0.64 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.464
SUBAREA AREA(ACRES) = 1.32 SUBAREA RUNOFF(CFS) = 0.83
EFFECTIVE AREA(ACRES) = 56.53 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 56.5 PEAK FLOW RATE(CFS) = 49.40
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 5114.00 TO NODE 5114.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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=====
MAINLINE Tc(MIN.) = 32.62
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.153
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          A       0.75    0.98    0.100    32
PUBLIC PARK         A       0.57    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA AREA(ACRES) = 1.32      SUBAREA RUNOFF(CFS) = 0.88
EFFECTIVE AREA(ACRES) = 57.85   AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 57.9       PEAK FLOW RATE(CFS) = 49.40
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 5114.00 TO NODE 5114.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 32.62
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.153
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          A       0.83    0.98    0.100    32
PUBLIC PARK         A       0.66    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.432
SUBAREA AREA(ACRES) = 1.49      SUBAREA RUNOFF(CFS) = 0.98
EFFECTIVE AREA(ACRES) = 59.34   AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 59.3       PEAK FLOW RATE(CFS) = 50.30

*****
FLOW PROCESS FROM NODE 5114.00 TO NODE 5115.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 748.44 DOWNSTREAM(FEET) = 747.58
FLOW LENGTH(FEET) = 47.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.21
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 50.30
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 32.68
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5115.00 = 7224.00 FEET.

*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
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*****
FLOW PROCESS FROM NODE 5043.00 TO NODE 5044.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 410.00
ELEVATION DATA: UPSTREAM(FEET) = 773.59 DOWNSTREAM(FEET) = 768.25

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.036
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.673
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          A       0.32    0.98    0.100    32  8.04
PUBLIC PARK         A       0.30    0.98    0.850    32  12.77
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA RUNOFF(CFS) = 1.24
TOTAL AREA(ACRES) = 0.62 PEAK FLOW RATE(CFS) = 1.24

*****
FLOW PROCESS FROM NODE 5044.00 TO NODE 5044.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 8.04
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.673
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          A       0.32    0.98    0.100    32
PUBLIC PARK         A       0.30    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA AREA(ACRES) = 0.62      SUBAREA RUNOFF(CFS) = 1.24
EFFECTIVE AREA(ACRES) = 1.24   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 1.2       PEAK FLOW RATE(CFS) = 2.48

*****
FLOW PROCESS FROM NODE 5044.00 TO NODE 5045.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 757.77 DOWNSTREAM(FEET) = 753.86
FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.64
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.48
PIPE TRAVEL TIME(MIN.) = 1.44 Tc(MIN.) = 9.47
LONGEST FLOWPATH FROM NODE 5043.00 TO NODE 5045.00 = 810.00 FEET.

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*****
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.47
* 10 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          A        0.29     0.98     0.100    32
PUBLIC PARK         A        0.27     0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462
SUBAREA AREA(ACRES) = 0.56   SUBAREA RUNOFF(CFS) = 0.99
EFFECTIVE AREA(ACRES) = 1.80   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.98   AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 1.8     PEAK FLOW RATE(CFS) = 3.19

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*****
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.47
* 10 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          A        0.29     0.98     0.100    32
PUBLIC PARK         A        0.27     0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462
SUBAREA AREA(ACRES) = 0.56   SUBAREA RUNOFF(CFS) = 0.99
EFFECTIVE AREA(ACRES) = 2.36   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.98   AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 2.4     PEAK FLOW RATE(CFS) = 4.19

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*****
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.47
RAINFALL INTENSITY(INCH/HR) = 2.42
AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.46
EFFECTIVE STREAM AREA(ACRES) = 2.36
TOTAL STREAM AREA(ACRES) = 2.36
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.19

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FLOW PROCESS FROM NODE 5025.00 TO NODE 5030.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 720.00
ELEVATION DATA: UPSTREAM(FEET) = 793.00 DOWNSTREAM(FEET) = 785.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.391
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.291
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          A        5.96     0.98     0.100    32  10.39
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 11.76
TOTAL AREA(ACRES) = 5.96   PEAK FLOW RATE(CFS) = 11.76

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*****
FLOW PROCESS FROM NODE 5030.00 TO NODE 5035.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 784.30
CHANNEL LENGTH THRU SUBAREA(FEET) = 340.00 CHANNEL SLOPE = 0.0021
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.930
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
  LAND USE          GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          A        8.48     0.98     0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 18.77
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.65
AVERAGE FLOW DEPTH(FEET) = 0.32 TRAVEL TIME(MIN.) = 3.44
Tc(MIN.) = 13.83
SUBAREA AREA(ACRES) = 8.48   SUBAREA RUNOFF(CFS) = 13.98
EFFECTIVE AREA(ACRES) = 14.44   AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.97   AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 14.4     PEAK FLOW RATE(CFS) = 23.81

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.36 FLOW VELOCITY(FEET/SEC.) = 1.77
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5035.00 = 1060.00 FEET.

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*****
FLOW PROCESS FROM NODE 5035.00 TO NODE 5040.00 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) = 774.30 DOWNSTREAM(FEET) = 770.10  
 FLOW LENGTH(FEET) = 860.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.25  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 23.81  
 PIPE TRAVEL TIME(MIN.) = 2.29 Tc(MIN.) = 16.13  
 LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5040.00 = 1920.00 FEET.

EFFECTIVE AREA(ACRES) = 57.62 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 57.6 PEAK FLOW RATE(CFS) = 81.72

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 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.) = 17.54  
 RAINFALL INTENSITY(INCH/HR) = 1.67  
 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA(ACRES) = 57.62  
 TOTAL STREAM AREA(ACRES) = 57.62  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 81.72

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	4.19	9.47	2.422	0.98( 0.45)	0.46	2.4	5043.00
2	81.72	17.54	1.673	0.97( 0.10)	0.10	57.6	5025.00

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	69.28	9.47	2.422	0.97( 0.12)	0.13	33.5	5043.00
2	84.32	17.54	1.673	0.97( 0.11)	0.11	60.0	5025.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 84.32 Tc(MIN.) = 17.54  
 EFFECTIVE AREA(ACRES) = 59.98 AREA-AVERAGED Fm(INCH/HR) = 0.11  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.11  
 TOTAL AREA(ACRES) = 60.0  
 LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5045.00 = 2930.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5045.00 TO NODE 5046.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 753.86 DOWNSTREAM(FEET) = 752.05  
 FLOW LENGTH(FEET) = 461.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 38.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.75  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 84.32  
 PIPE TRAVEL TIME(MIN.) = 0.99 Tc(MIN.) = 18.53

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5040.00 TO NODE 5040.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 16.13  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.760  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 19.84 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 19.84 SUBAREA RUNOFF(CFS) = 29.68  
 EFFECTIVE AREA(ACRES) = 34.28 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 34.3 PEAK FLOW RATE(CFS) = 51.29

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5040.00 TO NODE 5045.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 770.10 DOWNSTREAM(FEET) = 753.86  
 FLOW LENGTH(FEET) = 1010.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.92  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 51.29  
 PIPE TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 17.54  
 LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5045.00 = 2930.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 17.54  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.673  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 23.34 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 23.34 SUBAREA RUNOFF(CFS) = 33.10

LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5046.00 = 3391.00 FEET.

EFFECTIVE AREA(ACRES) = 75.38 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.25  
TOTAL AREA(ACRES) = 75.4 PEAK FLOW RATE(CFS) = 92.98

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5046.00 IS CODE = 81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5110.00 IS CODE = 31

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
MAINLINE Tc(MIN.) = 18.53  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.619  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.49 0.98 0.100 32  
PUBLIC PARK A 0.46 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463  
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 1.00  
EFFECTIVE AREA(ACRES) = 60.93 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 60.9 PEAK FLOW RATE(CFS) = 84.32  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

-----  
ELEVATION DATA: UPSTREAM(FEET) = 752.05 DOWNSTREAM(FEET) = 749.99  
FLOW LENGTH(FEET) = 590.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 41.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.61  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 92.98  
PIPE TRAVEL TIME(MIN.) = 1.29 Tc(MIN.) = 19.82  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5110.00 = 3981.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5046.00 IS CODE = 81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 18.53  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.619  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.49 0.98 0.100 32  
PUBLIC PARK A 0.46 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463  
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 1.00  
EFFECTIVE AREA(ACRES) = 61.88 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 61.9 PEAK FLOW RATE(CFS) = 84.32  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

-----  
MAINLINE Tc(MIN.) = 19.82  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.555  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.26 0.98 0.100 32  
PUBLIC PARK A 0.23 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.452  
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 0.49  
EFFECTIVE AREA(ACRES) = 75.87 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.26  
TOTAL AREA(ACRES) = 75.9 PEAK FLOW RATE(CFS) = 92.98  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5046.00 IS CODE = 81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 18.53  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.619  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 13.50 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 13.50 SUBAREA RUNOFF(CFS) = 9.60

-----  
MAINLINE Tc(MIN.) = 19.82  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.555  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.25 0.98 0.100 32  
PUBLIC PARK A 0.24 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467  
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 0.48  
EFFECTIVE AREA(ACRES) = 76.36 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.26

TOTAL AREA(ACRES) = 76.4 PEAK FLOW RATE(CFS) = 92.98  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 10  
-----  
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<  
=====

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5050.00 TO NODE 5055.00 IS CODE = 21  
-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 520.00  
ELEVATION DATA: UPSTREAM(FEET) = 797.72 DOWNSTREAM(FEET) = 783.05

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.689  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.389  
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.)

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	6.57	0.98	0.500	32	9.69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 11.24  
TOTAL AREA(ACRES) = 6.57 PEAK FLOW RATE(CFS) = 11.24

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5055.00 TO NODE 5060.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 773.05 DOWNSTREAM(FEET) = 764.33  
FLOW LENGTH(FEET) = 740.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.32  
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 11.24  
PIPE TRAVEL TIME(MIN.) = 1.69 Tc(MIN.) = 11.37  
LONGEST FLOWPATH FROM NODE 5050.00 TO NODE 5060.00 = 1260.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5060.00 TO NODE 5060.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 11.37  
\* 10 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

RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 9.33 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 9.33 SUBAREA RUNOFF(CFS) = 14.13  
EFFECTIVE AREA(ACRES) = 15.90 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 15.9 PEAK FLOW RATE(CFS) = 24.07

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5060.00 TO NODE 5065.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 764.33 DOWNSTREAM(FEET) = 761.54  
FLOW LENGTH(FEET) = 525.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.48  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 24.07  
PIPE TRAVEL TIME(MIN.) = 1.35 Tc(MIN.) = 12.72  
LONGEST FLOWPATH FROM NODE 5050.00 TO NODE 5065.00 = 1785.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5065.00 TO NODE 5065.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 12.72  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.029  
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 "11+ DWELLINGS/ACRE"	A	5.49	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 5.49 SUBAREA RUNOFF(CFS) = 9.06  
EFFECTIVE AREA(ACRES) = 21.39 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.42  
TOTAL AREA(ACRES) = 21.4 PEAK FLOW RATE(CFS) = 31.11

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5065.00 TO NODE 5100.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 761.54 DOWNSTREAM(FEET) = 759.53  
FLOW LENGTH(FEET) = 165.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.29  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 31.11  
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 13.02

LONGEST FLOWPATH FROM NODE 5050.00 TO NODE 5100.00 = 1950.00 FEET.

Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

```
*****
FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 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.) = 13.02
RAINFALL INTENSITY(INCH/HR) = 2.00
AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA(ACRES) = 21.39
TOTAL STREAM AREA(ACRES) = 21.39
PEAK FLOW RATE(CFS) AT CONFLUENCE = 31.11
```

```
**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.61
STRETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.20
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.09
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.67
STREET FLOW TRAVEL TIME(MIN.) = 8.28 Tc(MIN.) = 19.66
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.563
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" A 1.00 0.98 0.500 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.54 0.98 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.318
SUBAREA AREA(ACRES) = 2.54 SUBAREA RUNOFF(CFS) = 2.86
EFFECTIVE AREA(ACRES) = 3.97 AREA-AVERAGED Fm(INCH/HR) = 0.37
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 4.0 PEAK FLOW RATE(CFS) = 4.25
```

```
*****
FLOW PROCESS FROM NODE 5070.00 TO NODE 5075.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 730.00
ELEVATION DATA: UPSTREAM(FEET) = 797.68 DOWNSTREAM(FEET) = 779.53
```

```
END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 8.86
FLOW VELOCITY(FEET/SEC.) = 2.18 DEPTH*VELOCITY(FT*FT/SEC.) = 0.73
LONGEST FLOWPATH FROM NODE 5070.00 TO NODE 5100.00 = 1770.00 FEET.
```

```
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.381
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.169
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
"5-7 DWELLINGS/ACRE" A 1.43 0.98 0.500 32 11.38
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 2.16
TOTAL AREA(ACRES) = 1.43 PEAK FLOW RATE(CFS) = 2.16
```

```
*****
FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 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.) = 19.66
RAINFALL INTENSITY(INCH/HR) = 1.56
AREA-AVERAGED Fm(INCH/HR) = 0.37
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.38
EFFECTIVE STREAM AREA(ACRES) = 3.97
TOTAL STREAM AREA(ACRES) = 3.97
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.25
```

```
*****
FLOW PROCESS FROM NODE 5075.00 TO NODE 5100.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 779.53 DOWNSTREAM ELEVATION(FEET) = 769.53
STREET LENGTH(FEET) = 1040.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 18.00
```

```
*****
FLOW PROCESS FROM NODE 5080.00 TO NODE 5085.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 520.00
ELEVATION DATA: UPSTREAM(FEET) = 797.72 DOWNSTREAM(FEET) = 783.05
```

```
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
```

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.689  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.389  
 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  
 "5-7 DWELLINGS/ACRE" A 6.58 0.98 0.500 32 9.69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 11.26  
 TOTAL AREA(ACRES) = 6.58 PEAK FLOW RATE(CFS) = 11.26

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5085.00 TO NODE 5090.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 773.05 DOWNSTREAM(FEET) = 767.13  
 FLOW LENGTH(FEET) = 410.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.71  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 11.26  
 PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 10.58  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5090.00 = 930.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5090.00 TO NODE 5090.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 10.58  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.267  
 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" A 6.91 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.91 SUBAREA RUNOFF(CFS) = 11.07  
 EFFECTIVE AREA(ACRES) = 13.49 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 13.5 PEAK FLOW RATE(CFS) = 21.60

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5090.00 TO NODE 5095.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 767.13 DOWNSTREAM(FEET) = 763.05  
 FLOW LENGTH(FEET) = 355.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.33

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 21.60  
 PIPE TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 11.29  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5095.00 = 1285.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5095.00 TO NODE 5095.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 11.29  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.180  
 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" A 3.86 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 3.86 SUBAREA RUNOFF(CFS) = 6.90  
 EFFECTIVE AREA(ACRES) = 17.35 AREA-AVERAGED Fm(INCH/HR) = 0.42  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 17.4 PEAK FLOW RATE(CFS) = 27.44

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5095.00 TO NODE 5100.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 763.05 DOWNSTREAM(FEET) = 759.53  
 FLOW LENGTH(FEET) = 686.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.47  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 27.44  
 PIPE TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 13.05  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5100.00 = 1971.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 13.05  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.998  
 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" A 6.90 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 6.90 SUBAREA RUNOFF(CFS) = 11.20  
 EFFECTIVE AREA(ACRES) = 24.25 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.37



TOTAL AREA(ACRES) = 24.2 PEAK FLOW RATE(CFS) = 35.80

LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5105.00 = 2221.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

-----  
TOTAL NUMBER OF STREAMS = 3  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:  
TIME OF CONCENTRATION(MIN.) = 13.05  
RAINFALL INTENSITY(INCH/HR) = 2.00  
AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.37  
EFFECTIVE STREAM AREA(ACRES) = 24.25  
TOTAL STREAM AREA(ACRES) = 24.25  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.80

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	31.11	13.02	2.001	0.98 ( 0.41)	0.42	21.4	5050.00
2	4.25	19.66	1.563	0.98 ( 0.37)	0.38	4.0	5070.00
3	35.80	13.05	1.998	0.98 ( 0.36)	0.37	24.2	5080.00

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	70.74	13.02	2.001	0.98 ( 0.38)	0.39	48.2	5050.00
2	70.70	13.05	1.998	0.98 ( 0.38)	0.39	48.3	5080.00
3	53.07	19.66	1.563	0.98 ( 0.38)	0.39	49.6	5070.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 70.74 Tc(MIN.) = 13.02  
EFFECTIVE AREA(ACRES) = 48.21 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 49.6  
LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5100.00 = 1971.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5100.00 TO NODE 5105.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 759.53 DOWNSTREAM(FEET) = 757.79  
FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.35  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 70.74  
PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 13.47

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5105.00 TO NODE 5105.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 13.47  
\* 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  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 7.08 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 7.08 SUBAREA RUNOFF(CFS) = 11.25  
EFFECTIVE AREA(ACRES) = 55.29 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 56.7 PEAK FLOW RATE(CFS) = 79.72

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5105.00 TO NODE 5110.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 757.79 DOWNSTREAM(FEET) = 754.21  
FLOW LENGTH(FEET) = 520.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.65  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 79.72  
PIPE TRAVEL TIME(MIN.) = 0.90 Tc(MIN.) = 14.36  
LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5110.00 = 2741.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 14.36  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.886  
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" A 14.26 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 14.26 SUBAREA RUNOFF(CFS) = 21.71  
EFFECTIVE AREA(ACRES) = 69.55 AREA-AVERAGED Fm(INCH/HR) = 0.33  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 71.0 PEAK FLOW RATE(CFS) = 97.72

\*\*\*\*\*



FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 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	97.72	14.36	1.886	0.98 ( 0.33)	0.33	69.5	5050.00
2	97.65	14.40	1.884	0.98 ( 0.33)	0.33	69.6	5080.00
3	74.78	21.11	1.497	0.98 ( 0.33)	0.33	71.0	5070.00

LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5110.00 = 2741.00 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	85.57	11.81	2.121	0.97 ( 0.33)	0.34	49.9	5043.00
2	92.98	19.82	1.555	0.97 ( 0.25)	0.26	76.4	5025.00

LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5110.00 = 3981.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	178.01	11.81	2.121	0.98 ( 0.33)	0.34	107.0	5043.00
2	185.65	14.36	1.886	0.98 ( 0.32)	0.32	127.9	5050.00
3	185.61	14.40	1.884	0.98 ( 0.32)	0.32	128.0	5080.00
4	172.14	19.82	1.555	0.98 ( 0.29)	0.29	147.1	5025.00
5	163.67	21.11	1.497	0.98 ( 0.29)	0.29	147.3	5070.00

TOTAL AREA(ACRES) = 147.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 185.65 Tc(MIN.) = 14.364  
EFFECTIVE AREA(ACRES) = 127.85 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.34  
TOTAL AREA(ACRES) = 147.3  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5110.00 = 3981.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5111.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 749.99 DOWNSTREAM(FEET) = 749.73  
FLOW LENGTH(FEET) = 86.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 69.0 INCH PIPE IS 53.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.64  
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 185.65  
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 14.53

LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5111.00 = 4067.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5111.00 TO NODE 5111.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 14.53  
\* 10 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  
COMMERCIAL A 0.29 0.98 0.100 32  
PUBLIC PARK A 0.21 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.415  
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 0.66  
EFFECTIVE AREA(ACRES) = 128.35 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 147.8 PEAK FLOW RATE(CFS) = 185.65  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5111.00 TO NODE 5111.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 14.53  
\* 10 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  
COMMERCIAL A 0.25 0.98 0.100 32  
PUBLIC PARK A 0.24 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467  
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 0.63  
EFFECTIVE AREA(ACRES) = 128.84 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 148.3 PEAK FLOW RATE(CFS) = 185.65  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5111.00 TO NODE 5115.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 749.73 DOWNSTREAM(FEET) = 747.73  
FLOW LENGTH(FEET) = 581.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 53.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.97  
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 185.65  
PIPE TRAVEL TIME(MIN.) = 1.08 Tc(MIN.) = 15.61  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5115.00 = 4648.00 FEET.

```
*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.61
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.795
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A      0.29   0.98  0.100  32
PUBLIC PARK         A      0.22   0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA AREA(ACRES) = 0.51 SUBAREA RUNOFF(CFS) = 0.63
EFFECTIVE AREA(ACRES) = 129.35 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 148.8 PEAK FLOW RATE(CFS) = 185.65
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.61
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.795
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A      0.28   0.98  0.100  32
PUBLIC PARK         A      0.21   0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.421
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 0.61
EFFECTIVE AREA(ACRES) = 129.84 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 149.3 PEAK FLOW RATE(CFS) = 185.65
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 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      178.01 13.06  1.997 0.98(0.33) 0.34 109.0 5043.00
2      185.65 15.61  1.795 0.98(0.32) 0.33 129.8 5050.00
3      185.61 15.64  1.792 0.98(0.32) 0.33 130.0 5080.00
4      172.14 21.08  1.499 0.97(0.29) 0.30 149.0 5025.00
5      163.67 22.39  1.445 0.98(0.29) 0.30 149.3 5070.00
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5115.00 = 4648.00 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      50.30 32.68  1.152 0.98(0.21) 0.22 59.3 5000.00
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5115.00 = 7224.00 FEET.
```

```
** PEAK FLOW RATE TABLE **
STREAM   Q      Tc   Intensity   Fp(Fm)   Ap   Ae   HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1      216.18 13.06  1.997 0.98(0.31) 0.32 132.7 5043.00
2      226.09 15.61  1.795 0.98(0.30) 0.31 158.2 5050.00
3      226.08 15.64  1.792 0.97(0.30) 0.31 158.4 5080.00
4      216.54 21.08  1.499 0.97(0.27) 0.28 187.3 5025.00
5      208.88 22.39  1.445 0.98(0.27) 0.28 190.0 5070.00
6      172.45 32.68  1.152 0.98(0.27) 0.27 208.6 5000.00
TOTAL AREA(ACRES) = 208.6
```

```
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 226.09 Tc(MIN.) = 15.609
EFFECTIVE AREA(ACRES) = 158.19 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 208.6
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5115.00 = 7224.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====
```

```
*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5116.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 747.58 DOWNSTREAM(FEET) = 746.68
FLOW LENGTH(FEET) = 301.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.06
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 226.09
PIPE TRAVEL TIME(MIN.) = 0.55 Tc(MIN.) = 16.16
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5116.00 = 7525.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 5116.00 TO NODE 5116.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
```

```
MAINLINE Tc(MIN.) = 16.16
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.757
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
```

PUBLIC PARK A 7.72 0.98 0.850 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 1.94 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.719  
 SUBAREA AREA(ACRES) = 9.66 SUBAREA RUNOFF(CFS) = 9.18  
 EFFECTIVE AREA(ACRES) = 167.85 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 218.3 PEAK FLOW RATE(CFS) = 226.09  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5116.00 TO NODE 5117.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 746.68 DOWNSTREAM(FEET) = 744.57  
 FLOW LENGTH(FEET) = 389.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 66.0 INCH PIPE IS 52.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.25  
 ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 226.09  
 PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 16.74  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5117.00 = 7914.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5117.00 TO NODE 5117.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 16.74  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.721  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.51 0.98 0.100 32  
 PUBLIC PARK A 0.48 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.464  
 SUBAREA AREA(ACRES) = 0.99 SUBAREA RUNOFF(CFS) = 1.13  
 EFFECTIVE AREA(ACRES) = 168.84 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 219.3 PEAK FLOW RATE(CFS) = 226.09  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5117.00 TO NODE 5141.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 744.57 DOWNSTREAM(FEET) = 734.24  
 FLOW LENGTH(FEET) = 1156.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.55

ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 226.09  
 PIPE TRAVEL TIME(MIN.) = 1.42 Tc(MIN.) = 18.16  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5141.00 = 9070.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 18.16  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.639  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.85 0.98 0.100 32  
 PUBLIC PARK A 0.79 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.461  
 SUBAREA AREA(ACRES) = 1.64 SUBAREA RUNOFF(CFS) = 1.75  
 EFFECTIVE AREA(ACRES) = 170.48 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 220.9 PEAK FLOW RATE(CFS) = 226.09  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 18.16  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.639  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.65 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 1.65 SUBAREA RUNOFF(CFS) = 2.29  
 EFFECTIVE AREA(ACRES) = 172.13 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 222.6 PEAK FLOW RATE(CFS) = 226.09  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 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.) = 18.16  
 RAINFALL INTENSITY(INCH/HR) = 1.64  
 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.33

EFFECTIVE STREAM AREA(ACRES) = 172.13  
TOTAL STREAM AREA(ACRES) = 222.58  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 226.09

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.00	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	24.59	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225  
SUBAREA AREA(ACRES) = 25.59 SUBAREA RUNOFF(CFS) = 33.73  
EFFECTIVE AREA(ACRES) = 31.73 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.24  
TOTAL AREA(ACRES) = 31.7 PEAK FLOW RATE(CFS) = 41.48

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5142.00 TO NODE 5143.00 IS CODE = 21  
-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 800.00  
ELEVATION DATA: UPSTREAM(FEET) = 762.00 DOWNSTREAM(FEET) = 753.80

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
FLOW VELOCITY(FEET/SEC.) = 4.17 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.52  
LONGEST FLOWPATH FROM NODE 5142.00 TO NODE 5144.00 = 1990.00 FEET.

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.739  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.129  
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	5.30	0.98	0.200	32	11.74
PUBLIC PARK	A	0.84	0.98	0.850	32	17.50

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.289  
SUBAREA RUNOFF(CFS) = 10.21  
TOTAL AREA(ACRES) = 6.14 PEAK FLOW RATE(CFS) = 10.21

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5144.00 TO NODE 5141.00 IS CODE = 31  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5143.00 TO NODE 5144.00 IS CODE = 62  
-----  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
-----  
UPSTREAM ELEVATION(FEET) = 753.80 DOWNSTREAM ELEVATION(FEET) = 741.50  
STREET LENGTH(FEET) = 1190.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 741.50 DOWNSTREAM(FEET) = 735.66  
FLOW LENGTH(FEET) = 776.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.34  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 41.48  
PIPE TRAVEL TIME(MIN.) = 1.55 Tc(MIN.) = 18.90  
LONGEST FLOWPATH FROM NODE 5142.00 TO NODE 5141.00 = 2766.00 FEET.

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 27.28  
\*\*\*STREET FLOWING FULL\*\*\*  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.54  
HALFSTREET FLOOD WIDTH(FEET) = 18.00  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.54  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.92  
STREET FLOW TRAVEL TIME(MIN.) = 5.61 Tc(MIN.) = 17.35  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.684  
SUBAREA LOSS RATE DATA(AMC II):

MAINLINE Tc(MIN.) = 18.90  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.600  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	17.41	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 17.41 SUBAREA RUNOFF(CFS) = 22.01  
EFFECTIVE AREA(ACRES) = 49.14 AREA-AVERAGED Fm(INCH/HR) = 0.22  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.22  
TOTAL AREA(ACRES) = 49.1 PEAK FLOW RATE(CFS) = 61.09

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 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.) = 18.90  
 RAINFALL INTENSITY(INCH/HR) = 1.60  
 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.22  
 EFFECTIVE STREAM AREA(ACRES) = 49.14  
 TOTAL STREAM AREA(ACRES) = 49.14  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 61.09

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	216.18	15.63	1.793	0.98 ( 0.34)	0.34	146.7	5043.00
1	226.09	18.16	1.639	0.98 ( 0.32)	0.33	172.1	5050.00
1	226.08	18.19	1.637	0.97 ( 0.32)	0.33	172.4	5080.00
1	216.54	23.65	1.399	0.97 ( 0.29)	0.30	201.3	5025.00
1	208.88	24.97	1.354	0.98 ( 0.29)	0.30	203.9	5070.00
1	172.45	35.42	1.098	0.98 ( 0.29)	0.29	222.6	5000.00
2	61.09	18.90	1.600	0.98 ( 0.22)	0.22	49.1	5142.00

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	273.76	15.63	1.793	0.98 ( 0.31)	0.32	187.3	5043.00
2	286.44	18.16	1.639	0.98 ( 0.30)	0.31	219.3	5050.00
3	286.46	18.19	1.637	0.97 ( 0.30)	0.31	219.7	5080.00
4	285.93	18.90	1.600	0.97 ( 0.30)	0.30	225.2	5142.00
5	268.72	23.65	1.399	0.97 ( 0.28)	0.29	250.4	5025.00
6	259.08	24.97	1.354	0.98 ( 0.28)	0.29	253.0	5070.00
7	211.32	35.42	1.098	0.98 ( 0.27)	0.28	271.7	5000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 286.46 Tc(MIN.) = 18.19  
 EFFECTIVE AREA(ACRES) = 219.66 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.31  
 TOTAL AREA(ACRES) = 271.7  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5141.00 = 9070.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5141.00 TO NODE 5215.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 734.24 DOWNSTREAM(FEET) = 720.42  
 FLOW LENGTH(FEET) = 900.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 46.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.72  
 ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 286.46

PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 19.04  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5215.00 = 9970.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.04  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.593  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.66 0.98 0.100 32  
 PUBLIC PARK A 0.63 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.466  
 SUBAREA AREA(ACRES) = 1.29 SUBAREA RUNOFF(CFS) = 1.32  
 EFFECTIVE AREA(ACRES) = 220.95 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.31  
 TOTAL AREA(ACRES) = 273.0 PEAK FLOW RATE(CFS) = 286.46  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.04  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.593  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.80 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 1.08  
 EFFECTIVE AREA(ACRES) = 221.75 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.31  
 TOTAL AREA(ACRES) = 273.8 PEAK FLOW RATE(CFS) = 286.46  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5120.00 TO NODE 5125.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 563.00  
 ELEVATION DATA: UPSTREAM(FEET) = 768.00 DOWNSTREAM(FEET) = 766.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.530  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.047  
 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	A	4.78	0.98	0.100	32	12.53

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA RUNOFF(CFS) = 8.39  
 TOTAL AREA(ACRES) = 4.78 PEAK FLOW RATE(CFS) = 8.39

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5125.00 TO NODE 5130.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 766.50 DOWNSTREAM(FEET) = 763.50  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 819.00 CHANNEL SLOPE = 0.0037  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.549

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	7.05	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 13.02  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.84  
 AVERAGE FLOW DEPTH(FEET) = 0.23 TRAVEL TIME(MIN.) = 7.42  
 Tc(MIN.) = 19.95  
 SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 9.21  
 EFFECTIVE AREA(ACRES) = 11.83 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 11.8 PEAK FLOW RATE(CFS) = 15.45

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.25 FLOW VELOCITY(FEET/SEC.) = 1.91  
 LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5130.00 = 1382.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5130.00 TO NODE 5135.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 763.50 DOWNSTREAM(FEET) = 759.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 481.00 CHANNEL SLOPE = 0.0094  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.437

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	7.05	0.98	0.100	32

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	14.16	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.00  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.00  
 AVERAGE FLOW DEPTH(FEET) = 0.25 TRAVEL TIME(MIN.) = 2.67  
 Tc(MIN.) = 22.62  
 SUBAREA AREA(ACRES) = 14.16 SUBAREA RUNOFF(CFS) = 17.06  
 EFFECTIVE AREA(ACRES) = 25.99 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 26.0 PEAK FLOW RATE(CFS) = 31.32

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.28 FLOW VELOCITY(FEET/SEC.) = 3.30  
 LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5135.00 = 1863.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5135.00 TO NODE 5136.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 759.00 DOWNSTREAM(FEET) = 755.50  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 387.00 CHANNEL SLOPE = 0.0090  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.370

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	11.50	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 37.90  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.44  
 AVERAGE FLOW DEPTH(FEET) = 0.31 TRAVEL TIME(MIN.) = 1.87  
 Tc(MIN.) = 24.49  
 SUBAREA AREA(ACRES) = 11.50 SUBAREA RUNOFF(CFS) = 13.17  
 EFFECTIVE AREA(ACRES) = 37.49 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 37.5 PEAK FLOW RATE(CFS) = 42.92

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.33 FLOW VELOCITY(FEET/SEC.) = 3.52  
 LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5136.00 = 2250.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5136.00 TO NODE 5155.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 755.50 DOWNSTREAM(FEET) = 751.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 438.00 CHANNEL SLOPE = 0.0103  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000



MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) = 2.00  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.309  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS  
   LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
 COMMERCIAL            A        12.89    0.98    0.100    32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 49.95  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.84  
 AVERAGE FLOW DEPTH(FEET) = 0.35    TRAVEL TIME(MIN.) = 1.90  
 Tc(MIN.) = 26.39  
 SUBAREA AREA(ACRES) = 12.89        SUBAREA RUNOFF(CFS) = 14.06  
 EFFECTIVE AREA(ACRES) = 50.38        AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98    AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 50.4            PEAK FLOW RATE(CFS) = 54.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.36    FLOW VELOCITY(FEET/SEC.) = 3.96  
 LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5155.00 = 2688.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5155.00 TO NODE 5160.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 -----

ELEVATION DATA: UPSTREAM(FEET) = 751.00    DOWNSTREAM(FEET) = 747.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 415.00    CHANNEL SLOPE = 0.0096  
 CHANNEL BASE(FEET) = 20.00    "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) = 2.00  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.260  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS  
   LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
 COMMERCIAL            A        12.97    0.98    0.100    32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 61.74  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.98  
 AVERAGE FLOW DEPTH(FEET) = 0.39    TRAVEL TIME(MIN.) = 1.74  
 Tc(MIN.) = 28.13  
 SUBAREA AREA(ACRES) = 12.97        SUBAREA RUNOFF(CFS) = 13.57  
 EFFECTIVE AREA(ACRES) = 63.35        AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98    AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 63.3            PEAK FLOW RATE(CFS) = 66.30

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.41    FLOW VELOCITY(FEET/SEC.) = 4.03  
 LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5160.00 = 3103.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5160.00 TO NODE 5210.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 -----

=====

ELEVATION DATA: UPSTREAM(FEET) = 747.00    DOWNSTREAM(FEET) = 738.30  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 503.00    CHANNEL SLOPE = 0.0173  
 CHANNEL BASE(FEET) = 20.00    "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) = 2.00  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.219  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS  
   LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
 COMMERCIAL            A        16.23    0.98    0.100    32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 74.49  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.21  
 AVERAGE FLOW DEPTH(FEET) = 0.37    TRAVEL TIME(MIN.) = 1.61  
 Tc(MIN.) = 29.74  
 SUBAREA AREA(ACRES) = 16.23        SUBAREA RUNOFF(CFS) = 16.38  
 EFFECTIVE AREA(ACRES) = 79.58        AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98    AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 79.6            PEAK FLOW RATE(CFS) = 80.32

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.39    FLOW VELOCITY(FEET/SEC.) = 5.29  
 LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5210.00 = 3606.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5210.00 TO NODE 5210.00 IS CODE = 1  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 -----

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 29.74  
 RAINFALL INTENSITY(INCH/HR) = 1.22  
 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA(ACRES) = 79.58  
 TOTAL STREAM AREA(ACRES) = 79.58  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 80.32

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5170.00 TO NODE 5175.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 -----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 524.00  
 ELEVATION DATA: UPSTREAM(FEET) = 771.10    DOWNSTREAM(FEET) = 766.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.396  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.433  
 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 A 4.16 0.98 0.100 32 9.40  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 8.75  
TOTAL AREA(ACRES) = 4.16 PEAK FLOW RATE(CFS) = 8.75

Tc(MIN.) = 21.82  
SUBAREA AREA(ACRES) = 13.46 SUBAREA RUNOFF(CFS) = 16.60  
EFFECTIVE AREA(ACRES) = 24.69 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 24.7 PEAK FLOW RATE(CFS) = 30.45

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5175.00 TO NODE 5180.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 766.00 DOWNSTREAM(FEET) = 764.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 917.00 CHANNEL SLOPE = 0.0022  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.579  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 7.07 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 13.51  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.54  
AVERAGE FLOW DEPTH(FEET) = 0.26 TRAVEL TIME(MIN.) = 9.92  
Tc(MIN.) = 19.32  
SUBAREA AREA(ACRES) = 7.07 SUBAREA RUNOFF(CFS) = 9.43  
EFFECTIVE AREA(ACRES) = 11.23 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 11.2 PEAK FLOW RATE(CFS) = 14.97

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.28 FLOW VELOCITY(FEET/SEC.) = 1.58  
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5180.00 = 1441.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5180.00 TO NODE 5185.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 764.00 DOWNSTREAM(FEET) = 758.50  
CHANNEL LENGTH THRU SUBAREA(FEET) = 477.00 CHANNEL SLOPE = 0.0115  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.468  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 13.46 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 23.29  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.18  
AVERAGE FLOW DEPTH(FEET) = 0.23 TRAVEL TIME(MIN.) = 2.50

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.26 FLOW VELOCITY(FEET/SEC.) = 3.51  
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5185.00 = 1918.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5185.00 TO NODE 5190.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 758.50 DOWNSTREAM(FEET) = 755.50  
CHANNEL LENGTH THRU SUBAREA(FEET) = 394.00 CHANNEL SLOPE = 0.0076  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.390  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 11.16 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 36.95  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.16  
AVERAGE FLOW DEPTH(FEET) = 0.32 TRAVEL TIME(MIN.) = 2.08  
Tc(MIN.) = 23.89  
SUBAREA AREA(ACRES) = 11.16 SUBAREA RUNOFF(CFS) = 12.98  
EFFECTIVE AREA(ACRES) = 35.85 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 35.8 PEAK FLOW RATE(CFS) = 41.70

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.34 FLOW VELOCITY(FEET/SEC.) = 3.31  
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5190.00 = 2312.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5190.00 TO NODE 5195.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 755.50 DOWNSTREAM(FEET) = 751.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 430.00 CHANNEL SLOPE = 0.0105  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.329  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 12.16 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 48.44  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.84  
 AVERAGE FLOW DEPTH(FEET) = 0.34 TRAVEL TIME(MIN.) = 1.86  
 Tc(MIN.) = 25.76  
 SUBAREA AREA(ACRES) = 12.16 SUBAREA RUNOFF(CFS) = 13.47  
 EFFECTIVE AREA(ACRES) = 48.01 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 48.0 PEAK FLOW RATE(CFS) = 53.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.36 FLOW VELOCITY(FEET/SEC.) = 3.96  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5195.00 = 2742.00 FEET.

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	14.13	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 70.65  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.23  
 AVERAGE FLOW DEPTH(FEET) = 0.49 TRAVEL TIME(MIN.) = 3.01  
 Tc(MIN.) = 30.55  
 SUBAREA AREA(ACRES) = 14.13 SUBAREA RUNOFF(CFS) = 14.01  
 EFFECTIVE AREA(ACRES) = 74.12 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 74.1 PEAK FLOW RATE(CFS) = 73.50

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.50 FLOW VELOCITY(FEET/SEC.) = 3.28  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5205.00 = 3745.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5205.00 TO NODE 5210.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 734.60 DOWNSTREAM(FEET) = 728.80  
 FLOW LENGTH(FEET) = 1150.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.35  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 73.50  
 PIPE TRAVEL TIME(MIN.) = 2.30 Tc(MIN.) = 32.85  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5210.00 = 4895.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5210.00 TO NODE 5210.00 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.) = 32.85  
 RAINFALL INTENSITY(INCH/HR) = 1.15  
 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA(ACRES) = 74.12  
 TOTAL STREAM AREA(ACRES) = 74.12  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 73.50

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	80.32	29.74	1.219	0.98(0.10)	0.10	79.6	5120.00
2	73.50	32.85	1.148	0.98(0.10)	0.10	74.1	5170.00

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5195.00 TO NODE 5200.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 751.00 DOWNSTREAM(FEET) = 747.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 420.00 CHANNEL SLOPE = 0.0095  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 10 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  
 COMMERCIAL A 11.98 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 59.55  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.92  
 AVERAGE FLOW DEPTH(FEET) = 0.39 TRAVEL TIME(MIN.) = 1.78  
 Tc(MIN.) = 27.54  
 SUBAREA AREA(ACRES) = 11.98 SUBAREA RUNOFF(CFS) = 12.71  
 EFFECTIVE AREA(ACRES) = 59.99 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 60.0 PEAK FLOW RATE(CFS) = 63.65

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.40 FLOW VELOCITY(FEET/SEC.) = 3.98  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5200.00 = 3162.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5200.00 TO NODE 5205.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 747.00 DOWNSTREAM(FEET) = 744.10  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 583.00 CHANNEL SLOPE = 0.0050  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.199  
 SUBAREA LOSS RATE DATA(AMC II):

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	151.33	29.74	1.219	0.98 (0.10)	0.10	146.7	5120.00
2	148.76	32.85	1.148	0.98 (0.10)	0.10	153.7	5170.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 151.33 Tc(MIN.) = 29.74  
EFFECTIVE AREA(ACRES) = 146.69 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 153.7  
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5210.00 = 4895.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5210.00 TO NODE 5215.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 728.80 DOWNSTREAM(FEET) = 721.08  
FLOW LENGTH(FEET) = 420.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.05  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 151.33  
PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 30.18  
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5215.00 = 5315.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 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	151.33	30.18	1.208	0.98 (0.10)	0.10	146.7	5120.00
2	148.76	33.29	1.139	0.98 (0.10)	0.10	153.7	5170.00

LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5215.00 = 5315.00 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	273.76	16.48	1.737	0.98 (0.31)	0.32	189.4	5043.00
2	286.44	19.01	1.595	0.98 (0.30)	0.31	221.4	5050.00
3	286.46	19.04	1.593	0.97 (0.30)	0.31	221.8	5080.00
4	285.93	19.75	1.558	0.97 (0.30)	0.30	227.3	5142.00
5	268.72	24.50	1.369	0.97 (0.28)	0.29	252.5	5025.00
6	259.08	25.85	1.326	0.98 (0.28)	0.29	255.1	5070.00
7	211.32	36.33	1.081	0.98 (0.27)	0.28	273.8	5000.00

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5215.00 = 9970.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	395.75	16.48	1.737	0.98 (0.25)	0.25	269.5	5043.00
2	414.90	19.01	1.595	0.98 (0.24)	0.25	313.8	5050.00
3	415.00	19.04	1.593	0.97 (0.24)	0.25	314.3	5080.00
4	416.17	19.75	1.558	0.97 (0.24)	0.24	323.3	5142.00
5	409.39	24.50	1.369	0.97 (0.22)	0.23	371.6	5025.00
6	402.42	25.85	1.326	0.98 (0.22)	0.22	380.8	5070.00
7	390.68	30.18	1.208	0.98 (0.21)	0.22	409.5	5120.00
8	373.95	33.29	1.139	0.98 (0.21)	0.22	422.1	5170.00
9	351.76	36.33	1.081	0.98 (0.21)	0.22	427.5	5000.00

TOTAL AREA(ACRES) = 427.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 416.17 Tc(MIN.) = 19.746  
EFFECTIVE AREA(ACRES) = 323.31 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.22  
TOTAL AREA(ACRES) = 427.5  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5215.00 = 9970.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5215.00 TO NODE 5248.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 720.42 DOWNSTREAM(FEET) = 708.36  
FLOW LENGTH(FEET) = 1194.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.66  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 416.17  
PIPE TRAVEL TIME(MIN.) = 1.19 Tc(MIN.) = 20.94  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5248.00 = 11164.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.94  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.504  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.92 0.98 0.100 32  
PUBLIC PARK A 0.76 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.439

SUBAREA AREA(ACRES) = 1.68 SUBAREA RUNOFF(CFS) = 1.63  
EFFECTIVE AREA(ACRES) = 324.99 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.24  
TOTAL AREA(ACRES) = 429.2 PEAK FLOW RATE(CFS) = 416.17  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 4.53 0.98 0.200 32 14.07  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 6.99  
TOTAL AREA(ACRES) = 4.53 PEAK FLOW RATE(CFS) = 6.99

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 20.94  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.504  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.10 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 1.10 SUBAREA RUNOFF(CFS) = 1.39  
EFFECTIVE AREA(ACRES) = 326.09 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.24  
TOTAL AREA(ACRES) = 430.3 PEAK FLOW RATE(CFS) = 416.17  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5225.00 TO NODE 5230.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

-----  
UPSTREAM ELEVATION(FEET) = 750.20 DOWNSTREAM ELEVATION(FEET) = 745.90  
STREET LENGTH(FEET) = 345.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 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.) = 20.94  
RAINFALL INTENSITY(INCH/HR) = 1.50  
AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.24  
EFFECTIVE STREAM AREA(ACRES) = 326.09  
TOTAL STREAM AREA(ACRES) = 430.29  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 416.17

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.61

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.47  
HALFSTREET FLOOD WIDTH(FEET) = 15.70  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.32  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.57  
STREET FLOW TRAVEL TIME(MIN.) = 1.73 Tc(MIN.) = 15.80  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.781

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" A 14.86 0.98 0.200 32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 14.86 SUBAREA RUNOFF(CFS) = 21.22  
EFFECTIVE AREA(ACRES) = 19.39 AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 27.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5220.00 TO NODE 5225.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 614.00  
ELEVATION DATA: UPSTREAM(FEET) = 751.70 DOWNSTREAM(FEET) = 750.20

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
FLOW VELOCITY(FEET/SEC.) = 3.76 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.00  
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5230.00 = 959.00 FEET.

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.068

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.910

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.)

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5230.00 TO NODE 5235.00 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) = 738.90 DOWNSTREAM(FEET) = 738.10
FLOW LENGTH(FEET) = 265.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.46
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.68
PIPE TRAVEL TIME(MIN.) = 0.81 Tc(MIN.) = 16.61
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5235.00 = 1224.00 FEET.

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*****
FLOW PROCESS FROM NODE 5235.00 TO NODE 5235.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 16.61
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.729
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp      Ap      SCS
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK        A         7.86     0.98   0.850   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 7.86 SUBAREA RUNOFF(CFS) = 6.37
EFFECTIVE AREA(ACRES) = 27.25 AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 27.2 PEAK FLOW RATE(CFS) = 33.13

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*****
FLOW PROCESS FROM NODE 5235.00 TO NODE 5240.00 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) = 738.10 DOWNSTREAM(FEET) = 733.00
FLOW LENGTH(FEET) = 514.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.87
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 33.13
PIPE TRAVEL TIME(MIN.) = 0.97 Tc(MIN.) = 17.58
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5240.00 = 1738.00 FEET.

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*****
FLOW PROCESS FROM NODE 5240.00 TO NODE 5240.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 17.58
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.671
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp      Ap      SCS
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL        A         5.55     0.98   0.100   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

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SUBAREA AREA(ACRES) = 5.55 SUBAREA RUNOFF(CFS) = 7.86
EFFECTIVE AREA(ACRES) = 32.80 AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 32.8 PEAK FLOW RATE(CFS) = 39.58

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*****
FLOW PROCESS FROM NODE 5240.00 TO NODE 5247.00 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) = 733.00 DOWNSTREAM(FEET) = 717.05
FLOW LENGTH(FEET) = 800.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.88
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 39.58
PIPE TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 18.70
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5247.00 = 2538.00 FEET.

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*****
FLOW PROCESS FROM NODE 5247.00 TO NODE 5247.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 18.70
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.610
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp      Ap      SCS
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL        A        15.35     0.98   0.100   32
PUBLIC PARK        A         3.86     0.98   0.850   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.251
SUBAREA AREA(ACRES) = 19.21 SUBAREA RUNOFF(CFS) = 23.61
EFFECTIVE AREA(ACRES) = 52.01 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 52.0 PEAK FLOW RATE(CFS) = 61.39

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*****
FLOW PROCESS FROM NODE 5247.00 TO NODE 5248.00 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) = 717.05 DOWNSTREAM(FEET) = 710.66
FLOW LENGTH(FEET) = 950.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.82
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 61.39
PIPE TRAVEL TIME(MIN.) = 1.80 Tc(MIN.) = 20.50
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5248.00 = 3488.00 FEET.

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*****
FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 20.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.524
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A      1.56    0.98  0.100  32
PUBLIC PARK          A      1.20    0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426
SUBAREA AREA(ACRES) = 2.76    SUBAREA RUNOFF(CFS) = 2.75
EFFECTIVE AREA(ACRES) = 54.77  AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 54.8    PEAK FLOW RATE(CFS) = 61.39
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 20.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.524
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A      1.56    0.98  0.100  32
PUBLIC PARK          A      1.20    0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426
SUBAREA AREA(ACRES) = 2.76    SUBAREA RUNOFF(CFS) = 2.75
EFFECTIVE AREA(ACRES) = 57.53  AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 57.5    PEAK FLOW RATE(CFS) = 62.87

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*****
FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 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.) = 20.50
RAINFALL INTENSITY(INCH/HR) = 1.52
AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.32
EFFECTIVE STREAM AREA(ACRES) = 57.53
TOTAL STREAM AREA(ACRES) = 57.53
PEAK FLOW RATE(CFS) AT CONFLUENCE = 62.87

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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	395.75	17.70	1.664	0.97( 0.25)	0.25	272.3 5043.00
1	414.90	20.20	1.537	0.98( 0.24)	0.25	316.6 5050.00
1	415.00	20.23	1.536	0.97( 0.24)	0.25	317.1 5080.00
1	416.17	20.94	1.504	0.97( 0.24)	0.24	326.1 5142.00
1	409.39	25.70	1.331	0.97( 0.22)	0.23	374.4 5025.00
1	402.42	27.07	1.290	0.98( 0.22)	0.23	383.5 5070.00
1	390.68	31.40	1.180	0.97( 0.21)	0.22	412.3 5120.00
1	373.95	34.51	1.115	0.98( 0.21)	0.22	424.9 5170.00
1	351.76	37.59	1.059	0.97( 0.21)	0.22	430.3 5000.00
2	62.87	20.50	1.524	0.97( 0.31)	0.32	57.5 5220.00

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

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\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	456.31	17.70	1.664	0.98( 0.26)	0.26	322.0	5043.00
2	477.54	20.20	1.537	0.98( 0.25)	0.26	373.3	5050.00
3	477.67	20.23	1.536	0.98( 0.25)	0.26	373.9	5080.00
4	478.30	20.50	1.524	0.97( 0.25)	0.26	377.9	5220.00
5	478.02	20.94	1.504	0.97( 0.25)	0.26	383.6	5142.00
6	462.24	25.70	1.331	0.97( 0.23)	0.24	431.9	5025.00
7	453.16	27.07	1.290	0.98( 0.23)	0.24	441.1	5070.00
8	435.73	31.40	1.180	0.97( 0.23)	0.23	469.8	5120.00
9	415.63	34.51	1.115	0.98( 0.22)	0.23	482.4	5170.00
10	390.56	37.59	1.059	0.97( 0.22)	0.23	487.8	5000.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 478.30    Tc(MIN.) = 20.50
EFFECTIVE AREA(ACRES) = 377.94  AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.26
TOTAL AREA(ACRES) = 487.8
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5248.00 = 11164.00 FEET.

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*****
FLOW PROCESS FROM NODE 5248.00 TO NODE 5300.00 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) = 708.36  DOWNSTREAM(FEET) = 707.90
FLOW LENGTH(FEET) = 31.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 72.0 INCH PIPE IS 57.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.73
ESTIMATED PIPE DIAMETER(INCH) = 72.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 478.30
PIPE TRAVEL TIME(MIN.) = 0.03    Tc(MIN.) = 20.52
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5300.00 = 11195.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 10
-----

```

```

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
-----

```



```

*****
FLOW PROCESS FROM NODE 5273.00 TO NODE 5274.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 274.00
ELEVATION DATA: UPSTREAM(FEET) = 737.00 DOWNSTREAM(FEET) = 735.88

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.623
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.562
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 A 0.46 0.98 0.100 32 8.62
PUBLIC PARK A 0.35 0.98 0.850 32 13.70
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA RUNOFF(CFS) = 1.57
TOTAL AREA(ACRES) = 0.81 PEAK FLOW RATE(CFS) = 1.57

*****
FLOW PROCESS FROM NODE 5274.00 TO NODE 5274.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 8.62
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.562
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.46 0.98 0.100 32
PUBLIC PARK A 0.35 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA AREA(ACRES) = 0.81 SUBAREA RUNOFF(CFS) = 1.57
EFFECTIVE AREA(ACRES) = 1.62 AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 3.13

*****
FLOW PROCESS FROM NODE 5274.00 TO NODE 5275.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 725.22 DOWNSTREAM(FEET) = 722.55
FLOW LENGTH(FEET) = 510.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.94
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.13
PIPE TRAVEL TIME(MIN.) = 2.16 Tc(MIN.) = 10.78

```

```

LONGEST FLOWPATH FROM NODE 5273.00 TO NODE 5275.00 = 784.00 FEET.
*****
FLOW PROCESS FROM NODE 5275.00 TO NODE 5275.00 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.) = 10.78
RAINFALL INTENSITY(INCH/HR) = 2.24
AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA(ACRES) = 1.62
TOTAL STREAM AREA(ACRES) = 1.62
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.13

*****
FLOW PROCESS FROM NODE 5250.00 TO NODE 5255.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 502.00
ELEVATION DATA: UPSTREAM(FEET) = 747.50 DOWNSTREAM(FEET) = 745.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.408
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.166
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 A 3.72 0.98 0.100 32 11.41
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 6.93
TOTAL AREA(ACRES) = 3.72 PEAK FLOW RATE(CFS) = 6.93

*****
FLOW PROCESS FROM NODE 5255.00 TO NODE 5260.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
UPSTREAM ELEVATION(FEET) = 745.80 DOWNSTREAM ELEVATION(FEET) = 741.80
STREET LENGTH(FEET) = 615.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFBSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150

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Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 21.1 PEAK FLOW RATE(CFS) = 30.83

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.91  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.49  
HALFSTREET FLOOD WIDTH(FEET) = 16.73  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.49  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.23  
STREET FLOW TRAVEL TIME(MIN.) = 4.11 Tc(MIN.) = 15.52  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.801

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 10.38 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.38 SUBAREA RUNOFF(CFS) = 15.91  
EFFECTIVE AREA(ACRES) = 14.10 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 14.1 PEAK FLOW RATE(CFS) = 21.62

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
FLOW VELOCITY(FEET/SEC.) = 2.80 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.52  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5260.00 = 1117.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5260.00 TO NODE 5265.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 734.40 DOWNSTREAM(FEET) = 733.30  
FLOW LENGTH(FEET) = 364.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.14  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 21.62  
PIPE TRAVEL TIME(MIN.) = 1.18 Tc(MIN.) = 16.70  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5265.00 = 1481.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5265.00 TO NODE 5265.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
-----  
MAINLINE Tc(MIN.) = 16.70  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.723  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 6.97 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 6.97 SUBAREA RUNOFF(CFS) = 10.20  
EFFECTIVE AREA(ACRES) = 21.07 AREA-AVERAGED Fm(INCH/HR) = 0.10

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5265.00 TO NODE 5270.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 733.30 DOWNSTREAM(FEET) = 732.60  
FLOW LENGTH(FEET) = 183.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.96  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 30.83  
PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 17.21  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5270.00 = 1664.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5270.00 TO NODE 5270.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
-----  
MAINLINE Tc(MIN.) = 17.21  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.692  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 7.85 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 7.85 SUBAREA RUNOFF(CFS) = 11.27  
EFFECTIVE AREA(ACRES) = 28.92 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 28.9 PEAK FLOW RATE(CFS) = 41.51

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5270.00 TO NODE 5275.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 732.60 DOWNSTREAM(FEET) = 722.55  
FLOW LENGTH(FEET) = 322.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.50  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 41.51  
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 17.58  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5275.00 = 1986.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5275.00 TO NODE 5275.00 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.) = 17.58
RAINFALL INTENSITY(INCH/HR) = 1.67
AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 28.92
TOTAL STREAM AREA(ACRES) = 28.92
PEAK FLOW RATE(CFS) AT CONFLUENCE = 41.51

```

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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	3.13	10.78	2.240	0.97( 0.41)	0.42	1.6	5273.00
2	41.51	17.58	1.671	0.98( 0.10)	0.10	28.9	5250.00

```

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	37.81	10.78	2.240	0.97( 0.12)	0.13	19.4	5273.00
2	43.67	17.58	1.671	0.98( 0.11)	0.12	30.5	5250.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 43.67 Tc(MIN.) = 17.58
EFFECTIVE AREA(ACRES) = 30.54 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 30.5
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5275.00 = 1986.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 5275.00 TO NODE 5295.00 IS CODE = 31

```

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 722.55 DOWNSTREAM(FEET) = 717.86
FLOW LENGTH(FEET) = 722.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.11
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 43.67
PIPE TRAVEL TIME(MIN.) = 1.48 Tc(MIN.) = 19.06
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5295.00 = 2708.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 5295.00 TO NODE 5295.00 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.) = 19.06
RAINFALL INTENSITY(INCH/HR) = 1.59
AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.12
EFFECTIVE STREAM AREA(ACRES) = 30.54
TOTAL STREAM AREA(ACRES) = 30.54
PEAK FLOW RATE(CFS) AT CONFLUENCE = 43.67

```

```

*****
FLOW PROCESS FROM NODE 5280.00 TO NODE 5285.00 IS CODE = 21

```

```

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 556.00
ELEVATION DATA: UPSTREAM(FEET) = 737.20 DOWNSTREAM(FEET) = 736.30

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.774
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.934
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              A      1.60     0.98     0.850     32  21.88
COMMERCIAL               A      5.83     0.98     0.100     32  13.77
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
SUBAREA RUNOFF(CFS) = 11.23
TOTAL AREA(ACRES) = 7.43 PEAK FLOW RATE(CFS) = 11.23

```

```

*****
FLOW PROCESS FROM NODE 5285.00 TO NODE 5290.00 IS CODE = 31

```

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 736.30 DOWNSTREAM(FEET) = 728.30
FLOW LENGTH(FEET) = 347.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.38
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.23
PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 14.39
LONGEST FLOWPATH FROM NODE 5280.00 TO NODE 5290.00 = 903.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 5290.00 TO NODE 5290.00 IS CODE = 81

```

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.39
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.884
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN

```

COMMERCIAL C 4.80 0.57 0.100 69  
 PUBLIC PARK A 7.67 0.98 0.850 32  
 COMMERCIAL A 8.90 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.369  
 SUBAREA AREA(ACRES) = 21.37 SUBAREA RUNOFF(CFS) = 29.49  
 EFFECTIVE AREA(ACRES) = 28.80 AREA-AVERAGED Fm(INCH/HR) = 0.33  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.34  
 TOTAL AREA(ACRES) = 28.8 PEAK FLOW RATE(CFS) = 40.39

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5290.00 TO NODE 5295.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 728.30 DOWNSTREAM(FEET) = 724.50  
 FLOW LENGTH(FEET) = 374.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.46  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 40.39  
 PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 15.05  
 LONGEST FLOWPATH FROM NODE 5280.00 TO NODE 5295.00 = 1277.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5295.00 TO NODE 5295.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 15.05  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.834  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
PUBLIC PARK	C	0.32	0.57	0.850	69
COMMERCIAL	C	3.80	0.57	0.100	69
COMMERCIAL	A	6.20	0.98	0.100	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.77  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.123  
 SUBAREA AREA(ACRES) = 10.32 SUBAREA RUNOFF(CFS) = 16.16  
 EFFECTIVE AREA(ACRES) = 39.12 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 39.1 PEAK FLOW RATE(CFS) = 55.25

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5295.00 TO NODE 5295.00 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.) = 15.05  
 RAINFALL INTENSITY(INCH/HR) = 1.83  
 AREA-AVERAGED Fm(INCH/HR) = 0.26

AREA-AVERAGED Fp(INCH/HR) = 0.93  
 AREA-AVERAGED Ap = 0.28  
 EFFECTIVE STREAM AREA(ACRES) = 39.12  
 TOTAL STREAM AREA(ACRES) = 39.12  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 55.25

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	37.81	12.34	2.066	0.97( 0.12)	0.13	19.4	5273.00
1	43.67	19.06	1.592	0.98( 0.11)	0.12	30.5	5250.00
2	55.25	15.05	1.834	0.93( 0.26)	0.28	39.1	5280.00

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	89.81	12.34	2.066	0.94( 0.21)	0.22	51.4	5273.00
2	95.42	15.05	1.834	0.94( 0.21)	0.22	63.0	5280.00
3	90.38	19.06	1.592	0.94( 0.20)	0.21	69.7	5250.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 95.42 Tc(MIN.) = 15.05  
 EFFECTIVE AREA(ACRES) = 62.99 AREA-AVERAGED Fm(INCH/HR) = 0.21  
 AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.22  
 TOTAL AREA(ACRES) = 69.7  
 LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5295.00 = 2708.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5295.00 TO NODE 5300.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 717.86 DOWNSTREAM(FEET) = 710.30  
 FLOW LENGTH(FEET) = 921.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.68  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 95.42  
 PIPE TRAVEL TIME(MIN.) = 1.44 Tc(MIN.) = 16.49  
 LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5300.00 = 3629.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.49  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.737  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	C	1.50	0.57	0.100	69

PUBLIC PARK C 1.16 0.57 0.850 69 8 435.73 31.43 1.179 0.97( 0.23) 0.23 469.8 5120.00  
 COMMERCIAL A 1.58 0.98 0.100 32 9 415.63 34.54 1.114 0.98( 0.22) 0.23 482.4 5170.00  
 PUBLIC PARK A 1.22 0.98 0.850 32 10 390.56 37.62 1.059 0.97( 0.22) 0.23 487.8 5000.00  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427  
 SUBAREA AREA(ACRES) = 5.46 SUBAREA RUNOFF(CFS) = 6.91  
 EFFECTIVE AREA(ACRES) = 68.45 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.24  
 TOTAL AREA(ACRES) = 75.1 PEAK FLOW RATE(CFS) = 95.42  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
 =====

MAINLINE Tc(MIN.) = 16.49  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.737  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.46	0.57	0.100	69
PUBLIC PARK	C	1.12	0.57	0.850	69
COMMERCIAL	A	1.64	0.98	0.100	32
PUBLIC PARK	A	1.26	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426  
 SUBAREA AREA(ACRES) = 5.48 SUBAREA RUNOFF(CFS) = 6.92  
 EFFECTIVE AREA(ACRES) = 73.93 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 80.6 PEAK FLOW RATE(CFS) = 100.36

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 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	95.44	17.73	1.662	0.98( 0.23)	0.26	62.4	5273.00
2	100.36	16.49	1.737	0.90( 0.23)	0.25	73.9	5280.00
3	94.76	20.51	1.523	0.90( 0.22)	0.24	80.6	5250.00

LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5300.00 = 3629.00 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	456.31	17.73	1.662	0.98( 0.26)	0.26	322.0	5043.00
2	477.54	20.23	1.536	0.98( 0.25)	0.26	373.3	5050.00
3	477.67	20.26	1.535	0.98( 0.25)	0.26	373.9	5080.00
4	478.30	20.52	1.523	0.97( 0.25)	0.26	377.9	5220.00
5	478.02	20.97	1.503	0.97( 0.25)	0.26	383.6	5142.00
6	462.24	25.73	1.330	0.97( 0.23)	0.24	431.9	5025.00
7	453.16	27.10	1.289	0.98( 0.23)	0.24	441.1	5070.00

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	518.65	13.79	1.933	0.96( 0.25)	0.26	312.8	5273.00
2	547.06	16.49	1.737	0.96( 0.25)	0.26	373.4	5280.00
3	554.94	17.73	1.662	0.96( 0.25)	0.26	398.0	5043.00
4	572.69	20.23	1.536	0.96( 0.25)	0.25	453.4	5050.00
5	572.77	20.26	1.535	0.96( 0.25)	0.25	454.1	5080.00
6	573.03	20.51	1.523	0.96( 0.24)	0.25	458.4	5250.00
7	573.03	20.52	1.523	0.96( 0.24)	0.25	458.5	5220.00
8	571.34	20.97	1.503	0.96( 0.24)	0.25	464.2	5142.00
9	542.96	25.73	1.330	0.96( 0.23)	0.24	512.5	5025.00
10	530.92	27.10	1.289	0.96( 0.23)	0.24	521.7	5070.00
11	505.53	31.43	1.179	0.96( 0.22)	0.23	550.4	5120.00
12	480.72	34.54	1.114	0.96( 0.22)	0.23	563.0	5170.00
13	451.61	37.62	1.059	0.96( 0.22)	0.23	568.4	5000.00

TOTAL AREA(ACRES) = 568.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 573.03 Tc(MIN.) = 20.513  
 EFFECTIVE AREA(ACRES) = 458.40 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.26  
 TOTAL AREA(ACRES) = 568.4  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5300.00 = 11195.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 12  
 -----  
 >>>>CLEAR MEMORY BANK # 1 <<<<<<  
 =====

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5300.00 TO NODE 5305.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 707.90 DOWNSTREAM(FEET) = 704.64  
 FLOW LENGTH(FEET) = 652.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 96.0 INCH PIPE IS 73.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.83  
 ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 573.03  
 PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 21.30  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5305.00 = 11847.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5305.00 TO NODE 5305.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
 =====

MAINLINE Tc(MIN.) = 21.30  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.489  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 9.55 0.57 0.100 69  
 COMMERCIAL A 11.87 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 21.42 SUBAREA RUNOFF(CFS) = 27.18  
 EFFECTIVE AREA(ACRES) = 479.82 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 589.8 PEAK FLOW RATE(CFS) = 573.03  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.456  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 0.54 0.57 0.100 69  
 PUBLIC PARK C 0.41 0.57 0.850 69  
 COMMERCIAL A 0.51 0.98 0.100 32  
 PUBLIC PARK A 0.48 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.444  
 SUBAREA AREA(ACRES) = 1.94 SUBAREA RUNOFF(CFS) = 1.93  
 EFFECTIVE AREA(ACRES) = 482.71 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 592.7 PEAK FLOW RATE(CFS) = 573.03  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5305.00 TO NODE 5305.00 IS CODE = 81  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
 =====

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
 =====

MAINLINE Tc(MIN.) = 21.30  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.489  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 0.54 0.57 0.100 69  
 PUBLIC PARK C 0.41 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424  
 SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 1.07  
 EFFECTIVE AREA(ACRES) = 480.77 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 590.8 PEAK FLOW RATE(CFS) = 573.03  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

MAINLINE Tc(MIN.) = 22.11  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.456  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.51 0.98 0.100 32  
 PUBLIC PARK A 0.48 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.464  
 SUBAREA AREA(ACRES) = 0.99 SUBAREA RUNOFF(CFS) = 0.89  
 EFFECTIVE AREA(ACRES) = 483.70 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 593.7 PEAK FLOW RATE(CFS) = 573.03  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5305.00 TO NODE 5330.00 IS CODE = 31  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<  
 =====

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
 =====

ELEVATION DATA: UPSTREAM( FEET) = 704.64 DOWNSTREAM( FEET) = 701.26  
 FLOW LENGTH( FEET) = 675.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 96.0 INCH PIPE IS 73.7 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC.) = 13.84  
 ESTIMATED PIPE DIAMETER( INCH) = 96.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 573.03  
 PIPE TRAVEL TIME( MIN.) = 0.81 Tc( MIN.) = 22.11  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5330.00 = 12522.00 FEET.

MAINLINE Tc(MIN.) = 22.11  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.456  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 23.78 0.98 0.100 32  
 COMMERCIAL C 5.56 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.90  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 29.34 SUBAREA RUNOFF(CFS) = 36.08  
 EFFECTIVE AREA(ACRES) = 513.04 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.24  
 TOTAL AREA(ACRES) = 623.1 PEAK FLOW RATE(CFS) = 573.03  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 22.11

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 22.11  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.456  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 32.80 0.98 0.100 32  
COMMERCIAL C 4.08 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.93  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 36.88 SUBAREA RUNOFF(CFS) = 45.25  
EFFECTIVE AREA(ACRES) = 549.92 AREA-AVERAGED Fm(INCH/HR) = 0.22  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.23  
TOTAL AREA(ACRES) = 659.9 PEAK FLOW RATE(CFS) = 611.59

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 71  
-----

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<  
>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<

-----  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.66; LAG(HR) = 0.52; Fm(INCH/HR) = 0.21; Ybar = 0.26  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 659.9  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5330.00 = 12522.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0370; Lca/L=0.4,n=.0332; Lca/L=0.5,n=.0305;Lca/L=0.6,n=.0285  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 151.49  
UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 563.87  
TOTAL PEAK FLOW RATE(CFS) = 563.87 (SOURCE FLOW INCLUDED)  
RATIONAL METHOD PEAK FLOW RATE(CFS) = 611.59  
(UPSTREAM NODE PEAK FLOW RATE(CFS) = 611.59)  
PEAK FLOW RATE(CFS) USED = 611.59

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5330.00 TO NODE 5335.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM( FEET) = 701.26 DOWNSTREAM( FEET) = 697.78  
FLOW LENGTH( FEET) = 687.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 96.0 INCH PIPE IS 78.1 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC.) = 13.97  
ESTIMATED PIPE DIAMETER( INCH) = 96.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 611.59

PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 40.14  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5335.00 TO NODE 5335.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 40.14  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.018  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.54 0.98 0.100 32  
PUBLIC PARK A 0.50 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.461  
SUBAREA AREA(ACRES) = 1.04

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.67; LAG(HR) = 0.54; Fm(INCH/HR) = 0.21; Ybar = 0.26  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 661.0  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0362; Lca/L=0.4,n=.0324; Lca/L=0.5,n=.0298;Lca/L=0.6,n=.0278  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 151.66  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 558.76  
TOTAL AREA(ACRES) = 661.0 PEAK FLOW RATE(CFS) = 611.59  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5335.00 TO NODE 5335.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 40.14  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.018  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.54 0.98 0.100 32  
PUBLIC PARK A 0.50 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.461  
SUBAREA AREA(ACRES) = 1.04

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.67; LAG(HR) = 0.54; Fm(INCH/HR) = 0.21; Ybar = 0.26  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.



DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 662.0  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0362; Lca/L=0.4,n=.0324; Lca/L=0.5,n=.0298;Lca/L=0.6,n=.0278  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 151.83  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 559.45  
TOTAL AREA(ACRES) = 662.0 PEAK FLOW RATE(CFS) = 611.59  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

PIPE-FLOW(CFS) = 611.59  
PIPE TRAVEL TIME(MIN.) = 1.22 Tc(MIN.) = 41.36  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5375.00 = 14595.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5375.00 TO NODE 5375.00 IS CODE = 1  
-----  
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<  
-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
PEAK FLOW RATE(CFS) = 611.59 Tc(MIN.) = 41.36  
AREA-AVERAGED Fm(INCH/HR) = 0.21 Ybar = 0.26  
TOTAL AREA(ACRES) = 681.3

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5355.00 TO NODE 5360.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 410.00  
ELEVATION DATA: UPSTREAM(FEET) = 717.00 DOWNSTREAM(FEET) = 712.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.212  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.983  
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 A 2.36 0.98 0.850 32 13.21  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA RUNOFF(CFS) = 2.45  
TOTAL AREA(ACRES) = 2.36 PEAK FLOW RATE(CFS) = 2.45

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5360.00 TO NODE 5365.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<  
-----

UPSTREAM ELEVATION(FEET) = 712.50 DOWNSTREAM ELEVATION(FEET) = 710.30  
STREET LENGTH(FEET) = 394.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.29

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5335.00 TO NODE 5335.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
-----

MAINLINE Tc(MIN.) = 40.14  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.018  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 1.40 0.57 0.200 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 17.88 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 19.28  
UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.67; LAG(HR) = 0.54; Fm(INCH/HR) = 0.21; Ybar = 0.26  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 681.3  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0362; Lca/L=0.4,n=.0324; Lca/L=0.5,n=.0298;Lca/L=0.6,n=.0278  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 156.33  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 575.42  
TOTAL AREA(ACRES) = 681.3 PEAK FLOW RATE(CFS) = 611.59  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5335.00 TO NODE 5375.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 697.78 DOWNSTREAM(FEET) = 682.26  
FLOW LENGTH(FEET) = 1386.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 84.0 INCH PIPE IS 65.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.97  
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1



STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.36  
 HALFSTREET FLOOD WIDTH(FEET) = 10.17  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.75  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.63  
 STREET FLOW TRAVEL TIME(MIN.) = 3.75 Tc(MIN.) = 16.96  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.707  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	4.61	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 4.61 SUBAREA RUNOFF(CFS) = 3.65  
 EFFECTIVE AREA(ACRES) = 6.97 AREA-AVERAGED Fm(INCH/HR) = 0.83  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.85  
 TOTAL AREA(ACRES) = 7.0 PEAK FLOW RATE(CFS) = 5.51

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 11.39  
 FLOW VELOCITY(FEET/SEC.) = 1.85 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.72  
 LONGEST FLOWPATH FROM NODE 5355.00 TO NODE 5365.00 = 804.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5365.00 TO NODE 5370.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 703.30 DOWNSTREAM(FEET) = 702.40  
 FLOW LENGTH(FEET) = 287.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.60  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 5.51  
 PIPE TRAVEL TIME(MIN.) = 1.33 Tc(MIN.) = 18.29  
 LONGEST FLOWPATH FROM NODE 5355.00 TO NODE 5370.00 = 1091.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5370.00 TO NODE 5370.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 18.29  
 \* 10 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
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	6.55	0.57	0.500	69
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	5.60	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 12.15 SUBAREA RUNOFF(CFS) = 13.72  
 EFFECTIVE AREA(ACRES) = 19.12 AREA-AVERAGED Fm(INCH/HR) = 0.54

AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.63  
 TOTAL AREA(ACRES) = 19.1 PEAK FLOW RATE(CFS) = 18.75  
 \*\*\*\*\*  
 FLOW PROCESS FROM NODE 5370.00 TO NODE 5375.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 702.40 DOWNSTREAM(FEET) = 685.59  
 FLOW LENGTH(FEET) = 917.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.60  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 18.75  
 PIPE TRAVEL TIME(MIN.) = 1.59 Tc(MIN.) = 19.88  
 LONGEST FLOWPATH FROM NODE 5355.00 TO NODE 5375.00 = 2008.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5375.00 TO NODE 5375.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 19.88  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.552  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	9.45	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 9.45 SUBAREA RUNOFF(CFS) = 10.79  
 EFFECTIVE AREA(ACRES) = 28.57 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.78 AREA-AVERAGED Ap = 0.59  
 TOTAL AREA(ACRES) = 28.6 PEAK FLOW RATE(CFS) = 28.18

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5375.00 TO NODE 5375.00 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.) = 19.88  
 RAINFALL INTENSITY(INCH/HR) = 1.55  
 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.78  
 AREA-AVERAGED Ap = 0.59  
 EFFECTIVE STREAM AREA(ACRES) = 28.57  
 TOTAL STREAM AREA(ACRES) = 28.57  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 28.18  
 \*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	AREA (ACRES)	HEADWATER NODE

1 611.59 41.36 681.30 5000.00  
2 28.18 19.88 28.57 5355.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%

Tc(HR) = 0.69; LAG(HR) = 0.55; Fm(INCH/HR) = 0.22; Ybar = 0.27

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 709.9

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5375.00 = 14595.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0346; Lca/L=0.4,n=.0310; Lca/L=0.5,n=.0285;Lca/L=0.6,n=.0266

TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 160.67

PEAK FLOW RATE(CFS) = 581.46

(UPSTREAM NODE PEAK FLOW RATE(CFS) = 611.59)

PEAK FLOW RATE(CFS) USED = 611.59

\*\*\*\*\*

FLOW PROCESS FROM NODE 5375.00 TO NODE 5383.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 682.26 DOWNSTREAM(FEET) = 676.82

FLOW LENGTH( FEET) = 526.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 84.0 INCH PIPE IS 68.3 INCHES

PIPE-FLOW VELOCITY( FEET/SEC.) = 18.26

ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 611.59

PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 41.84

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 41.84

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.993

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.31	0.57	0.100	69
PUBLIC PARK	C	1.23	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463

SUBAREA AREA(ACRES) = 2.54

UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%

Tc(HR) = 0.70; LAG(HR) = 0.56; Fm(INCH/HR) = 0.22; Ybar = 0.27

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 712.4

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0342; Lca/L=0.4,n=.0307; Lca/L=0.5,n=.0282;Lca/L=0.6,n=.0263

TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 161.17

UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 577.74

TOTAL AREA(ACRES) = 712.4 PEAK FLOW RATE(CFS) = 611.59

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 41.84

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.993

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.31	0.57	0.100	69
PUBLIC PARK	C	1.23	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463

SUBAREA AREA(ACRES) = 2.54

UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%

Tc(HR) = 0.70; LAG(HR) = 0.56; Fm(INCH/HR) = 0.22; Ybar = 0.27

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 715.0

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0342; Lca/L=0.4,n=.0307; Lca/L=0.5,n=.0282;Lca/L=0.6,n=.0263

TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 161.68

UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 579.62

TOTAL AREA(ACRES) = 715.0 PEAK FLOW RATE(CFS) = 611.59

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

PEAK FLOW RATE(CFS) = 611.59 Tc(MIN.) = 41.84

AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.27

TOTAL AREA(ACRES) = 715.0

\*\*\*\*\*

FLOW PROCESS FROM NODE 5380.00 TO NODE 5381.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 594.00
ELEVATION DATA: UPSTREAM(FEET) = 702.90 DOWNSTREAM(FEET) = 700.51

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.789
\* 10 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.)
COMMERCIAL A 0.54 0.98 0.100 32 11.79
PUBLIC PARK A 0.45 0.98 0.850 32 18.73
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
SUBAREA RUNOFF(CFS) = 1.51
TOTAL AREA(ACRES) = 0.99 PEAK FLOW RATE(CFS) = 1.51

FLOW PROCESS FROM NODE 5381.00 TO NODE 5381.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 11.79
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.124
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.54 0.98 0.100 32
PUBLIC PARK A 0.45 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
SUBAREA AREA(ACRES) = 0.99 SUBAREA RUNOFF(CFS) = 1.51
EFFECTIVE AREA(ACRES) = 1.98 AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 2.0 PEAK FLOW RATE(CFS) = 3.02

FLOW PROCESS FROM NODE 5381.00 TO NODE 5382.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 690.51 DOWNSTREAM(FEET) = 685.38
FLOW LENGTH(FEET) = 1020.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.84
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.02
PIPE TRAVEL TIME(MIN.) = 4.43 Tc(MIN.) = 16.22
LONGEST FLOWPATH FROM NODE 5380.00 TO NODE 5382.00 = 1614.00 FEET.

FLOW PROCESS FROM NODE 5382.00 TO NODE 5382.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.22
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.754
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.20 0.57 0.100 69
PUBLIC PARK C 1.00 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
SUBAREA AREA(ACRES) = 2.20 SUBAREA RUNOFF(CFS) = 2.98
EFFECTIVE AREA(ACRES) = 4.18 AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.76 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 4.2 PEAK FLOW RATE(CFS) = 5.34

FLOW PROCESS FROM NODE 5382.00 TO NODE 5382.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.22
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.754
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.20 0.57 0.100 69
PUBLIC PARK C 1.00 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
SUBAREA AREA(ACRES) = 2.20 SUBAREA RUNOFF(CFS) = 2.98
EFFECTIVE AREA(ACRES) = 6.38 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 6.4 PEAK FLOW RATE(CFS) = 8.32

FLOW PROCESS FROM NODE 5382.00 TO NODE 5383.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 685.38 DOWNSTREAM(FEET) = 680.32
FLOW LENGTH(FEET) = 770.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.45
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.32
PIPE TRAVEL TIME(MIN.) = 2.35 Tc(MIN.) = 18.57
LONGEST FLOWPATH FROM NODE 5380.00 TO NODE 5383.00 = 2384.00 FEET.

FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.57
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.617
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         0.47      0.57      0.100    69
PUBLIC PARK         C         0.39      0.57      0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440
SUBAREA AREA(ACRES) = 0.86      SUBAREA RUNOFF(CFS) = 1.06
EFFECTIVE AREA(ACRES) = 7.24    AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.68  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 7.2      PEAK FLOW RATE(CFS) = 8.59

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*****
FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.57
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.617
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         0.47      0.57      0.100    69
PUBLIC PARK         C         0.39      0.57      0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440
SUBAREA AREA(ACRES) = 0.86      SUBAREA RUNOFF(CFS) = 1.06
EFFECTIVE AREA(ACRES) = 8.10    AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.67  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 8.1      PEAK FLOW RATE(CFS) = 9.65

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*****
FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.57
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.617
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" A         30.37     0.98      0.200    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C         45.30     0.57      0.200    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.73
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 75.67     SUBAREA RUNOFF(CFS) = 100.18
EFFECTIVE AREA(ACRES) = 83.77   AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.72  AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 83.8      PEAK FLOW RATE(CFS) = 109.83

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*****
FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 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.) = 18.57
RAINFALL INTENSITY(INCH/HR) = 1.62
AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.72
AREA-AVERAGED Ap = 0.22
EFFECTIVE STREAM AREA(ACRES) = 83.77
TOTAL STREAM AREA(ACRES) = 83.77
PEAK FLOW RATE(CFS) AT CONFLUENCE = 109.83
** CONFLUENCE DATA **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	AREA (ACRES)	HEADWATER NODE
1	611.59	41.84	714.95	5000.00
2	109.83	18.57	83.77	5380.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.70; LAG(HR) = 0.56; Fm(INCH/HR) = 0.21; Ybar = 0.27
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR = 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 798.7
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0341; Lca/L=0.4,n=.0305; Lca/L=0.5,n=.0281;Lca/L=0.6,n=.0262
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 181.57
PEAK FLOW RATE(CFS) = 647.64

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*****
FLOW PROCESS FROM NODE 5383.00 TO NODE 5425.00 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) = 676.82 DOWNSTREAM(FEET) = 676.55
FLOW LENGTH(FEET) = 38.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 93.0 INCH PIPE IS 73.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.18
ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 647.64
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 41.88
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5425.00 = 15159.00 FEET.

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*****
FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 10
-----

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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 5408.00 TO NODE 5409.00 IS CODE = 21

-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 200.00  
ELEVATION DATA: UPSTREAM(FEET) = 704.37 DOWNSTREAM(FEET) = 703.86

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.356  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.611  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL C 0.17 0.57 0.100 69 8.36  
PUBLIC PARK C 0.13 0.57 0.850 69 13.28  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.425  
SUBAREA RUNOFF(CFS) = 0.64  
TOTAL AREA(ACRES) = 0.30 PEAK FLOW RATE(CFS) = 0.64

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5409.00 TO NODE 5409.00 IS CODE = 81

-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 8.36  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.611  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.15 0.57 0.100 69  
PUBLIC PARK C 0.12 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.433  
SUBAREA AREA(ACRES) = 0.27 SUBAREA RUNOFF(CFS) = 0.57  
EFFECTIVE AREA(ACRES) = 0.57 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.43  
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 1.21

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5409.00 TO NODE 5410.00 IS CODE = 31

-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 694.03 DOWNSTREAM(FEET) = 692.13  
FLOW LENGTH(FEET) = 431.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.86  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 1.21  
PIPE TRAVEL TIME(MIN.) = 2.51 Tc(MIN.) = 10.87  
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5410.00 = 631.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 IS CODE = 81

-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 10.87  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.230  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.27 0.98 0.100 32  
PUBLIC PARK A 0.27 0.98 0.850 32  
COMMERCIAL C 0.27 0.57 0.100 69  
PUBLIC PARK C 0.27 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.77  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
SUBAREA AREA(ACRES) = 1.08 SUBAREA RUNOFF(CFS) = 1.81  
EFFECTIVE AREA(ACRES) = 1.65 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.70 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 2.83

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 IS CODE = 81

-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 10.87  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.230  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.27 0.98 0.100 32  
PUBLIC PARK A 0.26 0.98 0.850 32  
COMMERCIAL C 0.26 0.57 0.100 69  
PUBLIC PARK C 0.26 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.77  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.471  
SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = 1.76  
EFFECTIVE AREA(ACRES) = 2.70 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 4.60

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 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.) = 10.87  
RAINFALL INTENSITY(INCH/HR) = 2.23  
AREA-AVERAGED Fm(INCH/HR) = 0.34

AREA-AVERAGED Fp(INCH/HR) = 0.73  
 AREA-AVERAGED Ap = 0.46  
 EFFECTIVE STREAM AREA(ACRES) = 2.70  
 TOTAL STREAM AREA(ACRES) = 2.70  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.60

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 PUBLIC PARK A 0.72 0.98 0.850 32  
 PUBLIC PARK A 3.17 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 3.89 SUBAREA RUNOFF(CFS) = 4.30  
 EFFECTIVE AREA(ACRES) = 4.96 AREA-AVERAGED Fm(INCH/HR) = 0.72  
 AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.80  
 TOTAL AREA(ACRES) = 5.0 PEAK FLOW RATE(CFS) = 5.95

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 9.42  
 FLOW VELOCITY(FEET/SEC.) = 2.76 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.96  
 LONGEST FLOWPATH FROM NODE 5400.00 TO NODE 5410.00 = 535.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 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.) = 12.43  
 RAINFALL INTENSITY(INCH/HR) = 2.06  
 AREA-AVERAGED Fm(INCH/HR) = 0.72  
 AREA-AVERAGED Fp(INCH/HR) = 0.91  
 AREA-AVERAGED Ap = 0.80  
 EFFECTIVE STREAM AREA(ACRES) = 4.96  
 TOTAL STREAM AREA(ACRES) = 4.96  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.95

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.60	10.87	2.230	0.73( 0.34)	0.46	2.7	5408.00
2	5.95	12.43	2.057	0.91( 0.72)	0.80	5.0	5400.00

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	10.47	10.87	2.230	0.86( 0.58)	0.67	7.0	5408.00
2	10.13	12.43	2.057	0.87( 0.59)	0.68	7.7	5400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 10.47 Tc(MIN.) = 10.87  
 EFFECTIVE AREA(ACRES) = 7.03 AREA-AVERAGED Fm(INCH/HR) = 0.58  
 AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.67  
 TOTAL AREA(ACRES) = 7.7  
 LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5410.00 = 631.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5410.00 TO NODE 5411.00 IS CODE = 31  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5400.00 TO NODE 5405.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 -----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 295.00  
 ELEVATION DATA: UPSTREAM(FEET) = 709.30 DOWNSTREAM(FEET) = 707.30

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.879  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.229  
 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.)  
 SCHOOL C 1.07 0.57 0.600 69 10.88  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 SUBAREA RUNOFF(CFS) = 1.82  
 TOTAL AREA(ACRES) = 1.07 PEAK FLOW RATE(CFS) = 1.82

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5405.00 TO NODE 5410.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 -----

UPSTREAM ELEVATION(FEET) = 707.30 DOWNSTREAM ELEVATION(FEET) = 703.70  
 STREET LENGTH(FEET) = 240.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.98  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.31  
 HALFSTREET FLOOD WIDTH(FEET) = 7.64  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.57  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.80  
 STREET FLOW TRAVEL TIME(MIN.) = 1.55 Tc(MIN.) = 12.43  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.057  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 692.13 DOWNSTREAM(FEET) = 690.07
FLOW LENGTH(FEET) = 554.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.63
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.47
PIPE TRAVEL TIME(MIN.) = 2.00 Tc(MIN.) = 12.86
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5411.00 = 1185.00 FEET.

*****
FLOW PROCESS FROM NODE 5411.00 TO NODE 5411.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.016
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.40 0.98 0.100 32
PUBLIC PARK A 0.25 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.388
SUBAREA AREA(ACRES) = 0.65 SUBAREA RUNOFF(CFS) = 0.96
EFFECTIVE AREA(ACRES) = 7.68 AREA-AVERAGED Fm(INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.64
TOTAL AREA(ACRES) = 8.3 PEAK FLOW RATE(CFS) = 10.47
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 5411.00 TO NODE 5411.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.016
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.41 0.98 0.100 32
PUBLIC PARK A 0.27 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.398
SUBAREA AREA(ACRES) = 0.68 SUBAREA RUNOFF(CFS) = 1.00
EFFECTIVE AREA(ACRES) = 8.36 AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.62
TOTAL AREA(ACRES) = 9.0 PEAK FLOW RATE(CFS) = 11.07

*****
FLOW PROCESS FROM NODE 5411.00 TO NODE 5411.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 12.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.016
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" A 1.71 0.98 0.500 32
SCHOOL A 5.80 0.98 0.600 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.577
SUBAREA AREA(ACRES) = 7.51 SUBAREA RUNOFF(CFS) = 9.82
EFFECTIVE AREA(ACRES) = 15.87 AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 16.5 PEAK FLOW RATE(CFS) = 20.89

*****
FLOW PROCESS FROM NODE 5411.00 TO NODE 5415.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 690.07 DOWNSTREAM(FEET) = 689.61
FLOW LENGTH(FEET) = 92.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.17
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.89
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 13.11
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5415.00 = 1277.00 FEET.

*****
FLOW PROCESS FROM NODE 5415.00 TO NODE 5415.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.11
* 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
COMMERCIAL A 0.21 0.98 0.100 32
PUBLIC PARK A 0.14 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.35 SUBAREA RUNOFF(CFS) = 0.50
EFFECTIVE AREA(ACRES) = 16.22 AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 16.9 PEAK FLOW RATE(CFS) = 21.06

*****
FLOW PROCESS FROM NODE 5415.00 TO NODE 5415.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.11

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* 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
COMMERCIAL          A         0.21   0.98   0.100  32
PUBLIC PARK         A         0.18   0.98   0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.446
SUBAREA AREA(ACRES) = 0.39   SUBAREA RUNOFF(CFS) = 0.55
EFFECTIVE AREA(ACRES) = 16.61   AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.92   AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 17.2   PEAK FLOW RATE(CFS) = 21.61

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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          A         0.30   0.98   0.100  32
PUBLIC PARK         A         0.26   0.98   0.850  32
COMMERCIAL          C         0.15   0.57   0.100  69
PUBLIC PARK         C         0.12   0.57   0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.443
SUBAREA AREA(ACRES) = 0.83   SUBAREA RUNOFF(CFS) = 1.10
EFFECTIVE AREA(ACRES) = 32.13   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.83   AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 32.8   PEAK FLOW RATE(CFS) = 40.28

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*****
FLOW PROCESS FROM NODE 5415.00 TO NODE 5420.00 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) = 689.61 DOWNSTREAM(FEET) = 687.37
FLOW LENGTH(FEET) = 595.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.51
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.61
PIPE TRAVEL TIME(MIN.) = 1.80 Tc(MIN.) = 14.91
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5420.00 = 1872.00 FEET.

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*****
FLOW PROCESS FROM NODE 5420.00 TO NODE 5420.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.91
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.844
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C         10.00   0.57   0.500  69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A         4.69   0.98   0.500  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 14.69   SUBAREA RUNOFF(CFS) = 19.78
EFFECTIVE AREA(ACRES) = 31.30   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.83   AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 31.9   PEAK FLOW RATE(CFS) = 39.18

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*****
FLOW PROCESS FROM NODE 5420.00 TO NODE 5420.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.91
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.844

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*****
FLOW PROCESS FROM NODE 5420.00 TO NODE 5420.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.91
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.844
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A         0.32   0.98   0.100  32
PUBLIC PARK         A         0.28   0.98   0.850  32
COMMERCIAL          C         0.17   0.57   0.100  69
PUBLIC PARK         C         0.12   0.57   0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.437
SUBAREA AREA(ACRES) = 0.89   SUBAREA RUNOFF(CFS) = 1.18
EFFECTIVE AREA(ACRES) = 33.02   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.83   AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 33.7   PEAK FLOW RATE(CFS) = 41.46

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*****
FLOW PROCESS FROM NODE 5420.00 TO NODE 5425.00 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) = 687.37 DOWNSTREAM(FEET) = 679.09
FLOW LENGTH(FEET) = 640.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.25
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.46
PIPE TRAVEL TIME(MIN.) = 1.04 Tc(MIN.) = 15.95
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5425.00 = 2512.00 FEET.

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*****
FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.95

```

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.771  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 0.53 0.57 0.100 69  
 PUBLIC PARK C 0.44 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440  
 SUBAREA AREA(ACRES) = 0.97 SUBAREA RUNOFF(CFS) = 1.33  
 EFFECTIVE AREA(ACRES) = 33.99 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 34.6 PEAK FLOW RATE(CFS) = 41.46  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 15.95  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.771  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 0.53 0.57 0.100 69  
 PUBLIC PARK C 0.44 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440  
 SUBAREA AREA(ACRES) = 0.97 SUBAREA RUNOFF(CFS) = 1.33  
 EFFECTIVE AREA(ACRES) = 34.96 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.81 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 35.6 PEAK FLOW RATE(CFS) = 41.94

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 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	41.94	15.95	1.771	0.81( 0.44)	0.54	35.0	5408.00
2	39.34	17.56	1.672	0.82( 0.44)	0.54	35.6	5400.00

 LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5425.00 = 2512.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*  
 PEAK FLOW RATE(CFS) = 647.64 Tc(MIN.) = 41.88  
 AREA-AVERAGED Fm(INCH/HR) = 0.21 Ybar = 0.27  
 TOTAL AREA(ACRES) = 798.7  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5425.00 = 15159.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.70; LAG(HR) = 0.56; Fm(INCH/HR) = 0.22; Ybar = 0.28  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 834.3  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5425.00 = 15159.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0341; Lca/L=0.4,n=.0305; Lca/L=0.5,n=.0281;Lca/L=0.6,n=.0262  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 187.16  
 PEAK FLOW RATE(CFS) = 669.21

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 12  
 -----  
 >>>>CLEAR MEMORY BANK # 1 <<<<<  
 =====

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5425.00 TO NODE 5455.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 676.55 DOWNSTREAM(FEET) = 671.57  
 FLOW LENGTH(FEET) = 712.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 96.0 INCH PIPE IS 72.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.34  
 ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 669.21  
 PIPE TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 42.60  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5455.00 = 15871.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 42.60  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.982  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 0.66 0.57 0.100 69  
 PUBLIC PARK C 0.46 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.408  
 SUBAREA AREA(ACRES) = 1.12  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.71; LAG(HR) = 0.57; Fm(INCH/HR) = 0.22; Ybar = 0.28  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 835.4  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5455.00 = 15871.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0335; Lca/L=0.4,n=.0301; Lca/L=0.5,n=.0276;Lca/L=0.6,n=.0258  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 187.40  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 658.03  
 TOTAL AREA(ACRES) = 835.4 PEAK FLOW RATE(CFS) = 669.21  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

PIPE TRAVEL TIME(MIN.) = 2.40 Tc(MIN.) = 14.06  
 LONGEST FLOWPATH FROM NODE 5430.00 TO NODE 5432.00 = 1476.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5432.00 TO NODE 5432.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 14.06  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.911  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 3.81 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 3.81 SUBAREA RUNOFF(CFS) = 5.58  
 EFFECTIVE AREA(ACRES) = 7.76 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 7.8 PEAK FLOW RATE(CFS) = 10.83

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5432.00 TO NODE 5435.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 682.10 DOWNSTREAM(FEET) = 681.00  
 FLOW LENGTH(FEET) = 166.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.74  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 10.83  
 PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 14.54  
 LONGEST FLOWPATH FROM NODE 5430.00 TO NODE 5435.00 = 1642.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5435.00 TO NODE 5435.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 14.54  
 \* 10 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  
 "5-7 DWELLINGS/ACRE" C 1.85 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 1.85 SUBAREA RUNOFF(CFS) = 2.65  
 EFFECTIVE AREA(ACRES) = 9.61 AREA-AVERAGED Fm(INCH/HR) = 0.35  
 AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 9.6 PEAK FLOW RATE(CFS) = 13.21

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 1  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 =====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 PEAK FLOW RATE(CFS) = 669.21 Tc(MIN.) = 42.60  
 AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.28  
 TOTAL AREA(ACRES) = 835.4

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5430.00 TO NODE 5431.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 =====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 727.00  
 ELEVATION DATA: UPSTREAM(FEET) = 703.40 DOWNSTREAM(FEET) = 687.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.657  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.138  
 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  
 "5-7 DWELLINGS/ACRE" C 1.00 0.57 0.500 69 11.66  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 2.95 0.98 0.500 32 11.66  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.87  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 6.05  
 TOTAL AREA(ACRES) = 3.95 PEAK FLOW RATE(CFS) = 6.05

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5431.00 TO NODE 5432.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 687.50 DOWNSTREAM(FEET) = 682.10  
 FLOW LENGTH(FEET) = 749.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.20  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 6.05

```

*****
FLOW PROCESS FROM NODE 5435.00 TO NODE 5455.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 681.00 DOWNSTREAM(FEET) = 675.09
FLOW LENGTH(FEET) = 357.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.65
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.21
PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 15.23
LONGEST FLOWPATH FROM NODE 5430.00 TO NODE 5455.00 = 1999.00 FEET.

*****
FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.23
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.822
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 2.53 0.57 0.500 69
PUBLIC PARK C 0.90 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.592
SUBAREA AREA(ACRES) = 3.43 SUBAREA RUNOFF(CFS) = 4.59
EFFECTIVE AREA(ACRES) = 13.04 AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 13.0 PEAK FLOW RATE(CFS) = 17.35

*****
FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.23
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.822
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 0.96 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 0.96 SUBAREA RUNOFF(CFS) = 1.33
EFFECTIVE AREA(ACRES) = 14.00 AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.0 PEAK FLOW RATE(CFS) = 18.68

*****
FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 1

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-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.23
RAINFALL INTENSITY(INCH/HR) = 1.82
AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.65
AREA-AVERAGED Ap = 0.52
EFFECTIVE STREAM AREA(ACRES) = 14.00
TOTAL STREAM AREA(ACRES) = 14.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.68
** CONFLUENCE DATA **
STREAM Q Tc AREA HEADWATER
NUMBER (CFS) (MIN.) (ACRES) NODE
1 669.21 42.60 835.43 5000.00
2 18.68 15.23 14.00 5430.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.71; LAG(HR) = 0.57; Fm(INCH/HR) = 0.22; Ybar = 0.28
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR = 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 849.4
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5455.00 = 15871.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0334; Lca/L=0.4,n=.0299; Lca/L=0.5,n=.0275;Lca/L=0.6,n=.0257
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 189.92
PEAK FLOW RATE(CFS) = 667.37
(UPSTREAM NODE PEAK FLOW RATE(CFS) = 669.21)
PEAK FLOW RATE(CFS) USED = 669.21

*****
FLOW PROCESS FROM NODE 5455.00 TO NODE 5470.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 671.57 DOWNSTREAM(FEET) = 666.50
FLOW LENGTH(FEET) = 767.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 96.0 INCH PIPE IS 74.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.93
ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 669.21
PIPE TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 43.40
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.

*****
FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 IS CODE = 81
-----

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 43.40  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.972  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.23	0.57	0.100	69
PUBLIC PARK	C	1.01	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.438  
 SUBAREA AREA(ACRES) = 2.24

UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.72; LAG(HR) = 0.58; Fm(INCH/HR) = 0.22; Ybar = 0.28  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 851.7  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0253  
 TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 190.38  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 660.08  
 TOTAL AREA(ACRES) = 851.7 PEAK FLOW RATE(CFS) = 669.21  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 43.40  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.972  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.58	0.57	0.100	69
PUBLIC PARK	C	0.52	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455  
 SUBAREA AREA(ACRES) = 1.10

UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.72; LAG(HR) = 0.58; Fm(INCH/HR) = 0.22; Ybar = 0.28  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 852.8  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0253

TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 190.60  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 660.86  
 TOTAL AREA(ACRES) = 852.8 PEAK FLOW RATE(CFS) = 669.21  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 43.40  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.972  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	4.00	0.98	0.200	32
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	29.31	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 33.31

UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.72; LAG(HR) = 0.58; Fm(INCH/HR) = 0.22; Ybar = 0.28  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 886.1  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0253  
 TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 198.81  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 687.53  
 TOTAL AREA(ACRES) = 886.1 PEAK FLOW RATE(CFS) = 687.53

=====

END OF STUDY SUMMARY:  
 TOTAL AREA(ACRES) = 886.1 TC(MIN.) = 43.40  
 AREA-AVERAGED Fm(INCH/HR)= 0.22 Ybar = 0.28  
 PEAK FLOW RATE(CFS) = 687.53

=====

END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS



\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* MILL CREEK WITH DIVERSION FROM THE LAKES \*  
\* 100-YR STUDY \*  
\* AREA 'P' \*  
\*\*\*\*\*

FILE NAME: MCREEK\_M.DAT  
TIME/DATE OF STUDY: 15:44 08/03/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====  
--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
  
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*  
  
\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*  
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING  
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR  
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)  
=== =====  
1 18.0 12.0 0.020/0.020/0.020 0.67 2.00 0.0312 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.50 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH

FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

AREA-AVERAGED  
DURATION RAINFALL(INCH)  
5-MINUTES 0.44  
30-MINUTES 0.91  
1-HOUR 1.20  
3-HOUR 2.10  
6-HOUR 3.00  
24-HOUR 6.00

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5000.00 TO NODE 5002.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 900.00  
ELEVATION DATA: UPSTREAM(FEET) = 810.00 DOWNSTREAM(FEET) = 806.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.646  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.918  
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 A 3.75 0.98 0.100 32 13.65  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 9.52  
TOTAL AREA(ACRES) = 3.75 PEAK FLOW RATE(CFS) = 9.52

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5002.00 TO NODE 5004.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

===== UPSTREAM ELEVATION(FEET) = 806.00 DOWNSTREAM ELEVATION(FEET) = 804.00  
STREET LENGTH(FEET) = 700.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.85  
\*\*\*STREET FLOWING FULL\*\*\*  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:



STREET FLOW DEPTH(FEET) = 0.60  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.19  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.33  
 STREET FLOW TRAVEL TIME(MIN.) = 5.32 Tc(MIN.) = 18.96  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.395  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	11.83	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 11.83 SUBAREA RUNOFF(CFS) = 24.46  
 EFFECTIVE AREA(ACRES) = 15.58 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 32.22

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.68 HALFSTREET FLOOD WIDTH(FEET) = 18.54  
 FLOW VELOCITY(FEET/SEC.) = 2.56 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.73  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5004.00 = 1600.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5004.00 TO NODE 5006.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 =====  
 UPSTREAM ELEVATION(FEET) = 804.00 DOWNSTREAM ELEVATION(FEET) = 800.00  
 STREET LENGTH(FEET) = 530.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.96  
 \*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.64  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.88  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.49  
 STREET FLOW TRAVEL TIME(MIN.) = 2.27 Tc(MIN.) = 21.24  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.238  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	12.19	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 12.19 SUBAREA RUNOFF(CFS) = 23.48  
 EFFECTIVE AREA(ACRES) = 27.77 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 27.8 PEAK FLOW RATE(CFS) = 53.49

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.68 HALFSTREET FLOOD WIDTH(FEET) = 18.73  
 FLOW VELOCITY(FEET/SEC.) = 4.20 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.86  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5006.00 = 2130.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5006.00 TO NODE 5010.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 793.00 DOWNSTREAM(FEET) = 784.00  
 FLOW LENGTH(FEET) = 670.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.11  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 53.49  
 PIPE TRAVEL TIME(MIN.) = 1.01 Tc(MIN.) = 22.24  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5010.00 = 2800.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5010.00 TO NODE 5010.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 22.24  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.177  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.27	0.98	0.850	32
COMMERCIAL	A	12.40	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.170  
 SUBAREA AREA(ACRES) = 13.67 SUBAREA RUNOFF(CFS) = 24.74  
 EFFECTIVE AREA(ACRES) = 41.44 AREA-AVERAGED Fm(INCH/HR) = 0.12  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.12  
 TOTAL AREA(ACRES) = 41.4 PEAK FLOW RATE(CFS) = 76.70

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5010.00 TO NODE 5010.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 22.24  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.177  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.61	0.98	0.100	32
PUBLIC PARK	A	0.16	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.256  
SUBAREA AREA(ACRES) = 0.77 SUBAREA RUNOFF(CFS) = 1.34  
EFFECTIVE AREA(ACRES) = 42.21 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.13  
TOTAL AREA(ACRES) = 42.2 PEAK FLOW RATE(CFS) = 78.04

EFFECTIVE AREA(ACRES) = 44.48 AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.14  
TOTAL AREA(ACRES) = 44.5 PEAK FLOW RATE(CFS) = 79.80  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5011.00 TO NODE 5012.00 IS CODE = 31

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5010.00 TO NODE 5010.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 22.24  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.177  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.61 0.98 0.100 32  
PUBLIC PARK A 0.51 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.442  
SUBAREA AREA(ACRES) = 1.12 SUBAREA RUNOFF(CFS) = 1.76  
EFFECTIVE AREA(ACRES) = 43.33 AREA-AVERAGED Fm(INCH/HR) = 0.13  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.13  
TOTAL AREA(ACRES) = 43.3 PEAK FLOW RATE(CFS) = 79.80

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 782.48 DOWNSTREAM(FEET) = 780.95  
FLOW LENGTH(FEET) = 482.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.18  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 79.80  
PIPE TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 24.47  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5012.00 = 3761.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5012.00 TO NODE 5012.00 IS CODE = 81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5010.00 TO NODE 5011.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 784.00 DOWNSTREAM(FEET) = 782.48  
FLOW LENGTH(FEET) = 479.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.18  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 79.80  
PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 23.35  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5011.00 = 3279.00 FEET.

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 24.47  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.055  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.53 0.98 0.100 32  
PUBLIC PARK A 0.36 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.403  
SUBAREA AREA(ACRES) = 0.89 SUBAREA RUNOFF(CFS) = 1.33  
EFFECTIVE AREA(ACRES) = 45.37 AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.15  
TOTAL AREA(ACRES) = 45.4 PEAK FLOW RATE(CFS) = 79.80  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5012.00 TO NODE 5015.00 IS CODE = 31

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5011.00 TO NODE 5011.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 23.35  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.114  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.63 0.98 0.100 32  
PUBLIC PARK A 0.52 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.439  
SUBAREA AREA(ACRES) = 1.15 SUBAREA RUNOFF(CFS) = 1.74

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 780.95 DOWNSTREAM(FEET) = 779.48  
FLOW LENGTH(FEET) = 460.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.20  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 79.80  
PIPE TRAVEL TIME(MIN.) = 1.06 Tc(MIN.) = 25.54  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5015.00 = 4221.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5015.00 TO NODE 5015.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 25.54
\* 100 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 A 0.46 0.98 0.100 32
PUBLIC PARK A 0.38 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.439
SUBAREA AREA(ACRES) = 0.84 SUBAREA RUNOFF(CFS) = 1.19
EFFECTIVE AREA(ACRES) = 46.21 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 46.2 PEAK FLOW RATE(CFS) = 79.80
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 5015.00 TO NODE 5020.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 779.48 DOWNSTREAM(FEET) = 760.54
FLOW LENGTH(FEET) = 1937.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.00
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 79.80
PIPE TRAVEL TIME(MIN.) = 2.93 Tc(MIN.) = 28.47
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5020.00 = 6158.00 FEET.

FLOW PROCESS FROM NODE 5020.00 TO NODE 5020.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 28.47
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.877
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.20 0.98 0.100 32
PUBLIC PARK A 1.11 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.460
SUBAREA AREA(ACRES) = 2.31 SUBAREA RUNOFF(CFS) = 2.97
EFFECTIVE AREA(ACRES) = 48.52 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 48.5 PEAK FLOW RATE(CFS) = 79.80
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 5020.00 TO NODE 5020.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 28.47
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.877
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
SCHOOL A 4.59 0.98 0.600 32
COMMERCIAL A 2.10 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.443
SUBAREA AREA(ACRES) = 6.69 SUBAREA RUNOFF(CFS) = 8.70
EFFECTIVE AREA(ACRES) = 55.21 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 55.2 PEAK FLOW RATE(CFS) = 83.56

FLOW PROCESS FROM NODE 5020.00 TO NODE 5114.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 760.54 DOWNSTREAM(FEET) = 748.44
FLOW LENGTH(FEET) = 1019.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.73
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 83.56
PIPE TRAVEL TIME(MIN.) = 1.45 Tc(MIN.) = 29.92
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5114.00 = 7177.00 FEET.

FLOW PROCESS FROM NODE 5114.00 TO NODE 5114.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 29.92
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.822
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.68 0.98 0.100 32
PUBLIC PARK A 0.64 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.464
SUBAREA AREA(ACRES) = 1.32 SUBAREA RUNOFF(CFS) = 1.63
EFFECTIVE AREA(ACRES) = 56.53 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 56.5 PEAK FLOW RATE(CFS) = 83.56
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 5114.00 TO NODE 5114.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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=====
MAINLINE Tc(MIN.) = 29.92
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.822
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A      0.75   0.98  0.100  32
PUBLIC PARK         A      0.57   0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA AREA(ACRES) = 1.32   SUBAREA RUNOFF(CFS) = 1.67
EFFECTIVE AREA(ACRES) = 57.85   AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.98   AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 57.9   PEAK FLOW RATE(CFS) = 84.13

*****
FLOW PROCESS FROM NODE 5114.00 TO NODE 5114.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 29.92
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.822
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A      0.83   0.98  0.100  32
PUBLIC PARK         A      0.66   0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.432
SUBAREA AREA(ACRES) = 1.49   SUBAREA RUNOFF(CFS) = 1.88
EFFECTIVE AREA(ACRES) = 59.34   AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.98   AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 59.3   PEAK FLOW RATE(CFS) = 86.01

*****
FLOW PROCESS FROM NODE 5114.00 TO NODE 5115.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 748.44   DOWNSTREAM(FEET) = 747.58
FLOW LENGTH(FEET) = 47.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 26.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.23
ESTIMATED PIPE DIAMETER(INCH) = 39.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 86.01
PIPE TRAVEL TIME(MIN.) = 0.06   Tc(MIN.) = 29.97
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5115.00 = 7224.00 FEET.

*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
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FLOW PROCESS FROM NODE 5043.00 TO NODE 5044.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 410.00
ELEVATION DATA: UPSTREAM(FEET) = 773.59   DOWNSTREAM(FEET) = 768.25

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.036
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.009
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          A      0.32   0.98  0.100  32   8.04
PUBLIC PARK         A      0.30   0.98  0.850  32   12.77
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA RUNOFF(CFS) = 1.99
TOTAL AREA(ACRES) = 0.62   PEAK FLOW RATE(CFS) = 1.99

*****
FLOW PROCESS FROM NODE 5044.00 TO NODE 5044.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 8.04
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.009
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A      0.32   0.98  0.100  32
PUBLIC PARK         A      0.30   0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA AREA(ACRES) = 0.62   SUBAREA RUNOFF(CFS) = 1.99
EFFECTIVE AREA(ACRES) = 1.24   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.98   AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 1.2   PEAK FLOW RATE(CFS) = 3.97

*****
FLOW PROCESS FROM NODE 5044.00 TO NODE 5045.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 757.77   DOWNSTREAM(FEET) = 753.86
FLOW LENGTH(FEET) = 400.00   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.) = 5.28
ESTIMATED PIPE DIAMETER(INCH) = 18.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.97
PIPE TRAVEL TIME(MIN.) = 1.26   Tc(MIN.) = 9.30
LONGEST FLOWPATH FROM NODE 5043.00 TO NODE 5045.00 = 810.00 FEET.

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 9.30  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.673  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.29 0.98 0.100 32  
PUBLIC PARK A 0.27 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462  
SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.62  
EFFECTIVE AREA(ACRES) = 1.80 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 5.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 9.30  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.673  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.29 0.98 0.100 32  
PUBLIC PARK A 0.27 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462  
SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.62  
EFFECTIVE AREA(ACRES) = 2.36 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 2.4 PEAK FLOW RATE(CFS) = 6.84

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 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.) = 9.30  
RAINFALL INTENSITY(INCH/HR) = 3.67  
AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.46  
EFFECTIVE STREAM AREA(ACRES) = 2.36  
TOTAL STREAM AREA(ACRES) = 2.36  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.84

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5025.00 TO NODE 5030.00 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) = 720.00  
ELEVATION DATA: UPSTREAM(FEET) = 793.00 DOWNSTREAM(FEET) = 785.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.391  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.436  
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 A 5.96 0.98 0.100 32 10.39  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 17.91  
TOTAL AREA(ACRES) = 5.96 PEAK FLOW RATE(CFS) = 17.91

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5030.00 TO NODE 5035.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 784.30  
CHANNEL LENGTH THRU SUBAREA(FEET) = 340.00 CHANNEL SLOPE = 0.0021  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.941  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 8.48 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 28.78  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.84  
AVERAGE FLOW DEPTH(FEET) = 0.39 TRAVEL TIME(MIN.) = 3.08  
Tc(MIN.) = 13.47  
SUBAREA AREA(ACRES) = 8.48 SUBAREA RUNOFF(CFS) = 21.70  
EFFECTIVE AREA(ACRES) = 14.44 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 14.4 PEAK FLOW RATE(CFS) = 36.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.45 FLOW VELOCITY(FEET/SEC.) = 1.96  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5035.00 = 1060.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5035.00 TO NODE 5040.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 774.30 DOWNSTREAM(FEET) = 770.10

FLOW LENGTH(FEET) = 860.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.00  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 36.95  
PIPE TRAVEL TIME(MIN.) = 2.05 Tc(MIN.) = 15.52  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5040.00 = 1920.00 FEET.

AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 57.6 PEAK FLOW RATE(CFS) = 128.61

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 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.) = 16.78  
RAINFALL INTENSITY(INCH/HR) = 2.58  
AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.10  
EFFECTIVE STREAM AREA(ACRES) = 57.62  
TOTAL STREAM AREA(ACRES) = 57.62  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 128.61

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.84	9.30	3.673	0.98( 0.45)	0.46	2.4	5043.00
2	128.61	16.78	2.578	0.97( 0.10)	0.10	57.6	5025.00

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	109.60	9.30	3.673	0.97( 0.12)	0.12	34.3	5043.00
2	133.13	16.78	2.578	0.97( 0.11)	0.11	60.0	5025.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 133.13 Tc(MIN.) = 16.78  
EFFECTIVE AREA(ACRES) = 59.98 AREA-AVERAGED Fm(INCH/HR) = 0.11  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.11  
TOTAL AREA(ACRES) = 60.0  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5045.00 = 2930.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5045.00 TO NODE 5046.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 753.86 DOWNSTREAM(FEET) = 752.05  
FLOW LENGTH(FEET) = 461.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 46.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.69  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 133.13  
PIPE TRAVEL TIME(MIN.) = 0.88 Tc(MIN.) = 17.66  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5046.00 = 3391.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5040.00 TO NODE 5040.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 15.52  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.701  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 19.84 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 19.84 SUBAREA RUNOFF(CFS) = 46.50  
EFFECTIVE AREA(ACRES) = 34.28 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 34.3 PEAK FLOW RATE(CFS) = 80.34

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5040.00 TO NODE 5045.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 770.10 DOWNSTREAM(FEET) = 753.86  
FLOW LENGTH(FEET) = 1010.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 26.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.33  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 80.34  
PIPE TRAVEL TIME(MIN.) = 1.26 Tc(MIN.) = 16.78  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5045.00 = 2930.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 16.78  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.578  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 23.34 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 23.34 SUBAREA RUNOFF(CFS) = 52.10  
EFFECTIVE AREA(ACRES) = 57.62 AREA-AVERAGED Fm(INCH/HR) = 0.10



\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5046.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 17.66  
\* 100 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 A 0.49 0.98 0.100 32  
PUBLIC PARK A 0.46 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463  
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 1.75  
EFFECTIVE AREA(ACRES) = 60.93 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 60.9 PEAK FLOW RATE(CFS) = 133.13  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5046.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 17.66  
\* 100 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 A 0.49 0.98 0.100 32  
PUBLIC PARK A 0.46 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463  
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 1.75  
EFFECTIVE AREA(ACRES) = 61.88 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 61.9 PEAK FLOW RATE(CFS) = 133.13  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5046.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 17.66  
\* 100 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 A 13.50 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 13.50 SUBAREA RUNOFF(CFS) = 20.30  
EFFECTIVE AREA(ACRES) = 75.38 AREA-AVERAGED Fm(INCH/HR) = 0.25

AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.25  
TOTAL AREA(ACRES) = 75.4 PEAK FLOW RATE(CFS) = 152.70

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5110.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 752.05 DOWNSTREAM(FEET) = 749.99  
FLOW LENGTH(FEET) = 590.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.71  
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 152.70  
PIPE TRAVEL TIME(MIN.) = 1.13 Tc(MIN.) = 18.79  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5110.00 = 3981.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 18.79  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.408  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.26 0.98 0.100 32  
PUBLIC PARK A 0.23 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.452  
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 0.87  
EFFECTIVE AREA(ACRES) = 75.87 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.26  
TOTAL AREA(ACRES) = 75.9 PEAK FLOW RATE(CFS) = 152.70  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 18.79  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.408  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.25 0.98 0.100 32  
PUBLIC PARK A 0.24 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467  
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 0.86  
EFFECTIVE AREA(ACRES) = 76.36 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.26  
TOTAL AREA(ACRES) = 76.4 PEAK FLOW RATE(CFS) = 152.70



NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5050.00 TO NODE 5055.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 520.00  
ELEVATION DATA: UPSTREAM(FEET) = 797.72 DOWNSTREAM(FEET) = 783.05

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.689  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.584  
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  
"5-7 DWELLINGS/ACRE" A 6.57 0.98 0.500 32 9.69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 18.31  
TOTAL AREA(ACRES) = 6.57 PEAK FLOW RATE(CFS) = 18.31

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5055.00 TO NODE 5060.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 773.05 DOWNSTREAM(FEET) = 764.33  
FLOW LENGTH(FEET) = 740.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.21  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 18.31  
PIPE TRAVEL TIME(MIN.) = 1.50 Tc(MIN.) = 11.19  
LONGEST FLOWPATH FROM NODE 5050.00 TO NODE 5060.00 = 1260.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5060.00 TO NODE 5060.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 11.19  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.287  
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" A 9.33 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 9.33 SUBAREA RUNOFF(CFS) = 23.50  
EFFECTIVE AREA(ACRES) = 15.90 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 15.9 PEAK FLOW RATE(CFS) = 40.06

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5060.00 TO NODE 5065.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 764.33 DOWNSTREAM(FEET) = 761.54  
FLOW LENGTH(FEET) = 525.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.35  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 40.06  
PIPE TRAVEL TIME(MIN.) = 1.19 Tc(MIN.) = 12.38  
LONGEST FLOWPATH FROM NODE 5050.00 TO NODE 5065.00 = 1785.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5065.00 TO NODE 5065.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 12.38  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.093  
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" A 5.49 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 5.49 SUBAREA RUNOFF(CFS) = 14.32  
EFFECTIVE AREA(ACRES) = 21.39 AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.42  
TOTAL AREA(ACRES) = 21.4 PEAK FLOW RATE(CFS) = 51.61

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5065.00 TO NODE 5100.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 761.54 DOWNSTREAM(FEET) = 759.53  
FLOW LENGTH(FEET) = 165.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.59  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 51.61  
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 12.64  
LONGEST FLOWPATH FROM NODE 5050.00 TO NODE 5100.00 = 1950.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 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.) = 12.64  
RAINFALL INTENSITY(INCH/HR) = 3.05  
AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.42  
EFFECTIVE STREAM AREA(ACRES) = 21.39  
TOTAL STREAM AREA(ACRES) = 21.39  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 51.61

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5070.00 TO NODE 5075.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 730.00  
ELEVATION DATA: UPSTREAM(FEET) = 797.68 DOWNSTREAM(FEET) = 779.53

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.381  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.254  
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  
"5-7 DWELLINGS/ACRE" A 1.43 0.98 0.500 32 11.38  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 3.56  
TOTAL AREA(ACRES) = 1.43 PEAK FLOW RATE(CFS) = 3.56

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5075.00 TO NODE 5100.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<

-----  
UPSTREAM ELEVATION(FEET) = 779.53 DOWNSTREAM ELEVATION(FEET) = 769.53  
STREET LENGTH(FEET) = 1040.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSSTREETS 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) = 5.97  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.37  
HALFSTREET FLOOD WIDTH(FEET) = 10.45  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.33  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.86  
STREET FLOW TRAVEL TIME(MIN.) = 7.44 Tc(MIN.) = 18.82  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.406

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" A 1.00 0.98 0.500 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 1.54 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.318  
SUBAREA AREA(ACRES) = 2.54 SUBAREA RUNOFF(CFS) = 4.79  
EFFECTIVE AREA(ACRES) = 3.97 AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.38  
TOTAL AREA(ACRES) = 4.0 PEAK FLOW RATE(CFS) = 7.26

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 11.39  
FLOW VELOCITY(FEET/SEC.) = 2.44 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.94  
LONGEST FLOWPATH FROM NODE 5070.00 TO NODE 5100.00 = 1770.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 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.) = 18.82  
RAINFALL INTENSITY(INCH/HR) = 2.41  
AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.38  
EFFECTIVE STREAM AREA(ACRES) = 3.97  
TOTAL STREAM AREA(ACRES) = 3.97  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.26

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5080.00 TO NODE 5085.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 520.00  
ELEVATION DATA: UPSTREAM(FEET) = 797.72 DOWNSTREAM(FEET) = 783.05

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.689

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.584  
 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  
 "5-7 DWELLINGS/ACRE" A 6.58 0.98 0.500 32 9.69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 18.33  
 TOTAL AREA(ACRES) = 6.58 PEAK FLOW RATE(CFS) = 18.33

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5085.00 TO NODE 5090.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 773.05 DOWNSTREAM(FEET) = 767.13  
 FLOW LENGTH(FEET) = 410.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.91  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 18.33  
 PIPE TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 10.46  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5090.00 = 930.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5090.00 TO NODE 5090.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 10.46  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.423  
 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" A 6.91 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.91 SUBAREA RUNOFF(CFS) = 18.26  
 EFFECTIVE AREA(ACRES) = 13.49 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 13.5 PEAK FLOW RATE(CFS) = 35.65

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5090.00 TO NODE 5095.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 767.13 DOWNSTREAM(FEET) = 763.05  
 FLOW LENGTH(FEET) = 355.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.55  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 35.65  
 PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 11.08  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5095.00 = 1285.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5095.00 TO NODE 5095.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 11.08  
 \* 100 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  
 "11+ DWELLINGS/ACRE" A 3.86 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 3.86 SUBAREA RUNOFF(CFS) = 10.81  
 EFFECTIVE AREA(ACRES) = 17.35 AREA-AVERAGED Fm(INCH/HR) = 0.42  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 17.4 PEAK FLOW RATE(CFS) = 45.05

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5095.00 TO NODE 5100.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 763.05 DOWNSTREAM(FEET) = 759.53  
 FLOW LENGTH(FEET) = 686.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.31  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 45.05  
 PIPE TRAVEL TIME(MIN.) = 1.56 Tc(MIN.) = 12.64  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5100.00 = 1971.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 12.64  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.055  
 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" A 6.90 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 6.90 SUBAREA RUNOFF(CFS) = 17.76  
 EFFECTIVE AREA(ACRES) = 24.25 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA(ACRES) = 24.2 PEAK FLOW RATE(CFS) = 58.87

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 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.) = 12.64  
RAINFALL INTENSITY(INCH/HR) = 3.06  
AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.37  
EFFECTIVE STREAM AREA(ACRES) = 24.25  
TOTAL STREAM AREA(ACRES) = 24.25  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 58.87

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	51.61	12.64	3.055	0.98 (0.41)	0.42	21.4	5050.00
2	7.26	18.82	2.406	0.98 (0.37)	0.38	4.0	5070.00
3	58.87	12.64	3.055	0.98 (0.36)	0.37	24.2	5080.00

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	116.91	12.64	3.055	0.98 (0.38)	0.39	48.3	5080.00
2	116.91	12.64	3.055	0.97 (0.38)	0.39	48.3	5050.00
3	90.89	18.82	2.406	0.98 (0.38)	0.39	49.6	5070.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 116.91 Tc(MIN.) = 12.64  
EFFECTIVE AREA(ACRES) = 48.30 AREA-AVERAGED Fm(INCH/HR) = 0.38  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.39  
TOTAL AREA(ACRES) = 49.6  
LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5100.00 = 1971.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5100.00 TO NODE 5105.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 759.53 DOWNSTREAM(FEET) = 757.79  
FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.62  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 116.91  
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 13.03  
LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5105.00 = 2221.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5105.00 TO NODE 5105.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 13.03  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.000  
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" A 7.08 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 7.08 SUBAREA RUNOFF(CFS) = 17.87  
EFFECTIVE AREA(ACRES) = 55.38 AREA-AVERAGED Fm(INCH/HR) = 0.36  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 56.7 PEAK FLOW RATE(CFS) = 131.63

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5105.00 TO NODE 5110.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 757.79 DOWNSTREAM(FEET) = 754.21  
FLOW LENGTH(FEET) = 520.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 41.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.68  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 131.63  
PIPE TRAVEL TIME(MIN.) = 0.81 Tc(MIN.) = 13.84  
LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5110.00 = 2741.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 13.84  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.893  
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" A 14.26 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 14.26 SUBAREA RUNOFF(CFS) = 34.62  
EFFECTIVE AREA(ACRES) = 69.64 AREA-AVERAGED Fm(INCH/HR) = 0.33  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 71.0 PEAK FLOW RATE(CFS) = 160.93

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 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	160.93	13.84	2.893	0.98 ( 0.33)	0.33	69.6	5080.00
2	160.93	13.84	2.893	0.98 ( 0.33)	0.33	69.6	5050.00
3	126.89	20.09	2.313	0.98 ( 0.33)	0.33	71.0	5070.00

LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5110.00 = 2741.00 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	140.63	11.38	3.254	0.97 ( 0.33)	0.34	50.7	5043.00
2	152.70	18.79	2.408	0.97 ( 0.25)	0.26	76.4	5025.00

LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5110.00 = 3981.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	291.52	11.38	3.254	0.98 ( 0.33)	0.34	107.9	5043.00
2	305.57	13.84	2.893	0.98 ( 0.32)	0.32	128.9	5080.00
3	305.57	13.84	2.893	0.97 ( 0.32)	0.32	128.9	5050.00
4	286.68	18.79	2.408	0.98 ( 0.29)	0.29	147.0	5025.00
5	272.88	20.09	2.313	0.98 ( 0.29)	0.29	147.3	5070.00

TOTAL AREA(ACRES) = 147.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 305.57 Tc(MIN.) = 13.843  
EFFECTIVE AREA(ACRES) = 128.85 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.34  
TOTAL AREA(ACRES) = 147.3  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5110.00 = 3981.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 12  
-----

>>>>CLEAR MEMORY BANK # 2 <<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5111.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 749.99 DOWNSTREAM(FEET) = 749.73  
FLOW LENGTH(FEET) = 86.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 84.0 INCH PIPE IS 63.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.82  
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 305.57  
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 13.99  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5111.00 = 4067.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5111.00 TO NODE 5111.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 13.99  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.875  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.29 0.98 0.100 32  
PUBLIC PARK A 0.21 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.415  
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.11  
EFFECTIVE AREA(ACRES) = 129.35 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 147.8 PEAK FLOW RATE(CFS) = 305.57  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5111.00 TO NODE 5111.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 13.99  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.875  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.25 0.98 0.100 32  
PUBLIC PARK A 0.24 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467  
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 1.07  
EFFECTIVE AREA(ACRES) = 129.84 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 148.3 PEAK FLOW RATE(CFS) = 305.57  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5111.00 TO NODE 5115.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 749.73 DOWNSTREAM(FEET) = 747.73  
FLOW LENGTH(FEET) = 581.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 62.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.26  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 305.57  
PIPE TRAVEL TIME(MIN.) = 0.94 Tc(MIN.) = 14.93  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5115.00 = 4648.00 FEET.

```
*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.93
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.764
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp          Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR)  (DECIMAL) CN
COMMERCIAL          A      0.29     0.98     0.100    32
PUBLIC PARK         A      0.22     0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA AREA(ACRES) = 0.51      SUBAREA RUNOFF(CFS) = 1.08
EFFECTIVE AREA(ACRES) = 130.35  AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 148.8      PEAK FLOW RATE(CFS) = 305.57
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.93
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.764
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp          Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR)  (DECIMAL) CN
COMMERCIAL          A      0.28     0.98     0.100    32
PUBLIC PARK         A      0.21     0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.421
SUBAREA AREA(ACRES) = 0.49      SUBAREA RUNOFF(CFS) = 1.04
EFFECTIVE AREA(ACRES) = 130.84  AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 149.3      PEAK FLOW RATE(CFS) = 305.57
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 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           291.52  12.50   3.076      0.97( 0.33) 0.34    109.9   5043.00
2           305.57  14.93   2.764      0.98( 0.32) 0.32    130.8   5080.00
3           305.57  14.93   2.764      0.97( 0.32) 0.32    130.9   5050.00
4           286.68  19.91   2.326      0.98( 0.29) 0.30    149.0   5025.00
5           272.88  21.22   2.239      0.98( 0.29) 0.30    149.3   5070.00
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5115.00 = 4648.00 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           86.01   29.97   1.820      0.98( 0.21) 0.22    59.3    5000.00
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5115.00 = 7224.00 FEET.
```

```
** PEAK FLOW RATE TABLE **
STREAM      Q      Tc      Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)   (ACRES)  NODE
1           355.39  12.50   3.076      0.97( 0.31) 0.31    134.7   5043.00
2           373.58  14.93   2.764      0.97( 0.30) 0.30    160.4   5080.00
3           373.58  14.93   2.764      0.97( 0.30) 0.30    160.4   5050.00
4           361.79  19.91   2.326      0.98( 0.27) 0.28    188.4   5025.00
5           349.62  21.22   2.239      0.98( 0.27) 0.28    191.3   5070.00
6           300.21  29.97   1.820      0.98( 0.27) 0.27    208.6   5000.00
TOTAL AREA(ACRES) = 208.6
```

```
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 373.58  Tc(MIN.) = 14.933
EFFECTIVE AREA(ACRES) = 160.41  AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 208.6
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5115.00 = 7224.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====
```

```
*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5116.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 747.58  DOWNSTREAM(FEET) = 746.68
FLOW LENGTH(FEET) = 301.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 90.0 INCH PIPE IS 69.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.25
ESTIMATED PIPE DIAMETER(INCH) = 90.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 373.58
PIPE TRAVEL TIME(MIN.) = 0.49  Tc(MIN.) = 15.42
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5116.00 = 7525.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 5116.00 TO NODE 5116.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.42
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.711
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp          Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR)  (DECIMAL) CN
PUBLIC PARK         A      7.72     0.98     0.850    32
```



RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 1.94 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.719  
 SUBAREA AREA(ACRES) = 9.66 SUBAREA RUNOFF(CFS) = 17.47  
 EFFECTIVE AREA(ACRES) = 170.07 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 218.3 PEAK FLOW RATE(CFS) = 373.58  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

PIPE-FLOW(CFS) = 373.58  
 PIPE TRAVEL TIME(MIN.) = 1.26 Tc(MIN.) = 17.19  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5141.00 = 9070.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 17.19  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.541  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.85 0.98 0.100 32  
 PUBLIC PARK A 0.79 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.461  
 SUBAREA AREA(ACRES) = 1.64 SUBAREA RUNOFF(CFS) = 3.09  
 EFFECTIVE AREA(ACRES) = 172.70 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 220.9 PEAK FLOW RATE(CFS) = 373.58  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 17.19  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.541  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.65 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 1.65 SUBAREA RUNOFF(CFS) = 3.63  
 EFFECTIVE AREA(ACRES) = 174.35 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 222.6 PEAK FLOW RATE(CFS) = 373.58  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 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.) = 17.19  
 RAINFALL INTENSITY(INCH/HR) = 2.54  
 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.33  
 EFFECTIVE STREAM AREA(ACRES) = 174.35

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5116.00 TO NODE 5117.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 746.68 DOWNSTREAM(FEET) = 744.57  
 FLOW LENGTH(FEET) = 389.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 81.0 INCH PIPE IS 61.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.85  
 ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 373.58  
 PIPE TRAVEL TIME(MIN.) = 0.50 Tc(MIN.) = 15.93  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5117.00 = 7914.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5117.00 TO NODE 5117.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 15.93  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.659  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.51 0.98 0.100 32  
 PUBLIC PARK A 0.48 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.464  
 SUBAREA AREA(ACRES) = 0.99 SUBAREA RUNOFF(CFS) = 1.97  
 EFFECTIVE AREA(ACRES) = 171.06 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 219.3 PEAK FLOW RATE(CFS) = 373.58  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5117.00 TO NODE 5141.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 744.57 DOWNSTREAM(FEET) = 734.24  
 FLOW LENGTH(FEET) = 1156.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 72.0 INCH PIPE IS 58.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.31  
 ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1



TOTAL STREAM AREA(ACRES) = 222.58  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 373.58

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
PUBLIC PARK	A	1.00	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	24.59	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.225  
SUBAREA AREA(ACRES) = 25.59 SUBAREA RUNOFF(CFS) = 55.13  
EFFECTIVE AREA(ACRES) = 31.73 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.23  
AREA-AVERAGED  $F_p$ (INCH/HR) = 0.98 AREA-AVERAGED  $A_p$  = 0.24  
TOTAL AREA(ACRES) = 31.7 PEAK FLOW RATE(CFS) = 68.02

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5142.00 TO NODE 5143.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 800.00  
ELEVATION DATA: UPSTREAM(FEET) = 762.00 DOWNSTREAM(FEET) = 753.80

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.70 HALFSTREET FLOOD WIDTH(FEET) = 19.64  
FLOW VELOCITY(FEET/SEC.) = 5.06 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.54  
\*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
AND L = 1190.0 FT WITH ELEVATION-DROP = 12.3 FT, IS 61.9 CFS,  
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 5144.00  
LONGEST FLOWPATH FROM NODE 5142.00 TO NODE 5144.00 = 1990.00 FEET.

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
SUBAREA ANALYSIS USED MINIMUM  $T_c$ (MIN.) = 11.739  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.194  
SUBAREA  $T_c$  AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	$F_p$ (INCH/HR)	$A_p$ (DECIMAL)	SCS CN	$T_c$ (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	5.30	0.98	0.200	32	11.74
PUBLIC PARK	A	0.84	0.98	0.850	32	17.50

SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.289  
SUBAREA RUNOFF(CFS) = 16.09  
TOTAL AREA(ACRES) = 6.14 PEAK FLOW RATE(CFS) = 16.09

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5144.00 TO NODE 5141.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 741.50 DOWNSTREAM(FEET) = 735.66  
FLOW LENGTH(FEET) = 776.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.61  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 68.02  
PIPE TRAVEL TIME(MIN.) = 1.35  $T_c$ (MIN.) = 17.74  
LONGEST FLOWPATH FROM NODE 5142.00 TO NODE 5141.00 = 2766.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5143.00 TO NODE 5144.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
-----  
UPSTREAM ELEVATION(FEET) = 753.80 DOWNSTREAM ELEVATION(FEET) = 741.50  
STREET LENGTH(FEET) = 1190.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 IS CODE = 81  
-----

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

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

MAINLINE  $T_c$ (MIN.) = 17.74  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.493  
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"	A	17.41	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.200  
SUBAREA AREA(ACRES) = 17.41 SUBAREA RUNOFF(CFS) = 36.00  
EFFECTIVE AREA(ACRES) = 49.14 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.22  
AREA-AVERAGED  $F_p$ (INCH/HR) = 0.98 AREA-AVERAGED  $A_p$  = 0.22  
TOTAL AREA(ACRES) = 49.1 PEAK FLOW RATE(CFS) = 100.57

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.90  
\*\*\*STREET FLOWING FULL\*\*\*  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.61  
HALFSTREET FLOOD WIDTH(FEET) = 18.00  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.26  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.62  
STREET FLOW TRAVEL TIME(MIN.) = 4.66  $T_c$ (MIN.) = 16.40  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.614  
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"	A	17.41	0.98	0.200	32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 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.) = 17.74  
RAINFALL INTENSITY(INCH/HR) = 2.49  
AREA-AVERAGED Fm(INCH/HR) = 0.22  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.22  
EFFECTIVE STREAM AREA(ACRES) = 49.14  
TOTAL STREAM AREA(ACRES) = 49.14  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 100.57

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	355.39	14.77	2.782	0.97( 0.33)	0.34	148.6	5043.00
1	373.58	17.19	2.541	0.97( 0.32)	0.33	174.3	5080.00
1	373.58	17.19	2.541	0.97( 0.32)	0.33	174.4	5050.00
1	361.79	22.18	2.180	0.98( 0.29)	0.30	202.4	5025.00
1	349.62	23.50	2.106	0.97( 0.29)	0.30	205.2	5070.00
1	300.21	32.36	1.738	0.98( 0.29)	0.29	222.6	5000.00
2	100.57	17.74	2.493	0.98( 0.22)	0.22	49.1	5142.00

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	449.78	14.77	2.782	0.97( 0.31)	0.32	189.5	5043.00
2	473.06	17.19	2.541	0.97( 0.30)	0.31	221.9	5080.00
3	473.06	17.19	2.541	0.97( 0.30)	0.31	222.0	5050.00
4	472.84	17.74	2.493	0.97( 0.30)	0.30	226.6	5142.00
5	448.53	22.18	2.180	0.98( 0.28)	0.29	251.5	5025.00
6	433.09	23.50	2.106	0.97( 0.28)	0.29	254.4	5070.00
7	367.40	32.36	1.738	0.98( 0.27)	0.28	271.7	5000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 473.06 Tc(MIN.) = 17.19  
EFFECTIVE AREA(ACRES) = 221.96 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.31  
TOTAL AREA(ACRES) = 271.7  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5141.00 = 9070.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5141.00 TO NODE 5215.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

=====

ELEVATION DATA: UPSTREAM( FEET ) = 734.24 DOWNSTREAM( FEET ) = 720.42  
FLOW LENGTH( FEET ) = 900.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 56.0 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC. ) = 20.04

ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 473.06  
PIPE TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 17.94  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5215.00 = 9970.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

MAINLINE Tc(MIN.) = 17.94  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.477  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.66	0.98	0.100	32
PUBLIC PARK	A	0.63	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.466  
SUBAREA AREA(ACRES) = 1.29 SUBAREA RUNOFF(CFS) = 2.35  
EFFECTIVE AREA(ACRES) = 223.25 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.31  
TOTAL AREA(ACRES) = 273.0 PEAK FLOW RATE(CFS) = 473.06  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

MAINLINE Tc(MIN.) = 17.94  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.477  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.80	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 1.71  
EFFECTIVE AREA(ACRES) = 224.05 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.31  
TOTAL AREA(ACRES) = 273.8 PEAK FLOW RATE(CFS) = 473.06  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5120.00 TO NODE 5125.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 563.00  
ELEVATION DATA: UPSTREAM(FEET) = 768.00 DOWNSTREAM(FEET) = 766.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.530  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.071  
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 A 4.78 0.98 0.100 32 12.53  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 12.79  
TOTAL AREA(ACRES) = 4.78 PEAK FLOW RATE(CFS) = 12.79

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 14.16 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 37.83  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.44  
AVERAGE FLOW DEPTH(FEET) = 0.31 TRAVEL TIME(MIN.) = 2.33  
Tc(MIN.) = 21.50  
SUBAREA AREA(ACRES) = 14.16 SUBAREA RUNOFF(CFS) = 27.06  
EFFECTIVE AREA(ACRES) = 25.99 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 26.0 PEAK FLOW RATE(CFS) = 49.67

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.35 FLOW VELOCITY(FEET/SEC.) = 3.72  
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5135.00 = 1863.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5125.00 TO NODE 5130.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 766.50 DOWNSTREAM(FEET) = 763.50  
CHANNEL LENGTH THRU SUBAREA(FEET) = 819.00 CHANNEL SLOPE = 0.0037  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.379  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 7.05 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 20.07  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.06  
AVERAGE FLOW DEPTH(FEET) = 0.29 TRAVEL TIME(MIN.) = 6.64  
Tc(MIN.) = 19.17  
SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 14.48  
EFFECTIVE AREA(ACRES) = 11.83 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 11.8 PEAK FLOW RATE(CFS) = 24.30

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.32 FLOW VELOCITY(FEET/SEC.) = 2.15  
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5130.00 = 1382.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5130.00 TO NODE 5135.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 763.50 DOWNSTREAM(FEET) = 759.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 481.00 CHANNEL SLOPE = 0.0094  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.221

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5135.00 TO NODE 5136.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 759.00 DOWNSTREAM(FEET) = 755.50  
CHANNEL LENGTH THRU SUBAREA(FEET) = 387.00 CHANNEL SLOPE = 0.0090  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.124  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 11.50 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 60.16  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.88  
AVERAGE FLOW DEPTH(FEET) = 0.39 TRAVEL TIME(MIN.) = 1.66  
Tc(MIN.) = 23.17  
SUBAREA AREA(ACRES) = 11.50 SUBAREA RUNOFF(CFS) = 20.97  
EFFECTIVE AREA(ACRES) = 37.49 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 37.5 PEAK FLOW RATE(CFS) = 68.37

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.42 FLOW VELOCITY(FEET/SEC.) = 4.02  
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5136.00 = 2250.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5136.00 TO NODE 5155.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 755.50 DOWNSTREAM(FEET) = 751.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 438.00 CHANNEL SLOPE = 0.0103  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.037  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 12.89 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 79.62  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.34  
AVERAGE FLOW DEPTH(FEET) = 0.44 TRAVEL TIME(MIN.) = 1.68  
Tc(MIN.) = 24.85  
SUBAREA AREA(ACRES) = 12.89 SUBAREA RUNOFF(CFS) = 22.49  
EFFECTIVE AREA(ACRES) = 50.38 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 87.92

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.45 FLOW VELOCITY(FEET/SEC.) = 4.52  
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5155.00 = 2688.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5155.00 TO NODE 5160.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 751.00 DOWNSTREAM(FEET) = 747.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 415.00 CHANNEL SLOPE = 0.0096  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.965  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 12.97 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 98.82  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.52  
AVERAGE FLOW DEPTH(FEET) = 0.49 TRAVEL TIME(MIN.) = 1.53  
Tc(MIN.) = 26.38  
SUBAREA AREA(ACRES) = 12.97 SUBAREA RUNOFF(CFS) = 21.80  
EFFECTIVE AREA(ACRES) = 63.35 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 63.3 PEAK FLOW RATE(CFS) = 106.46

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.51 FLOW VELOCITY(FEET/SEC.) = 4.61  
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5160.00 = 3103.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5160.00 TO NODE 5210.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 747.00 DOWNSTREAM(FEET) = 738.30  
CHANNEL LENGTH THRU SUBAREA(FEET) = 503.00 CHANNEL SLOPE = 0.0173  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.904  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 16.23 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 119.65  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.89  
AVERAGE FLOW DEPTH(FEET) = 0.47 TRAVEL TIME(MIN.) = 1.42  
Tc(MIN.) = 27.81  
SUBAREA AREA(ACRES) = 16.23 SUBAREA RUNOFF(CFS) = 26.38  
EFFECTIVE AREA(ACRES) = 79.58 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 79.6 PEAK FLOW RATE(CFS) = 129.36

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.49 FLOW VELOCITY(FEET/SEC.) = 6.02  
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5210.00 = 3606.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5210.00 TO NODE 5210.00 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.) = 27.81  
RAINFALL INTENSITY(INCH/HR) = 1.90  
AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.10  
EFFECTIVE STREAM AREA(ACRES) = 79.58  
TOTAL STREAM AREA(ACRES) = 79.58  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 129.36

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5170.00 TO NODE 5175.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 524.00  
ELEVATION DATA: UPSTREAM(FEET) = 771.10 DOWNSTREAM(FEET) = 766.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.396  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.650  
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 A 4.16 0.98 0.100 32 9.40  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA RUNOFF(CFS) = 13.30  
 TOTAL AREA(ACRES) = 4.16 PEAK FLOW RATE(CFS) = 13.30

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.66  
 AVERAGE FLOW DEPTH(FEET) = 0.29 TRAVEL TIME(MIN.) = 2.17  
 Tc(MIN.) = 20.43  
 SUBAREA AREA(ACRES) = 13.46 SUBAREA RUNOFF(CFS) = 26.57  
 EFFECTIVE AREA(ACRES) = 24.69 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 24.7 PEAK FLOW RATE(CFS) = 48.73

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5175.00 TO NODE 5180.00 IS CODE = 51  
 -----

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.33 FLOW VELOCITY(FEET/SEC.) = 4.00  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5185.00 = 1918.00 FEET.

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 766.00 DOWNSTREAM(FEET) = 764.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 917.00 CHANNEL SLOPE = 0.0022  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.451  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 7.07 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 20.87  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.73  
 AVERAGE FLOW DEPTH(FEET) = 0.33 TRAVEL TIME(MIN.) = 8.86  
 Tc(MIN.) = 18.25  
 SUBAREA AREA(ACRES) = 7.07 SUBAREA RUNOFF(CFS) = 14.97  
 EFFECTIVE AREA(ACRES) = 11.23 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 11.2 PEAK FLOW RATE(CFS) = 23.78

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.35 FLOW VELOCITY(FEET/SEC.) = 1.78  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5180.00 = 1441.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5180.00 TO NODE 5185.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 764.00 DOWNSTREAM(FEET) = 758.50  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 477.00 CHANNEL SLOPE = 0.0115  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.290  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 13.46 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 37.08

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5185.00 TO NODE 5190.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 758.50 DOWNSTREAM(FEET) = 755.50  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 394.00 CHANNEL SLOPE = 0.0076  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.176  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 11.16 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 59.17  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.60  
 AVERAGE FLOW DEPTH(FEET) = 0.41 TRAVEL TIME(MIN.) = 1.82  
 Tc(MIN.) = 22.25  
 SUBAREA AREA(ACRES) = 11.16 SUBAREA RUNOFF(CFS) = 20.88  
 EFFECTIVE AREA(ACRES) = 35.85 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 35.8 PEAK FLOW RATE(CFS) = 67.06

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.43 FLOW VELOCITY(FEET/SEC.) = 3.73  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5190.00 = 2312.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5190.00 TO NODE 5195.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 755.50 DOWNSTREAM(FEET) = 751.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 430.00 CHANNEL SLOPE = 0.0105  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.085  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN



COMMERCIAL A 12.16 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 77.94  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.37  
 AVERAGE FLOW DEPTH(FEET) = 0.43 TRAVEL TIME(MIN.) = 1.64  
 Tc(MIN.) = 23.89  
 SUBAREA AREA(ACRES) = 12.16 SUBAREA RUNOFF(CFS) = 21.75  
 EFFECTIVE AREA(ACRES) = 48.01 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 48.0 PEAK FLOW RATE(CFS) = 85.88

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.45 FLOW VELOCITY(FEET/SEC.) = 4.44  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5195.00 = 2742.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5195.00 TO NODE 5200.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 751.00 DOWNSTREAM(FEET) = 747.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 420.00 CHANNEL SLOPE = 0.0095  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.007  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 11.98 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 96.17  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.48  
 AVERAGE FLOW DEPTH(FEET) = 0.49 TRAVEL TIME(MIN.) = 1.56  
 Tc(MIN.) = 25.46  
 SUBAREA AREA(ACRES) = 11.98 SUBAREA RUNOFF(CFS) = 20.59  
 EFFECTIVE AREA(ACRES) = 59.99 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 60.0 PEAK FLOW RATE(CFS) = 103.10

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.50 FLOW VELOCITY(FEET/SEC.) = 4.57  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5200.00 = 3162.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5200.00 TO NODE 5205.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 747.00 DOWNSTREAM(FEET) = 744.10  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 583.00 CHANNEL SLOPE = 0.0050  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.892  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 14.13 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 114.51  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.69  
 AVERAGE FLOW DEPTH(FEET) = 0.61 TRAVEL TIME(MIN.) = 2.64  
 Tc(MIN.) = 28.09  
 SUBAREA AREA(ACRES) = 14.13 SUBAREA RUNOFF(CFS) = 22.82  
 EFFECTIVE AREA(ACRES) = 74.12 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 74.1 PEAK FLOW RATE(CFS) = 119.70

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.63 FLOW VELOCITY(FEET/SEC.) = 3.70  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5205.00 = 3745.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5205.00 TO NODE 5210.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 734.60 DOWNSTREAM(FEET) = 728.80  
 FLOW LENGTH(FEET) = 1150.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.43  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 119.70  
 PIPE TRAVEL TIME(MIN.) = 2.03 Tc(MIN.) = 30.13  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5210.00 = 4895.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5210.00 TO NODE 5210.00 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.) = 30.13  
 RAINFALL INTENSITY(INCH/HR) = 1.81  
 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA(ACRES) = 74.12  
 TOTAL STREAM AREA(ACRES) = 74.12  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 119.70

\*\* CONFLUENCE DATA \*\*  
 STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
 1 129.36 27.81 1.904 0.98(0.10) 0.10 79.6 5120.00

2 119.70 30.13 1.814 0.98( 0.10) 0.10 74.1 5170.00

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5215.00 = 9970.00 FEET.

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO  
CONFLUENCE FORMULA USED FOR 2 STREAMS.

\*\* PEAK FLOW RATE TABLE \*\*

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	245.60	27.81	1.904	0.98( 0.10)	0.10	148.0	5120.00
2	242.66	30.13	1.814	0.98( 0.10)	0.10	153.7	5170.00

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	646.41	15.52	2.701	0.97( 0.25)	0.25	273.1	5043.00
2	680.66	17.93	2.477	0.98( 0.24)	0.25	318.2	5080.00
3	680.67	17.94	2.477	0.98( 0.24)	0.25	318.2	5050.00
4	682.84	18.49	2.432	0.98( 0.24)	0.24	325.8	5142.00
5	676.10	22.93	2.137	0.98( 0.22)	0.23	374.0	5025.00
6	665.47	24.26	2.066	0.97( 0.22)	0.22	383.8	5070.00
7	649.68	28.19	1.888	0.97( 0.21)	0.22	412.1	5120.00
8	629.60	30.51	1.800	0.98( 0.21)	0.22	422.4	5170.00
9	597.58	33.16	1.713	0.98( 0.21)	0.22	427.5	5000.00
TOTAL AREA(ACRES) =							427.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 245.60 Tc(MIN.) = 27.81  
EFFECTIVE AREA(ACRES) = 147.99 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 153.7  
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5210.00 = 4895.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 682.84 Tc(MIN.) = 18.491  
EFFECTIVE AREA(ACRES) = 325.77 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.22  
TOTAL AREA(ACRES) = 427.5  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5215.00 = 9970.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5210.00 TO NODE 5215.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 728.80 DOWNSTREAM(FEET) = 721.08  
FLOW LENGTH(FEET) = 420.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 54.0 INCH PIPE IS 42.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.12  
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 245.60  
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 28.19  
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5215.00 = 5315.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 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	245.60	28.19	1.888	0.98( 0.10)	0.10	148.0	5120.00
2	242.66	30.51	1.800	0.98( 0.10)	0.10	153.7	5170.00
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5215.00 =							5315.00 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	449.78	15.52	2.701	0.97( 0.31)	0.32	191.6	5043.00
2	473.06	17.93	2.477	0.98( 0.30)	0.31	224.0	5080.00
3	473.06	17.94	2.477	0.97( 0.30)	0.31	224.0	5050.00
4	472.84	18.49	2.432	0.97( 0.30)	0.30	228.7	5142.00
5	448.53	22.93	2.137	0.97( 0.28)	0.29	253.6	5025.00
6	433.09	24.26	2.066	0.97( 0.28)	0.29	256.5	5070.00
7	367.40	33.16	1.713	0.98( 0.27)	0.28	273.8	5000.00

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 12  
-----

>>>>CLEAR MEMORY BANK # 1 <<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5215.00 TO NODE 5248.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 720.42 DOWNSTREAM(FEET) = 708.36  
FLOW LENGTH(FEET) = 1194.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 90.0 INCH PIPE IS 68.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.83  
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 682.84  
PIPE TRAVEL TIME(MIN.) = 1.06 Tc(MIN.) = 19.55  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5248.00 = 11164.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 19.55  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.352  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.92	0.98	0.100	32
PUBLIC PARK	A	0.76	0.98	0.850	32



SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.439  
 SUBAREA AREA(ACRES) = 1.68 SUBAREA RUNOFF(CFS) = 2.91  
 EFFECTIVE AREA(ACRES) = 327.45 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.24  
 TOTAL AREA(ACRES) = 429.2 PEAK FLOW RATE(CFS) = 682.84  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	4.53	0.98	0.200	32	14.07

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA RUNOFF(CFS) = 10.89  
 TOTAL AREA(ACRES) = 4.53 PEAK FLOW RATE(CFS) = 10.89

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5225.00 TO NODE 5230.00 IS CODE = 62

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

-----  
 MAINLINE Tc(MIN.) = 19.55  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.352  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.10	0.98	0.100	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 1.10 SUBAREA RUNOFF(CFS) = 2.23  
 EFFECTIVE AREA(ACRES) = 328.55 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.24  
 TOTAL AREA(ACRES) = 430.3 PEAK FLOW RATE(CFS) = 682.84  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

-----  
 UPSTREAM ELEVATION(FEET) = 750.20 DOWNSTREAM ELEVATION(FEET) = 745.90  
 STREET LENGTH(FEET) = 345.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 1

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 27.60

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

\*\*\*STREET FLOWING FULL\*\*\*

-----  
 TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 19.55  
 RAINFALL INTENSITY(INCH/HR) = 2.35  
 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.24  
 EFFECTIVE STREAM AREA(ACRES) = 328.55  
 TOTAL STREAM AREA(ACRES) = 430.29  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 682.84

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.53  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.75  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.00  
 STREET FLOW TRAVEL TIME(MIN.) = 1.53 Tc(MIN.) = 15.60  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.693

SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	14.86	0.98	0.200	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 14.86 SUBAREA RUNOFF(CFS) = 33.40  
 EFFECTIVE AREA(ACRES) = 19.39 AREA-AVERAGED Fm(INCH/HR) = 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 43.59

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5220.00 TO NODE 5225.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 FLOW VELOCITY(FEET/SEC.) = 4.50 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.68  
 LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5230.00 = 959.00 FEET.

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 614.00  
 ELEVATION DATA: UPSTREAM(FEET) = 751.70 DOWNSTREAM(FEET) = 750.20

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.068  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.865  
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5230.00 TO NODE 5235.00 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) = 738.90 DOWNSTREAM(FEET) = 738.10
FLOW LENGTH(FEET) = 265.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.10
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 43.59
PIPE TRAVEL TIME(MIN.) = 0.72 Tc(MIN.) = 16.33
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5235.00 = 1224.00 FEET.

*****
FLOW PROCESS FROM NODE 5235.00 TO NODE 5235.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.33
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.620
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 7.86 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 7.86 SUBAREA RUNOFF(CFS) = 12.67
EFFECTIVE AREA(ACRES) = 27.25 AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 27.2 PEAK FLOW RATE(CFS) = 55.00

*****
FLOW PROCESS FROM NODE 5235.00 TO NODE 5240.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 738.10 DOWNSTREAM(FEET) = 733.00
FLOW LENGTH(FEET) = 514.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.05
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 55.00
PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 17.18
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5240.00 = 1738.00 FEET.

*****
FLOW PROCESS FROM NODE 5240.00 TO NODE 5240.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.18
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.541
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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COMMERCIAL A 5.55 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.55 SUBAREA RUNOFF(CFS) = 12.21
EFFECTIVE AREA(ACRES) = 32.80 AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 32.8 PEAK FLOW RATE(CFS) = 65.27

*****
FLOW PROCESS FROM NODE 5240.00 TO NODE 5247.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 733.00 DOWNSTREAM(FEET) = 717.05
FLOW LENGTH(FEET) = 800.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.53
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 65.27
PIPE TRAVEL TIME(MIN.) = 0.99 Tc(MIN.) = 18.16
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5247.00 = 2538.00 FEET.

*****
FLOW PROCESS FROM NODE 5247.00 TO NODE 5247.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.16
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.458
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 15.35 0.98 0.100 32
PUBLIC PARK A 3.86 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.251
SUBAREA AREA(ACRES) = 19.21 SUBAREA RUNOFF(CFS) = 38.27
EFFECTIVE AREA(ACRES) = 52.01 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 52.0 PEAK FLOW RATE(CFS) = 101.07

*****
FLOW PROCESS FROM NODE 5247.00 TO NODE 5248.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 717.05 DOWNSTREAM(FEET) = 710.66
FLOW LENGTH(FEET) = 950.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.07
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 101.07
PIPE TRAVEL TIME(MIN.) = 1.57 Tc(MIN.) = 19.74
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5248.00 = 3488.00 FEET.

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 19.74  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.338  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.56 0.98 0.100 32  
PUBLIC PARK A 1.20 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426  
SUBAREA AREA(ACRES) = 2.76 SUBAREA RUNOFF(CFS) = 4.78  
EFFECTIVE AREA(ACRES) = 54.77 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.31  
TOTAL AREA(ACRES) = 54.8 PEAK FLOW RATE(CFS) = 101.07  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 19.74  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.338  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.56 0.98 0.100 32  
PUBLIC PARK A 1.20 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426  
SUBAREA AREA(ACRES) = 2.76 SUBAREA RUNOFF(CFS) = 4.78  
EFFECTIVE AREA(ACRES) = 57.53 AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 57.5 PEAK FLOW RATE(CFS) = 105.03

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 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.) = 19.74  
RAINFALL INTENSITY(INCH/HR) = 2.34  
AREA-AVERAGED Fm(INCH/HR) = 0.31  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.32  
EFFECTIVE STREAM AREA(ACRES) = 57.53  
TOTAL STREAM AREA(ACRES) = 57.53  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 105.03

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	646.41	16.60	2.594	0.97( 0.25)	0.25	275.9	5043.00
1	680.66	18.99	2.393	0.98( 0.24)	0.25	321.0	5080.00
1	680.67	18.99	2.393	0.97( 0.24)	0.25	321.0	5050.00
1	682.84	19.55	2.352	0.97( 0.24)	0.24	328.6	5142.00
1	676.10	23.99	2.080	0.97( 0.22)	0.23	376.8	5025.00
1	665.47	25.34	2.013	0.97( 0.22)	0.22	386.6	5070.00
1	649.68	29.27	1.846	0.97( 0.21)	0.22	414.9	5120.00
1	629.60	31.59	1.763	0.97( 0.21)	0.22	425.1	5170.00
1	597.58	34.26	1.680	0.97( 0.21)	0.22	430.3	5000.00
2	105.03	19.74	2.338	0.97( 0.31)	0.32	57.5	5220.00

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	745.90	16.60	2.594	0.97( 0.26)	0.26	324.3	5043.00
2	784.44	18.99	2.393	0.98( 0.25)	0.26	376.3	5080.00
3	784.46	18.99	2.393	0.98( 0.25)	0.26	376.3	5050.00
4	787.56	19.55	2.352	0.97( 0.25)	0.25	385.5	5142.00
5	787.58	19.74	2.338	0.97( 0.25)	0.25	388.1	5220.00
6	767.75	23.99	2.080	0.97( 0.23)	0.24	434.3	5025.00
7	753.64	25.34	2.013	0.97( 0.23)	0.24	444.2	5070.00
8	729.22	29.27	1.846	0.98( 0.22)	0.23	472.4	5120.00
9	704.85	31.59	1.763	0.98( 0.22)	0.23	482.7	5170.00
10	668.50	34.26	1.680	0.97( 0.22)	0.23	487.8	5000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 787.58 Tc(MIN.) = 19.74  
EFFECTIVE AREA(ACRES) = 388.12 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.25  
TOTAL AREA(ACRES) = 487.8  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5248.00 = 11164.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5248.00 TO NODE 5300.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 708.36 DOWNSTREAM(FEET) = 707.90  
FLOW LENGTH(FEET) = 31.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 87.0 INCH PIPE IS 69.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.37  
ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 787.58  
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 19.76  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5300.00 = 11195.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 10

-----  
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<<  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5273.00 TO NODE 5274.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 274.00  
ELEVATION DATA: UPSTREAM(FEET) = 737.00 DOWNSTREAM(FEET) = 735.88

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
SUBAREA ANALYSIS USED MINIMUM  $T_c$ (MIN.) = 8.623  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.843  
SUBAREA  $T_c$  AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA  $F_p$   $A_p$  SCS  $T_c$   
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL A 0.46 0.98 0.100 32 8.62  
PUBLIC PARK A 0.35 0.98 0.850 32 13.70  
SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.424  
SUBAREA RUNOFF(CFS) = 2.50  
TOTAL AREA(ACRES) = 0.81 PEAK FLOW RATE(CFS) = 2.50

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5274.00 TO NODE 5274.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
-----

MAINLINE  $T_c$ (MIN.) = 8.62  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.843  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA  $F_p$   $A_p$  SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.46 0.98 0.100 32  
PUBLIC PARK A 0.35 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.424  
SUBAREA AREA(ACRES) = 0.81 SUBAREA RUNOFF(CFS) = 2.50  
EFFECTIVE AREA(ACRES) = 1.62 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.41  
AREA-AVERAGED  $F_p$ (INCH/HR) = 0.97 AREA-AVERAGED  $A_p$  = 0.42  
TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 5.00

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5274.00 TO NODE 5275.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 725.22 DOWNSTREAM(FEET) = 722.55  
FLOW LENGTH(FEET) = 510.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.41  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 5.00  
PIPE TRAVEL TIME(MIN.) = 1.93  $T_c$ (MIN.) = 10.55  
LONGEST FLOWPATH FROM NODE 5273.00 TO NODE 5275.00 = 784.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5275.00 TO NODE 5275.00 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.) = 10.55  
RAINFALL INTENSITY(INCH/HR) = 3.40  
AREA-AVERAGED  $F_m$ (INCH/HR) = 0.41  
AREA-AVERAGED  $F_p$ (INCH/HR) = 0.97  
AREA-AVERAGED  $A_p$  = 0.42  
EFFECTIVE STREAM AREA(ACRES) = 1.62  
TOTAL STREAM AREA(ACRES) = 1.62  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.00

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5250.00 TO NODE 5255.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 502.00  
ELEVATION DATA: UPSTREAM(FEET) = 747.50 DOWNSTREAM(FEET) = 745.80

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
SUBAREA ANALYSIS USED MINIMUM  $T_c$ (MIN.) = 11.408  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.249  
SUBAREA  $T_c$  AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA  $F_p$   $A_p$  SCS  $T_c$   
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL A 3.72 0.98 0.100 32 11.41  
SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.100  
SUBAREA RUNOFF(CFS) = 10.55  
TOTAL AREA(ACRES) = 3.72 PEAK FLOW RATE(CFS) = 10.55

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5255.00 TO NODE 5260.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<<  
-----

UPSTREAM ELEVATION(FEET) = 745.80 DOWNSTREAM ELEVATION(FEET) = 741.80  
STREET LENGTH(FEET) = 615.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 23.06

\*\*\*STREET FLOWING FULL\*\*\*

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.55  
HALFSTREET FLOOD WIDTH(FEET) = 18.00  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.87  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.58  
STREET FLOW TRAVEL TIME(MIN.) = 3.57 Tc(MIN.) = 14.97

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.760

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	10.38	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.38 SUBAREA RUNOFF(CFS) = 24.87  
EFFECTIVE AREA(ACRES) = 14.10 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 14.1 PEAK FLOW RATE(CFS) = 33.78

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.61 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
FLOW VELOCITY(FEET/SEC.) = 3.35 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.04  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5260.00 = 1117.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5260.00 TO NODE 5265.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 734.40 DOWNSTREAM(FEET) = 733.30  
FLOW LENGTH(FEET) = 364.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.61  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 33.78  
PIPE TRAVEL TIME(MIN.) = 1.08 Tc(MIN.) = 16.06  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5265.00 = 1481.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5265.00 TO NODE 5265.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.06  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.647

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	6.97	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 6.97 SUBAREA RUNOFF(CFS) = 15.99  
EFFECTIVE AREA(ACRES) = 21.07 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 21.1 PEAK FLOW RATE(CFS) = 48.34

\*\*\*\*\*

FLOW PROCESS FROM NODE 5265.00 TO NODE 5270.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 733.30 DOWNSTREAM(FEET) = 732.60  
FLOW LENGTH(FEET) = 183.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.66  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 48.34  
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 16.51  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5270.00 = 1664.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5270.00 TO NODE 5270.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.51  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.602

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	7.85	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 7.85 SUBAREA RUNOFF(CFS) = 17.70  
EFFECTIVE AREA(ACRES) = 28.92 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 28.9 PEAK FLOW RATE(CFS) = 65.19

\*\*\*\*\*

FLOW PROCESS FROM NODE 5270.00 TO NODE 5275.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 732.60 DOWNSTREAM(FEET) = 722.55  
FLOW LENGTH(FEET) = 322.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.93  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 65.19  
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 16.85  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5275.00 = 1986.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5275.00 TO NODE 5275.00 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.) = 16.85
RAINFALL INTENSITY(INCH/HR) = 2.57
AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 28.92
TOTAL STREAM AREA(ACRES) = 28.92
PEAK FLOW RATE(CFS) AT CONFLUENCE = 65.19

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 5.00 10.55 3.405 0.97( 0.41) 0.42 1.6 5273.00
2 65.19 16.85 2.571 0.98( 0.10) 0.10 28.9 5250.00

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 59.58 10.55 3.405 0.97( 0.12) 0.13 19.7 5273.00
2 68.80 16.85 2.571 0.98( 0.11) 0.12 30.5 5250.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 68.80 Tc(MIN.) = 16.85
EFFECTIVE AREA(ACRES) = 30.54 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 30.5
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5275.00 = 1986.00 FEET.

*****
FLOW PROCESS FROM NODE 5275.00 TO NODE 5295.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 722.55 DOWNSTREAM(FEET) = 717.86
FLOW LENGTH(FEET) = 722.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.04
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 68.80
PIPE TRAVEL TIME(MIN.) = 1.33 Tc(MIN.) = 18.18
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5295.00 = 2708.00 FEET.

*****
FLOW PROCESS FROM NODE 5295.00 TO NODE 5295.00 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.) = 18.18
RAINFALL INTENSITY(INCH/HR) = 2.46
AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.12
EFFECTIVE STREAM AREA(ACRES) = 30.54
TOTAL STREAM AREA(ACRES) = 30.54
PEAK FLOW RATE(CFS) AT CONFLUENCE = 68.80

*****
FLOW PROCESS FROM NODE 5280.00 TO NODE 5285.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 556.00
ELEVATION DATA: UPSTREAM(FEET) = 737.20 DOWNSTREAM(FEET) = 736.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.774
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.902
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.)
PUBLIC PARK A 1.60 0.98 0.850 32 21.88
COMMERCIAL A 5.83 0.98 0.100 32 13.77
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
SUBAREA RUNOFF(CFS) = 17.70
TOTAL AREA(ACRES) = 7.43 PEAK FLOW RATE(CFS) = 17.70

*****
FLOW PROCESS FROM NODE 5285.00 TO NODE 5290.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 736.30 DOWNSTREAM(FEET) = 728.30
FLOW LENGTH(FEET) = 347.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.48
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.70
PIPE TRAVEL TIME(MIN.) = 0.55 Tc(MIN.) = 14.33
LONGEST FLOWPATH FROM NODE 5280.00 TO NODE 5290.00 = 903.00 FEET.

*****
FLOW PROCESS FROM NODE 5290.00 TO NODE 5290.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 14.33
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.834

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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 C 4.80 0.57 0.100 69  
 PUBLIC PARK A 7.67 0.98 0.850 32  
 COMMERCIAL A 8.90 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.369  
 SUBAREA AREA(ACRES) = 21.37 SUBAREA RUNOFF(CFS) = 47.76  
 EFFECTIVE AREA(ACRES) = 28.80 AREA-AVERAGED Fm(INCH/HR) = 0.33  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.34  
 TOTAL AREA(ACRES) = 28.8 PEAK FLOW RATE(CFS) = 65.01

TIME OF CONCENTRATION(MIN.) = 14.91  
 RAINFALL INTENSITY(INCH/HR) = 2.77  
 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.93  
 AREA-AVERAGED Ap = 0.28  
 EFFECTIVE STREAM AREA(ACRES) = 39.12  
 TOTAL STREAM AREA(ACRES) = 39.12  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 88.08

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	59.58	11.94	3.161	0.97( 0.12)	0.13	19.7	5273.00
1	68.80	18.18	2.456	0.98( 0.11)	0.12	30.5	5250.00
2	88.08	14.91	2.767	0.93( 0.26)	0.28	39.1	5280.00

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	141.24	11.94	3.161	0.94( 0.21)	0.22	51.1	5273.00
2	152.05	14.91	2.767	0.94( 0.21)	0.22	64.0	5280.00
3	145.95	18.18	2.456	0.94( 0.20)	0.21	69.7	5250.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 152.05 Tc(MIN.) = 14.91  
 EFFECTIVE AREA(ACRES) = 63.99 AREA-AVERAGED Fm(INCH/HR) = 0.21  
 AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.22  
 TOTAL AREA(ACRES) = 69.7  
 LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5295.00 = 2708.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5295.00 TO NODE 5300.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 717.86 DOWNSTREAM(FEET) = 710.30  
 FLOW LENGTH(FEET) = 921.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.03  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 152.05  
 PIPE TRAVEL TIME(MIN.) = 1.28 Tc(MIN.) = 16.19  
 LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5300.00 = 3629.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.19  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.634  
 SUBAREA LOSS RATE DATA(AMC II):

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5290.00 TO NODE 5295.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 728.30 DOWNSTREAM(FEET) = 724.50  
 FLOW LENGTH(FEET) = 374.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.63  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 65.01  
 PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 14.91  
 LONGEST FLOWPATH FROM NODE 5280.00 TO NODE 5295.00 = 1277.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5295.00 TO NODE 5295.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 14.91  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.767

SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 PUBLIC PARK C 0.32 0.57 0.850 69  
 COMMERCIAL C 3.80 0.57 0.100 69  
 COMMERCIAL A 6.20 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.77  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.123  
 SUBAREA AREA(ACRES) = 10.32 SUBAREA RUNOFF(CFS) = 24.82  
 EFFECTIVE AREA(ACRES) = 39.12 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 39.1 PEAK FLOW RATE(CFS) = 88.08

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5295.00 TO NODE 5295.00 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:

```

DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              C        1.50    0.57    0.100    69
PUBLIC PARK             C        1.16    0.57    0.850    69
COMMERCIAL              A        1.58    0.98    0.100    32
PUBLIC PARK             A        1.22    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427
SUBAREA AREA(ACRES) = 5.46      SUBAREA RUNOFF(CFS) = 11.31
EFFECTIVE AREA(ACRES) = 69.45   AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.92  AREA-AVERAGED Ap = 0.24
TOTAL AREA(ACRES) = 75.1      PEAK FLOW RATE(CFS) = 152.05
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.19
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.634
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              C        1.46    0.57    0.100    69
PUBLIC PARK             C        1.12    0.57    0.850    69
COMMERCIAL              A        1.64    0.98    0.100    32
PUBLIC PARK             A        1.26    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426
SUBAREA AREA(ACRES) = 5.48      SUBAREA RUNOFF(CFS) = 11.35
EFFECTIVE AREA(ACRES) = 74.93   AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.90  AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 80.6      PEAK FLOW RATE(CFS) = 162.35

*****
FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 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      152.71  13.26   2.969  0.89( 0.23)  0.26   62.0   5273.00
2      162.35  16.19   2.634  0.90( 0.22)  0.25   74.9   5280.00
3      155.29  19.47   2.358  0.90( 0.22)  0.24   80.6   5250.00
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5300.00 = 3629.00 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      745.90  16.63   2.592  0.97( 0.26)  0.26   324.3  5043.00
2      784.44  19.01   2.391  0.98( 0.25)  0.26   376.3  5080.00
3      784.46  19.02   2.391  0.98( 0.25)  0.26   376.3  5050.00
4      787.56  19.57   2.350  0.97( 0.25)  0.25   385.5  5142.00

*****
** PEAK FLOW RATE TABLE **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)  (ACRES)  NODE
1      843.52  13.26   2.969  0.96( 0.25)  0.26   320.6  5273.00
2      901.61  16.19   2.634  0.96( 0.25)  0.26   390.7  5280.00
3      907.30  16.63   2.592  0.96( 0.25)  0.26   400.0  5043.00
4      940.71  19.01   2.391  0.96( 0.24)  0.25   456.1  5080.00
5      940.72  19.02   2.391  0.96( 0.24)  0.25   456.2  5050.00
6      942.27  19.47   2.358  0.96( 0.24)  0.25   464.4  5250.00
7      942.30  19.57   2.350  0.96( 0.24)  0.25   466.1  5142.00
8      941.35  19.76   2.337  0.96( 0.24)  0.25   468.7  5220.00
9      902.79  24.02   2.079  0.96( 0.23)  0.24   514.9  5025.00
10     883.82  25.37   2.012  0.96( 0.23)  0.24   524.8  5070.00
11     847.32  29.29   1.845  0.96( 0.22)  0.23   553.0  5120.00
12     816.96  31.62   1.762  0.96( 0.22)  0.23   563.3  5170.00
13     774.54  34.29   1.679  0.96( 0.22)  0.23   568.4  5000.00
TOTAL AREA(ACRES) = 568.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 942.30  Tc(MIN.) = 19.571
EFFECTIVE AREA(ACRES) = 466.13  AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 568.4
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5300.00 = 11195.00 FEET.

*****
FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE 5300.00 TO NODE 5305.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 707.90  DOWNSTREAM(FEET) = 704.64
FLOW LENGTH(FEET) = 652.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 114.0 INCH PIPE IS 90.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.55
ESTIMATED PIPE DIAMETER(INCH) = 114.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 942.30
PIPE TRAVEL TIME(MIN.) = 0.70  Tc(MIN.) = 20.27
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5305.00 = 11847.00 FEET.

*****
FLOW PROCESS FROM NODE 5305.00 TO NODE 5305.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 20.27
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.301
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C       9.55    0.57      0.100    69
COMMERCIAL              A      11.87    0.98      0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 21.42      SUBAREA RUNOFF(CFS) = 42.84
EFFECTIVE AREA(ACRES) = 487.55  AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 589.8        PEAK FLOW RATE(CFS) = 942.30
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5305.00 TO NODE 5305.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 20.27
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.301
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C       0.54    0.57      0.100    69
PUBLIC PARK             C       0.41    0.57      0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA AREA(ACRES) = 0.95      SUBAREA RUNOFF(CFS) = 1.76
EFFECTIVE AREA(ACRES) = 488.50  AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 590.8        PEAK FLOW RATE(CFS) = 942.30
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5305.00 TO NODE 5330.00 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) = 704.64  DOWNSTREAM(FEET) = 701.26
FLOW LENGTH(FEET) = 675.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 114.0 INCH PIPE IS 90.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.57
ESTIMATED PIPE DIAMETER(INCH) = 114.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 942.30
PIPE TRAVEL TIME(MIN.) = 0.72  Tc(MIN.) = 20.99
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5330.00 = 12522.00 FEET.

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*****
FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 20.99
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.253
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C       0.54    0.57      0.100    69
PUBLIC PARK             C       0.41    0.57      0.850    69
COMMERCIAL              A       0.51    0.98      0.100    32
PUBLIC PARK             A       0.48    0.98      0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.444
SUBAREA AREA(ACRES) = 1.94      SUBAREA RUNOFF(CFS) = 3.33
EFFECTIVE AREA(ACRES) = 490.44  AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 592.7        PEAK FLOW RATE(CFS) = 942.30
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 20.99
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.253
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A       0.51    0.98      0.100    32
PUBLIC PARK             A       0.48    0.98      0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.464
SUBAREA AREA(ACRES) = 0.99      SUBAREA RUNOFF(CFS) = 1.60
EFFECTIVE AREA(ACRES) = 491.43  AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 593.7        PEAK FLOW RATE(CFS) = 942.30
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 20.99
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.253
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      23.78    0.98      0.100    32
COMMERCIAL              C       5.56    0.57      0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.90
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 29.34      SUBAREA RUNOFF(CFS) = 57.13
EFFECTIVE AREA(ACRES) = 520.77  AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.24

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TOTAL AREA(ACRES) = 623.1 PEAK FLOW RATE(CFS) = 949.21

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FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 20.99

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.253

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	32.80	0.98	0.100	32
COMMERCIAL	C	4.08	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.93

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 36.88 SUBAREA RUNOFF(CFS) = 71.71

EFFECTIVE AREA(ACRES) = 557.65 AREA-AVERAGED Fm(INCH/HR) = 0.22

AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.23

TOTAL AREA(ACRES) = 659.9 PEAK FLOW RATE(CFS) = 1020.92

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	954.56	14.70	2.791	0.95( 0.22)	0.23	412.1	5273.00
2	990.39	17.61	2.504	0.95( 0.22)	0.23	482.2	5280.00
3	993.14	18.05	2.467	0.95( 0.22)	0.23	491.5	5043.00
4	1020.21	20.44	2.290	0.96( 0.22)	0.23	547.7	5080.00
5	1020.21	20.44	2.290	0.96( 0.22)	0.23	547.7	5050.00
6	1021.06	20.89	2.260	0.96( 0.22)	0.23	555.9	5250.00
7	1020.92	20.99	2.253	0.96( 0.22)	0.23	557.7	5142.00
8	1019.72	21.18	2.241	0.96( 0.22)	0.23	560.2	5220.00
9	980.80	25.44	2.008	0.96( 0.21)	0.22	606.4	5025.00
10	963.31	26.79	1.946	0.96( 0.21)	0.22	616.3	5070.00
11	920.41	30.73	1.793	0.96( 0.21)	0.22	644.5	5120.00
12	889.68	33.09	1.715	0.96( 0.21)	0.21	654.8	5170.00
13	850.27	35.76	1.637	0.96( 0.21)	0.21	659.9	5000.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 1021.06 Tc(MIN.) = 20.89

AREA-AVERAGED Fm(INCH/HR) = 0.22 AREA-AVERAGED Fp(INCH/HR) = 0.96

AREA-AVERAGED Ap = 0.23 EFFECTIVE AREA(ACRES) = 555.92

\*\*\*\*\*

FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 71

-----

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<

>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<

=====

UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%

Tc(HR) = 0.60; LAG(HR) = 0.48; Fm(INCH/HR) = 0.21; Ybar = 0.24

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 659.9

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5330.00 = 12522.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0337; Lca/L=0.4,n=.0302; Lca/L=0.5,n=.0277;Lca/L=0.6,n=.0259

TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 257.32

UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 914.45

TOTAL PEAK FLOW RATE(CFS) = 914.45 (SOURCE FLOW INCLUDED)

RATIONAL METHOD PEAK FLOW RATE(CFS) = 1021.06

(UPSTREAM NODE PEAK FLOW RATE(CFS) = 1021.06)

PEAK FLOW RATE(CFS) USED = 1021.06

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FLOW PROCESS FROM NODE 5330.00 TO NODE 5335.00 IS CODE = 31

-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 701.26 DOWNSTREAM(FEET) = 697.78

FLOW LENGTH(FEET) = 687.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 120.0 INCH PIPE IS 90.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 16.12

ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 1021.06

PIPE TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 36.47

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5335.00 TO NODE 5335.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 36.47

\* 100 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
COMMERCIAL	A	0.54	0.98	0.100	32
PUBLIC PARK	A	0.50	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.461

SUBAREA AREA(ACRES) = 1.04

UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%

Tc(HR) = 0.61; LAG(HR) = 0.49; Fm(INCH/HR) = 0.21; Ybar = 0.24

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 661.0

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0252

TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 257.61

UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 897.35

TOTAL AREA(ACRES) = 661.0 PEAK FLOW RATE(CFS) = 1021.06

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5335.00 TO NODE 5335.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
MAINLINE Tc(MIN.) = 36.47
\* 100 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 A 0.54 0.98 0.100 32
PUBLIC PARK A 0.50 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.461
SUBAREA AREA(ACRES) = 1.04
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.61; LAG(HR) = 0.49; Fm(INCH/HR) = 0.21; Ybar = 0.24
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
3HR = 1.00; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 662.0
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0252
TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 257.91
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 898.51
TOTAL AREA(ACRES) = 662.0 PEAK FLOW RATE(CFS) = 1021.06
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*
FLOW PROCESS FROM NODE 5335.00 TO NODE 5335.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
MAINLINE Tc(MIN.) = 36.47
\* 100 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" C 1.40 0.57 0.200 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 17.88 0.98 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 19.28
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.61; LAG(HR) = 0.49; Fm(INCH/HR) = 0.21; Ybar = 0.24

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
3HR = 1.00; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 681.3
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0252
TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 265.54
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 924.09
TOTAL AREA(ACRES) = 681.3 PEAK FLOW RATE(CFS) = 1021.06
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*
FLOW PROCESS FROM NODE 5335.00 TO NODE 5375.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 697.78 DOWNSTREAM(FEET) = 682.26
FLOW LENGTH(FEET) = 1386.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 102.0 INCH PIPE IS 79.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.58
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1021.06
PIPE TRAVEL TIME(MIN.) = 1.07 Tc(MIN.) = 37.55
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5375.00 = 14595.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 5375.00 TO NODE 5375.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
PEAK FLOW RATE(CFS) = 1021.06 Tc(MIN.) = 37.55
AREA-AVERAGED Fm(INCH/HR) = 0.21 Ybar = 0.24
TOTAL AREA(ACRES) = 681.3

\*\*\*\*\*
FLOW PROCESS FROM NODE 5355.00 TO NODE 5360.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 410.00
ELEVATION DATA: UPSTREAM(FEET) = 717.00 DOWNSTREAM(FEET) = 712.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.212
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.975
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 A 2.36 0.98 0.850 32 13.21
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850

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SUBAREA RUNOFF(CFS) = 4.56
TOTAL AREA(ACRES) = 2.36 PEAK FLOW RATE(CFS) = 4.56
*****
FLOW PROCESS FROM NODE 5360.00 TO NODE 5365.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
-----
UPSTREAM ELEVATION(FEET) = 712.50 DOWNSTREAM ELEVATION(FEET) = 710.30
STREET LENGTH(FEET) = 394.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.27
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 13.55
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.04
PRODUCT OF DEPTH*VELOCITY(FT*FT/SEC.) = 0.88
STREET FLOW TRAVEL TIME(MIN.) = 3.22 Tc(MIN.) = 16.43
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.611
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 4.61 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 4.61 SUBAREA RUNOFF(CFS) = 7.39
EFFECTIVE AREA(ACRES) = 6.97 AREA-AVERAGED Fm(INCH/HR) = 0.83
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 7.0 PEAK FLOW RATE(CFS) = 11.18

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 15.33
FLOW VELOCITY(FEET/SEC.) = 2.20 DEPTH*VELOCITY(FT*FT/SEC.) = 1.02
LONGEST FLOWPATH FROM NODE 5355.00 TO NODE 5365.00 = 804.00 FEET.
*****
FLOW PROCESS FROM NODE 5365.00 TO NODE 5370.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 703.30 DOWNSTREAM(FEET) = 702.40
FLOW LENGTH(FEET) = 287.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.34

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ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.18
PIPE TRAVEL TIME(MIN.) = 1.10 Tc(MIN.) = 17.53
LONGEST FLOWPATH FROM NODE 5355.00 TO NODE 5370.00 = 1091.00 FEET.
*****
FLOW PROCESS FROM NODE 5370.00 TO NODE 5370.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 17.53
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.511
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 6.55 0.57 0.500 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 5.60 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 12.15 SUBAREA RUNOFF(CFS) = 23.33
EFFECTIVE AREA(ACRES) = 19.12 AREA-AVERAGED Fm(INCH/HR) = 0.54
AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.63
TOTAL AREA(ACRES) = 19.1 PEAK FLOW RATE(CFS) = 33.88
*****
FLOW PROCESS FROM NODE 5370.00 TO NODE 5375.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 702.40 DOWNSTREAM(FEET) = 685.59
FLOW LENGTH(FEET) = 917.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.23
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 33.88
PIPE TRAVEL TIME(MIN.) = 1.36 Tc(MIN.) = 18.89
LONGEST FLOWPATH FROM NODE 5355.00 TO NODE 5375.00 = 2008.00 FEET.
*****
FLOW PROCESS FROM NODE 5375.00 TO NODE 5375.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 18.89
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.401
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 9.45 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 9.45 SUBAREA RUNOFF(CFS) = 18.01

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EFFECTIVE AREA(ACRES) = 28.57 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.78 AREA-AVERAGED Ap = 0.59  
TOTAL AREA(ACRES) = 28.6 PEAK FLOW RATE(CFS) = 50.00

PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 37.97  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5375.00 TO NODE 5375.00 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.) = 18.89  
RAINFALL INTENSITY(INCH/HR) = 2.40  
AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.78  
AREA-AVERAGED Ap = 0.59  
EFFECTIVE STREAM AREA(ACRES) = 28.57  
TOTAL STREAM AREA(ACRES) = 28.57  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 50.00

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	AREA (ACRES)	HEADWATER NODE
1	1021.06	37.55	681.30	5000.00
2	50.00	18.89	28.57	5355.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%

Tc(HR) = 0.63; LAG(HR) = 0.50; Fm(INCH/HR) = 0.22; Ybar = 0.25

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 709.9

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5375.00 = 14595.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0314; Lca/L=0.4,n=.0281; Lca/L=0.5,n=.0258;Lca/L=0.6,n=.0241

TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 273.56

PEAK FLOW RATE(CFS) = 949.26

(UPSTREAM NODE PEAK FLOW RATE(CFS) = 1021.06)

PEAK FLOW RATE(CFS) USED = 1021.06

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5375.00 TO NODE 5383.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 682.26 DOWNSTREAM(FEET) = 676.82

FLOW LENGTH(FEET) = 526.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 102.0 INCH PIPE IS 82.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 20.78

ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 1021.06

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 37.97

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.579

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.31	0.57	0.100	69
PUBLIC PARK	C	1.23	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463

SUBAREA AREA(ACRES) = 2.54

UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%

Tc(HR) = 0.63; LAG(HR) = 0.51; Fm(INCH/HR) = 0.22; Ybar = 0.25

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 712.4

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0311; Lca/L=0.4,n=.0279; Lca/L=0.5,n=.0256;Lca/L=0.6,n=.0239

TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 274.50

UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 949.79

TOTAL AREA(ACRES) = 712.4 PEAK FLOW RATE(CFS) = 1021.06

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 37.97

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.579

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.31	0.57	0.100	69
PUBLIC PARK	C	1.23	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463

SUBAREA AREA(ACRES) = 2.54

UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%

Tc(HR) = 0.63; LAG(HR) = 0.51; Fm(INCH/HR) = 0.22; Ybar = 0.25

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
 3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 715.0  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0311; Lca/L=0.4,n=.0279; Lca/L=0.5,n=.0256;Lca/L=0.6,n=.0239  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 275.44  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 952.98  
 TOTAL AREA(ACRES) = 715.0 PEAK FLOW RATE(CFS) = 1021.06  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441  
 SUBAREA AREA(ACRES) = 0.99 SUBAREA RUNOFF(CFS) = 2.46  
 EFFECTIVE AREA(ACRES) = 1.98 AREA-AVERAGED Fm(INCH/HR) = 0.43  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.44  
 TOTAL AREA(ACRES) = 2.0 PEAK FLOW RATE(CFS) = 4.91

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5381.00 TO NODE 5382.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 690.51 DOWNSTREAM(FEET) = 685.38  
 FLOW LENGTH(FEET) = 1020.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.32  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 4.91  
 PIPE TRAVEL TIME(MIN.) = 3.94 Tc(MIN.) = 15.72  
 LONGEST FLOWPATH FROM NODE 5380.00 TO NODE 5382.00 = 1614.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5382.00 TO NODE 5382.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 15.72  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.680  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 1.20 0.57 0.100 69  
 PUBLIC PARK C 1.00 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441  
 SUBAREA AREA(ACRES) = 2.20 SUBAREA RUNOFF(CFS) = 4.81  
 EFFECTIVE AREA(ACRES) = 4.18 AREA-AVERAGED Fm(INCH/HR) = 0.33  
 AREA-AVERAGED Fp(INCH/HR) = 0.76 AREA-AVERAGED Ap = 0.44  
 TOTAL AREA(ACRES) = 4.2 PEAK FLOW RATE(CFS) = 8.82

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5382.00 TO NODE 5382.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 15.72  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.680  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 1.20 0.57 0.100 69  
 PUBLIC PARK C 1.00 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441  
 SUBAREA AREA(ACRES) = 2.20 SUBAREA RUNOFF(CFS) = 4.81

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 1  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 -----  
 TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 PEAK FLOW RATE(CFS) = 1021.06 Tc(MIN.) = 37.97  
 AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.25  
 TOTAL AREA(ACRES) = 715.0

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5380.00 TO NODE 5381.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 -----  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 594.00  
 ELEVATION DATA: UPSTREAM(FEET) = 702.90 DOWNSTREAM(FEET) = 700.51

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.789  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.186  
 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 A 0.54 0.98 0.100 32 11.79  
 PUBLIC PARK A 0.45 0.98 0.850 32 18.73  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441  
 SUBAREA RUNOFF(CFS) = 2.46  
 TOTAL AREA(ACRES) = 0.99 PEAK FLOW RATE(CFS) = 2.46

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5381.00 TO NODE 5381.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 11.79  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.186  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 0.54 0.98 0.100 32  
 PUBLIC PARK A 0.45 0.98 0.850 32

EFFECTIVE AREA(ACRES) = 6.38 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.44  
 TOTAL AREA(ACRES) = 6.4 PEAK FLOW RATE(CFS) = 13.63

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5382.00 TO NODE 5383.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 685.38 DOWNSTREAM(FEET) = 680.32  
 FLOW LENGTH(FEET) = 770.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.13  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 13.63  
 PIPE TRAVEL TIME(MIN.) = 2.09 Tc(MIN.) = 17.82  
 LONGEST FLOWPATH FROM NODE 5380.00 TO NODE 5383.00 = 2384.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 17.82  
 \* 100 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
COMMERCIAL	C	0.47	0.57	0.100	69
PUBLIC PARK	C	0.39	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440  
 SUBAREA AREA(ACRES) = 0.86 SUBAREA RUNOFF(CFS) = 1.73  
 EFFECTIVE AREA(ACRES) = 7.24 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.44  
 TOTAL AREA(ACRES) = 7.2 PEAK FLOW RATE(CFS) = 14.25

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 17.82  
 \* 100 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
COMMERCIAL	C	0.47	0.57	0.100	69
PUBLIC PARK	C	0.39	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440  
 SUBAREA AREA(ACRES) = 0.86 SUBAREA RUNOFF(CFS) = 1.73  
 EFFECTIVE AREA(ACRES) = 8.10 AREA-AVERAGED Fm(INCH/HR) = 0.29  
 AREA-AVERAGED Fp(INCH/HR) = 0.67 AREA-AVERAGED Ap = 0.44  
 TOTAL AREA(ACRES) = 8.1 PEAK FLOW RATE(CFS) = 15.98

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 17.82  
 \* 100 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
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	30.37	0.98	0.200	32
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	45.30	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.73  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 75.67 SUBAREA RUNOFF(CFS) = 159.38  
 EFFECTIVE AREA(ACRES) = 83.77 AREA-AVERAGED Fm(INCH/HR) = 0.16  
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.22  
 TOTAL AREA(ACRES) = 83.8 PEAK FLOW RATE(CFS) = 175.36

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 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.) = 17.82  
 RAINFALL INTENSITY(INCH/HR) = 2.49  
 AREA-AVERAGED Fm(INCH/HR) = 0.16  
 AREA-AVERAGED Fp(INCH/HR) = 0.72  
 AREA-AVERAGED Ap = 0.22  
 EFFECTIVE STREAM AREA(ACRES) = 83.77  
 TOTAL STREAM AREA(ACRES) = 83.77  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 175.36  
 \*\* CONFLUENCE DATA \*\*  

STREAM NUMBER	Q (CFS)	Tc (MIN.)	AREA (ACRES)	HEADWATER NODE
1	1021.06	37.97	714.95	5000.00
2	175.36	17.82	83.77	5380.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.63; LAG(HR) = 0.51; Fm(INCH/HR) = 0.21; Ybar = 0.24  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR = 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 798.7  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0309; Lca/L=0.4,n=.0277; Lca/L=0.5,n=.0255;Lca/L=0.6,n=.0238  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 309.86  
 PEAK FLOW RATE(CFS) = 1064.32

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	C	0.15	0.57	0.100	69
PUBLIC PARK	C	0.12	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.433  
 SUBAREA AREA(ACRES) = 0.27 SUBAREA RUNOFF(CFS) = 0.89  
 EFFECTIVE AREA(ACRES) = 0.57 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 1.88

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5383.00 TO NODE 5425.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 676.82 DOWNSTREAM(FEET) = 676.55  
 FLOW LENGTH(FEET) = 38.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 114.0 INCH PIPE IS 86.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.47  
 ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 1064.32  
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 38.00  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5425.00 = 15159.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 10  
 -----

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5408.00 TO NODE 5409.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 200.00  
 ELEVATION DATA: UPSTREAM(FEET) = 704.37 DOWNSTREAM(FEET) = 703.86

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.356  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.916  
 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	C	0.17	0.57	0.100	69	8.36
PUBLIC PARK	C	0.13	0.57	0.850	69	13.28

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.425  
 SUBAREA RUNOFF(CFS) = 0.99  
 TOTAL AREA(ACRES) = 0.30 PEAK FLOW RATE(CFS) = 0.99

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5409.00 TO NODE 5409.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.36  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.916  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.17	0.57	0.100	69
PUBLIC PARK	C	0.13	0.57	0.850	69

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5409.00 TO NODE 5410.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 694.03 DOWNSTREAM(FEET) = 692.13  
 FLOW LENGTH(FEET) = 431.00 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.) = 3.23  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 1.88  
 PIPE TRAVEL TIME(MIN.) = 2.23 Tc(MIN.) = 10.58  
 LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5410.00 = 631.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 10.58  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.399  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.27	0.98	0.100	32
PUBLIC PARK	A	0.27	0.98	0.850	32
COMMERCIAL	C	0.27	0.57	0.100	69
PUBLIC PARK	C	0.27	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.77  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
 SUBAREA AREA(ACRES) = 1.08 SUBAREA RUNOFF(CFS) = 2.95  
 EFFECTIVE AREA(ACRES) = 1.65 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.70 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 4.57

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 10.58  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.399  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.27	0.98	0.100	32
PUBLIC PARK	A	0.27	0.98	0.850	32
COMMERCIAL	C	0.27	0.57	0.100	69
PUBLIC PARK	C	0.27	0.57	0.850	69

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	0.27	0.98	0.100	32
PUBLIC PARK	A	0.26	0.98	0.850	32
COMMERCIAL	C	0.26	0.57	0.100	69
PUBLIC PARK	C	0.26	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.77  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.471  
 SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = 2.87  
 EFFECTIVE AREA(ACRES) = 2.70 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.34  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.73 AREA-AVERAGED  $A_p$  = 0.46  
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 7.44

STREET LENGTH(FEET) = 240.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 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.) = 10.58  
 RAINFALL INTENSITY(INCH/HR) = 3.40  
 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.34  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.73  
 AREA-AVERAGED  $A_p$  = 0.46  
 EFFECTIVE STREAM AREA(ACRES) = 2.70  
 TOTAL STREAM AREA(ACRES) = 2.70  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.44

\*\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.90

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.36  
 HALFSTREET FLOOD WIDTH(FEET) = 10.08  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.86  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.03  
 STREET FLOW TRAVEL TIME(MIN.) = 1.40  $T_c$ (MIN.) = 12.28  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.109

SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/	SCS SOIL	AREA	$F_p$	$A_p$	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
PUBLIC PARK	A	0.72	0.98	0.850	32
PUBLIC PARK	A	3.17	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.850  
 SUBAREA AREA(ACRES) = 3.89 SUBAREA RUNOFF(CFS) = 7.98  
 EFFECTIVE AREA(ACRES) = 4.96 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.72  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.91 AREA-AVERAGED  $A_p$  = 0.80  
 TOTAL AREA(ACRES) = 5.0 PEAK FLOW RATE(CFS) = 10.65

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.40 HALFSTREET FLOOD WIDTH(FEET) = 12.23  
 FLOW VELOCITY(FEET/SEC.) = 3.16 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.27  
 LONGEST FLOWPATH FROM NODE 5400.00 TO NODE 5410.00 = 535.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5400.00 TO NODE 5405.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 295.00  
 ELEVATION DATA: UPSTREAM(FEET) = 709.30 DOWNSTREAM(FEET) = 707.30

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
 SUBAREA ANALYSIS USED MINIMUM  $T_c$ (MIN.) = 10.879  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.343  
 SUBAREA  $T_c$  AND LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/	SCS SOIL	AREA	$F_p$	$A_p$	SCS	$T_c$
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN	(MIN.)
SCHOOL	C	1.07	0.57	0.600	69	10.88

 SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.600  
 SUBAREA RUNOFF(CFS) = 2.89  
 TOTAL AREA(ACRES) = 1.07 PEAK FLOW RATE(CFS) = 2.89

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 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.) = 12.28  
 RAINFALL INTENSITY(INCH/HR) = 3.11  
 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.72  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.91  
 AREA-AVERAGED  $A_p$  = 0.80  
 EFFECTIVE STREAM AREA(ACRES) = 4.96  
 TOTAL STREAM AREA(ACRES) = 4.96  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.65

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5405.00 TO NODE 5410.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 707.30 DOWNSTREAM ELEVATION(FEET) = 703.70

\*\* CONFLUENCE DATA \*\*  

STREAM	Q	$T_c$	Intensity	$F_p$ ( $F_m$ )	$A_p$	$A_e$	HEADWATER
--------	---	-------	-----------	-----------------	-------	-------	-----------

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	7.44	10.58	3.399	0.73 ( 0.34)	0.46	2.7 5408.00
2	10.65	12.28	3.109	0.91 ( 0.72)	0.80	5.0 5400.00

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	17.73	10.58	3.399	0.86 ( 0.57)	0.67	7.0	5408.00
2	17.38	12.28	3.109	0.87 ( 0.59)	0.68	7.7	5400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 17.73 Tc(MIN.) = 10.58  
EFFECTIVE AREA(ACRES) = 6.98 AREA-AVERAGED Fm(INCH/HR) = 0.57  
AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.67  
TOTAL AREA(ACRES) = 7.7  
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5410.00 = 631.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5410.00 TO NODE 5411.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 692.13 DOWNSTREAM(FEET) = 690.07  
FLOW LENGTH(FEET) = 554.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.14  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 17.73  
PIPE TRAVEL TIME(MIN.) = 1.80 Tc(MIN.) = 12.38  
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5411.00 = 1185.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5411.00 TO NODE 5411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 12.38  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.094  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.40 0.98 0.100 32  
PUBLIC PARK A 0.25 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.388  
SUBAREA AREA(ACRES) = 0.65 SUBAREA RUNOFF(CFS) = 1.59  
EFFECTIVE AREA(ACRES) = 7.63 AREA-AVERAGED Fm(INCH/HR) = 0.56  
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.64  
TOTAL AREA(ACRES) = 8.3 PEAK FLOW RATE(CFS) = 17.73  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 5411.00 TO NODE 5411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 12.38  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.094  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.41 0.98 0.100 32  
PUBLIC PARK A 0.27 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.398  
SUBAREA AREA(ACRES) = 0.68 SUBAREA RUNOFF(CFS) = 1.66  
EFFECTIVE AREA(ACRES) = 8.31 AREA-AVERAGED Fm(INCH/HR) = 0.54  
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.62  
TOTAL AREA(ACRES) = 9.0 PEAK FLOW RATE(CFS) = 19.06

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5411.00 TO NODE 5411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 12.38  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.094  
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" A 1.71 0.98 0.500 32  
SCHOOL A 5.80 0.98 0.600 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.577  
SUBAREA AREA(ACRES) = 7.51 SUBAREA RUNOFF(CFS) = 17.11  
EFFECTIVE AREA(ACRES) = 15.82 AREA-AVERAGED Fm(INCH/HR) = 0.55  
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.60  
TOTAL AREA(ACRES) = 16.5 PEAK FLOW RATE(CFS) = 36.16

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5411.00 TO NODE 5415.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 690.07 DOWNSTREAM(FEET) = 689.61  
FLOW LENGTH(FEET) = 92.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.05  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 36.16  
PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 12.60  
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5415.00 = 1277.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5415.00 TO NODE 5415.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.60
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.061
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A       0.21     0.98     0.100    32
PUBLIC PARK             A       0.14     0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.35      SUBAREA RUNOFF(CFS) = 0.84
EFFECTIVE AREA(ACRES) = 16.17   AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 16.9        PEAK FLOW RATE(CFS) = 36.55

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FLOW PROCESS FROM NODE 5415.00 TO NODE 5415.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.60
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.061
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A       0.21     0.98     0.100    32
PUBLIC PARK             A       0.18     0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.446
SUBAREA AREA(ACRES) = 0.39      SUBAREA RUNOFF(CFS) = 0.92
EFFECTIVE AREA(ACRES) = 16.56   AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 17.2        PEAK FLOW RATE(CFS) = 37.47

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FLOW PROCESS FROM NODE 5415.00 TO NODE 5420.00 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) = 689.61 DOWNSTREAM(FEET) = 687.37
FLOW LENGTH(FEET) = 595.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.26
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 37.47
PIPE TRAVEL TIME(MIN.) = 1.58 Tc(MIN.) = 14.18
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5420.00 = 1872.00 FEET.

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*****
FLOW PROCESS FROM NODE 5420.00 TO NODE 5420.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.18

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* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.851
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C       10.00    0.57     0.500    69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   A       4.69     0.98     0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 14.69     SUBAREA RUNOFF(CFS) = 33.09
EFFECTIVE AREA(ACRES) = 31.25   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 31.9        PEAK FLOW RATE(CFS) = 67.43

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FLOW PROCESS FROM NODE 5420.00 TO NODE 5420.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.18
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.851
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A       0.30     0.98     0.100    32
PUBLIC PARK             A       0.26     0.98     0.850    32
COMMERCIAL              C       0.15     0.57     0.100    69
PUBLIC PARK             C       0.12     0.57     0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.443
SUBAREA AREA(ACRES) = 0.83      SUBAREA RUNOFF(CFS) = 1.85
EFFECTIVE AREA(ACRES) = 32.08   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 32.8        PEAK FLOW RATE(CFS) = 69.28

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FLOW PROCESS FROM NODE 5420.00 TO NODE 5420.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.18
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.851
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A       0.32     0.98     0.100    32
PUBLIC PARK             A       0.28     0.98     0.850    32
COMMERCIAL              C       0.17     0.57     0.100    69
PUBLIC PARK             C       0.12     0.57     0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.437
SUBAREA AREA(ACRES) = 0.89      SUBAREA RUNOFF(CFS) = 1.99
EFFECTIVE AREA(ACRES) = 32.97   AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 33.7        PEAK FLOW RATE(CFS) = 71.27

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 5420.00 TO NODE 5425.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 687.37 DOWNSTREAM(FEET) = 679.09  
FLOW LENGTH(FEET) = 640.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.61  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 71.27  
PIPE TRAVEL TIME(MIN.) = 0.92 Tc(MIN.) = 15.10  
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5425.00 = 2512.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 15.10  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.746  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.53 0.57 0.100 69  
PUBLIC PARK C 0.44 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440  
SUBAREA AREA(ACRES) = 0.97 SUBAREA RUNOFF(CFS) = 2.18  
EFFECTIVE AREA(ACRES) = 33.94 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.54  
TOTAL AREA(ACRES) = 34.6 PEAK FLOW RATE(CFS) = 71.27  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 15.10  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.746  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.53 0.57 0.100 69  
PUBLIC PARK C 0.44 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440  
SUBAREA AREA(ACRES) = 0.97 SUBAREA RUNOFF(CFS) = 2.18  
EFFECTIVE AREA(ACRES) = 34.91 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.81 AREA-AVERAGED Ap = 0.54  
TOTAL AREA(ACRES) = 35.6 PEAK FLOW RATE(CFS) = 72.50

FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 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 72.50 15.10 2.746 0.81( 0.44) 0.54 34.9 5408.00  
2 68.25 16.82 2.574 0.82( 0.44) 0.54 35.6 5400.00  
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5425.00 = 2512.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*

PEAK FLOW RATE(CFS) = 1064.32 Tc(MIN.) = 38.00  
AREA-AVERAGED Fm(INCH/HR) = 0.21 Ybar = 0.24  
TOTAL AREA(ACRES) = 798.7  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5425.00 = 15159.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.63; LAG(HR) = 0.51; Fm(INCH/HR) = 0.22; Ybar = 0.25  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 834.3  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5425.00 = 15159.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0309; Lca/L=0.4,n=.0277; Lca/L=0.5,n=.0255;Lca/L=0.6,n=.0238  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 320.00  
PEAK FLOW RATE(CFS) = 1102.86

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5425.00 TO NODE 5455.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 676.55 DOWNSTREAM(FEET) = 671.57  
FLOW LENGTH(FEET) = 712.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 114.0 INCH PIPE IS 89.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.39  
ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 1102.86  
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 38.65  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5455.00 = 15871.00 FEET.

FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 38.65  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.562  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.66	0.57	0.100	69
PUBLIC PARK	C	0.46	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.408  
 SUBAREA AREA(ACRES) = 1.12

UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.44; 30M= 0.91; 1H= 1.20; 3H= 2.10; 6H= 3.00; 24H= 6.00  
 S-GRAPH: VALLEY(DEV.)=100.0%; VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%; FOOTHILL= 0.0%; DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.64; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 835.4  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5455.00 = 15871.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3, n=.0304; Lca/L=0.4, n=.0273; Lca/L=0.5, n=.0251; Lca/L=0.6, n=.0234  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 320.42  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1097.15  
 TOTAL AREA(ACRES) = 835.4 PEAK FLOW RATE(CFS) = 1102.86  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 PEAK FLOW RATE(CFS) = 1102.86 Tc(MIN.) = 38.65  
 AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.25  
 TOTAL AREA(ACRES) = 835.4

\*\*\*\*\*

FLOW PROCESS FROM NODE 5430.00 TO NODE 5431.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 727.00  
 ELEVATION DATA: UPSTREAM(FEET) = 703.40 DOWNSTREAM(FEET) = 687.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.657  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.207  
 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
RESIDENTIAL	C	3.81	0.57	0.500	69	

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 3.81 SUBAREA RUNOFF(CFS) = 8.97  
 EFFECTIVE AREA(ACRES) = 7.76 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 7.8 PEAK FLOW RATE(CFS) = 17.73

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN	(MIN.)
RESIDENTIAL	C	1.00	0.57	0.500	69	11.66
"5-7 DWELLINGS/ACRE"	C	1.00	0.57	0.500	69	11.66
RESIDENTIAL	A	2.95	0.98	0.500	32	11.66
"5-7 DWELLINGS/ACRE"	A	2.95	0.98	0.500	32	11.66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.87  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 9.85  
 TOTAL AREA(ACRES) = 3.95 PEAK FLOW RATE(CFS) = 9.85

\*\*\*\*\*

FLOW PROCESS FROM NODE 5431.00 TO NODE 5432.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 687.50 DOWNSTREAM(FEET) = 682.10  
 FLOW LENGTH(FEET) = 749.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.86  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 9.85  
 PIPE TRAVEL TIME(MIN.) = 2.13 Tc(MIN.) = 13.79  
 LONGEST FLOWPATH FROM NODE 5430.00 TO NODE 5432.00 = 1476.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5432.00 TO NODE 5432.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 13.79  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.900  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL	C	3.81	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 3.81 SUBAREA RUNOFF(CFS) = 8.97  
 EFFECTIVE AREA(ACRES) = 7.76 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 7.8 PEAK FLOW RATE(CFS) = 17.73

\*\*\*\*\*

FLOW PROCESS FROM NODE 5432.00 TO NODE 5435.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 682.10 DOWNSTREAM(FEET) = 681.00  
 FLOW LENGTH(FEET) = 166.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.58  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 17.73

PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 14.21  
LONGEST FLOWPATH FROM NODE 5430.00 TO NODE 5435.00 = 1642.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5435.00 TO NODE 5435.00 IS CODE = 81

=====  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 14.21  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.848  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 1.85 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 1.85 SUBAREA RUNOFF(CFS) = 4.27  
EFFECTIVE AREA(ACRES) = 9.61 AREA-AVERAGED Fm(INCH/HR) = 0.35  
AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 9.6 PEAK FLOW RATE(CFS) = 21.64

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5435.00 TO NODE 5455.00 IS CODE = 31

=====  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM( FEET) = 681.00 DOWNSTREAM( FEET) = 675.09  
FLOW LENGTH( FEET) = 357.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.0 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC.) = 9.73  
ESTIMATED PIPE DIAMETER( INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 21.64  
PIPE TRAVEL TIME( MIN.) = 0.61 Tc( MIN.) = 14.82  
LONGEST FLOWPATH FROM NODE 5430.00 TO NODE 5455.00 = 1999.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 81

=====  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 14.82  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.777  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 2.53 0.57 0.500 69  
PUBLIC PARK C 0.90 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.592  
SUBAREA AREA(ACRES) = 3.43 SUBAREA RUNOFF(CFS) = 7.54  
EFFECTIVE AREA(ACRES) = 13.04 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 13.0 PEAK FLOW RATE(CFS) = 28.56

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 81

=====  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 14.82  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.777  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 0.96 0.57 0.500 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 0.96 SUBAREA RUNOFF(CFS) = 2.15  
EFFECTIVE AREA(ACRES) = 14.00 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 14.0 PEAK FLOW RATE(CFS) = 30.72

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 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.) = 14.82  
RAINFALL INTENSITY(INCH/HR) = 2.78  
AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.65  
AREA-AVERAGED Ap = 0.52  
EFFECTIVE STREAM AREA(ACRES) = 14.00  
TOTAL STREAM AREA(ACRES) = 14.00  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 30.72  
\*\* CONFLUENCE DATA \*\*  
STREAM Q Tc AREA HEADWATER  
NUMBER (CFS) (MIN.) (ACRES) NODE  
1 1102.86 38.65 835.43 5000.00  
2 30.72 14.82 14.00 5430.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.64; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR = 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 849.4  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5455.00 = 15871.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0303; Lca/L=0.4,n=.0271; Lca/L=0.5,n=.0249;Lca/L=0.6,n=.0233  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 325.11

PEAK FLOW RATE(CFS) = 1113.51

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5455.00 TO NODE 5470.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 671.57 DOWNSTREAM(FEET) = 666.50  
FLOW LENGTH(FEET) = 767.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 120.0 INCH PIPE IS 86.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.30  
ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 1113.51  
PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 39.35  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 39.35  
\* 100 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
COMMERCIAL	C	1.23	0.57	0.100	69
PUBLIC PARK	C	1.01	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.438  
SUBAREA AREA(ACRES) = 2.24

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.66; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 851.7  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0298; Lca/L=0.4,n=.0267; Lca/L=0.5,n=.0246;Lca/L=0.6,n=.0229  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 325.96  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1107.98  
TOTAL AREA(ACRES) = 851.7 PEAK FLOW RATE(CFS) = 1113.51  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 39.35  
\* 100 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
COMMERCIAL	C	0.58	0.57	0.100	69
PUBLIC PARK	C	0.52	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455  
SUBAREA AREA(ACRES) = 1.10

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.66; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 852.8  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0298; Lca/L=0.4,n=.0267; Lca/L=0.5,n=.0246;Lca/L=0.6,n=.0229  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 326.36  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1109.33  
TOTAL AREA(ACRES) = 852.8 PEAK FLOW RATE(CFS) = 1113.51  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 39.35  
\* 100 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
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	4.00	0.98	0.200	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	29.31	0.57	0.200	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 33.31

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.66; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 886.1  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0298; Lca/L=0.4,n=.0267; Lca/L=0.5,n=.0246;Lca/L=0.6,n=.0229  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 340.61  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1153.54

TOTAL AREA(ACRES) = 886.1 PEAK FLOW RATE(CFS) = 1153.54

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 886.1 TC(MIN.) = 39.35

AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.25

PEAK FLOW RATE(CFS) = 1153.54

=====

END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS





\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Analysis prepared by:

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USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH  
FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

AREA-AVERAGED  
DURATION RAINFALL(INCH)  
5-MINUTES 0.35  
30-MINUTES 0.71  
1-HOUR 0.94  
3-HOUR 1.64  
6-HOUR 2.32  
24-HOUR 4.49

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* MILL CREEK WITH DIVERSION FROM THE LAKES \*  
\* 25-YR STUDY \*  
\* AREA 'D' \*  
\*\*\*\*\*

FILE NAME: MCREEK\_M.DAT  
TIME/DATE OF STUDY: 10:02 08/24/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*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)	HIKE (FT)	MANNING FACTOR (n)
1	18.0	12.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5000.00 TO NODE 5002.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 900.00  
ELEVATION DATA: UPSTREAM(FEET) = 810.00 DOWNSTREAM(FEET) = 806.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.646  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.287  
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 A 3.75 0.98 0.100 32 13.65  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 7.39  
TOTAL AREA(ACRES) = 3.75 PEAK FLOW RATE(CFS) = 7.39

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5002.00 TO NODE 5004.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<<<<

===== UPSTREAM ELEVATION(FEET) = 806.00 DOWNSTREAM ELEVATION(FEET) = 804.00  
STREET LENGTH(FEET) = 700.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.77

```

***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.56
HALFSTREET FLOOD WIDTH(FEET) = 18.00
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.98
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.12
STREET FLOW TRAVEL TIME(MIN.) = 5.89 Tc(MIN.) = 19.53
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.844
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
  LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A       11.83    0.98      0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.83      SUBAREA RUNOFF(CFS) = 18.59
EFFECTIVE AREA(ACRES) = 15.58    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 15.6        PEAK FLOW RATE(CFS) = 24.49

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.62  HALFSTREET FLOOD WIDTH(FEET) = 18.00
FLOW VELOCITY(FEET/SEC.) = 2.30  DEPTH*VELOCITY(FT*FT/SEC.) = 1.43
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5004.00 = 1600.00 FEET.

*****
FLOW PROCESS FROM NODE 5004.00 TO NODE 5006.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
-----
UPSTREAM ELEVATION(FEET) = 804.00  DOWNSTREAM ELEVATION(FEET) = 800.00
STREET LENGTH(FEET) = 530.00  CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(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) = 33.36
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.59
HALFSTREET FLOOD WIDTH(FEET) = 18.00
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.47
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.06
STREET FLOW TRAVEL TIME(MIN.) = 2.54 Tc(MIN.) = 22.08
* 25 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
COMMERCIAL              A       12.19    0.98      0.100    32

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 12.19      SUBAREA RUNOFF(CFS) = 17.73
EFFECTIVE AREA(ACRES) = 27.77    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 27.8        PEAK FLOW RATE(CFS) = 40.38

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```

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.63  HALFSTREET FLOOD WIDTH(FEET) = 18.00
FLOW VELOCITY(FEET/SEC.) = 3.76  DEPTH*VELOCITY(FT*FT/SEC.) = 2.35
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5006.00 = 2130.00 FEET.

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*****
FLOW PROCESS FROM NODE 5006.00 TO NODE 5010.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 793.00  DOWNSTREAM(FEET) = 784.00
FLOW LENGTH(FEET) = 670.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.39
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.38
PIPE TRAVEL TIME(MIN.) = 1.07  Tc(MIN.) = 23.15
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5010.00 = 2800.00 FEET.

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*****
FLOW PROCESS FROM NODE 5010.00 TO NODE 5010.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 23.15
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.665
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
  LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
PUBLIC PARK              A       1.27    0.98      0.850    32
COMMERCIAL              A       12.40    0.98      0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.170
SUBAREA AREA(ACRES) = 13.67      SUBAREA RUNOFF(CFS) = 18.45
EFFECTIVE AREA(ACRES) = 41.44    AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 41.4        PEAK FLOW RATE(CFS) = 57.63

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*****
FLOW PROCESS FROM NODE 5010.00 TO NODE 5010.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 23.15
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.665
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
  LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN

```

COMMERCIAL A 0.61 0.98 0.100 32  
 PUBLIC PARK A 0.16 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.256  
 SUBAREA AREA(ACRES) = 0.77 SUBAREA RUNOFF(CFS) = 0.98  
 EFFECTIVE AREA(ACRES) = 42.21 AREA-AVERAGED Fm(INCH/HR) = 0.12  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.13  
 TOTAL AREA(ACRES) = 42.2 PEAK FLOW RATE(CFS) = 58.61

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.439  
 SUBAREA AREA(ACRES) = 1.15 SUBAREA RUNOFF(CFS) = 1.23  
 EFFECTIVE AREA(ACRES) = 44.48 AREA-AVERAGED Fm(INCH/HR) = 0.14  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.14  
 TOTAL AREA(ACRES) = 44.5 PEAK FLOW RATE(CFS) = 59.86  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5011.00 TO NODE 5012.00 IS CODE = 31

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5010.00 TO NODE 5010.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 23.15  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.665  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.61	0.98	0.100	32
PUBLIC PARK	A	0.51	0.98	0.850	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.442  
 SUBAREA AREA(ACRES) = 1.12 SUBAREA RUNOFF(CFS) = 1.24  
 EFFECTIVE AREA(ACRES) = 43.33 AREA-AVERAGED Fm(INCH/HR) = 0.13  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.13  
 TOTAL AREA(ACRES) = 43.3 PEAK FLOW RATE(CFS) = 59.86

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5010.00 TO NODE 5011.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 784.00 DOWNSTREAM(FEET) = 782.48  
 FLOW LENGTH(FEET) = 479.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.64  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 59.86  
 PIPE TRAVEL TIME(MIN.) = 1.20 Tc(MIN.) = 24.35  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5011.00 = 3279.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5011.00 TO NODE 5011.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 24.35  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.615  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.63	0.98	0.100	32
PUBLIC PARK	A	0.52	0.98	0.850	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 782.48 DOWNSTREAM(FEET) = 780.95  
 FLOW LENGTH(FEET) = 482.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.64  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 59.86  
 PIPE TRAVEL TIME(MIN.) = 1.21 Tc(MIN.) = 25.56  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5012.00 = 3761.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5012.00 TO NODE 5012.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 25.56  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.569  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.53	0.98	0.100	32
PUBLIC PARK	A	0.36	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.403  
 SUBAREA AREA(ACRES) = 0.89 SUBAREA RUNOFF(CFS) = 0.94  
 EFFECTIVE AREA(ACRES) = 45.37 AREA-AVERAGED Fm(INCH/HR) = 0.14  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.15  
 TOTAL AREA(ACRES) = 45.4 PEAK FLOW RATE(CFS) = 59.86  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5012.00 TO NODE 5015.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 780.95 DOWNSTREAM(FEET) = 779.48  
 FLOW LENGTH(FEET) = 460.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.66  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 59.86  
 PIPE TRAVEL TIME(MIN.) = 1.15 Tc(MIN.) = 26.71  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5015.00 = 4221.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5015.00 TO NODE 5015.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 26.71  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.528  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.46	0.98	0.100	32
PUBLIC PARK	A	0.38	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.439  
SUBAREA AREA(ACRES) = 0.84 SUBAREA RUNOFF(CFS) = 0.83  
EFFECTIVE AREA(ACRES) = 46.21 AREA-AVERAGED Fm(INCH/HR) = 0.15  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.15  
TOTAL AREA(ACRES) = 46.2 PEAK FLOW RATE(CFS) = 59.86  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5015.00 TO NODE 5020.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 779.48 DOWNSTREAM(FEET) = 760.54  
FLOW LENGTH(FEET) = 1937.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.08  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 59.86  
PIPE TRAVEL TIME(MIN.) = 3.20 Tc(MIN.) = 29.92  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5020.00 = 6158.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5020.00 TO NODE 5020.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 29.92  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.428  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.20	0.98	0.100	32
PUBLIC PARK	A	1.11	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.460  
SUBAREA AREA(ACRES) = 2.31 SUBAREA RUNOFF(CFS) = 2.04  
EFFECTIVE AREA(ACRES) = 48.52 AREA-AVERAGED Fm(INCH/HR) = 0.16  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.17  
TOTAL AREA(ACRES) = 48.5 PEAK FLOW RATE(CFS) = 59.86  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5020.00 TO NODE 5020.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 29.92  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.428  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
SCHOOL	A	4.59	0.98	0.600	32
COMMERCIAL	A	2.10	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.443  
SUBAREA AREA(ACRES) = 6.69 SUBAREA RUNOFF(CFS) = 6.00  
EFFECTIVE AREA(ACRES) = 55.21 AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 55.2 PEAK FLOW RATE(CFS) = 61.25

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5020.00 TO NODE 5114.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 760.54 DOWNSTREAM(FEET) = 748.44  
FLOW LENGTH(FEET) = 1019.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.02  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 61.25  
PIPE TRAVEL TIME(MIN.) = 1.54 Tc(MIN.) = 31.46  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5114.00 = 7177.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5114.00 TO NODE 5114.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 31.46  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.385  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.68	0.98	0.100	32
PUBLIC PARK	A	0.64	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.464  
SUBAREA AREA(ACRES) = 1.32 SUBAREA RUNOFF(CFS) = 1.11  
EFFECTIVE AREA(ACRES) = 56.53 AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.21  
TOTAL AREA(ACRES) = 56.5 PEAK FLOW RATE(CFS) = 61.25  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5114.00 TO NODE 5114.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 31.46
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.385
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A        0.75    0.98    0.100    32
PUBLIC PARK             A        0.57    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA AREA(ACRES) = 1.32      SUBAREA RUNOFF(CFS) = 1.15
EFFECTIVE AREA(ACRES) = 57.85  AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 57.9      PEAK FLOW RATE(CFS) = 61.41

*****
FLOW PROCESS FROM NODE 5114.00 TO NODE 5114.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 31.46
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.385
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A        0.83    0.98    0.100    32
PUBLIC PARK             A        0.66    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.432
SUBAREA AREA(ACRES) = 1.49      SUBAREA RUNOFF(CFS) = 1.29
EFFECTIVE AREA(ACRES) = 59.34  AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 59.3      PEAK FLOW RATE(CFS) = 62.70

*****
FLOW PROCESS FROM NODE 5114.00 TO NODE 5115.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 748.44  DOWNSTREAM(FEET) = 747.58
FLOW LENGTH(FEET) = 47.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.97
ESTIMATED PIPE DIAMETER(INCH) = 33.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 62.70
PIPE TRAVEL TIME(MIN.) = 0.06  Tc(MIN.) = 31.52
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5115.00 = 7224.00 FEET.

*****
FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

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*****
FLOW PROCESS FROM NODE 5043.00 TO NODE 5044.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 410.00
ELEVATION DATA: UPSTREAM(FEET) = 773.59  DOWNSTREAM(FEET) = 768.25

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.036
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.142
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              A        0.32    0.98    0.100    32  8.04
PUBLIC PARK             A        0.30    0.98    0.850    32  12.77
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA RUNOFF(CFS) = 1.50
TOTAL AREA(ACRES) = 0.62  PEAK FLOW RATE(CFS) = 1.50

*****
FLOW PROCESS FROM NODE 5044.00 TO NODE 5044.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 8.04
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.142
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A        0.32    0.98    0.100    32
PUBLIC PARK             A        0.30    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA AREA(ACRES) = 0.62      SUBAREA RUNOFF(CFS) = 1.50
EFFECTIVE AREA(ACRES) = 1.24  AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 1.2      PEAK FLOW RATE(CFS) = 3.00

*****
FLOW PROCESS FROM NODE 5044.00 TO NODE 5045.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 757.77  DOWNSTREAM(FEET) = 753.86
FLOW LENGTH(FEET) = 400.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.90
ESTIMATED PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.00
PIPE TRAVEL TIME(MIN.) = 1.36  Tc(MIN.) = 9.40

```



LONGEST FLOWPATH FROM NODE 5043.00 TO NODE 5045.00 = 810.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 9.40  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.860  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.29	0.98	0.100	32
PUBLIC PARK	A	0.27	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462  
SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.21  
EFFECTIVE AREA(ACRES) = 1.80 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 3.90

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 9.40  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.860  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.29	0.98	0.100	32
PUBLIC PARK	A	0.27	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462  
SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.21  
EFFECTIVE AREA(ACRES) = 2.36 AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.46  
TOTAL AREA(ACRES) = 2.4 PEAK FLOW RATE(CFS) = 5.12

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 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.) = 9.40  
RAINFALL INTENSITY(INCH/HR) = 2.86  
AREA-AVERAGED Fm(INCH/HR) = 0.45  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.46  
EFFECTIVE STREAM AREA(ACRES) = 2.36  
TOTAL STREAM AREA(ACRES) = 2.36  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.12

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5025.00 TO NODE 5030.00 IS CODE = 21

-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 720.00  
ELEVATION DATA: UPSTREAM(FEET) = 793.00 DOWNSTREAM(FEET) = 785.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.391  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.693  
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	A	5.96	0.98	0.100	32	10.39

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 13.92  
TOTAL AREA(ACRES) = 5.96 PEAK FLOW RATE(CFS) = 13.92

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5030.00 TO NODE 5035.00 IS CODE = 51

-----  
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 784.30  
CHANNEL LENGTH THRU SUBAREA(FEET) = 340.00 CHANNEL SLOPE = 0.0021  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.284  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	8.48	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 22.30  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.73  
AVERAGE FLOW DEPTH(FEET) = 0.35 TRAVEL TIME(MIN.) = 3.28  
Tc(MIN.) = 13.67  
SUBAREA AREA(ACRES) = 8.48 SUBAREA RUNOFF(CFS) = 16.69  
EFFECTIVE AREA(ACRES) = 14.44 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 14.4 PEAK FLOW RATE(CFS) = 28.42

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.39 FLOW VELOCITY(FEET/SEC.) = 1.83  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5035.00 = 1060.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5035.00 TO NODE 5040.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 774.30 DOWNSTREAM(FEET) = 770.10
FLOW LENGTH(FEET) = 860.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.57
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 28.42
PIPE TRAVEL TIME(MIN.) = 2.18 Tc(MIN.) = 15.85
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5040.00 = 1920.00 FEET.

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*****
FLOW PROCESS FROM NODE 5040.00 TO NODE 5040.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 15.85
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.090
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            A      19.84    0.98    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 19.84 SUBAREA RUNOFF(CFS) = 35.58
EFFECTIVE AREA(ACRES) = 34.28 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 34.3 PEAK FLOW RATE(CFS) = 61.47

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*****
FLOW PROCESS FROM NODE 5040.00 TO NODE 5045.00 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) = 770.10 DOWNSTREAM(FEET) = 753.86
FLOW LENGTH(FEET) = 1010.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.20
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 61.47
PIPE TRAVEL TIME(MIN.) = 1.38 Tc(MIN.) = 17.23
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5045.00 = 2930.00 FEET.

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*****
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 17.23
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.988
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            A      23.34    0.98    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

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SUBAREA AREA(ACRES) = 23.34 SUBAREA RUNOFF(CFS) = 39.71
EFFECTIVE AREA(ACRES) = 57.62 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 57.6 PEAK FLOW RATE(CFS) = 98.03

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*****
FLOW PROCESS FROM NODE 5045.00 TO NODE 5045.00 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.) = 17.23
RAINFALL INTENSITY(INCH/HR) = 1.99
AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 57.62
TOTAL STREAM AREA(ACRES) = 57.62
PEAK FLOW RATE(CFS) AT CONFLUENCE = 98.03

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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	5.12	9.40	2.860	0.98( 0.45)	0.46	2.4	5043.00
2	98.03	17.23	1.988	0.97( 0.10)	0.10	57.6	5025.00

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

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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	83.25	9.40	2.860	0.98( 0.12)	0.13	33.8	5043.00
2	101.30	17.23	1.988	0.97( 0.11)	0.11	60.0	5025.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 101.30 Tc(MIN.) = 17.23
EFFECTIVE AREA(ACRES) = 59.98 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.11
TOTAL AREA(ACRES) = 60.0
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5045.00 = 2930.00 FEET.

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*****
FLOW PROCESS FROM NODE 5045.00 TO NODE 5046.00 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) = 753.86 DOWNSTREAM(FEET) = 752.05
FLOW LENGTH(FEET) = 461.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 38.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.27
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 101.30

```

PIPE TRAVEL TIME(MIN.) = 0.93 Tc(MIN.) = 18.16  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5046.00 = 3391.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5046.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.16  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.926  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.49 0.98 0.100 32  
PUBLIC PARK A 0.46 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463  
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 1.26  
EFFECTIVE AREA(ACRES) = 60.93 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 60.9 PEAK FLOW RATE(CFS) = 101.30  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5046.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.16  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.926  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.49 0.98 0.100 32  
PUBLIC PARK A 0.46 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463  
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 1.26  
EFFECTIVE AREA(ACRES) = 61.88 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 61.9 PEAK FLOW RATE(CFS) = 101.30  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5046.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.16  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.926  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 13.50 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850

SUBAREA AREA(ACRES) = 13.50 SUBAREA RUNOFF(CFS) = 13.34  
EFFECTIVE AREA(ACRES) = 75.38 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.25  
TOTAL AREA(ACRES) = 75.4 PEAK FLOW RATE(CFS) = 113.83

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5046.00 TO NODE 5110.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 752.05 DOWNSTREAM(FEET) = 749.99  
FLOW LENGTH(FEET) = 590.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.12  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 113.83  
PIPE TRAVEL TIME(MIN.) = 1.21 Tc(MIN.) = 19.37  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5110.00 = 3981.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.37  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.853  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.26 0.98 0.100 32  
PUBLIC PARK A 0.23 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.452  
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 0.62  
EFFECTIVE AREA(ACRES) = 75.87 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.26  
TOTAL AREA(ACRES) = 75.9 PEAK FLOW RATE(CFS) = 113.83  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.37  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.853  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.25 0.98 0.100 32  
PUBLIC PARK A 0.24 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467  
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 0.62  
EFFECTIVE AREA(ACRES) = 76.36 AREA-AVERAGED Fm(INCH/HR) = 0.25

AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.26  
 TOTAL AREA(ACRES) = 76.4 PEAK FLOW RATE(CFS) = 113.83  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 10  
 -----  
 >>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<  
 =====

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5050.00 TO NODE 5055.00 IS CODE = 21  
 -----  
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 =====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 520.00  
 ELEVATION DATA: UPSTREAM(FEET) = 797.72 DOWNSTREAM(FEET) = 783.05

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.689  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.808  
 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  
 "5-7 DWELLINGS/ACRE" A 6.57 0.98 0.500 32 9.69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 13.72  
 TOTAL AREA(ACRES) = 6.57 PEAK FLOW RATE(CFS) = 13.72

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5055.00 TO NODE 5060.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 773.05 DOWNSTREAM(FEET) = 764.33  
 FLOW LENGTH(FEET) = 740.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.60  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 13.72  
 PIPE TRAVEL TIME(MIN.) = 1.62 Tc(MIN.) = 11.31  
 LONGEST FLOWPATH FROM NODE 5050.00 TO NODE 5060.00 = 1260.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5060.00 TO NODE 5060.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 11.31  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.559  
 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" A 9.33 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 9.33 SUBAREA RUNOFF(CFS) = 17.40  
 EFFECTIVE AREA(ACRES) = 15.90 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 15.9 PEAK FLOW RATE(CFS) = 29.65

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5060.00 TO NODE 5065.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 764.33 DOWNSTREAM(FEET) = 761.54  
 FLOW LENGTH(FEET) = 525.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.86  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 29.65  
 PIPE TRAVEL TIME(MIN.) = 1.28 Tc(MIN.) = 12.59  
 LONGEST FLOWPATH FROM NODE 5050.00 TO NODE 5065.00 = 1785.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5065.00 TO NODE 5065.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 12.59  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.400  
 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" A 5.49 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 5.49 SUBAREA RUNOFF(CFS) = 10.90  
 EFFECTIVE AREA(ACRES) = 21.39 AREA-AVERAGED Fm(INCH/HR) = 0.41  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA(ACRES) = 21.4 PEAK FLOW RATE(CFS) = 38.27

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5065.00 TO NODE 5100.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 761.54 DOWNSTREAM(FEET) = 759.53  
 FLOW LENGTH(FEET) = 165.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.89  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 38.27

PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 12.87  
LONGEST FLOWPATH FROM NODE 5050.00 TO NODE 5100.00 = 1950.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 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.) = 12.87  
RAINFALL INTENSITY(INCH/HR) = 2.37  
AREA-AVERAGED Fm(INCH/HR) = 0.41  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.42  
EFFECTIVE STREAM AREA(ACRES) = 21.39  
TOTAL STREAM AREA(ACRES) = 21.39  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 38.27

\*\*\*\*\*

FLOW PROCESS FROM NODE 5070.00 TO NODE 5075.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 730.00  
ELEVATION DATA: UPSTREAM(FEET) = 797.68 DOWNSTREAM(FEET) = 779.53

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.381  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.550  
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  
"5-7 DWELLINGS/ACRE" A 1.43 0.98 0.500 32 11.38  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 2.65  
TOTAL AREA(ACRES) = 1.43 PEAK FLOW RATE(CFS) = 2.65

\*\*\*\*\*

FLOW PROCESS FROM NODE 5075.00 TO NODE 5100.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

-----  
UPSTREAM ELEVATION(FEET) = 779.53 DOWNSTREAM ELEVATION(FEET) = 769.53  
STREET LENGTH(FEET) = 1040.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.44

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.34  
HALFSTREET FLOOD WIDTH(FEET) = 9.05  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.20  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.75  
STREET FLOW TRAVEL TIME(MIN.) = 7.87 Tc(MIN.) = 19.26  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.860

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" A 1.00 0.98 0.500 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 1.54 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.318  
SUBAREA AREA(ACRES) = 2.54 SUBAREA RUNOFF(CFS) = 3.54  
EFFECTIVE AREA(ACRES) = 3.97 AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.38  
TOTAL AREA(ACRES) = 4.0 PEAK FLOW RATE(CFS) = 5.31

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 9.89  
FLOW VELOCITY(FEET/SEC.) = 2.27 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.81  
LONGEST FLOWPATH FROM NODE 5070.00 TO NODE 5100.00 = 1770.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 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.) = 19.26  
RAINFALL INTENSITY(INCH/HR) = 1.86  
AREA-AVERAGED Fm(INCH/HR) = 0.37  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.38  
EFFECTIVE STREAM AREA(ACRES) = 3.97  
TOTAL STREAM AREA(ACRES) = 3.97  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.31

\*\*\*\*\*

FLOW PROCESS FROM NODE 5080.00 TO NODE 5085.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 520.00  
ELEVATION DATA: UPSTREAM(FEET) = 797.72 DOWNSTREAM(FEET) = 783.05

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.689  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.808  
 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 "5-7 DWELLINGS/ACRE"	A	6.58	0.98	0.500	32	9.69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 13.74  
 TOTAL AREA(ACRES) = 6.58 PEAK FLOW RATE(CFS) = 13.74

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5085.00 TO NODE 5090.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM( FEET) = 773.05 DOWNSTREAM( FEET) = 767.13  
 FLOW LENGTH( FEET) = 410.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.7 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC.) = 8.26  
 ESTIMATED PIPE DIAMETER( INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 13.74  
 PIPE TRAVEL TIME( MIN.) = 0.83 Tc( MIN.) = 10.52  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5090.00 = 930.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5090.00 TO NODE 5090.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc( MIN.) = 10.52  
 \* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 2.674  
 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"	A	6.91	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA( ACRES) = 6.91 SUBAREA RUNOFF( CFS) = 13.60  
 EFFECTIVE AREA( ACRES) = 13.49 AREA-AVERAGED Fm( INCH/HR) = 0.49  
 AREA-AVERAGED Fp( INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA( ACRES) = 13.5 PEAK FLOW RATE( CFS) = 26.54

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5090.00 TO NODE 5095.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM( FEET) = 767.13 DOWNSTREAM( FEET) = 763.05  
 FLOW LENGTH( FEET) = 355.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.0 INCHES

PIPE-FLOW VELOCITY( FEET/SEC.) = 8.88  
 ESTIMATED PIPE DIAMETER( INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 26.54  
 PIPE TRAVEL TIME( MIN.) = 0.67 Tc( MIN.) = 11.18  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5095.00 = 1285.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5095.00 TO NODE 5095.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc( MIN.) = 11.18  
 \* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 2.577  
 SUBAREA LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	3.86	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA( ACRES) = 3.86 SUBAREA RUNOFF( CFS) = 8.27  
 EFFECTIVE AREA( ACRES) = 17.35 AREA-AVERAGED Fm( INCH/HR) = 0.42  
 AREA-AVERAGED Fp( INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA( ACRES) = 17.4 PEAK FLOW RATE( CFS) = 33.64

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5095.00 TO NODE 5100.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM( FEET) = 763.05 DOWNSTREAM( FEET) = 759.53  
 FLOW LENGTH( FEET) = 686.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.3 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC.) = 6.88  
 ESTIMATED PIPE DIAMETER( INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 33.64  
 PIPE TRAVEL TIME( MIN.) = 1.66 Tc( MIN.) = 12.84  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5100.00 = 1971.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc( MIN.) = 12.84  
 \* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 2.371  
 SUBAREA LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	6.90	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA( ACRES) = 6.90 SUBAREA RUNOFF( CFS) = 13.51  
 EFFECTIVE AREA( ACRES) = 24.25 AREA-AVERAGED Fm( INCH/HR) = 0.36



AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA(ACRES) = 24.2 PEAK FLOW RATE(CFS) = 43.95

PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 13.27  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5105.00 = 2221.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5100.00 TO NODE 5100.00 IS CODE = 1

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5105.00 TO NODE 5105.00 IS CODE = 81

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<  
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<<

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

-----  
 TOTAL NUMBER OF STREAMS = 3  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:  
 TIME OF CONCENTRATION(MIN.) = 12.84  
 RAINFALL INTENSITY(INCH/HR) = 2.37  
 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.37  
 EFFECTIVE STREAM AREA(ACRES) = 24.25  
 TOTAL STREAM AREA(ACRES) = 24.25  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 43.95

-----  
 MAINLINE Tc(MIN.) = 13.27  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.325  
 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" A 7.08 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 7.08 SUBAREA RUNOFF(CFS) = 13.58  
 EFFECTIVE AREA(ACRES) = 55.33 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA(ACRES) = 56.7 PEAK FLOW RATE(CFS) = 97.94

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	38.27	12.87	2.369	0.98 (0.41)	0.42	21.4	5050.00
2	5.31	19.26	1.860	0.98 (0.37)	0.38	4.0	5070.00
3	43.95	12.84	2.371	0.98 (0.36)	0.37	24.2	5080.00

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	86.96	12.84	2.371	0.98 (0.38)	0.39	48.3	5080.00
2	86.92	12.87	2.369	0.98 (0.38)	0.39	48.3	5050.00
3	66.40	19.26	1.860	0.98 (0.38)	0.39	49.6	5070.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 86.96 Tc(MIN.) = 12.84  
 EFFECTIVE AREA(ACRES) = 48.25 AREA-AVERAGED Fm(INCH/HR) = 0.38  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.39  
 TOTAL AREA(ACRES) = 49.6  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5100.00 = 1971.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5105.00 TO NODE 5110.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

-----  
 ELEVATION DATA: UPSTREAM(FEET) = 757.79 DOWNSTREAM(FEET) = 754.21  
 FLOW LENGTH(FEET) = 520.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.13  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 97.94  
 PIPE TRAVEL TIME(MIN.) = 0.86 Tc(MIN.) = 14.12  
 LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5110.00 = 2741.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

-----  
 MAINLINE Tc(MIN.) = 14.12  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.240  
 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" A 14.26 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 14.26 SUBAREA RUNOFF(CFS) = 26.24  
 EFFECTIVE AREA(ACRES) = 69.59 AREA-AVERAGED Fm(INCH/HR) = 0.33  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 71.0 PEAK FLOW RATE(CFS) = 119.92

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5100.00 TO NODE 5105.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

-----  
 ELEVATION DATA: UPSTREAM(FEET) = 759.53 DOWNSTREAM(FEET) = 757.79  
 FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.82  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 86.96

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 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	119.92	14.12	2.240	0.98( 0.33)	0.33	69.6	5080.00
2	119.86	14.15	2.238	0.98( 0.33)	0.33	69.6	5050.00
3	93.12	20.63	1.784	0.98( 0.33)	0.33	71.0	5070.00

LONGEST FLOWPATH FROM NODE 5080.00 TO NODE 5110.00 = 2741.00 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	104.65	11.64	2.516	0.98( 0.33)	0.34	50.2	5043.00
2	113.83	19.37	1.853	0.97( 0.25)	0.26	76.4	5025.00

LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5110.00 = 3981.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	217.70	11.64	2.516	0.98( 0.33)	0.34	107.5	5043.00
2	227.52	14.12	2.240	0.98( 0.32)	0.32	128.2	5080.00
3	227.49	14.15	2.238	0.98( 0.32)	0.32	128.3	5050.00
4	212.14	19.37	1.853	0.98( 0.29)	0.29	147.1	5025.00
5	202.07	20.63	1.784	0.98( 0.29)	0.29	147.3	5070.00

TOTAL AREA(ACRES) = 147.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 227.52 Tc(MIN.) = 14.125  
EFFECTIVE AREA(ACRES) = 128.18 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.34  
TOTAL AREA(ACRES) = 147.3  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5110.00 = 3981.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5110.00 IS CODE = 12  
-----

>>>>CLEAR MEMORY BANK # 2 <<<<<  
=====

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5110.00 TO NODE 5111.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 749.99 DOWNSTREAM(FEET) = 749.73  
FLOW LENGTH(FEET) = 86.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.11  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 227.52

PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 14.28  
LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5111.00 = 4067.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5111.00 TO NODE 5111.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 14.28  
\* 25 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  
COMMERCIAL A 0.29 0.98 0.100 32  
PUBLIC PARK A 0.21 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.415  
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 0.82  
EFFECTIVE AREA(ACRES) = 128.68 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 147.8 PEAK FLOW RATE(CFS) = 227.52  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5111.00 TO NODE 5111.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 14.28  
\* 25 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  
COMMERCIAL A 0.25 0.98 0.100 32  
PUBLIC PARK A 0.24 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467  
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 0.78  
EFFECTIVE AREA(ACRES) = 129.17 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 148.3 PEAK FLOW RATE(CFS) = 227.52  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5111.00 TO NODE 5115.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 749.73 DOWNSTREAM(FEET) = 747.73  
FLOW LENGTH(FEET) = 581.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 56.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.50  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 227.52  
PIPE TRAVEL TIME(MIN.) = 1.02 Tc(MIN.) = 15.30

LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5115.00 = 4648.00 FEET.

LONGEST FLOWPATH FROM NODE 5025.00 TO NODE 5115.00 = 4648.00 FEET.

\*\*\*\*\*

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*

FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 81

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
1 62.70 31.52 1.384 0.98( 0.21) 0.22 59.3 5000.00  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5115.00 = 7224.00 FEET.

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 15.30  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.135  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.29 0.98 0.100 32  
PUBLIC PARK A 0.22 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424  
SUBAREA AREA(ACRES) = 0.51 SUBAREA RUNOFF(CFS) = 0.79  
EFFECTIVE AREA(ACRES) = 129.68 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 148.8 PEAK FLOW RATE(CFS) = 227.52  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\* PEAK FLOW RATE TABLE \*\*

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
1 264.74 12.82 2.374 0.98( 0.31) 0.32 133.6 5043.00  
2 277.46 15.30 2.135 0.98( 0.30) 0.31 159.0 5080.00  
3 277.45 15.32 2.133 0.98( 0.30) 0.31 159.1 5050.00  
4 267.14 20.56 1.788 0.98( 0.27) 0.28 187.8 5025.00  
5 258.14 21.84 1.724 0.98( 0.27) 0.28 190.4 5070.00  
6 216.82 31.52 1.384 0.98( 0.27) 0.27 208.6 5000.00  
TOTAL AREA(ACRES) = 208.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 277.46 Tc(MIN.) = 15.301  
EFFECTIVE AREA(ACRES) = 158.98 AREA-AVERAGED Fm(INCH/HR) = 0.30  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.31  
TOTAL AREA(ACRES) = 208.6

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5115.00 = 7224.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 15.30  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.135  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.28 0.98 0.100 32  
PUBLIC PARK A 0.21 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.421  
SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 0.76  
EFFECTIVE AREA(ACRES) = 130.17 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 149.3 PEAK FLOW RATE(CFS) = 227.52  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

\*\*\*\*\*

FLOW PROCESS FROM NODE 5115.00 TO NODE 5116.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 747.58 DOWNSTREAM(FEET) = 746.68  
FLOW LENGTH(FEET) = 301.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 61.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.54  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 277.46  
PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 15.83  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5116.00 = 7525.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5115.00 TO NODE 5115.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

\*\*\*\*\*

FLOW PROCESS FROM NODE 5116.00 TO NODE 5116.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\* MAIN STREAM CONFLUENCE DATA \*\*  
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
1 217.70 12.82 2.374 0.98( 0.33) 0.34 109.5 5043.00  
2 227.52 15.30 2.135 0.97( 0.32) 0.33 130.2 5080.00  
3 227.49 15.32 2.133 0.98( 0.32) 0.33 130.3 5050.00  
4 212.14 20.56 1.788 0.98( 0.29) 0.30 149.0 5025.00  
5 202.07 21.84 1.724 0.98( 0.29) 0.30 149.3 5070.00

MAINLINE Tc(MIN.) = 15.83  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.092  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
PUBLIC PARK            A            7.72        0.98        0.850        32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE"    A            1.94        0.98        0.200        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.719  
SUBAREA AREA(ACRES) = 9.66            SUBAREA RUNOFF(CFS) = 12.09  
EFFECTIVE AREA(ACRES) = 168.64    AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.97    AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 218.3            PEAK FLOW RATE(CFS) = 277.46  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5116.00 TO NODE 5117.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 746.68    DOWNSTREAM(FEET) = 744.57  
FLOW LENGTH(FEET) = 389.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 55.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.90  
ESTIMATED PIPE DIAMETER(INCH) = 72.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 277.46  
PIPE TRAVEL TIME(MIN.) = 0.54    Tc(MIN.) = 16.37  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5117.00 = 7914.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5117.00 TO NODE 5117.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
=====

MAINLINE Tc(MIN.) = 16.37  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.050  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/            SCS SOIL    AREA        Fp            Ap            SCS  
LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
COMMERCIAL            A            0.51        0.98        0.100        32  
PUBLIC PARK            A            0.48        0.98        0.850        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.464  
SUBAREA AREA(ACRES) = 0.99            SUBAREA RUNOFF(CFS) = 1.42  
EFFECTIVE AREA(ACRES) = 169.63    AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.98    AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 219.3            PEAK FLOW RATE(CFS) = 277.46  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5117.00 TO NODE 5141.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 744.57    DOWNSTREAM(FEET) = 734.24  
FLOW LENGTH(FEET) = 1156.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 49.9 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 14.38  
ESTIMATED PIPE DIAMETER(INCH) = 66.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 277.46  
PIPE TRAVEL TIME(MIN.) = 1.34    Tc(MIN.) = 17.71  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5141.00 = 9070.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
=====

MAINLINE Tc(MIN.) = 17.71  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.955  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/            SCS SOIL    AREA        Fp            Ap            SCS  
LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
COMMERCIAL            A            0.85        0.98        0.100        32  
PUBLIC PARK            A            0.79        0.98        0.850        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.461  
SUBAREA AREA(ACRES) = 1.64            SUBAREA RUNOFF(CFS) = 2.22  
EFFECTIVE AREA(ACRES) = 171.27    AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.97    AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 220.9            PEAK FLOW RATE(CFS) = 277.46  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
=====

MAINLINE Tc(MIN.) = 17.71  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.955  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/            SCS SOIL    AREA        Fp            Ap            SCS  
LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
COMMERCIAL            A            1.65        0.98        0.100        32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 1.65            SUBAREA RUNOFF(CFS) = 2.76  
EFFECTIVE AREA(ACRES) = 172.92    AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.97    AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 222.6            PEAK FLOW RATE(CFS) = 277.46  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 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.) = 17.71  
RAINFALL INTENSITY(INCH/HR) = 1.96  
AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.97

AREA-AVERAGED Ap = 0.33  
EFFECTIVE STREAM AREA(ACRES) = 172.92  
TOTAL STREAM AREA(ACRES) = 222.58  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 277.46

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 1.00 0.98 0.850 32  
RESIDENTIAL

"11+ DWELLINGS/ACRE" A 24.59 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225  
SUBAREA AREA(ACRES) = 25.59 SUBAREA RUNOFF(CFS) = 41.19  
EFFECTIVE AREA(ACRES) = 31.73 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.24  
TOTAL AREA(ACRES) = 31.7 PEAK FLOW RATE(CFS) = 50.74

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.64 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
FLOW VELOCITY(FEET/SEC.) = 4.52 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.89  
LONGEST FLOWPATH FROM NODE 5142.00 TO NODE 5144.00 = 1990.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5144.00 TO NODE 5141.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 741.50 DOWNSTREAM(FEET) = 735.66  
FLOW LENGTH(FEET) = 776.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.81  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 50.74  
PIPE TRAVEL TIME(MIN.) = 1.47 Tc(MIN.) = 18.41  
LONGEST FLOWPATH FROM NODE 5142.00 TO NODE 5141.00 = 2766.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 18.41  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.911

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" A 17.41 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 17.41 SUBAREA RUNOFF(CFS) = 26.88  
EFFECTIVE AREA(ACRES) = 49.14 AREA-AVERAGED Fm(INCH/HR) = 0.22  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.22  
TOTAL AREA(ACRES) = 49.1 PEAK FLOW RATE(CFS) = 74.83

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5141.00 TO NODE 5141.00 IS CODE = 1  
-----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5142.00 TO NODE 5143.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 800.00  
ELEVATION DATA: UPSTREAM(FEET) = 762.00 DOWNSTREAM(FEET) = 753.80

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.739  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.503

SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 5.30 0.98 0.200 32 11.74  
PUBLIC PARK A 0.84 0.98 0.850 32 17.50  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.289  
SUBAREA RUNOFF(CFS) = 12.27  
TOTAL AREA(ACRES) = 6.14 PEAK FLOW RATE(CFS) = 12.27

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5143.00 TO NODE 5144.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 753.80 DOWNSTREAM ELEVATION(FEET) = 741.50  
STREET LENGTH(FEET) = 1190.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.11  
\*\*\*STREET FLOWING FULL\*\*\*  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.57  
HALFSTREET FLOOD WIDTH(FEET) = 18.00  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.81  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.17  
STREET FLOW TRAVEL TIME(MIN.) = 5.20 Tc(MIN.) = 16.94  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.008

>>>>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) = 1.91
AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.22
EFFECTIVE STREAM AREA(ACRES) = 49.14
TOTAL STREAM AREA(ACRES) = 49.14
PEAK FLOW RATE(CFS) AT CONFLUENCE = 74.83

\*\* 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 8 rows of data for different stream segments.

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 7 rows of data for different stream segments.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 351.38 Tc(MIN.) = 17.73
EFFECTIVE AREA(ACRES) = 220.41 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 271.7
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5141.00 = 9070.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 5141.00 TO NODE 5215.00 IS CODE = 31
\*\*\*\*\*

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 734.24 DOWNSTREAM(FEET) = 720.42
FLOW LENGTH(FEET) = 900.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 48.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.78
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 351.38
PIPE TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 18.53
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5215.00 = 9970.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 81
\*\*\*\*\*

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.53
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.903
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.66 0.98 0.100 32
PUBLIC PARK A 0.63 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.466
SUBAREA AREA(ACRES) = 1.29 SUBAREA RUNOFF(CFS) = 1.68
EFFECTIVE AREA(ACRES) = 221.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 273.0 PEAK FLOW RATE(CFS) = 351.38
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*
FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 81
\*\*\*\*\*

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.53
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.903
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.80 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 1.30
EFFECTIVE AREA(ACRES) = 222.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 273.8 PEAK FLOW RATE(CFS) = 351.38
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*
FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 10
\*\*\*\*\*

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<

\*\*\*\*\*
FLOW PROCESS FROM NODE 5120.00 TO NODE 5125.00 IS CODE = 21
\*\*\*\*\*

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

\*\*\*\*\*
INITIAL SUBAREA FLOW-LENGTH(FEET) = 563.00
\*\*\*\*\*



ELEVATION DATA: UPSTREAM(FEET) = 768.00 DOWNSTREAM(FEET) = 766.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.530
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.407
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 A 4.78 0.98 0.100 32 12.53
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 9.93
TOTAL AREA(ACRES) = 4.78 PEAK FLOW RATE(CFS) = 9.93

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 14.16 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 28.81
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.19
AVERAGE FLOW DEPTH(FEET) = 0.27 TRAVEL TIME(MIN.) = 2.52
Tc(MIN.) = 22.16
SUBAREA AREA(ACRES) = 14.16 SUBAREA RUNOFF(CFS) = 20.54
EFFECTIVE AREA(ACRES) = 25.99 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 26.0 PEAK FLOW RATE(CFS) = 37.70

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FLOW PROCESS FROM NODE 5125.00 TO NODE 5130.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 766.50 DOWNSTREAM(FEET) = 763.50
CHANNEL LENGTH THRU SUBAREA(FEET) = 819.00 CHANNEL SLOPE = 0.0037
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.837
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 7.05 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.49
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.92
AVERAGE FLOW DEPTH(FEET) = 0.25 TRAVEL TIME(MIN.) = 7.12
Tc(MIN.) = 19.65
SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 11.04
EFFECTIVE AREA(ACRES) = 11.83 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 11.8 PEAK FLOW RATE(CFS) = 18.53

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.27 FLOW VELOCITY(FEET/SEC.) = 2.03
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5130.00 = 1382.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5130.00 TO NODE 5135.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 763.50 DOWNSTREAM(FEET) = 759.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 481.00 CHANNEL SLOPE = 0.0094
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.709
SUBAREA LOSS RATE DATA(AMC II):

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.31 FLOW VELOCITY(FEET/SEC.) = 3.43
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5135.00 = 1863.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5135.00 TO NODE 5136.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 759.00 DOWNSTREAM(FEET) = 755.50
CHANNEL LENGTH THRU SUBAREA(FEET) = 387.00 CHANNEL SLOPE = 0.0090
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.632
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 11.50 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 45.64
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.62
AVERAGE FLOW DEPTH(FEET) = 0.34 TRAVEL TIME(MIN.) = 1.78
Tc(MIN.) = 23.95
SUBAREA AREA(ACRES) = 11.50 SUBAREA RUNOFF(CFS) = 15.88
EFFECTIVE AREA(ACRES) = 37.49 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 37.5 PEAK FLOW RATE(CFS) = 51.77

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.36 FLOW VELOCITY(FEET/SEC.) = 3.73
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5136.00 = 2250.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5136.00 TO NODE 5155.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 755.50 DOWNSTREAM(FEET) = 751.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 438.00 CHANNEL SLOPE = 0.0103

CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.563  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	12.89	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 60.27  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.09  
AVERAGE FLOW DEPTH(FEET) = 0.38 TRAVEL TIME(MIN.) = 1.79  
Tc(MIN.) = 25.73  
SUBAREA AREA(ACRES) = 12.89 SUBAREA RUNOFF(CFS) = 17.00  
EFFECTIVE AREA(ACRES) = 50.38 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 66.45

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.40 FLOW VELOCITY(FEET/SEC.) = 4.16  
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5155.00 = 2688.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5155.00 TO NODE 5160.00 IS CODE = 51  
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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 751.00 DOWNSTREAM(FEET) = 747.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 415.00 CHANNEL SLOPE = 0.0096  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.506  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	12.97	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 74.67  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.18  
AVERAGE FLOW DEPTH(FEET) = 0.43 TRAVEL TIME(MIN.) = 1.65  
Tc(MIN.) = 27.38  
SUBAREA AREA(ACRES) = 12.97 SUBAREA RUNOFF(CFS) = 16.44  
EFFECTIVE AREA(ACRES) = 63.35 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 63.3 PEAK FLOW RATE(CFS) = 80.28

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.45 FLOW VELOCITY(FEET/SEC.) = 4.26  
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5160.00 = 3103.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5160.00 TO NODE 5210.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 747.00 DOWNSTREAM(FEET) = 738.30  
CHANNEL LENGTH THRU SUBAREA(FEET) = 503.00 CHANNEL SLOPE = 0.0173  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 25 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
COMMERCIAL	A	16.23	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 90.21  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.45  
AVERAGE FLOW DEPTH(FEET) = 0.41 TRAVEL TIME(MIN.) = 1.54  
Tc(MIN.) = 28.92  
SUBAREA AREA(ACRES) = 16.23 SUBAREA RUNOFF(CFS) = 19.86  
EFFECTIVE AREA(ACRES) = 79.58 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 79.6 PEAK FLOW RATE(CFS) = 97.37

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.42 FLOW VELOCITY(FEET/SEC.) = 5.57  
LONGEST FLOWPATH FROM NODE 5120.00 TO NODE 5210.00 = 3606.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5210.00 TO NODE 5210.00 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.) = 28.92  
RAINFALL INTENSITY(INCH/HR) = 1.46  
AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.10  
EFFECTIVE STREAM AREA(ACRES) = 79.58  
TOTAL STREAM AREA(ACRES) = 79.58  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 97.37

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5170.00 TO NODE 5175.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 524.00  
ELEVATION DATA: UPSTREAM(FEET) = 771.10 DOWNSTREAM(FEET) = 766.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.396  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.860  
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
COMMERCIAL	A	16.23	0.98	0.100	32	

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL A 4.16 0.98 0.100 32 9.40  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 10.34  
TOTAL AREA(ACRES) = 4.16 PEAK FLOW RATE(CFS) = 10.34

AVERAGE FLOW DEPTH(FEET) = 0.25 TRAVEL TIME(MIN.) = 2.30  
Tc(MIN.) = 21.32  
SUBAREA AREA(ACRES) = 13.46 SUBAREA RUNOFF(CFS) = 20.01  
EFFECTIVE AREA(ACRES) = 24.69 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 24.7 PEAK FLOW RATE(CFS) = 36.71

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5175.00 TO NODE 5180.00 IS CODE = 51  
-----

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.29 FLOW VELOCITY(FEET/SEC.) = 3.72  
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5185.00 = 1918.00 FEET.

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5185.00 TO NODE 5190.00 IS CODE = 51  
-----

ELEVATION DATA: UPSTREAM(FEET) = 766.00 DOWNSTREAM(FEET) = 764.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 917.00 CHANNEL SLOPE = 0.0022  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 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  
COMMERCIAL A 7.07 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.10  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.59  
AVERAGE FLOW DEPTH(FEET) = 0.29 TRAVEL TIME(MIN.) = 9.63  
Tc(MIN.) = 19.03  
SUBAREA AREA(ACRES) = 7.07 SUBAREA RUNOFF(CFS) = 11.30  
EFFECTIVE AREA(ACRES) = 11.23 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 11.2 PEAK FLOW RATE(CFS) = 17.95

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 758.50 DOWNSTREAM(FEET) = 755.50  
CHANNEL LENGTH THRU SUBAREA(FEET) = 394.00 CHANNEL SLOPE = 0.0076  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.659  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 11.16 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 44.55  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.34  
AVERAGE FLOW DEPTH(FEET) = 0.35 TRAVEL TIME(MIN.) = 1.97  
Tc(MIN.) = 23.29  
SUBAREA AREA(ACRES) = 11.16 SUBAREA RUNOFF(CFS) = 15.69  
EFFECTIVE AREA(ACRES) = 35.85 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 35.8 PEAK FLOW RATE(CFS) = 50.39

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.31 FLOW VELOCITY(FEET/SEC.) = 1.65  
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5180.00 = 1441.00 FEET.

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.38 FLOW VELOCITY(FEET/SEC.) = 3.44  
LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5190.00 = 2312.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5180.00 TO NODE 5185.00 IS CODE = 51  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5190.00 TO NODE 5195.00 IS CODE = 51  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 764.00 DOWNSTREAM(FEET) = 758.50  
CHANNEL LENGTH THRU SUBAREA(FEET) = 477.00 CHANNEL SLOPE = 0.0115  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.749  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 13.46 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 27.95  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.46

ELEVATION DATA: UPSTREAM(FEET) = 755.50 DOWNSTREAM(FEET) = 751.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 430.00 CHANNEL SLOPE = 0.0105  
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.587  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 12.16 0.98 0.100 32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 58.55  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.00  
 AVERAGE FLOW DEPTH(FEET) = 0.38 TRAVEL TIME(MIN.) = 1.79  
 Tc(MIN.) = 25.08  
 SUBAREA AREA(ACRES) = 12.16 SUBAREA RUNOFF(CFS) = 16.30  
 EFFECTIVE AREA(ACRES) = 48.01 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 48.0 PEAK FLOW RATE(CFS) = 64.37

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.39 FLOW VELOCITY(FEET/SEC.) = 4.15  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5195.00 = 2742.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5195.00 TO NODE 5200.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 751.00 DOWNSTREAM(FEET) = 747.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 420.00 CHANNEL SLOPE = 0.0095  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 25 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	A	11.98	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 72.07  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.12  
 AVERAGE FLOW DEPTH(FEET) = 0.42 TRAVEL TIME(MIN.) = 1.70  
 Tc(MIN.) = 26.78  
 SUBAREA AREA(ACRES) = 11.98 SUBAREA RUNOFF(CFS) = 15.40  
 EFFECTIVE AREA(ACRES) = 59.99 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 60.0 PEAK FLOW RATE(CFS) = 77.12

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.44 FLOW VELOCITY(FEET/SEC.) = 4.21  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5200.00 = 3162.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5200.00 TO NODE 5205.00 IS CODE = 51  
 -----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 747.00 DOWNSTREAM(FEET) = 744.10  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 583.00 CHANNEL SLOPE = 0.0050  
 CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 50.000  
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.436

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	14.13	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 85.64  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.40  
 AVERAGE FLOW DEPTH(FEET) = 0.54 TRAVEL TIME(MIN.) = 2.85  
 Tc(MIN.) = 29.63  
 SUBAREA AREA(ACRES) = 14.13 SUBAREA RUNOFF(CFS) = 17.02  
 EFFECTIVE AREA(ACRES) = 74.12 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 74.1 PEAK FLOW RATE(CFS) = 89.29

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.55 FLOW VELOCITY(FEET/SEC.) = 3.45  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5205.00 = 3745.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5205.00 TO NODE 5210.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 734.60 DOWNSTREAM(FEET) = 728.80  
 FLOW LENGTH(FEET) = 1150.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.74  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 89.29  
 PIPE TRAVEL TIME(MIN.) = 2.19 Tc(MIN.) = 31.83  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5210.00 = 4895.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5210.00 TO NODE 5210.00 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.) = 31.83  
 RAINFALL INTENSITY(INCH/HR) = 1.38  
 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA(ACRES) = 74.12  
 TOTAL STREAM AREA(ACRES) = 74.12  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 89.29

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	97.37	28.92	1.457	0.98( 0.10)	0.10	79.6	5120.00
2	89.29	31.83	1.376	0.98( 0.10)	0.10	74.1	5170.00

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	183.68	28.92	1.457	0.98 (0.10)	0.10	146.9	5120.00
2	180.84	31.83	1.376	0.98 (0.10)	0.10	153.7	5170.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 183.68 Tc(MIN.) = 28.92  
 EFFECTIVE AREA(ACRES) = 146.94 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 153.7  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5210.00 = 4895.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5210.00 TO NODE 5215.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 728.80 DOWNSTREAM(FEET) = 721.08  
 FLOW LENGTH(FEET) = 420.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 39.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.76  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 183.68  
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 29.34  
 LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5215.00 = 5315.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 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	183.68	29.34	1.445	0.98 (0.10)	0.10	146.9	5120.00
2	180.84	32.24	1.365	0.98 (0.10)	0.10	153.7	5170.00

LONGEST FLOWPATH FROM NODE 5170.00 TO NODE 5215.00 = 5315.00 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	335.15	16.10	2.071	0.98 (0.31)	0.32	190.4	5043.00
2	351.37	18.51	1.904	0.97 (0.30)	0.31	222.3	5080.00
3	351.38	18.53	1.903	0.98 (0.30)	0.31	222.5	5050.00
4	350.96	19.21	1.863	0.97 (0.30)	0.30	228.0	5142.00
5	331.42	23.81	1.638	0.98 (0.28)	0.29	252.9	5025.00
6	319.98	25.14	1.585	0.98 (0.28)	0.29	255.6	5070.00
7	265.53	34.96	1.300	0.98 (0.27)	0.28	273.8	5000.00

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5215.00 = 9970.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	482.79	16.10	2.071	0.98 (0.25)	0.25	271.1	5043.00
2	506.81	18.51	1.904	0.97 (0.24)	0.25	315.0	5080.00
3	506.89	18.53	1.903	0.98 (0.24)	0.25	315.3	5050.00
4	508.52	19.21	1.863	0.97 (0.24)	0.24	324.2	5142.00
5	501.81	23.81	1.638	0.98 (0.22)	0.23	372.2	5025.00
6	493.74	25.14	1.585	0.98 (0.22)	0.22	381.5	5070.00
7	480.36	29.34	1.445	0.98 (0.21)	0.22	410.3	5120.00
8	461.44	32.24	1.365	0.98 (0.21)	0.22	422.5	5170.00
9	437.14	34.96	1.300	0.98 (0.21)	0.22	427.5	5000.00

TOTAL AREA(ACRES) = 427.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 508.52 Tc(MIN.) = 19.207  
 EFFECTIVE AREA(ACRES) = 324.17 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.22  
 TOTAL AREA(ACRES) = 427.5  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5215.00 = 9970.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5215.00 TO NODE 5215.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1<<<<<

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5215.00 TO NODE 5248.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 720.42 DOWNSTREAM(FEET) = 708.36  
 FLOW LENGTH(FEET) = 1194.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 81.0 INCH PIPE IS 61.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.53  
 ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 508.52  
 PIPE TRAVEL TIME(MIN.) = 1.14 Tc(MIN.) = 20.34  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5248.00 = 11164.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 20.34  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.800  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.92	0.98	0.100	32
PUBLIC PARK	A	0.76	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97



SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.439  
 SUBAREA AREA(ACRES) = 1.68 SUBAREA RUNOFF(CFS) = 2.07  
 EFFECTIVE AREA(ACRES) = 325.85 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.24  
 TOTAL AREA(ACRES) = 429.2 PEAK FLOW RATE(CFS) = 508.52  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 4.53 0.98 0.200 32 14.07  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA RUNOFF(CFS) = 8.36  
 TOTAL AREA(ACRES) = 4.53 PEAK FLOW RATE(CFS) = 8.36

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5225.00 TO NODE 5230.00 IS CODE = 62

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

MAINLINE Tc(MIN.) = 20.34  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.800  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.10 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 1.10 SUBAREA RUNOFF(CFS) = 1.69  
 EFFECTIVE AREA(ACRES) = 326.95 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.24  
 TOTAL AREA(ACRES) = 430.3 PEAK FLOW RATE(CFS) = 508.52  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

UPSTREAM ELEVATION(FEET) = 750.20 DOWNSTREAM ELEVATION(FEET) = 745.90  
 STREET LENGTH(FEET) = 345.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 1

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.11

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 20.34  
 RAINFALL INTENSITY(INCH/HR) = 1.80  
 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.24  
 EFFECTIVE STREAM AREA(ACRES) = 326.95  
 TOTAL STREAM AREA(ACRES) = 430.29  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 508.52

STREET FLOW DEPTH(FEET) = 0.50  
 HALFSTREET FLOOD WIDTH(FEET) = 16.92  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.46  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.72  
 STREET FLOW TRAVEL TIME(MIN.) = 1.66 Tc(MIN.) = 15.73

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.100  
 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" A 14.86 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 14.86 SUBAREA RUNOFF(CFS) = 25.47  
 EFFECTIVE AREA(ACRES) = 19.39 AREA-AVERAGED Fm(INCH/HR) = 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 33.24

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5220.00 TO NODE 5225.00 IS CODE = 21

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.56 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 FLOW VELOCITY(FEET/SEC.) = 4.05 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.25  
 LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5230.00 = 959.00 FEET.

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 614.00  
 ELEVATION DATA: UPSTREAM(FEET) = 751.70 DOWNSTREAM(FEET) = 750.20

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.068

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.245

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5230.00 TO NODE 5235.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<



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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 738.90 DOWNSTREAM(FEET) = 738.10
FLOW LENGTH(FEET) = 265.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.60
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 33.24
PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 16.52
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5235.00 = 1224.00 FEET.

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*****
FLOW PROCESS FROM NODE 5235.00 TO NODE 5235.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 16.52
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.039
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 7.86 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 7.86 SUBAREA RUNOFF(CFS) = 8.56
EFFECTIVE AREA(ACRES) = 27.25 AREA-AVERAGED Fm(INCH/HR) = 0.38
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 27.2 PEAK FLOW RATE(CFS) = 40.74

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*****
FLOW PROCESS FROM NODE 5235.00 TO NODE 5240.00 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) = 738.10 DOWNSTREAM(FEET) = 733.00
FLOW LENGTH(FEET) = 514.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.38
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.74
PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 17.43
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5240.00 = 1738.00 FEET.

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*****
FLOW PROCESS FROM NODE 5240.00 TO NODE 5240.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 17.43
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.974
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 5.55 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

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SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.55 SUBAREA RUNOFF(CFS) = 9.37
EFFECTIVE AREA(ACRES) = 32.80 AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 32.8 PEAK FLOW RATE(CFS) = 48.53

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*****
FLOW PROCESS FROM NODE 5240.00 TO NODE 5247.00 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) = 733.00 DOWNSTREAM(FEET) = 717.05
FLOW LENGTH(FEET) = 800.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.63
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 48.53
PIPE TRAVEL TIME(MIN.) = 1.06 Tc(MIN.) = 18.49
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5247.00 = 2538.00 FEET.

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FLOW PROCESS FROM NODE 5247.00 TO NODE 5247.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 18.49
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.906
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 15.35 0.98 0.100 32
PUBLIC PARK A 3.86 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.251
SUBAREA AREA(ACRES) = 19.21 SUBAREA RUNOFF(CFS) = 28.72
EFFECTIVE AREA(ACRES) = 52.01 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 52.0 PEAK FLOW RATE(CFS) = 75.23

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*****
FLOW PROCESS FROM NODE 5247.00 TO NODE 5248.00 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) = 717.05 DOWNSTREAM(FEET) = 710.66
FLOW LENGTH(FEET) = 950.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 33.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.27
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 75.23
PIPE TRAVEL TIME(MIN.) = 1.71 Tc(MIN.) = 20.20
LONGEST FLOWPATH FROM NODE 5220.00 TO NODE 5248.00 = 3488.00 FEET.

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*****

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FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

```

=====
MAINLINE Tc(MIN.) = 20.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.807
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A        1.56     0.98     0.100    32
PUBLIC PARK         A        1.20     0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426
SUBAREA AREA(ACRES) = 2.76     SUBAREA RUNOFF(CFS) = 3.46
EFFECTIVE AREA(ACRES) = 54.77  AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 54.8     PEAK FLOW RATE(CFS) = 75.23
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
  
```

\*\*\*\*\*

FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

```

=====
MAINLINE Tc(MIN.) = 20.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.807
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A        1.56     0.98     0.100    32
PUBLIC PARK         A        1.20     0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426
SUBAREA AREA(ACRES) = 2.76     SUBAREA RUNOFF(CFS) = 3.46
EFFECTIVE AREA(ACRES) = 57.53  AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 57.5     PEAK FLOW RATE(CFS) = 77.54
  
```

\*\*\*\*\*

FLOW PROCESS FROM NODE 5248.00 TO NODE 5248.00 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.) = 20.20
RAINFALL INTENSITY(INCH/HR) = 1.81
AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.32
EFFECTIVE STREAM AREA(ACRES) = 57.53
TOTAL STREAM AREA(ACRES) = 57.53
PEAK FLOW RATE(CFS) AT CONFLUENCE = 77.54
  
```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	482.79	17.26	1.986	0.98( 0.25)	0.25	273.9	5043.00
1	506.81	19.65	1.838	0.97( 0.24)	0.25	317.8	5080.00
1	506.89	19.67	1.836	0.98( 0.24)	0.25	318.1	5050.00
1	508.52	20.34	1.800	0.97( 0.24)	0.24	326.9	5142.00
1	501.81	24.94	1.592	0.98( 0.22)	0.23	374.9	5025.00
1	493.74	26.29	1.543	0.97( 0.22)	0.23	384.3	5070.00
1	480.36	30.50	1.411	0.98( 0.21)	0.22	413.1	5120.00
1	461.44	33.41	1.336	0.97( 0.21)	0.22	425.2	5170.00
1	437.14	36.15	1.274	0.97( 0.21)	0.22	430.3	5000.00
2	77.54	20.20	1.807	0.97( 0.31)	0.32	57.5	5220.00

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	556.95	17.26	1.986	0.98( 0.26)	0.26	323.0	5043.00
2	583.75	19.65	1.838	0.97( 0.25)	0.26	373.7	5080.00
3	583.86	19.67	1.836	0.98( 0.25)	0.26	374.1	5050.00
4	585.71	20.20	1.807	0.98( 0.25)	0.26	382.6	5220.00
5	585.66	20.34	1.800	0.97( 0.25)	0.26	384.5	5142.00
6	568.22	24.94	1.592	0.98( 0.23)	0.24	432.5	5025.00
7	557.58	26.29	1.543	0.97( 0.23)	0.24	441.8	5070.00
8	537.39	30.50	1.411	0.98( 0.23)	0.23	470.6	5120.00
9	514.59	33.41	1.336	0.98( 0.22)	0.23	482.8	5170.00
10	487.08	36.15	1.274	0.97( 0.22)	0.23	487.8	5000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 585.71     Tc(MIN.) = 20.20
EFFECTIVE AREA(ACRES) = 382.57  AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.26
TOTAL AREA(ACRES) = 487.8
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5248.00 = 11164.00 FEET.
  
```

\*\*\*\*\*

FLOW PROCESS FROM NODE 5248.00 TO NODE 5300.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 708.36  DOWNSTREAM(FEET) = 707.90
FLOW LENGTH(FEET) = 31.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 61.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.80
ESTIMATED PIPE DIAMETER(INCH) = 78.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 585.71
PIPE TRAVEL TIME(MIN.) = 0.02  Tc(MIN.) = 20.22
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5300.00 = 11195.00 FEET.
  
```

\*\*\*\*\*

FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

```

=====
*****
FLOW PROCESS FROM NODE 5273.00 TO NODE 5274.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 274.00
ELEVATION DATA: UPSTREAM(FEET) = 737.00 DOWNSTREAM(FEET) = 735.88

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.623
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.012
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 A 0.46 0.98 0.100 32 8.62
PUBLIC PARK A 0.35 0.98 0.850 32 13.70
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA RUNOFF(CFS) = 1.89
TOTAL AREA(ACRES) = 0.81 PEAK FLOW RATE(CFS) = 1.89

*****
FLOW PROCESS FROM NODE 5274.00 TO NODE 5274.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 8.62
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.012
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.46 0.98 0.100 32
PUBLIC PARK A 0.35 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA AREA(ACRES) = 0.81 SUBAREA RUNOFF(CFS) = 1.89
EFFECTIVE AREA(ACRES) = 1.62 AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 3.79

*****
FLOW PROCESS FROM NODE 5274.00 TO NODE 5275.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 725.22 DOWNSTREAM(FEET) = 722.55
FLOW LENGTH(FEET) = 510.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.13
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.79

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PIPE TRAVEL TIME(MIN.) = 2.06 Tc(MIN.) = 10.68
LONGEST FLOWPATH FROM NODE 5273.00 TO NODE 5275.00 = 784.00 FEET.

*****
FLOW PROCESS FROM NODE 5275.00 TO NODE 5275.00 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.) = 10.68
RAINFALL INTENSITY(INCH/HR) = 2.65
AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA(ACRES) = 1.62
TOTAL STREAM AREA(ACRES) = 1.62
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.79

*****
FLOW PROCESS FROM NODE 5250.00 TO NODE 5255.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 502.00
ELEVATION DATA: UPSTREAM(FEET) = 747.50 DOWNSTREAM(FEET) = 745.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.408
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.546
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 A 3.72 0.98 0.100 32 11.41
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 8.20
TOTAL AREA(ACRES) = 3.72 PEAK FLOW RATE(CFS) = 8.20

*****
FLOW PROCESS FROM NODE 5255.00 TO NODE 5260.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
UPSTREAM ELEVATION(FEET) = 745.80 DOWNSTREAM ELEVATION(FEET) = 741.80
STREET LENGTH(FEET) = 615.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

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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) = 17.75  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.52  
HALFSTREET FLOOD WIDTH(FEET) = 17.95  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.60  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.35  
STREET FLOW TRAVEL TIME(MIN.) = 3.94 Tc(MIN.) = 15.35  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.131  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 10.38 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.38 SUBAREA RUNOFF(CFS) = 19.00  
EFFECTIVE AREA(ACRES) = 14.10 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 14.1 PEAK FLOW RATE(CFS) = 25.80  
  
END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
FLOW VELOCITY(FEET/SEC.) = 3.00 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.70  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5260.00 = 1117.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5260.00 TO NODE 5265.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 734.40 DOWNSTREAM(FEET) = 733.30  
FLOW LENGTH(FEET) = 364.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.28  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 25.80  
PIPE TRAVEL TIME(MIN.) = 1.15 Tc(MIN.) = 16.50  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5265.00 = 1481.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5265.00 TO NODE 5265.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 16.50  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.041  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 6.97 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 6.97 SUBAREA RUNOFF(CFS) = 12.19

EFFECTIVE AREA(ACRES) = 21.07 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 21.1 PEAK FLOW RATE(CFS) = 36.85

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5265.00 TO NODE 5270.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 733.30 DOWNSTREAM(FEET) = 732.60  
FLOW LENGTH(FEET) = 183.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.30  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 36.85  
PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 16.98  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5270.00 = 1664.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5270.00 TO NODE 5270.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 16.98  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.005  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 7.85 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 7.85 SUBAREA RUNOFF(CFS) = 13.48  
EFFECTIVE AREA(ACRES) = 28.92 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 28.9 PEAK FLOW RATE(CFS) = 49.66

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5270.00 TO NODE 5275.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 732.60 DOWNSTREAM(FEET) = 722.55  
FLOW LENGTH(FEET) = 322.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.86  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 49.66  
PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 17.34  
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5275.00 = 1986.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5275.00 TO NODE 5275.00 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.) = 17.34
RAINFALL INTENSITY(INCH/HR) = 1.98
AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 28.92
TOTAL STREAM AREA(ACRES) = 28.92
PEAK FLOW RATE(CFS) AT CONFLUENCE = 49.66

** CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap      Ae  HEADWATER
NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES)  NODE
1          3.79  10.68  2.649  0.97( 0.41) 0.42    1.6  5273.00
2         49.66  17.34  1.980  0.98( 0.10) 0.10    28.9  5250.00

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          45.23  10.68  2.649  0.98( 0.12) 0.13    19.4  5273.00
2         52.32  17.34  1.980  0.98( 0.11) 0.12    30.5  5250.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 52.32  Tc(MIN.) = 17.34
EFFECTIVE AREA(ACRES) = 30.54  AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 30.5
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5275.00 = 1986.00 FEET.

*****
FLOW PROCESS FROM NODE 5275.00 TO NODE 5295.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 722.55  DOWNSTREAM(FEET) = 717.86
FLOW LENGTH(FEET) = 722.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.51
ESTIMATED PIPE DIAMETER(INCH) = 39.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 52.32
PIPE TRAVEL TIME(MIN.) = 1.41  Tc(MIN.) = 18.76
LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5295.00 = 2708.00 FEET.

*****
FLOW PROCESS FROM NODE 5295.00 TO NODE 5295.00 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.) = 18.76
RAINFALL INTENSITY(INCH/HR) = 1.89
AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.12
EFFECTIVE STREAM AREA(ACRES) = 30.54
TOTAL STREAM AREA(ACRES) = 30.54
PEAK FLOW RATE(CFS) AT CONFLUENCE = 52.32

*****
FLOW PROCESS FROM NODE 5280.00 TO NODE 5285.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 556.00
ELEVATION DATA: UPSTREAM(FEET) = 737.20  DOWNSTREAM(FEET) = 736.30

Tc = K*[ (LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.774
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.274
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       A      1.60  0.98  0.850  32  21.88
COMMERCIAL        A      5.83  0.98  0.100  32  13.77
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
SUBAREA RUNOFF(CFS) = 13.50
TOTAL AREA(ACRES) = 7.43  PEAK FLOW RATE(CFS) = 13.50

*****
FLOW PROCESS FROM NODE 5285.00 TO NODE 5290.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 736.30  DOWNSTREAM(FEET) = 728.30
FLOW LENGTH(FEET) = 347.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.68
ESTIMATED PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.50
PIPE TRAVEL TIME(MIN.) = 0.60  Tc(MIN.) = 14.37
LONGEST FLOWPATH FROM NODE 5280.00 TO NODE 5290.00 = 903.00 FEET.

*****
FLOW PROCESS FROM NODE 5290.00 TO NODE 5290.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 14.37
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.217
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS

```

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 4.80 0.57 0.100 69  
 PUBLIC PARK A 7.67 0.98 0.850 32  
 COMMERCIAL A 8.90 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.369  
 SUBAREA AREA(ACRES) = 21.37 SUBAREA RUNOFF(CFS) = 35.89  
 EFFECTIVE AREA(ACRES) = 28.80 AREA-AVERAGED Fm(INCH/HR) = 0.33  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.34  
 TOTAL AREA(ACRES) = 28.8 PEAK FLOW RATE(CFS) = 49.01

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5290.00 TO NODE 5295.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 728.30 DOWNSTREAM(FEET) = 724.50  
 FLOW LENGTH(FEET) = 374.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.70  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 49.01  
 PIPE TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 15.01  
 LONGEST FLOWPATH FROM NODE 5280.00 TO NODE 5295.00 = 1277.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5295.00 TO NODE 5295.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 15.01  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.159  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 PUBLIC PARK C 0.32 0.57 0.850 69  
 COMMERCIAL C 3.80 0.57 0.100 69  
 COMMERCIAL A 6.20 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.77  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.123  
 SUBAREA AREA(ACRES) = 10.32 SUBAREA RUNOFF(CFS) = 19.18  
 EFFECTIVE AREA(ACRES) = 39.12 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 39.1 PEAK FLOW RATE(CFS) = 66.70

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5295.00 TO NODE 5295.00 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.) = 15.01  
 RAINFALL INTENSITY(INCH/HR) = 2.16

AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.93  
 AREA-AVERAGED Ap = 0.28  
 EFFECTIVE STREAM AREA(ACRES) = 39.12  
 TOTAL STREAM AREA(ACRES) = 39.12  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 66.70

\*\* CONFLUENCE DATA \*\*  
 STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
 1 45.23 12.16 2.451 0.98( 0.12) 0.13 19.4 5273.00  
 1 52.32 18.76 1.889 0.98( 0.11) 0.12 30.5 5250.00  
 2 66.70 15.01 2.159 0.93( 0.26) 0.28 39.1 5280.00

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  
 1 107.55 12.16 2.451 0.94( 0.21) 0.22 51.1 5273.00  
 2 114.99 15.01 2.159 0.94( 0.21) 0.22 63.4 5280.00  
 3 109.51 18.76 1.889 0.94( 0.20) 0.21 69.7 5250.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 114.99 Tc(MIN.) = 15.01  
 EFFECTIVE AREA(ACRES) = 63.36 AREA-AVERAGED Fm(INCH/HR) = 0.21  
 AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.22  
 TOTAL AREA(ACRES) = 69.7  
 LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5295.00 = 2708.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5295.00 TO NODE 5300.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 717.86 DOWNSTREAM(FEET) = 710.30  
 FLOW LENGTH(FEET) = 921.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.16  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 114.99  
 PIPE TRAVEL TIME(MIN.) = 1.38 Tc(MIN.) = 16.39  
 LONGEST FLOWPATH FROM NODE 5250.00 TO NODE 5300.00 = 3629.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 16.39  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.049  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN



COMMERCIAL	C	1.50	0.57	0.100	69	7	557.58	26.32	1.542	0.97( 0.23)	0.24	441.8	5070.00
PUBLIC PARK	C	1.16	0.57	0.850	69	8	537.39	30.53	1.411	0.98( 0.23)	0.23	470.6	5120.00
COMMERCIAL	A	1.58	0.98	0.100	32	9	514.59	33.43	1.336	0.98( 0.22)	0.23	482.8	5170.00
PUBLIC PARK	A	1.22	0.98	0.850	32	10	487.08	36.18	1.274	0.97( 0.22)	0.23	487.8	5000.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5300.00 = 11195.00 FEET.

SUBAREA AREA(ACRES) = 5.46 SUBAREA RUNOFF(CFS) = 8.44  
 EFFECTIVE AREA(ACRES) = 68.82 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.24  
 TOTAL AREA(ACRES) = 75.1 PEAK FLOW RATE(CFS) = 114.99  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE					
1	630.71	13.55	2.297	0.96( 0.25)	0.26	315.2	5273.00					
2	669.57	16.39	2.049	0.96( 0.25)	0.26	380.6	5280.00					
3	677.26	17.28	1.984	0.96( 0.25)	0.26	398.8	5043.00					
4	700.11	19.67	1.836	0.96( 0.25)	0.25	453.5	5080.00					
5	700.18	19.69	1.835	0.96( 0.25)	0.25	454.0	5050.00					
6	701.01	20.14	1.810	0.96( 0.24)	0.25	461.9	5250.00					
7	700.97	20.22	1.806	0.96( 0.24)	0.25	463.2	5220.00					
8	700.37	20.37	1.798	0.96( 0.24)	0.25	465.1	5142.00					
9	667.92	24.97	1.591	0.96( 0.23)	0.24	513.1	5025.00					
10	653.69	26.32	1.542	0.96( 0.23)	0.24	522.4	5070.00					
11	623.98	30.53	1.411	0.96( 0.22)	0.23	551.2	5120.00					
12	595.75	33.43	1.336	0.96( 0.22)	0.23	563.4	5170.00					
13	563.75	36.18	1.274	0.96( 0.22)	0.23	568.4	5000.00					
TOTAL AREA(ACRES) =		568.4										

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 701.01 Tc(MIN.) = 20.142  
 EFFECTIVE AREA(ACRES) = 461.88 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.26  
 TOTAL AREA(ACRES) = 568.4  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5300.00 = 11195.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 16.39  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.049  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 1.46 0.57 0.100 69  
 PUBLIC PARK C 1.12 0.57 0.850 69  
 COMMERCIAL A 1.64 0.98 0.100 32  
 PUBLIC PARK A 1.26 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426  
 SUBAREA AREA(ACRES) = 5.48 SUBAREA RUNOFF(CFS) = 8.46  
 EFFECTIVE AREA(ACRES) = 74.30 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 80.6 PEAK FLOW RATE(CFS) = 121.78

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 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	115.28	13.55	2.297	0.90( 0.23)	0.26	62.1	5273.00
2	121.78	16.39	2.049	0.90( 0.23)	0.25	74.3	5280.00
3	115.58	20.14	1.810	0.90( 0.22)	0.24	80.6	5250.00
LONGEST FLOWPATH FROM NODE		5250.00 TO NODE		5300.00 =		3629.00 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	556.95	17.28	1.984	0.98( 0.26)	0.26	323.0	5043.00
2	583.75	19.67	1.836	0.97( 0.25)	0.26	373.7	5080.00
3	583.86	19.69	1.835	0.98( 0.25)	0.26	374.1	5050.00
4	585.71	20.22	1.806	0.98( 0.25)	0.26	382.6	5220.00
5	585.66	20.37	1.798	0.97( 0.25)	0.26	384.5	5142.00
6	568.22	24.97	1.591	0.98( 0.23)	0.24	432.5	5025.00

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5300.00 TO NODE 5300.00 IS CODE = 12  
 -----

>>>>CLEAR MEMORY BANK # 1 <<<<<  
 =====

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5300.00 TO NODE 5305.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 707.90 DOWNSTREAM(FEET) = 704.64  
 FLOW LENGTH(FEET) = 652.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 102.0 INCH PIPE IS 81.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.44  
 ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 701.01  
 PIPE TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 20.89  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5305.00 = 11847.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5305.00 TO NODE 5305.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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=====
MAINLINE Tc(MIN.) = 20.89
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.771
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           C         9.55     0.57    0.100    69
COMMERCIAL           A        11.87     0.98    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 21.42      SUBAREA RUNOFF(CFS) = 32.61
EFFECTIVE AREA(ACRES) = 483.30  AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 589.8      PEAK FLOW RATE(CFS) = 701.01
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5305.00 TO NODE 5305.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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=====
MAINLINE Tc(MIN.) = 20.89
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.771
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           C         0.54     0.57    0.100    69
PUBLIC PARK          C         0.41     0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.424
SUBAREA AREA(ACRES) = 0.95      SUBAREA RUNOFF(CFS) = 1.31
EFFECTIVE AREA(ACRES) = 484.25  AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 590.8      PEAK FLOW RATE(CFS) = 701.01
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5305.00 TO NODE 5330.00 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) = 704.64  DOWNSTREAM(FEET) = 701.26
FLOW LENGTH(FEET) = 675.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 102.0 INCH PIPE IS 81.3 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 14.45
ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 701.01
PIPE TRAVEL TIME(MIN.) = 0.78    Tc(MIN.) = 21.67
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5330.00 = 12522.00 FEET.

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*****
FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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```

MAINLINE Tc(MIN.) = 21.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.732
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           C         0.54     0.57    0.100    69
PUBLIC PARK          C         0.41     0.57    0.850    69
COMMERCIAL           A         0.51     0.98    0.100    32
PUBLIC PARK          A         0.48     0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.78
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.444
SUBAREA AREA(ACRES) = 1.94      SUBAREA RUNOFF(CFS) = 2.42
EFFECTIVE AREA(ACRES) = 486.19  AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 592.7      PEAK FLOW RATE(CFS) = 701.01
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

=====
MAINLINE Tc(MIN.) = 21.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.732
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A         0.51     0.98    0.100    32
PUBLIC PARK          A         0.48     0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.464
SUBAREA AREA(ACRES) = 0.99      SUBAREA RUNOFF(CFS) = 1.14
EFFECTIVE AREA(ACRES) = 487.18  AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 593.7      PEAK FLOW RATE(CFS) = 701.01
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

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=====
MAINLINE Tc(MIN.) = 21.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.732
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A        23.78     0.98    0.100    32
COMMERCIAL           C         5.56     0.57    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.90
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 29.34      SUBAREA RUNOFF(CFS) = 43.38
EFFECTIVE AREA(ACRES) = 516.52  AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.24
TOTAL AREA(ACRES) = 623.1      PEAK FLOW RATE(CFS) = 701.01
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 21.67  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.732  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 32.80 0.98 0.100 32  
COMMERCIAL C 4.08 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.93  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 36.88 SUBAREA RUNOFF(CFS) = 54.42  
EFFECTIVE AREA(ACRES) = 553.40 AREA-AVERAGED Fm(INCH/HR) = 0.22  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.23  
TOTAL AREA(ACRES) = 659.9 PEAK FLOW RATE(CFS) = 753.34

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5330.00 TO NODE 5330.00 IS CODE = 71

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<  
>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<

-----  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.63; LAG(HR) = 0.50; Fm(INCH/HR) = 0.21; Ybar = 0.25  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 659.9  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5330.00 = 12522.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0356; Lca/L=0.4,n=.0319; Lca/L=0.5,n=.0293;Lca/L=0.6,n=.0273  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 188.73  
UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 681.07  
TOTAL PEAK FLOW RATE(CFS) = 681.07 (SOURCE FLOW INCLUDED)  
RATIONAL METHOD PEAK FLOW RATE(CFS) = 753.34  
(UPSTREAM NODE PEAK FLOW RATE(CFS) = 753.34)  
PEAK FLOW RATE(CFS) USED = 753.34

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5330.00 TO NODE 5335.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 701.26 DOWNSTREAM(FEET) = 697.78  
FLOW LENGTH(FEET) = 687.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 108.0 INCH PIPE IS 79.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.98  
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 753.34  
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 38.54  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5335.00 TO NODE 5335.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 38.54  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.226  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.54 0.98 0.100 32  
PUBLIC PARK A 0.50 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.461  
SUBAREA AREA(ACRES) = 1.04

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.64; LAG(HR) = 0.51; Fm(INCH/HR) = 0.21; Ybar = 0.25  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 661.0  
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0347; Lca/L=0.4,n=.0311; Lca/L=0.5,n=.0286;Lca/L=0.6,n=.0267  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 188.94  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 676.85  
TOTAL AREA(ACRES) = 661.0 PEAK FLOW RATE(CFS) = 753.34  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5335.00 TO NODE 5335.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 38.54  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.226  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.54 0.98 0.100 32  
PUBLIC PARK A 0.50 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.461  
SUBAREA AREA(ACRES) = 1.04

UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.64; LAG(HR) = 0.51; Fm(INCH/HR) = 0.21; Ybar = 0.25

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
 3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 662.0  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0347; Lca/L=0.4,n=.0311; Lca/L=0.5,n=.0286;Lca/L=0.6,n=.0267  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 189.15  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 677.70  
 TOTAL AREA(ACRES) = 662.0 PEAK FLOW RATE(CFS) = 753.34  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5335.00 TO NODE 5335.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----

MAINLINE Tc(MIN.) = 38.54  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.226  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	1.40	0.57	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	17.88	0.98	0.200	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 19.28  
 UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.64; LAG(HR) = 0.51; Fm(INCH/HR) = 0.21; Ybar = 0.25  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
 3HR = 1.00; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 681.3  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5335.00 = 13209.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0347; Lca/L=0.4,n=.0311; Lca/L=0.5,n=.0286;Lca/L=0.6,n=.0267  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 194.75  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 697.04  
 TOTAL AREA(ACRES) = 681.3 PEAK FLOW RATE(CFS) = 753.34  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5335.00 TO NODE 5375.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----

ELEVATION DATA: UPSTREAM(FEET) = 697.78 DOWNSTREAM(FEET) = 682.26  
 FLOW LENGTH(FEET) = 1386.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 90.0 INCH PIPE IS 72.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.89

ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 753.34  
 PIPE TRAVEL TIME(MIN.) = 1.16 Tc(MIN.) = 39.71  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5375.00 = 14595.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5375.00 TO NODE 5375.00 IS CODE = 1  
 -----  
 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 -----

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 PEAK FLOW RATE(CFS) = 753.34 Tc(MIN.) = 39.71  
 AREA-AVERAGED Fm(INCH/HR) = 0.21 Ybar = 0.25  
 TOTAL AREA(ACRES) = 681.3

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5355.00 TO NODE 5360.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 -----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 410.00  
 ELEVATION DATA: UPSTREAM(FEET) = 717.00 DOWNSTREAM(FEET) = 712.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.212  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.331  
 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	A	2.36	0.98	0.850	32	13.21

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA RUNOFF(CFS) = 3.19  
 TOTAL AREA(ACRES) = 2.36 PEAK FLOW RATE(CFS) = 3.19

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5360.00 TO NODE 5365.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 -----  
 UPSTREAM ELEVATION(FEET) = 712.50 DOWNSTREAM ELEVATION(FEET) = 710.30  
 STREET LENGTH(FEET) = 394.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 12.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFBSTREETS 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) =      5.69
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 11.58
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.86
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.72
STREET FLOW TRAVEL TIME(MIN.) = 3.53  Tc(MIN.) = 16.75
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.022
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS
  LAND USE             GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
PUBLIC PARK            A        4.61    0.98    0.850   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 4.61      SUBAREA RUNOFF(CFS) = 4.95
EFFECTIVE AREA(ACRES) = 6.97      AREA-AVERAGED Fm(INCH/HR) = 0.83
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 7.0          PEAK FLOW RATE(CFS) = 7.49

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42  HALFSTREET FLOOD WIDTH(FEET) = 12.98
FLOW VELOCITY(FEET/SEC.) = 2.00  DEPTH*VELOCITY(FT*FT/SEC.) = 0.83
LONGEST FLOWPATH FROM NODE 5355.00 TO NODE 5365.00 = 804.00 FEET.

*****
FLOW PROCESS FROM NODE 5365.00 TO NODE 5370.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 703.30  DOWNSTREAM(FEET) = 702.40
FLOW LENGTH(FEET) = 287.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.95
ESTIMATED PIPE DIAMETER(INCH) = 21.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.49
PIPE TRAVEL TIME(MIN.) = 1.21  Tc(MIN.) = 17.96
LONGEST FLOWPATH FROM NODE 5355.00 TO NODE 5370.00 = 1091.00 FEET.

*****
FLOW PROCESS FROM NODE 5370.00 TO NODE 5370.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.96
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.940
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS
  LAND USE             GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C        6.55    0.57    0.500   69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  A        5.60    0.98    0.500   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 12.15      SUBAREA RUNOFF(CFS) = 17.08

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EFFECTIVE AREA(ACRES) = 19.12  AREA-AVERAGED Fm(INCH/HR) = 0.54
AREA-AVERAGED Fp(INCH/HR) = 0.86  AREA-AVERAGED Ap = 0.63
TOTAL AREA(ACRES) = 19.1          PEAK FLOW RATE(CFS) = 24.05

*****
FLOW PROCESS FROM NODE 5370.00 TO NODE 5375.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 702.40  DOWNSTREAM(FEET) = 685.59
FLOW LENGTH(FEET) = 917.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.34
ESTIMATED PIPE DIAMETER(INCH) = 24.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.05
PIPE TRAVEL TIME(MIN.) = 1.48  Tc(MIN.) = 19.43
LONGEST FLOWPATH FROM NODE 5355.00 TO NODE 5375.00 = 2008.00 FEET.

*****
FLOW PROCESS FROM NODE 5375.00 TO NODE 5375.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.43
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.850
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS
  LAND USE             GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C        9.45    0.57    0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 9.45      SUBAREA RUNOFF(CFS) = 13.32
EFFECTIVE AREA(ACRES) = 28.57  AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.78  AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 28.6          PEAK FLOW RATE(CFS) = 35.83

*****
FLOW PROCESS FROM NODE 5375.00 TO NODE 5375.00 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.) = 19.43
RAINFALL INTENSITY(INCH/HR) = 1.85
AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.78
AREA-AVERAGED Ap = 0.59
EFFECTIVE STREAM AREA(ACRES) = 28.57
TOTAL STREAM AREA(ACRES) = 28.57
PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.83
** CONFLUENCE DATA **
STREAM      Q          Tc          AREA          HEADWATER

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NUMBER	(CFS)	(MIN.)	(ACRES)	NODE
1	753.34	39.71	681.30	5000.00
2	35.83	19.43	28.57	5355.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%

Tc(HR) = 0.66; LAG(HR) = 0.53; Fm(INCH/HR) = 0.22; Ybar = 0.26

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 709.9

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5375.00 = 14595.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0297; Lca/L=0.5,n=.0273;Lca/L=0.6,n=.0255

TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 200.34

PEAK FLOW RATE(CFS) = 710.73

(UPSTREAM NODE PEAK FLOW RATE(CFS) = 753.34)

PEAK FLOW RATE(CFS) USED = 753.34

\*\*\*\*\*

FLOW PROCESS FROM NODE 5375.00 TO NODE 5383.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM( FEET) = 682.26 DOWNSTREAM( FEET) = 676.82

FLOW LENGTH( FEET) = 526.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 93.0 INCH PIPE IS 71.1 INCHES

PIPE-FLOW VELOCITY( FEET/SEC.) = 19.47

ESTIMATED PIPE DIAMETER( INCH) = 93.00 NUMBER OF PIPES = 1

PIPE-FLOW( CFS) = 753.34

PIPE TRAVEL TIME( MIN.) = 0.45 Tc( MIN.) = 40.16

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc( MIN.) = 40.16

\* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 1.197

SUBAREA LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.31	0.57	0.100	69
PUBLIC PARK	C	1.23	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.57

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463

SUBAREA AREA( ACRES) = 2.54

UNIT-HYDROGRAPH DATA:

RAINFALL( INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49

S-GRAPH: VALLEY( DEV.)=100.0%;VALLEY( UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT( UNDEV.)= 0.0%

Tc(HR) = 0.67; LAG(HR) = 0.54; Fm(INCH/HR) = 0.22; Ybar = 0.26

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 712.4

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0253

TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 201.00

UNIT-HYDROGRAPH PEAK FLOW RATE( CFS) = 708.88

TOTAL AREA( ACRES) = 712.4 PEAK FLOW RATE( CFS) = 753.34

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc( MIN.) = 40.16

\* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 1.197

SUBAREA LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.31	0.57	0.100	69
PUBLIC PARK	C	1.23	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.57

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463

SUBAREA AREA( ACRES) = 2.54

UNIT-HYDROGRAPH DATA:

RAINFALL( INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49

S-GRAPH: VALLEY( DEV.)=100.0%;VALLEY( UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT( UNDEV.)= 0.0%

Tc(HR) = 0.67; LAG(HR) = 0.54; Fm(INCH/HR) = 0.22; Ybar = 0.26

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;

3HR = 1.00; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 715.0

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0253

TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 201.66

UNIT-HYDROGRAPH PEAK FLOW RATE( CFS) = 711.22

TOTAL AREA( ACRES) = 715.0 PEAK FLOW RATE( CFS) = 753.34

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

PEAK FLOW RATE( CFS) = 753.34 Tc( MIN.) = 40.16

AREA-AVERAGED Fm( INCH/HR) = 0.22 Ybar = 0.26

TOTAL AREA( ACRES) = 715.0



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*****
FLOW PROCESS FROM NODE 5380.00 TO NODE 5381.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 594.00
ELEVATION DATA: UPSTREAM(FEET) = 702.90 DOWNSTREAM(FEET) = 700.51

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.789
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.497
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 A 0.54 0.98 0.100 32 11.79
PUBLIC PARK A 0.45 0.98 0.850 32 18.73
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
SUBAREA RUNOFF(CFS) = 1.84
TOTAL AREA(ACRES) = 0.99 PEAK FLOW RATE(CFS) = 1.84

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*****
FLOW PROCESS FROM NODE 5381.00 TO NODE 5381.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.79
* 25 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
COMMERCIAL A 0.54 0.98 0.100 32
PUBLIC PARK A 0.45 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
SUBAREA AREA(ACRES) = 0.99 SUBAREA RUNOFF(CFS) = 1.84
EFFECTIVE AREA(ACRES) = 1.98 AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 2.0 PEAK FLOW RATE(CFS) = 3.68

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*****
FLOW PROCESS FROM NODE 5381.00 TO NODE 5382.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 690.51 DOWNSTREAM(FEET) = 685.38
FLOW LENGTH(FEET) = 1020.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.04
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.68
PIPE TRAVEL TIME(MIN.) = 4.21 Tc(MIN.) = 16.00
LONGEST FLOWPATH FROM NODE 5380.00 TO NODE 5382.00 = 1614.00 FEET.

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*****
FLOW PROCESS FROM NODE 5382.00 TO NODE 5382.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.079
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.20 0.57 0.100 69
PUBLIC PARK C 1.00 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
SUBAREA AREA(ACRES) = 2.20 SUBAREA RUNOFF(CFS) = 3.62
EFFECTIVE AREA(ACRES) = 4.18 AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.76 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 4.2 PEAK FLOW RATE(CFS) = 6.56

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*****
FLOW PROCESS FROM NODE 5382.00 TO NODE 5382.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.079
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.20 0.57 0.100 69
PUBLIC PARK C 1.00 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
SUBAREA AREA(ACRES) = 2.20 SUBAREA RUNOFF(CFS) = 3.62
EFFECTIVE AREA(ACRES) = 6.38 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 6.4 PEAK FLOW RATE(CFS) = 10.18

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*****
FLOW PROCESS FROM NODE 5382.00 TO NODE 5383.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 685.38 DOWNSTREAM(FEET) = 680.32
FLOW LENGTH(FEET) = 770.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.67
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.18
PIPE TRAVEL TIME(MIN.) = 2.26 Tc(MIN.) = 18.26
LONGEST FLOWPATH FROM NODE 5380.00 TO NODE 5383.00 = 2384.00 FEET.
*****
FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 18.26
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.920
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            C        0.47    0.57    0.100    69
PUBLIC PARK          C        0.39    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440
SUBAREA AREA(ACRES) = 0.86      SUBAREA RUNOFF(CFS) = 1.29
EFFECTIVE AREA(ACRES) = 7.24    AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.68  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 7.2        PEAK FLOW RATE(CFS) = 10.56

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*****
FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 18.26
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.920
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            C        0.47    0.57    0.100    69
PUBLIC PARK          C        0.39    0.57    0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440
SUBAREA AREA(ACRES) = 0.86      SUBAREA RUNOFF(CFS) = 1.29
EFFECTIVE AREA(ACRES) = 8.10    AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.67  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 8.1        PEAK FLOW RATE(CFS) = 11.86

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*****
FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 18.26
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.920
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"  A        30.37   0.98    0.200    32
RESIDENTIAL
"11+ DWELLINGS/ACRE"  C        45.30   0.57    0.200    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.73
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 75.67     SUBAREA RUNOFF(CFS) = 120.82
EFFECTIVE AREA(ACRES) = 83.77   AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.72  AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 83.8        PEAK FLOW RATE(CFS) = 132.68

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*****
FLOW PROCESS FROM NODE 5383.00 TO NODE 5383.00 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.) = 18.26
RAINFALL INTENSITY(INCH/HR) = 1.92
AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.72
AREA-AVERAGED Ap = 0.22
EFFECTIVE STREAM AREA(ACRES) = 83.77
TOTAL STREAM AREA(ACRES) = 83.77
PEAK FLOW RATE(CFS) AT CONFLUENCE = 132.68
** CONFLUENCE DATA **
STREAM      Q          Tc        AREA      HEADWATER
NUMBER      (CFS)      (MIN.)   (ACRES)   NODE
1           753.34    40.16    714.95    5000.00
2           132.68    18.26    83.77     5380.00

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COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.67; LAG(HR) = 0.54; Fm(INCH/HR) = 0.21; Ybar = 0.26
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR = 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 798.7
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5383.00 = 15121.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=.03,n=.0327; Lca/L=.04,n=.0293; Lca/L=.05,n=.0269;Lca/L=.06,n=.0251
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 226.67
PEAK FLOW RATE(CFS) = 794.56

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*****
FLOW PROCESS FROM NODE 5383.00 TO NODE 5425.00 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) = 676.82 DOWNSTREAM(FEET) = 676.55
FLOW LENGTH(FEET) = 38.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 102.0 INCH PIPE IS 77.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.16
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 794.56
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 40.19
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5425.00 = 15159.00 FEET.

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*****
FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 10

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-----  
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<  
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\*\*\*\*\*  
FLOW PROCESS FROM NODE 5408.00 TO NODE 5409.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 200.00  
ELEVATION DATA: UPSTREAM(FEET) = 704.37 DOWNSTREAM(FEET) = 703.86

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
SUBAREA ANALYSIS USED MINIMUM  $T_c$ (MIN.) = 8.356  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.069  
SUBAREA  $T_c$  AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL C 0.17 0.57 0.100 69 8.36  
PUBLIC PARK C 0.13 0.57 0.850 69 13.28  
SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.425  
SUBAREA RUNOFF(CFS) = 0.76  
TOTAL AREA(ACRES) = 0.30 PEAK FLOW RATE(CFS) = 0.76

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5409.00 TO NODE 5409.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

MAINLINE  $T_c$ (MIN.) = 8.36  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.069  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.15 0.57 0.100 69  
PUBLIC PARK C 0.12 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.433  
SUBAREA AREA(ACRES) = 0.27 SUBAREA RUNOFF(CFS) = 0.69  
EFFECTIVE AREA(ACRES) = 0.57 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.24  
AREA-AVERAGED  $F_p$ (INCH/HR) = 0.57 AREA-AVERAGED  $A_p$  = 0.43  
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 1.45

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5409.00 TO NODE 5410.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 694.03 DOWNSTREAM(FEET) = 692.13  
FLOW LENGTH(FEET) = 431.00 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.) = 3.00

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 1.45  
PIPE TRAVEL TIME(MIN.) = 2.40  $T_c$ (MIN.) = 10.75  
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5410.00 = 631.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

MAINLINE  $T_c$ (MIN.) = 10.75  
\* 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  
COMMERCIAL A 0.27 0.98 0.100 32  
PUBLIC PARK A 0.27 0.98 0.850 32  
COMMERCIAL C 0.27 0.57 0.100 69  
PUBLIC PARK C 0.27 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.77  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.475  
SUBAREA AREA(ACRES) = 1.08 SUBAREA RUNOFF(CFS) = 2.21  
EFFECTIVE AREA(ACRES) = 1.65 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.32  
AREA-AVERAGED  $F_p$ (INCH/HR) = 0.70 AREA-AVERAGED  $A_p$  = 0.46  
TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 3.44

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

MAINLINE  $T_c$ (MIN.) = 10.75  
\* 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  
COMMERCIAL A 0.27 0.98 0.100 32  
PUBLIC PARK A 0.26 0.98 0.850 32  
COMMERCIAL C 0.26 0.57 0.100 69  
PUBLIC PARK C 0.26 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.77  
SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 0.471  
SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = 2.15  
EFFECTIVE AREA(ACRES) = 2.70 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.34  
AREA-AVERAGED  $F_p$ (INCH/HR) = 0.73 AREA-AVERAGED  $A_p$  = 0.46  
TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 5.59

\*\*\*\*\*  
FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 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.) = 10.75  
RAINFALL INTENSITY(INCH/HR) = 2.64

AREA-AVERAGED Fm(INCH/HR) = 0.34  
 AREA-AVERAGED Fp(INCH/HR) = 0.73  
 AREA-AVERAGED Ap = 0.46  
 EFFECTIVE STREAM AREA(ACRES) = 2.70  
 TOTAL STREAM AREA(ACRES) = 2.70  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.59

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	0.72	0.98	0.850	32
PUBLIC PARK	A	3.17	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 3.89 SUBAREA RUNOFF(CFS) = 5.58  
 EFFECTIVE AREA(ACRES) = 4.96 AREA-AVERAGED Fm(INCH/HR) = 0.72  
 AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.80  
 TOTAL AREA(ACRES) = 5.0 PEAK FLOW RATE(CFS) = 7.59

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5400.00 TO NODE 5405.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 -----  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 295.00  
 ELEVATION DATA: UPSTREAM(FEET) = 709.30 DOWNSTREAM(FEET) = 707.30

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 10.55  
 FLOW VELOCITY(FEET/SEC.) = 2.92 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.08  
 LONGEST FLOWPATH FROM NODE 5400.00 TO NODE 5410.00 = 535.00 FEET.

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.879  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.620  
 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.)
SCHOOL	C	1.07	0.57	0.600	69	10.88

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 SUBAREA RUNOFF(CFS) = 2.20  
 TOTAL AREA(ACRES) = 1.07 PEAK FLOW RATE(CFS) = 2.20

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5410.00 TO NODE 5410.00 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.) = 12.38  
 RAINFALL INTENSITY(INCH/HR) = 2.42  
 AREA-AVERAGED Fm(INCH/HR) = 0.72  
 AREA-AVERAGED Fp(INCH/HR) = 0.91  
 AREA-AVERAGED Ap = 0.80  
 EFFECTIVE STREAM AREA(ACRES) = 4.96  
 TOTAL STREAM AREA(ACRES) = 4.96  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.59

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5405.00 TO NODE 5410.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 -----

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.59	10.75	2.638	0.73( 0.34)	0.46	2.7	5408.00
2	7.59	12.38	2.424	0.91( 0.72)	0.80	5.0	5400.00

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	13.01	10.75	2.638	0.86( 0.58)	0.67	7.0	5408.00
2	12.66	12.38	2.424	0.87( 0.59)	0.68	7.7	5400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 13.01 Tc(MIN.) = 10.75  
 EFFECTIVE AREA(ACRES) = 7.01 AREA-AVERAGED Fm(INCH/HR) = 0.58  
 AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.67  
 TOTAL AREA(ACRES) = 7.7  
 LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5410.00 = 631.00 FEET.

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FLOW PROCESS FROM NODE 5410.00 TO NODE 5411.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 692.13 DOWNSTREAM(FEET) = 690.07
FLOW LENGTH(FEET) = 554.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.75
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.01
PIPE TRAVEL TIME(MIN.) = 1.94 Tc(MIN.) = 12.70
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5411.00 = 1185.00 FEET.

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*****
FLOW PROCESS FROM NODE 5411.00 TO NODE 5411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 12.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.388
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A       0.40     0.98     0.100     32
PUBLIC PARK             A       0.25     0.98     0.850     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.388
SUBAREA AREA(ACRES) = 0.65 SUBAREA RUNOFF(CFS) = 1.18
EFFECTIVE AREA(ACRES) = 7.66 AREA-AVERAGED Fm(INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.64
TOTAL AREA(ACRES) = 8.3 PEAK FLOW RATE(CFS) = 13.01
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5411.00 TO NODE 5411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 12.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.388
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A       0.41     0.98     0.100     32
PUBLIC PARK             A       0.27     0.98     0.850     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.398
SUBAREA AREA(ACRES) = 0.68 SUBAREA RUNOFF(CFS) = 1.22
EFFECTIVE AREA(ACRES) = 8.34 AREA-AVERAGED Fm(INCH/HR) = 0.54
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.62
TOTAL AREA(ACRES) = 9.0 PEAK FLOW RATE(CFS) = 13.83

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*****
FLOW PROCESS FROM NODE 5411.00 TO NODE 5411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 12.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.388
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"   A       1.71     0.98     0.500     32
SCHOOL                 A       5.80     0.98     0.600     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.577
SUBAREA AREA(ACRES) = 7.51 SUBAREA RUNOFF(CFS) = 12.34
EFFECTIVE AREA(ACRES) = 15.85 AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 16.5 PEAK FLOW RATE(CFS) = 26.16

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FLOW PROCESS FROM NODE 5411.00 TO NODE 5415.00 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) = 690.07 DOWNSTREAM(FEET) = 689.61
FLOW LENGTH(FEET) = 92.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.38
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.16
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 12.94
LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5415.00 = 1277.00 FEET.

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*****
FLOW PROCESS FROM NODE 5415.00 TO NODE 5415.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 12.94
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.361
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A       0.21     0.98     0.100     32
PUBLIC PARK             A       0.14     0.98     0.850     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.35 SUBAREA RUNOFF(CFS) = 0.62
EFFECTIVE AREA(ACRES) = 16.20 AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 16.9 PEAK FLOW RATE(CFS) = 26.40

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*****
FLOW PROCESS FROM NODE 5415.00 TO NODE 5415.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 12.94  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.361  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.21	0.98	0.100	32
PUBLIC PARK	A	0.18	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.446  
 SUBAREA AREA(ACRES) = 0.39 SUBAREA RUNOFF(CFS) = 0.68  
 EFFECTIVE AREA(ACRES) = 16.59 AREA-AVERAGED Fm(INCH/HR) = 0.55  
 AREA-AVERAGED Fp(INCH/HR) = 0.92 AREA-AVERAGED Ap = 0.59  
 TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 27.08

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.193  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.30	0.98	0.100	32
PUBLIC PARK	A	0.26	0.98	0.850	32
COMMERCIAL	C	0.15	0.57	0.100	69
PUBLIC PARK	C	0.12	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.84  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.443  
 SUBAREA AREA(ACRES) = 0.83 SUBAREA RUNOFF(CFS) = 1.36  
 EFFECTIVE AREA(ACRES) = 32.11 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.55  
 TOTAL AREA(ACRES) = 32.8 PEAK FLOW RATE(CFS) = 50.32

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5415.00 TO NODE 5420.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 689.61 DOWNSTREAM(FEET) = 687.37  
 FLOW LENGTH(FEET) = 595.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.85  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 27.08  
 PIPE TRAVEL TIME(MIN.) = 1.70 Tc(MIN.) = 14.63  
 LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5420.00 = 1872.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5420.00 TO NODE 5420.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 14.63  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.193  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.32	0.98	0.100	32
PUBLIC PARK	A	0.28	0.98	0.850	32
COMMERCIAL	C	0.17	0.57	0.100	69
PUBLIC PARK	C	0.12	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.437  
 SUBAREA AREA(ACRES) = 0.89 SUBAREA RUNOFF(CFS) = 1.46  
 EFFECTIVE AREA(ACRES) = 33.00 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 33.7 PEAK FLOW RATE(CFS) = 51.78

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5420.00 TO NODE 5420.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 14.63  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.193  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	10.00	0.57	0.500	69
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	4.69	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 14.69 SUBAREA RUNOFF(CFS) = 24.39  
 EFFECTIVE AREA(ACRES) = 31.28 AREA-AVERAGED Fm(INCH/HR) = 0.45  
 AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.55  
 TOTAL AREA(ACRES) = 31.9 PEAK FLOW RATE(CFS) = 48.96

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5420.00 TO NODE 5425.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 687.37 DOWNSTREAM(FEET) = 679.09  
 FLOW LENGTH(FEET) = 640.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.88  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 51.78  
 PIPE TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 15.61  
 LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5425.00 = 2512.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5420.00 TO NODE 5420.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 14.63

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====



MAINLINE Tc(MIN.) = 15.61  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.109  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.53	0.57	0.100	69
PUBLIC PARK	C	0.44	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440  
 SUBAREA AREA(ACRES) = 0.97 SUBAREA RUNOFF(CFS) = 1.62  
 EFFECTIVE AREA(ACRES) = 33.97 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 34.6 PEAK FLOW RATE(CFS) = 51.78  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
 =====

MAINLINE Tc(MIN.) = 15.61  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.109  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.53	0.57	0.100	69
PUBLIC PARK	C	0.44	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.440  
 SUBAREA AREA(ACRES) = 0.97 SUBAREA RUNOFF(CFS) = 1.62  
 EFFECTIVE AREA(ACRES) = 34.94 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.81 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 35.6 PEAK FLOW RATE(CFS) = 52.54

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 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	52.54	15.61	2.109	0.81( 0.44)	0.54	34.9	5408.00
2	49.38	17.27	1.985	0.82( 0.44)	0.54	35.6	5400.00

LONGEST FLOWPATH FROM NODE 5408.00 TO NODE 5425.00 = 2512.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*

PEAK FLOW RATE(CFS) = 794.56 Tc(MIN.) = 40.19  
 AREA-AVERAGED Fm(INCH/HR) = 0.21 Ybar = 0.26  
 TOTAL AREA(ACRES) = 798.7  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5425.00 = 15159.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.67; LAG(HR) = 0.54; Fm(INCH/HR) = 0.22; Ybar = 0.27  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 834.3  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5425.00 = 15159.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0327; Lca/L=0.4,n=.0293; Lca/L=0.5,n=.0269;Lca/L=0.6,n=.0251  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 233.81  
 PEAK FLOW RATE(CFS) = 822.15

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5425.00 TO NODE 5425.00 IS CODE = 12  
 -----

>>>>CLEAR MEMORY BANK # 1 <<<<<<  
 =====

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5425.00 TO NODE 5455.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 676.55 DOWNSTREAM(FEET) = 671.57  
 FLOW LENGTH(FEET) = 712.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 102.0 INCH PIPE IS 80.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.08  
 ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 822.15  
 PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 40.89  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5455.00 = 15871.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
 =====

MAINLINE Tc(MIN.) = 40.89  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.184  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.66	0.57	0.100	69
PUBLIC PARK	C	0.46	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.408  
 SUBAREA AREA(ACRES) = 1.12  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.68; LAG(HR) = 0.55; Fm(INCH/HR) = 0.22; Ybar = 0.27  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;

3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 835.4  
 LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5455.00 = 15871.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0322; Lca/L=0.4,n=.0289; Lca/L=0.5,n=.0265;Lca/L=0.6,n=.0247  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 234.11  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 813.97  
 TOTAL AREA(ACRES) = 835.4 PEAK FLOW RATE(CFS) = 822.15  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

PIPE-FLOW(CFS) = 7.39  
 PIPE TRAVEL TIME(MIN.) = 2.31 Tc(MIN.) = 13.97  
 LONGEST FLOWPATH FROM NODE 5430.00 TO NODE 5432.00 = 1476.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5432.00 TO NODE 5432.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 13.97  
 \* 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  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 3.81 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 3.81 SUBAREA RUNOFF(CFS) = 6.76  
 EFFECTIVE AREA(ACRES) = 7.76 AREA-AVERAGED Fm(INCH/HR) = 0.36  
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 7.8 PEAK FLOW RATE(CFS) = 13.23

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5432.00 TO NODE 5435.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 682.10 DOWNSTREAM(FEET) = 681.00  
 FLOW LENGTH(FEET) = 166.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.11  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 13.23  
 PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 14.42  
 LONGEST FLOWPATH FROM NODE 5430.00 TO NODE 5435.00 = 1642.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5435.00 TO NODE 5435.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 14.42  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.212  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 1.85 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 1.85 SUBAREA RUNOFF(CFS) = 3.21  
 EFFECTIVE AREA(ACRES) = 9.61 AREA-AVERAGED Fm(INCH/HR) = 0.35  
 AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 9.6 PEAK FLOW RATE(CFS) = 16.14

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 1  
 -----  
 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 =====  
 TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 PEAK FLOW RATE(CFS) = 822.15 Tc(MIN.) = 40.89  
 AREA-AVERAGED Fm(INCH/HR) = 0.22 Ybar = 0.27  
 TOTAL AREA(ACRES) = 835.4

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5430.00 TO NODE 5431.00 IS CODE = 21  
 -----  
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 =====  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 727.00  
 ELEVATION DATA: UPSTREAM(FEET) = 703.40 DOWNSTREAM(FEET) = 687.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.657  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.513  
 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  
 "5-7 DWELLINGS/ACRE" C 1.00 0.57 0.500 69 11.66  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 2.95 0.98 0.500 32 11.66  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.87  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 7.39  
 TOTAL AREA(ACRES) = 3.95 PEAK FLOW RATE(CFS) = 7.39

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5431.00 TO NODE 5432.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 687.50 DOWNSTREAM(FEET) = 682.10  
 FLOW LENGTH(FEET) = 749.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.39  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

```

*****
FLOW PROCESS FROM NODE 5435.00 TO NODE 5455.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 681.00 DOWNSTREAM(FEET) = 675.09
FLOW LENGTH(FEET) = 357.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.00
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.14
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 15.09
LONGEST FLOWPATH FROM NODE 5430.00 TO NODE 5455.00 = 1999.00 FEET.

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*****
FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.09
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.153
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 2.53 0.57 0.500 69
PUBLIC PARK C 0.90 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.592
SUBAREA AREA(ACRES) = 3.43 SUBAREA RUNOFF(CFS) = 5.61
EFFECTIVE AREA(ACRES) = 13.04 AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 13.0 PEAK FLOW RATE(CFS) = 21.25

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*****
FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.09
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.153
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 0.96 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 0.96 SUBAREA RUNOFF(CFS) = 1.62
EFFECTIVE AREA(ACRES) = 14.00 AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.0 PEAK FLOW RATE(CFS) = 22.86

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FLOW PROCESS FROM NODE 5455.00 TO NODE 5455.00 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.) = 15.09
RAINFALL INTENSITY(INCH/HR) = 2.15
AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.65
AREA-AVERAGED Ap = 0.52
EFFECTIVE STREAM AREA(ACRES) = 14.00
TOTAL STREAM AREA(ACRES) = 14.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 22.86
** CONFLUENCE DATA **
STREAM Q Tc AREA HEADWATER
NUMBER (CFS) (MIN.) (ACRES) NODE
1 822.15 40.89 835.43 5000.00
2 22.86 15.09 14.00 5430.00

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COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.68; LAG(HR) = 0.55; Fm(INCH/HR) = 0.22; Ybar = 0.27
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 849.4
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5455.00 = 15871.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0320; Lca/L=0.4,n=.0287; Lca/L=0.5,n=.0264;Lca/L=0.6,n=.0246
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 237.38
PEAK FLOW RATE(CFS) = 825.80

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*****
FLOW PROCESS FROM NODE 5455.00 TO NODE 5470.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 671.57 DOWNSTREAM(FEET) = 666.50
FLOW LENGTH(FEET) = 767.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 102.0 INCH PIPE IS 83.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.61
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 825.80
PIPE TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 41.66
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.

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*****
FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 41.66
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.171
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         1.23   0.57  0.100  69
PUBLIC PARK         C         1.01   0.57  0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.438
SUBAREA AREA(ACRES) = 2.24
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
          MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.69; LAG(HR) = 0.56; Fm(INCH/HR) = 0.22; Ybar = 0.27
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 851.7
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0316; Lca/L=0.4,n=.0283; Lca/L=0.5,n=.0260;Lca/L=0.6,n=.0243
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 237.97
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 815.77
TOTAL AREA(ACRES) = 851.7 PEAK FLOW RATE(CFS) = 825.80
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 41.66
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.171
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         0.58   0.57  0.100  69
PUBLIC PARK         C         0.52   0.57  0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455
SUBAREA AREA(ACRES) = 1.10
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
          MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.69; LAG(HR) = 0.56; Fm(INCH/HR) = 0.22; Ybar = 0.27
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 852.8
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0316; Lca/L=0.4,n=.0283; Lca/L=0.5,n=.0260;Lca/L=0.6,n=.0243
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 238.26

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UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 816.74
TOTAL AREA(ACRES) = 852.8 PEAK FLOW RATE(CFS) = 825.80
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 5470.00 TO NODE 5470.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 41.66
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.171
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" A         4.00   0.98  0.200  32
RESIDENTIAL
"11+ DWELLINGS/ACRE" C        29.31   0.57  0.200  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 33.31
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
          MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.69; LAG(HR) = 0.56; Fm(INCH/HR) = 0.22; Ybar = 0.27
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 886.1
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5470.00 = 16638.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0316; Lca/L=0.4,n=.0283; Lca/L=0.5,n=.0260;Lca/L=0.6,n=.0243
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 248.60
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 849.56
TOTAL AREA(ACRES) = 886.1 PEAK FLOW RATE(CFS) = 849.56
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 886.1 TC(MIN.) = 41.66
AREA-AVERAGED Fm(INCH/HR)= 0.22 Ybar = 0.27
PEAK FLOW RATE(CFS) = 849.56
=====
END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Analysis prepared by:

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2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH  
FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.30
30-MINUTES	0.61
1-HOUR	0.80
3-HOUR	1.38
6-HOUR	1.94
24-HOUR	3.65

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*

\* MILLIKEN AVENUE \*  
\* 10-YR STUDY \*  
\* AREA 'Q' \*  
\*\*\*\*\*

FILE NAME: MILLIKEN.DAT  
TIME/DATE OF STUDY: 10:21 08/24/2011

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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 GUTTER-GEOMETRIES:		MANNING	
	WIDTH	CROSSFALL	IN- / OUT-	PARK-	HEIGHT	WIDTH	LIP	HIKE
	(FT)	(FT)	SIDE / SIDE/	WAY	(FT)	(FT)	(FT)	(FT)
===	=====	=====	=====	=====	=====	=====	=====	=====
1	30.0	20.0	0.018/0.018/0.020	0.020	0.67	2.00	0.0312	0.167
2	40.0	25.0	0.020/0.020/0.020	0.020	0.67	2.00	0.0312	0.167

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.50 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF

\*\*\*\*\*

FLOW PROCESS FROM NODE 6000.00 TO NODE 6005.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 800.00  
ELEVATION DATA: UPSTREAM(FEET) = 809.00 DOWNSTREAM(FEET) = 800.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.811  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.237  
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	A	3.63	0.98	0.100	32	10.81

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 6.99  
TOTAL AREA(ACRES) = 3.63 PEAK FLOW RATE(CFS) = 6.99

\*\*\*\*\*

FLOW PROCESS FROM NODE 6005.00 TO NODE 6010.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 800.00 DOWNSTREAM ELEVATION(FEET) = 795.06  
STREET LENGTH(FEET) = 920.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 40.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 25.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.37  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:



STREET FLOW DEPTH(FEET) = 0.57  
 HALFSTREET FLOOD WIDTH(FEET) = 20.62  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.56  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.46  
 STREET FLOW TRAVEL TIME(MIN.) = 5.99 Tc(MIN.) = 16.80  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.717  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	5.89	0.98	0.100	32
PUBLIC PARK	A	0.15	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.119  
 SUBAREA AREA(ACRES) = 6.04 SUBAREA RUNOFF(CFS) = 8.71  
 EFFECTIVE AREA(ACRES) = 9.67 AREA-AVERAGED Fm(INCH/HR) = 0.11  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.11  
 TOTAL AREA(ACRES) = 9.7 PEAK FLOW RATE(CFS) = 14.00

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.61 HALFSTREET FLOOD WIDTH(FEET) = 22.37  
 FLOW VELOCITY(FEET/SEC.) = 2.69 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.63  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6010.00 = 1720.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6010.00 TO NODE 6012.50 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 779.48 DOWNSTREAM(FEET) = 767.69  
 FLOW LENGTH(FEET) = 1590.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.47  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 14.00  
 PIPE TRAVEL TIME(MIN.) = 4.10 Tc(MIN.) = 20.89  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6012.50 = 3310.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6012.50 TO NODE 6012.50 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 20.89  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.506  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.24	0.98	0.850	32
COMMERCIAL	A	2.91	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.324  
 SUBAREA AREA(ACRES) = 4.15 SUBAREA RUNOFF(CFS) = 4.45  
 EFFECTIVE AREA(ACRES) = 13.82 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.18  
 TOTAL AREA(ACRES) = 13.8 PEAK FLOW RATE(CFS) = 16.61

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6012.50 TO NODE 6015.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 767.69 DOWNSTREAM(FEET) = 762.79  
 FLOW LENGTH(FEET) = 917.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.96  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 16.61  
 PIPE TRAVEL TIME(MIN.) = 2.56 Tc(MIN.) = 23.46  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6015.00 = 4227.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6015.00 TO NODE 6015.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 23.46  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.405  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	0.71	0.98	0.850	32
COMMERCIAL	A	1.70	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.321  
 SUBAREA AREA(ACRES) = 2.41 SUBAREA RUNOFF(CFS) = 2.37  
 EFFECTIVE AREA(ACRES) = 16.23 AREA-AVERAGED Fm(INCH/HR) = 0.19  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 16.2 PEAK FLOW RATE(CFS) = 17.72

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6015.00 TO NODE 6020.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 762.79 DOWNSTREAM(FEET) = 745.81  
 FLOW LENGTH(FEET) = 1290.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.53  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 17.72  
 PIPE TRAVEL TIME(MIN.) = 2.52 Tc(MIN.) = 25.98  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6020.00 = 5517.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6020.00 TO NODE 6020.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 25.98

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* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.322
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A         3.35   0.98  0.100  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 3.35   SUBAREA RUNOFF(CFS) = 3.69
EFFECTIVE AREA(ACRES) = 19.58  AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 19.6   PEAK FLOW RATE(CFS) = 20.20

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*****
FLOW PROCESS FROM NODE 6020.00 TO NODE 6025.00 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) = 745.81  DOWNSTREAM(FEET) = 736.48
FLOW LENGTH(FEET) = 1450.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.66
ESTIMATED PIPE DIAMETER(INCH) = 27.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.20
PIPE TRAVEL TIME(MIN.) = 3.63  Tc(MIN.) = 29.60
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6025.00 = 6967.00 FEET.

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*****
FLOW PROCESS FROM NODE 6025.00 TO NODE 6025.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 29.60
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.222
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A         3.83   0.98  0.100  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 3.83   SUBAREA RUNOFF(CFS) = 3.88
EFFECTIVE AREA(ACRES) = 23.41  AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 23.4   PEAK FLOW RATE(CFS) = 22.32

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*****
FLOW PROCESS FROM NODE 6025.00 TO NODE 6030.00 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) = 736.48  DOWNSTREAM(FEET) = 724.27
FLOW LENGTH(FEET) = 1164.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.29
ESTIMATED PIPE DIAMETER(INCH) = 27.00  NUMBER OF PIPES = 1

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PIPE-FLOW(CFS) = 22.32
PIPE TRAVEL TIME(MIN.) = 2.34  Tc(MIN.) = 31.95
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6030.00 = 8131.00 FEET.

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*****
FLOW PROCESS FROM NODE 6030.00 TO NODE 6030.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 31.95
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.168
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A         3.06   0.98  0.100  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 3.06   SUBAREA RUNOFF(CFS) = 2.95
EFFECTIVE AREA(ACRES) = 26.47  AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 26.5   PEAK FLOW RATE(CFS) = 24.11

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*****
FLOW PROCESS FROM NODE 6030.00 TO NODE 6050.00 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) = 724.27  DOWNSTREAM(FEET) = 713.28
FLOW LENGTH(FEET) = 769.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.28
ESTIMATED PIPE DIAMETER(INCH) = 24.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.11
PIPE TRAVEL TIME(MIN.) = 1.38  Tc(MIN.) = 33.33
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6050.00 = 8900.00 FEET.

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*****
FLOW PROCESS FROM NODE 6050.00 TO NODE 6050.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 33.33
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.138
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           A        12.09   0.98  0.100  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 12.09  SUBAREA RUNOFF(CFS) = 11.33
EFFECTIVE AREA(ACRES) = 38.56  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 38.6   PEAK FLOW RATE(CFS) = 34.74

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FLOW PROCESS FROM NODE 6050.00 TO NODE 6075.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 713.28 DOWNSTREAM(FEET) = 702.49
FLOW LENGTH(FEET) = 692.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.50
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.74
PIPE TRAVEL TIME(MIN.) = 1.10 Tc(MIN.) = 34.42
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6075.00 = 9592.00 FEET.

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*****
FLOW PROCESS FROM NODE 6075.00 TO NODE 6075.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 34.42
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.117
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A       6.70   0.98  0.100  32
COMMERCIAL          C       4.77   0.57  0.100  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.47 SUBAREA RUNOFF(CFS) = 10.69
EFFECTIVE AREA(ACRES) = 50.03 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 50.0 PEAK FLOW RATE(CFS) = 44.68

```

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*****
FLOW PROCESS FROM NODE 6075.00 TO NODE 6077.50 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 702.49 DOWNSTREAM(FEET) = 698.66
FLOW LENGTH(FEET) = 476.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.64
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 44.68
PIPE TRAVEL TIME(MIN.) = 0.92 Tc(MIN.) = 35.34
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6077.50 = 10068.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 6077.50 TO NODE 6077.50 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 35.34
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.099
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
COMMERCIAL          C       0.90   0.57  0.100  69
PUBLIC PARK         C       0.16   0.57  0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.213
SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 0.93
EFFECTIVE AREA(ACRES) = 51.09 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 51.1 PEAK FLOW RATE(CFS) = 44.82

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*****
FLOW PROCESS FROM NODE 6077.50 TO NODE 6105.00 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) = 698.66 DOWNSTREAM(FEET) = 690.85
FLOW LENGTH(FEET) = 831.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.29
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 44.82
PIPE TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 36.83
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6105.00 = 10899.00 FEET.

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*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 IS CODE = 81
-----

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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 36.83
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.072
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C       1.53   0.57  0.100  69
PUBLIC PARK         C       0.35   0.57  0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.240
SUBAREA AREA(ACRES) = 1.88 SUBAREA RUNOFF(CFS) = 1.58
EFFECTIVE AREA(ACRES) = 52.97 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 53.0 PEAK FLOW RATE(CFS) = 45.17

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*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 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.) = 36.83
RAINFALL INTENSITY(INCH/HR) = 1.07
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.91

```

AREA-AVERAGED Ap = 0.14  
 EFFECTIVE STREAM AREA(ACRES) = 52.97  
 TOTAL STREAM AREA(ACRES) = 52.97  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 45.17

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	7.98	0.57	0.200	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA(ACRES) =		7.98	SUBAREA RUNOFF(CFS) =		9.68
EFFECTIVE AREA(ACRES) =		9.36	AREA-AVERAGED Fm(INCH/HR) =		0.11
AREA-AVERAGED Fp(INCH/HR) =		0.57	AREA-AVERAGED Ap =		0.20
TOTAL AREA(ACRES) =		9.4	PEAK FLOW RATE(CFS) =		11.35

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6080.00 TO NODE 6085.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 255.00  
 ELEVATION DATA: UPSTREAM(FEET) = 715.50 DOWNSTREAM(FEET) = 714.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.005  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.496  
 SUBAREA Tc AND LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 1.38 0.57 0.200 69 9.00  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA RUNOFF(CFS) = 2.96  
 TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 2.96

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 22.70  
 FLOW VELOCITY(FEET/SEC.) = 1.18 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.67  
 LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6090.00 = 1102.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6090.00 TO NODE 6095.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
 ELEVATION DATA: UPSTREAM(FEET) = 713.50 DOWNSTREAM(FEET) = 706.60  
 FLOW LENGTH(FEET) = 425.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 10.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.30  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 11.35  
 PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 22.85  
 LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6095.00 = 1527.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6095.00 TO NODE 6095.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
 MAINLINE Tc(MIN.) = 22.85  
 \* 10 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" A 1.00 0.98 0.200 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 8.67 0.57 0.200 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 9.67 SUBAREA RUNOFF(CFS) = 11.37  
 EFFECTIVE AREA(ACRES) = 19.03 AREA-AVERAGED Fm(INCH/HR) = 0.12  
 AREA-AVERAGED Fp(INCH/HR) = 0.59 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 19.0 PEAK FLOW RATE(CFS) = 22.44

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6095.00 TO NODE 6097.50 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6085.00 TO NODE 6090.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

-----  
 UPSTREAM ELEVATION(FEET) = 714.50 DOWNSTREAM ELEVATION(FEET) = 713.50  
 STREET LENGTH(FEET) = 847.00 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) = 7.97  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.51  
 HALFSTREET FLOOD WIDTH(FEET) = 19.73  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.09  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.56  
 STREET FLOW TRAVEL TIME(MIN.) = 12.99 Tc(MIN.) = 22.00

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.461  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 706.60 DOWNSTREAM(FEET) = 703.67
FLOW LENGTH(FEET) = 586.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.25
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 22.44
PIPE TRAVEL TIME(MIN.) = 1.56 Tc(MIN.) = 24.41
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6097.50 = 2113.00 FEET.

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*****
FLOW PROCESS FROM NODE 6097.50 TO NODE 6097.50 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 24.41
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.372
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"  A      2.30    0.98    0.500   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C      9.59    0.57    0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.65
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.89 SUBAREA RUNOFF(CFS) = 11.23
EFFECTIVE AREA(ACRES) = 30.92 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 30.9 PEAK FLOW RATE(CFS) = 32.72

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*****
FLOW PROCESS FROM NODE 6097.50 TO NODE 6100.00 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) = 703.67 DOWNSTREAM(FEET) = 700.00
FLOW LENGTH(FEET) = 742.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.75
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 32.72
PIPE TRAVEL TIME(MIN.) = 1.83 Tc(MIN.) = 26.25
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6100.00 = 2855.00 FEET.

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*****
FLOW PROCESS FROM NODE 6100.00 TO NODE 6100.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 26.25
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.314
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
"5-7 DWELLINGS/ACRE"  C      9.54    0.57    0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 9.54 SUBAREA RUNOFF(CFS) = 8.85
EFFECTIVE AREA(ACRES) = 40.46 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 40.5 PEAK FLOW RATE(CFS) = 39.95

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*****
FLOW PROCESS FROM NODE 6100.00 TO NODE 6105.00 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) = 700.00 DOWNSTREAM(FEET) = 690.85
FLOW LENGTH(FEET) = 477.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.66
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 39.95
PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 26.93
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6105.00 = 3332.00 FEET.

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*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 26.93
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.294
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp      Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          C      1.55    0.57    0.100   69
PUBLIC PARK         C      0.75    0.57    0.850   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.345
SUBAREA AREA(ACRES) = 2.30 SUBAREA RUNOFF(CFS) = 2.27
EFFECTIVE AREA(ACRES) = 42.76 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 42.8 PEAK FLOW RATE(CFS) = 41.49

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```

*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 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.) = 26.93
RAINFALL INTENSITY(INCH/HR) = 1.29
AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60

```

AREA-AVERAGED Ap = 0.36  
 EFFECTIVE STREAM AREA(ACRES) = 42.76  
 TOTAL STREAM AREA(ACRES) = 42.76  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 41.49

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	45.17	36.83	1.072	0.91 (0.12)	0.14	53.0	6000.00
2	41.49	26.93	1.294	0.60 (0.22)	0.36	42.8	6080.00

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	82.24	26.93	1.294	0.68 (0.17)	0.25	81.5	6080.00
2	78.13	36.83	1.072	0.70 (0.17)	0.24	95.7	6000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 82.24 Tc(MIN.) = 26.93  
 EFFECTIVE AREA(ACRES) = 81.48 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 95.7  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6105.00 = 10899.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 6105.00 TO NODE 6130.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 690.85 DOWNSTREAM(FEET) = 679.50  
 FLOW LENGTH(FEET) = 1791.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.36  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 82.24  
 PIPE TRAVEL TIME(MIN.) = 3.19 Tc(MIN.) = 30.12  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6130.00 = 12690.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 30.12  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.210  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	3.02	0.57	0.100	69
PUBLIC PARK	C	0.98	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.284

SUBAREA AREA(ACRES) = 4.00 SUBAREA RUNOFF(CFS) = 3.78  
 EFFECTIVE AREA(ACRES) = 85.48 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 99.7 PEAK FLOW RATE(CFS) = 82.24  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 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.) = 30.12  
 RAINFALL INTENSITY(INCH/HR) = 1.21  
 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.68  
 AREA-AVERAGED Ap = 0.25  
 EFFECTIVE STREAM AREA(ACRES) = 85.48  
 TOTAL STREAM AREA(ACRES) = 99.73  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 82.24

\*\*\*\*\*

FLOW PROCESS FROM NODE 6110.00 TO NODE 6115.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

\*\*\*\*\*

INITIAL SUBAREA FLOW-LENGTH(FEET) = 595.00  
 ELEVATION DATA: UPSTREAM(FEET) = 704.20 DOWNSTREAM(FEET) = 703.80

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 21.589  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.477  
 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 "5-7 DWELLINGS/ACRE"	C	3.15	0.57	0.500	69	21.59

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 3.39  
 TOTAL AREA(ACRES) = 3.15 PEAK FLOW RATE(CFS) = 3.39

\*\*\*\*\*

FLOW PROCESS FROM NODE 6115.00 TO NODE 6120.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 703.80 DOWNSTREAM ELEVATION(FEET) = 702.90  
 STREET LENGTH(FEET) = 386.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.018



OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018  
 SPECIFIED NUMBER OF HALFSSTREETS 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) = 7.35  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.46  
 HALFSSTREET FLOOD WIDTH(FEET) = 16.60  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.38  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.64  
 STREET FLOW TRAVEL TIME(MIN.) = 4.65 Tc(MIN.) = 26.24  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.314

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"	A	2.10	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	4.13	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.23 SUBAREA RUNOFF(CFS) = 5.19  
 EFFECTIVE AREA(ACRES) = 18.09 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 18.1 PEAK FLOW RATE(CFS) = 15.61

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.51 HALFSSTREET FLOOD WIDTH(FEET) = 19.41  
 FLOW VELOCITY(FEET/SEC.) = 1.52 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.77  
 LONGEST FLOWPATH FROM NODE 6110.00 TO NODE 6120.00 = 981.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6120.00 TO NODE 6125.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 702.90 DOWNSTREAM(FEET) = 689.90  
 FLOW LENGTH(FEET) = 676.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 10.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.72  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 10.83  
 PIPE TRAVEL TIME(MIN.) = 1.29 Tc(MIN.) = 27.53  
 LONGEST FLOWPATH FROM NODE 6110.00 TO NODE 6125.00 = 1657.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6125.00 TO NODE 6125.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 27.53  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.277

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"	A	2.10	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	4.13	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.23 SUBAREA RUNOFF(CFS) = 5.19  
 EFFECTIVE AREA(ACRES) = 18.09 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 18.1 PEAK FLOW RATE(CFS) = 15.61

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6125.00 TO NODE 6130.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 689.90 DOWNSTREAM(FEET) = 679.50  
 FLOW LENGTH(FEET) = 1196.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.04  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 15.61  
 PIPE TRAVEL TIME(MIN.) = 2.83 Tc(MIN.) = 30.36  
 LONGEST FLOWPATH FROM NODE 6110.00 TO NODE 6130.00 = 2853.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 30.36  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.204  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	8.18	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 8.18 SUBAREA RUNOFF(CFS) = 6.78  
 EFFECTIVE AREA(ACRES) = 26.27 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 26.3 PEAK FLOW RATE(CFS) = 21.21

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 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.) = 30.36  
 RAINFALL INTENSITY(INCH/HR) = 1.20  
 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.60  
 AREA-AVERAGED Ap = 0.51  
 EFFECTIVE STREAM AREA(ACRES) = 26.27  
 TOTAL STREAM AREA(ACRES) = 26.27  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 21.21

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	82.24	30.12	1.210	0.68 ( 0.17)	0.25	85.5	6080.00
1	78.13	40.05	1.020	0.69 ( 0.17)	0.24	99.7	6000.00
2	21.21	30.36	1.204	0.60 ( 0.31)	0.51	26.3	6110.00

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	103.42	30.12	1.210	0.65 ( 0.20)	0.31	111.5	6080.00
2	103.35	30.36	1.204	0.65 ( 0.20)	0.31	112.1	6110.00
3	94.98	40.05	1.020	0.66 ( 0.19)	0.30	126.0	6000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 103.42 Tc(MIN.) = 30.12  
 EFFECTIVE AREA(ACRES) = 111.55 AREA-AVERAGED Fm(INCH/HR) = 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.31  
 TOTAL AREA(ACRES) = 126.0  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6130.00 = 12690.00 FEET.

=====  
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 126.0 TC(MIN.) = 30.12  
 EFFECTIVE AREA(ACRES) = 111.55 AREA-AVERAGED Fm(INCH/HR)= 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.315  
 PEAK FLOW RATE(CFS) = 103.42

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	103.42	30.12	1.210	0.65 ( 0.20)	0.31	111.5	6080.00
2	103.35	30.36	1.204	0.65 ( 0.20)	0.31	112.1	6110.00
3	94.98	40.05	1.020	0.66 ( 0.19)	0.30	126.0	6000.00

=====  
 END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* MILLIKEN AVENUE \*  
\* 100-YR STUDY \*  
\* AREA 'Q' \*  
\*\*\*\*\*

FILE NAME: MILLIKEN.DAT  
TIME/DATE OF STUDY: 09:03 08/03/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====  
--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GUTTER LIP (FT)	GEOMETRIES 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	40.0	25.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.50 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF

2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH  
FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

AREA-AVERAGED

DURATION	RAINFALL(INCH)
5-MINUTES	0.44
30-MINUTES	0.91
1-HOUR	1.20
3-HOUR	2.10
6-HOUR	3.00
24-HOUR	6.00

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6000.00 TO NODE 6005.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 800.00  
ELEVATION DATA: UPSTREAM(FEET) = 809.00 DOWNSTREAM(FEET) = 800.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.811  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.355  
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	A	3.63	0.98	0.100	32	10.81

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 10.64  
TOTAL AREA(ACRES) = 3.63 PEAK FLOW RATE(CFS) = 10.64

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6005.00 TO NODE 6010.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

===== UPSTREAM ELEVATION(FEET) = 800.00 DOWNSTREAM ELEVATION(FEET) = 795.06  
STREET LENGTH(FEET) = 920.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 40.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 25.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.52  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.65  
 HALFSTREET FLOOD WIDTH(FEET) = 24.42  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.85  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.84  
 STREET FLOW TRAVEL TIME(MIN.) = 5.39 Tc(MIN.) = 16.20  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.633  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	5.89	0.98	0.100	32
PUBLIC PARK	A	0.15	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.119  
 SUBAREA AREA(ACRES) = 6.04 SUBAREA RUNOFF(CFS) = 13.68  
 EFFECTIVE AREA(ACRES) = 9.67 AREA-AVERAGED Fm(INCH/HR) = 0.11  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.11  
 TOTAL AREA(ACRES) = 9.7 PEAK FLOW RATE(CFS) = 21.96

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.69 HALFSTREET FLOOD WIDTH(FEET) = 27.92  
 FLOW VELOCITY(FEET/SEC.) = 3.00 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.08  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6010.00 = 1720.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6010.00 TO NODE 6012.50 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 779.48 DOWNSTREAM(FEET) = 767.69  
 FLOW LENGTH(FEET) = 1590.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.17  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 21.96  
 PIPE TRAVEL TIME(MIN.) = 3.70 Tc(MIN.) = 19.90  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6012.50 = 3310.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6012.50 TO NODE 6012.50 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 19.90  
 \* 100 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	A	1.24	0.98	0.850	32
COMMERCIAL	A	2.91	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.324  
 SUBAREA AREA(ACRES) = 4.15 SUBAREA RUNOFF(CFS) = 7.51  
 EFFECTIVE AREA(ACRES) = 13.82 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.18  
 TOTAL AREA(ACRES) = 13.8 PEAK FLOW RATE(CFS) = 26.82

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6012.50 TO NODE 6015.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 767.69 DOWNSTREAM(FEET) = 762.79  
 FLOW LENGTH(FEET) = 917.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.59  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 26.82  
 PIPE TRAVEL TIME(MIN.) = 2.32 Tc(MIN.) = 22.22  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6015.00 = 4227.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6015.00 TO NODE 6015.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 22.22  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.178  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	0.71	0.98	0.850	32
COMMERCIAL	A	1.70	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.321  
 SUBAREA AREA(ACRES) = 2.41 SUBAREA RUNOFF(CFS) = 4.05  
 EFFECTIVE AREA(ACRES) = 16.23 AREA-AVERAGED Fm(INCH/HR) = 0.19  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 16.2 PEAK FLOW RATE(CFS) = 29.01

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6015.00 TO NODE 6020.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 762.79 DOWNSTREAM(FEET) = 745.81  
 FLOW LENGTH(FEET) = 1290.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.53  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 29.01  
 PIPE TRAVEL TIME(MIN.) = 2.26 Tc(MIN.) = 24.47  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6020.00 = 5517.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6020.00 TO NODE 6020.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 24.47

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.055  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 3.35 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 3.35 SUBAREA RUNOFF(CFS) = 5.90  
 EFFECTIVE AREA(ACRES) = 19.58 AREA-AVERAGED Fm(INCH/HR) = 0.18  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.18  
 TOTAL AREA(ACRES) = 19.6 PEAK FLOW RATE(CFS) = 33.12

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6020.00 TO NODE 6025.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 745.81 DOWNSTREAM(FEET) = 736.48  
 FLOW LENGTH(FEET) = 1450.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.57  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 33.12  
 PIPE TRAVEL TIME(MIN.) = 3.19 Tc(MIN.) = 27.67  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6025.00 = 6967.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6025.00 TO NODE 6025.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 27.67  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.909  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 3.83 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 3.83 SUBAREA RUNOFF(CFS) = 6.25  
 EFFECTIVE AREA(ACRES) = 23.41 AREA-AVERAGED Fm(INCH/HR) = 0.16  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.17  
 TOTAL AREA(ACRES) = 23.4 PEAK FLOW RATE(CFS) = 36.79

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6025.00 TO NODE 6030.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 736.48 DOWNSTREAM(FEET) = 724.27  
 FLOW LENGTH(FEET) = 1164.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.21  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 36.79  
 PIPE TRAVEL TIME(MIN.) = 2.11 Tc(MIN.) = 29.77  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6030.00 = 8131.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6030.00 TO NODE 6030.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 29.77  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.827  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 3.06 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 3.06 SUBAREA RUNOFF(CFS) = 4.76  
 EFFECTIVE AREA(ACRES) = 26.47 AREA-AVERAGED Fm(INCH/HR) = 0.16  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.16  
 TOTAL AREA(ACRES) = 26.5 PEAK FLOW RATE(CFS) = 39.83

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6030.00 TO NODE 6050.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 724.27 DOWNSTREAM(FEET) = 713.28  
 FLOW LENGTH(FEET) = 769.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.65  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 39.83  
 PIPE TRAVEL TIME(MIN.) = 1.20 Tc(MIN.) = 30.97  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6050.00 = 8900.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6050.00 TO NODE 6050.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 30.97  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.784  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 12.09 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 12.09 SUBAREA RUNOFF(CFS) = 18.35  
 EFFECTIVE AREA(ACRES) = 38.56 AREA-AVERAGED Fm(INCH/HR) = 0.14  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.14  
 TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 57.16

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FLOW PROCESS FROM NODE 6050.00 TO NODE 6075.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 713.28 DOWNSTREAM(FEET) = 702.49
FLOW LENGTH(FEET) = 692.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.96
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 57.16
PIPE TRAVEL TIME(MIN.) = 0.96 Tc(MIN.) = 31.94
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6075.00 = 9592.00 FEET.

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*****
FLOW PROCESS FROM NODE 6075.00 TO NODE 6075.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 31.94
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.752
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A       6.70   0.98  0.100  32
COMMERCIAL          C       4.77   0.57  0.100  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.47 SUBAREA RUNOFF(CFS) = 17.25
EFFECTIVE AREA(ACRES) = 50.03 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 50.0 PEAK FLOW RATE(CFS) = 73.28

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*****
FLOW PROCESS FROM NODE 6075.00 TO NODE 6077.50 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 702.49 DOWNSTREAM(FEET) = 698.66
FLOW LENGTH(FEET) = 476.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.00
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 73.28
PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 32.73
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6077.50 = 10068.00 FEET.

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*****
FLOW PROCESS FROM NODE 6077.50 TO NODE 6077.50 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 32.73
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.726
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
COMMERCIAL          C       0.90   0.57  0.100  69
PUBLIC PARK         C       0.16   0.57  0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.213
SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 1.53
EFFECTIVE AREA(ACRES) = 51.09 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 51.1 PEAK FLOW RATE(CFS) = 73.66

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*****
FLOW PROCESS FROM NODE 6077.50 TO NODE 6105.00 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) = 698.66 DOWNSTREAM(FEET) = 690.85
FLOW LENGTH(FEET) = 831.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.43
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 73.66
PIPE TRAVEL TIME(MIN.) = 1.33 Tc(MIN.) = 34.06
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6105.00 = 10899.00 FEET.

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*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 34.06
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.685
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C       1.53   0.57  0.100  69
PUBLIC PARK         C       0.35   0.57  0.850  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.240
SUBAREA AREA(ACRES) = 1.88 SUBAREA RUNOFF(CFS) = 2.62
EFFECTIVE AREA(ACRES) = 52.97 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 53.0 PEAK FLOW RATE(CFS) = 74.41

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*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 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.) = 34.06
RAINFALL INTENSITY(INCH/HR) = 1.69
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.91

```

AREA-AVERAGED Ap = 0.14  
EFFECTIVE STREAM AREA(ACRES) = 52.97  
TOTAL STREAM AREA(ACRES) = 52.97  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 74.41

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6080.00 TO NODE 6085.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 255.00  
ELEVATION DATA: UPSTREAM(FEET) = 715.50 DOWNSTREAM(FEET) = 714.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.005  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.744  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 1.38 0.57 0.200 69 9.00  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 4.51  
TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 4.51

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6085.00 TO NODE 6090.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

-----  
UPSTREAM ELEVATION(FEET) = 714.50 DOWNSTREAM ELEVATION(FEET) = 713.50  
STREET LENGTH(FEET) = 847.00 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 HALFSSTREETS 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) = 12.50  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.58  
HALFSSTREET FLOOD WIDTH(FEET) = 23.55  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.21  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.71  
STREET FLOW TRAVEL TIME(MIN.) = 11.62 Tc(MIN.) = 20.63

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.277  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 7.98 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 7.98 SUBAREA RUNOFF(CFS) = 15.54  
EFFECTIVE AREA(ACRES) = 9.36 AREA-AVERAGED Fm(INCH/HR) = 0.11  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 9.4 PEAK FLOW RATE(CFS) = 18.23

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.65 HALFSSTREET FLOOD WIDTH(FEET) = 27.30  
FLOW VELOCITY(FEET/SEC.) = 1.33 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.86  
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6090.00 = 1102.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6090.00 TO NODE 6095.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 713.50 DOWNSTREAM(FEET) = 706.60  
FLOW LENGTH(FEET) = 425.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.32  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 18.23  
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 21.39  
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6095.00 = 1527.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6095.00 TO NODE 6095.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 21.39  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.228  
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" A 1.00 0.98 0.200 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 8.67 0.57 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 9.67 SUBAREA RUNOFF(CFS) = 18.33  
EFFECTIVE AREA(ACRES) = 19.03 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.59 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 19.0 PEAK FLOW RATE(CFS) = 36.15

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6095.00 TO NODE 6097.50 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 706.60 DOWNSTREAM(FEET) = 703.67
FLOW LENGTH(FEET) = 586.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.04
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 36.15
PIPE TRAVEL TIME(MIN.) = 1.39 Tc(MIN.) = 22.78
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6097.50 = 2113.00 FEET.

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FLOW PROCESS FROM NODE 6097.50 TO NODE 6097.50 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 22.78
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.146
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"  A      2.30   0.98   0.500   32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  C      9.59   0.57   0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.65
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.89 SUBAREA RUNOFF(CFS) = 19.51
EFFECTIVE AREA(ACRES) = 30.92 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 30.9 PEAK FLOW RATE(CFS) = 54.25

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*****
FLOW PROCESS FROM NODE 6097.50 TO NODE 6100.00 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) = 703.67 DOWNSTREAM(FEET) = 700.00
FLOW LENGTH(FEET) = 742.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.57
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 54.25
PIPE TRAVEL TIME(MIN.) = 1.63 Tc(MIN.) = 24.41
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6100.00 = 2855.00 FEET.

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*****
FLOW PROCESS FROM NODE 6100.00 TO NODE 6100.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 24.41
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.058
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
"5-7 DWELLINGS/ACRE"  C      9.54   0.57   0.500   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 9.54 SUBAREA RUNOFF(CFS) = 15.24
EFFECTIVE AREA(ACRES) = 40.46 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 40.5 PEAK FLOW RATE(CFS) = 67.06

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*****
FLOW PROCESS FROM NODE 6100.00 TO NODE 6105.00 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) = 700.00 DOWNSTREAM(FEET) = 690.85
FLOW LENGTH(FEET) = 477.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.33
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 67.06
PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 25.01
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6105.00 = 3332.00 FEET.

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FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 25.01
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.029
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE           GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL         C      1.55   0.57   0.100   69
PUBLIC PARK        C      0.75   0.57   0.850   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.345
SUBAREA AREA(ACRES) = 2.30 SUBAREA RUNOFF(CFS) = 3.80
EFFECTIVE AREA(ACRES) = 42.76 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 42.8 PEAK FLOW RATE(CFS) = 69.78

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*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 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.) = 25.01
RAINFALL INTENSITY(INCH/HR) = 2.03
AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60

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AREA-AVERAGED Ap = 0.36  
 EFFECTIVE STREAM AREA(ACRES) = 42.76  
 TOTAL STREAM AREA(ACRES) = 42.76  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 69.78

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	74.41	34.06	1.685	0.91 (0.12)	0.14	53.0	6000.00
2	69.78	25.01	2.029	0.60 (0.22)	0.36	42.8	6080.00

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	136.43	25.01	2.029	0.68 (0.17)	0.25	81.6	6080.00
2	130.98	34.06	1.685	0.70 (0.17)	0.24	95.7	6000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 136.43 Tc(MIN.) = 25.01  
 EFFECTIVE AREA(ACRES) = 81.65 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 95.7  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6105.00 = 10899.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 6105.00 TO NODE 6130.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 690.85 DOWNSTREAM(FEET) = 679.50  
 FLOW LENGTH(FEET) = 1791.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.59  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 136.43  
 PIPE TRAVEL TIME(MIN.) = 2.82 Tc(MIN.) = 27.82  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6130.00 = 12690.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 27.82  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.903  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 3.02 0.57 0.100 69  
 PUBLIC PARK C 0.98 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.284

SUBAREA AREA(ACRES) = 4.00 SUBAREA RUNOFF(CFS) = 6.27  
 EFFECTIVE AREA(ACRES) = 85.65 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 99.7 PEAK FLOW RATE(CFS) = 136.43  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 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.) = 27.82  
 RAINFALL INTENSITY(INCH/HR) = 1.90  
 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.68  
 AREA-AVERAGED Ap = 0.25  
 EFFECTIVE STREAM AREA(ACRES) = 85.65  
 TOTAL STREAM AREA(ACRES) = 99.73  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 136.43

\*\*\*\*\*

FLOW PROCESS FROM NODE 6110.00 TO NODE 6115.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 595.00  
 ELEVATION DATA: UPSTREAM(FEET) = 704.20 DOWNSTREAM(FEET) = 703.80

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 21.589  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.216  
 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  
 "5-7 DWELLINGS/ACRE" C 3.15 0.57 0.500 69 21.59  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 5.48  
 TOTAL AREA(ACRES) = 3.15 PEAK FLOW RATE(CFS) = 5.48

\*\*\*\*\*

FLOW PROCESS FROM NODE 6115.00 TO NODE 6120.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 703.80 DOWNSTREAM ELEVATION(FEET) = 702.90  
 STREET LENGTH(FEET) = 386.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.018

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018  
 SPECIFIED NUMBER OF HALFSSTREETS 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) = 12.11  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.53  
 HALFSSTREET FLOOD WIDTH(FEET) = 20.35  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.56  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.82  
 STREET FLOW TRAVEL TIME(MIN.) = 4.13 Tc(MIN.) = 25.72  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.995

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"	A	2.10	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	4.13	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.23 SUBAREA RUNOFF(CFS) = 8.92  
 EFFECTIVE AREA(ACRES) = 18.09 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 18.1 PEAK FLOW RATE(CFS) = 26.47

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.59 HALFSSTREET FLOOD WIDTH(FEET) = 23.87  
 FLOW VELOCITY(FEET/SEC.) = 1.71 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.01  
 LONGEST FLOWPATH FROM NODE 6110.00 TO NODE 6120.00 = 981.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6120.00 TO NODE 6125.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 702.90 DOWNSTREAM(FEET) = 689.90  
 FLOW LENGTH(FEET) = 676.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 13.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.93  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 18.09  
 PIPE TRAVEL TIME(MIN.) = 1.13 Tc(MIN.) = 26.86  
 LONGEST FLOWPATH FROM NODE 6110.00 TO NODE 6125.00 = 1657.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6125.00 TO NODE 6125.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 26.86  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.944

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"	A	2.10	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	4.13	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.23 SUBAREA RUNOFF(CFS) = 8.92  
 EFFECTIVE AREA(ACRES) = 18.09 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 18.1 PEAK FLOW RATE(CFS) = 26.47

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6125.00 TO NODE 6130.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 689.90 DOWNSTREAM(FEET) = 679.50  
 FLOW LENGTH(FEET) = 1196.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.85  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 26.47  
 PIPE TRAVEL TIME(MIN.) = 2.54 Tc(MIN.) = 29.40  
 LONGEST FLOWPATH FROM NODE 6110.00 TO NODE 6130.00 = 2853.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 29.40  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.841  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	8.18	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 8.18 SUBAREA RUNOFF(CFS) = 11.47  
 EFFECTIVE AREA(ACRES) = 26.27 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 26.3 PEAK FLOW RATE(CFS) = 36.27

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 IS CODE = 1  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<  
 =====  
 TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 29.40  
 RAINFALL INTENSITY(INCH/HR) = 1.84  
 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.60  
 AREA-AVERAGED Ap = 0.51  
 EFFECTIVE STREAM AREA(ACRES) = 26.27  
 TOTAL STREAM AREA(ACRES) = 26.27  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 36.27

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	136.43	27.82	1.903	0.68 ( 0.17)	0.25	85.6	6080.00
1	130.98	36.89	1.607	0.69 ( 0.17)	0.24	99.7	6000.00
2	36.27	29.40	1.841	0.60 ( 0.31)	0.51	26.3	6110.00

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	172.14	27.82	1.903	0.65 ( 0.20)	0.31	110.5	6080.00
2	171.75	29.40	1.841	0.65 ( 0.20)	0.31	114.4	6110.00
3	161.71	36.89	1.607	0.66 ( 0.19)	0.30	126.0	6000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 172.14 Tc(MIN.) = 27.82  
 EFFECTIVE AREA(ACRES) = 110.51 AREA-AVERAGED Fm(INCH/HR) = 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.31  
 TOTAL AREA(ACRES) = 126.0  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6130.00 = 12690.00 FEET.

=====  
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 126.0 TC(MIN.) = 27.82  
 EFFECTIVE AREA(ACRES) = 110.51 AREA-AVERAGED Fm(INCH/HR)= 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.313  
 PEAK FLOW RATE(CFS) = 172.14

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	172.14	27.82	1.903	0.65 ( 0.20)	0.31	110.5	6080.00
2	171.75	29.40	1.841	0.65 ( 0.20)	0.31	114.4	6110.00
3	161.71	36.89	1.607	0.66 ( 0.19)	0.30	126.0	6000.00

=====  
 END OF RATIONAL METHOD ANALYSIS





\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* MILLIKEN AVENUE \*  
\* 25-YR STUDY \*  
\* AREA 'Q' \*  
\*\*\*\*\*

FILE NAME: MILLIKEN.DAT  
TIME/DATE OF STUDY: 10:24 08/24/2011

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*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)	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	40.0	25.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH  
FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

AREA-AVERAGED

DURATION	RAINFALL(INCH)
5-MINUTES	0.35
30-MINUTES	0.71
1-HOUR	0.94
3-HOUR	1.64
6-HOUR	2.32
24-HOUR	4.49

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6000.00 TO NODE 6005.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 800.00  
ELEVATION DATA: UPSTREAM(FEET) = 809.00 DOWNSTREAM(FEET) = 800.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.811  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.630  
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	A	3.63	0.98	0.100	32	10.81

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 8.27  
TOTAL AREA(ACRES) = 3.63 PEAK FLOW RATE(CFS) = 8.27

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6005.00 TO NODE 6010.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 800.00 DOWNSTREAM ELEVATION(FEET) = 795.06  
STREET LENGTH(FEET) = 920.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 40.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 25.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 13.53  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.60  
HALFSTREET FLOOD WIDTH(FEET) = 22.08  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.67  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.60  
STREET FLOW TRAVEL TIME(MIN.) = 5.74 Tc(MIN.) = 16.55  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.037  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	5.89	0.98	0.100	32
PUBLIC PARK	A	0.15	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.119  
SUBAREA AREA(ACRES) = 6.04 SUBAREA RUNOFF(CFS) = 10.44  
EFFECTIVE AREA(ACRES) = 9.67 AREA-AVERAGED Fm(INCH/HR) = 0.11  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.11  
TOTAL AREA(ACRES) = 9.7 PEAK FLOW RATE(CFS) = 16.78

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.64 HALFSTREET FLOOD WIDTH(FEET) = 24.03  
FLOW VELOCITY(FEET/SEC.) = 2.81 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.80  
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6010.00 = 1720.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6010.00 TO NODE 6012.50 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 779.48 DOWNSTREAM(FEET) = 767.69  
FLOW LENGTH(FEET) = 1590.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.67  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 16.78  
PIPE TRAVEL TIME(MIN.) = 3.98 Tc(MIN.) = 20.53  
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6012.50 = 3310.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6012.50 TO NODE 6012.50 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 20.53  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.790  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.24	0.98	0.850	32
COMMERCIAL	A	2.91	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.324  
SUBAREA AREA(ACRES) = 4.15 SUBAREA RUNOFF(CFS) = 5.50  
EFFECTIVE AREA(ACRES) = 13.82 AREA-AVERAGED Fm(INCH/HR) = 0.17

AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.18  
TOTAL AREA(ACRES) = 13.8 PEAK FLOW RATE(CFS) = 20.13  
\*\*\*\*\*  
FLOW PROCESS FROM NODE 6012.50 TO NODE 6015.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 767.69 DOWNSTREAM(FEET) = 762.79  
FLOW LENGTH(FEET) = 917.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.14  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 20.13  
PIPE TRAVEL TIME(MIN.) = 2.49 Tc(MIN.) = 23.02  
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6015.00 = 4227.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6015.00 TO NODE 6015.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 23.02  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.671  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	0.71	0.98	0.850	32
COMMERCIAL	A	1.70	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.321  
SUBAREA AREA(ACRES) = 2.41 SUBAREA RUNOFF(CFS) = 2.95  
EFFECTIVE AREA(ACRES) = 16.23 AREA-AVERAGED Fm(INCH/HR) = 0.19  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 16.2 PEAK FLOW RATE(CFS) = 21.60

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6015.00 TO NODE 6020.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 762.79 DOWNSTREAM(FEET) = 745.81  
FLOW LENGTH(FEET) = 1290.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.84  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 21.60  
PIPE TRAVEL TIME(MIN.) = 2.43 Tc(MIN.) = 25.45  
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6020.00 = 5517.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 6020.00 TO NODE 6020.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

```

=====
MAINLINE Tc(MIN.) = 25.45
* 25 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
COMMERCIAL          A        3.35    0.98    0.100   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 3.35      SUBAREA RUNOFF(CFS) = 4.45
EFFECTIVE AREA(ACRES) = 19.58  AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 19.6      PEAK FLOW RATE(CFS) = 24.62

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*****
FLOW PROCESS FROM NODE 6020.00 TO NODE 6025.00 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) = 745.81  DOWNSTREAM(FEET) = 736.48
FLOW LENGTH(FEET) = 1450.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.05
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.62
PIPE TRAVEL TIME(MIN.) = 3.43  Tc(MIN.) = 28.88
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6025.00 = 6967.00 FEET.

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*****
FLOW PROCESS FROM NODE 6025.00 TO NODE 6025.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 28.88
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.458
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          A        3.83    0.98    0.100   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 3.83      SUBAREA RUNOFF(CFS) = 4.69
EFFECTIVE AREA(ACRES) = 23.41  AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 23.4      PEAK FLOW RATE(CFS) = 27.29

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*****
FLOW PROCESS FROM NODE 6025.00 TO NODE 6030.00 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) = 736.48  DOWNSTREAM(FEET) = 724.27
FLOW LENGTH(FEET) = 1164.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.2 INCHES

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PIPE-FLOW VELOCITY(FEET/SEC.) = 8.57
ESTIMATED PIPE DIAMETER(INCH) = 27.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.29
PIPE TRAVEL TIME(MIN.) = 2.26  Tc(MIN.) = 31.14
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6030.00 = 8131.00 FEET.

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*****
FLOW PROCESS FROM NODE 6030.00 TO NODE 6030.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 31.14
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.394
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          A        3.06    0.98    0.100   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 3.06      SUBAREA RUNOFF(CFS) = 3.57
EFFECTIVE AREA(ACRES) = 26.47  AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 26.5      PEAK FLOW RATE(CFS) = 29.50

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*****
FLOW PROCESS FROM NODE 6030.00 TO NODE 6050.00 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) = 724.27  DOWNSTREAM(FEET) = 713.28
FLOW LENGTH(FEET) = 769.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.90
ESTIMATED PIPE DIAMETER(INCH) = 27.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 29.50
PIPE TRAVEL TIME(MIN.) = 1.30  Tc(MIN.) = 32.44
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6050.00 = 8900.00 FEET.

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*****
FLOW PROCESS FROM NODE 6050.00 TO NODE 6050.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 32.44
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.360
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          A        12.09   0.98    0.100   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 12.09  SUBAREA RUNOFF(CFS) = 13.74
EFFECTIVE AREA(ACRES) = 38.56  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 38.6      PEAK FLOW RATE(CFS) = 42.44

```

```

*****
FLOW PROCESS FROM NODE 6050.00 TO NODE 6075.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 713.28 DOWNSTREAM(FEET) = 702.49
FLOW LENGTH(FEET) = 692.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.16
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 42.44
PIPE TRAVEL TIME(MIN.) = 1.03 Tc(MIN.) = 33.47
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6075.00 = 9592.00 FEET.

*****
FLOW PROCESS FROM NODE 6075.00 TO NODE 6075.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 33.47
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.335
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 6.70 0.98 0.100 32
COMMERCIAL C 4.77 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.47 SUBAREA RUNOFF(CFS) = 12.95
EFFECTIVE AREA(ACRES) = 50.03 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 50.0 PEAK FLOW RATE(CFS) = 54.51

*****
FLOW PROCESS FROM NODE 6075.00 TO NODE 6077.50 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 702.49 DOWNSTREAM(FEET) = 698.66
FLOW LENGTH(FEET) = 476.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.14
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 54.51
PIPE TRAVEL TIME(MIN.) = 0.87 Tc(MIN.) = 34.34
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6077.50 = 10068.00 FEET.

*****
FLOW PROCESS FROM NODE 6077.50 TO NODE 6077.50 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 34.34

```

```

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.314
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.90 0.57 0.100 69
PUBLIC PARK C 0.16 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.213
SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 1.14
EFFECTIVE AREA(ACRES) = 51.09 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.93 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 51.1 PEAK FLOW RATE(CFS) = 54.73

*****
FLOW PROCESS FROM NODE 6077.50 TO NODE 6105.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 698.66 DOWNSTREAM(FEET) = 690.85
FLOW LENGTH(FEET) = 831.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.81
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 54.73
PIPE TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 35.75
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6105.00 = 10899.00 FEET.

*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 35.75
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.283
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.53 0.57 0.100 69
PUBLIC PARK C 0.35 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.240
SUBAREA AREA(ACRES) = 1.88 SUBAREA RUNOFF(CFS) = 1.94
EFFECTIVE AREA(ACRES) = 52.97 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 53.0 PEAK FLOW RATE(CFS) = 55.23

*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 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.) = 35.75
RAINFALL INTENSITY(INCH/HR) = 1.28

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AREA-AVERAGED Fm(INCH/HR) = 0.12  
 AREA-AVERAGED Fp(INCH/HR) = 0.91  
 AREA-AVERAGED Ap = 0.14  
 EFFECTIVE STREAM AREA(ACRES) = 52.97  
 TOTAL STREAM AREA(ACRES) = 52.97  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 55.23

SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 7.98 0.57 0.200 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 7.98 SUBAREA RUNOFF(CFS) = 11.71  
 EFFECTIVE AREA(ACRES) = 9.36 AREA-AVERAGED Fm(INCH/HR) = 0.11  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 9.4 PEAK FLOW RATE(CFS) = 13.73

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 24.41  
 FLOW VELOCITY(FEET/SEC.) = 1.24 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.75  
 LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6090.00 = 1102.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6090.00 TO NODE 6095.00 IS CODE = 31  
 \*\*\*\*\*

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 713.50 DOWNSTREAM(FEET) = 706.60  
 FLOW LENGTH(FEET) = 425.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 12.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.71  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 13.73  
 PIPE TRAVEL TIME(MIN.) = 0.81 Tc(MIN.) = 22.26  
 LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6095.00 = 1527.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6095.00 TO NODE 6095.00 IS CODE = 81  
 \*\*\*\*\*

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 22.26  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.705  
 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" A 1.00 0.98 0.200 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 8.67 0.57 0.200 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 9.67 SUBAREA RUNOFF(CFS) = 13.78  
 EFFECTIVE AREA(ACRES) = 19.03 AREA-AVERAGED Fm(INCH/HR) = 0.12  
 AREA-AVERAGED Fp(INCH/HR) = 0.59 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 19.0 PEAK FLOW RATE(CFS) = 27.19

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6095.00 TO NODE 6097.50 IS CODE = 31  
 \*\*\*\*\*

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6080.00 TO NODE 6085.00 IS CODE = 21  
 \*\*\*\*\*

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 \*\*\*\*\*

INITIAL SUBAREA FLOW-LENGTH(FEET) = 255.00  
 ELEVATION DATA: UPSTREAM(FEET) = 715.50 DOWNSTREAM(FEET) = 714.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.005  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.934  
 SUBAREA Tc AND LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 1.38 0.57 0.200 69 9.00  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA RUNOFF(CFS) = 3.50  
 TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 3.50

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6085.00 TO NODE 6090.00 IS CODE = 62  
 \*\*\*\*\*

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 =====

UPSTREAM ELEVATION(FEET) = 714.50 DOWNSTREAM ELEVATION(FEET) = 713.50  
 STREET LENGTH(FEET) = 847.00 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) = 9.56  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.54  
 HALFSTREET FLOOD WIDTH(FEET) = 21.21  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.13  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.61  
 STREET FLOW TRAVEL TIME(MIN.) = 12.44 Tc(MIN.) = 21.45  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.743



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-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 706.60 DOWNSTREAM(FEET) = 703.67
FLOW LENGTH(FEET) = 586.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.39
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.19
PIPE TRAVEL TIME(MIN.) = 1.53 Tc(MIN.) = 23.79
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6097.50 = 2113.00 FEET.

*****
FLOW PROCESS FROM NODE 6097.50 TO NODE 6097.50 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.79
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.638
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" A 2.30 0.98 0.500 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 9.59 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.65
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.89 SUBAREA RUNOFF(CFS) = 14.08
EFFECTIVE AREA(ACRES) = 30.92 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 30.9 PEAK FLOW RATE(CFS) = 40.13

*****
FLOW PROCESS FROM NODE 6097.50 TO NODE 6100.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 703.67 DOWNSTREAM(FEET) = 700.00
FLOW LENGTH(FEET) = 742.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.13
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.13
PIPE TRAVEL TIME(MIN.) = 1.74 Tc(MIN.) = 25.52
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6100.00 = 2855.00 FEET.

*****
FLOW PROCESS FROM NODE 6100.00 TO NODE 6100.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.52
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.571

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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
"5-7 DWELLINGS/ACRE" C 9.54 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 9.54 SUBAREA RUNOFF(CFS) = 11.06
EFFECTIVE AREA(ACRES) = 40.46 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 40.5 PEAK FLOW RATE(CFS) = 49.30

*****
FLOW PROCESS FROM NODE 6100.00 TO NODE 6105.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 690.85
FLOW LENGTH(FEET) = 477.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.45
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 49.30
PIPE TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 26.16
LONGEST FLOWPATH FROM NODE 6080.00 TO NODE 6105.00 = 3332.00 FEET.

*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 26.16
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.547
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.55 0.57 0.100 69
PUBLIC PARK C 0.75 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.345
SUBAREA AREA(ACRES) = 2.30 SUBAREA RUNOFF(CFS) = 2.80
EFFECTIVE AREA(ACRES) = 42.76 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 42.8 PEAK FLOW RATE(CFS) = 51.25

*****
FLOW PROCESS FROM NODE 6105.00 TO NODE 6105.00 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.) = 26.16
RAINFALL INTENSITY(INCH/HR) = 1.55

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AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.60  
 AREA-AVERAGED Ap = 0.36  
 EFFECTIVE STREAM AREA(ACRES) = 42.76  
 TOTAL STREAM AREA(ACRES) = 42.76  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 51.25

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	55.23	35.75	1.283	0.91 ( 0.12)	0.14	53.0	6000.00
2	51.25	26.16	1.547	0.60 ( 0.22)	0.36	42.8	6080.00

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	100.89	26.16	1.547	0.68 ( 0.17)	0.25	81.5	6080.00
2	96.31	35.75	1.283	0.70 ( 0.17)	0.24	95.7	6000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 100.89 Tc(MIN.) = 26.16  
 EFFECTIVE AREA(ACRES) = 81.52 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 95.7  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6105.00 = 10899.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 6105.00 TO NODE 6130.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 690.85 DOWNSTREAM(FEET) = 679.50  
 FLOW LENGTH(FEET) = 1791.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.81  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 100.89  
 PIPE TRAVEL TIME(MIN.) = 3.04 Tc(MIN.) = 29.21  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6130.00 = 12690.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 29.21  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.449  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	3.02	0.57	0.100	69
PUBLIC PARK	C	0.98	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.284  
 SUBAREA AREA(ACRES) = 4.00 SUBAREA RUNOFF(CFS) = 4.64  
 EFFECTIVE AREA(ACRES) = 85.52 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.25  
 TOTAL AREA(ACRES) = 99.7 PEAK FLOW RATE(CFS) = 100.89  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 =====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 29.21  
 RAINFALL INTENSITY(INCH/HR) = 1.45  
 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.68  
 AREA-AVERAGED Ap = 0.25  
 EFFECTIVE STREAM AREA(ACRES) = 85.52  
 TOTAL STREAM AREA(ACRES) = 99.73  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 100.89

\*\*\*\*\*

FLOW PROCESS FROM NODE 6110.00 TO NODE 6115.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 =====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 595.00  
 ELEVATION DATA: UPSTREAM(FEET) = 704.20 DOWNSTREAM(FEET) = 703.80

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 21.589  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.736  
 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.)
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	3.15	0.57	0.500	69	21.59

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 4.12  
 TOTAL AREA(ACRES) = 3.15 PEAK FLOW RATE(CFS) = 4.12

\*\*\*\*\*

FLOW PROCESS FROM NODE 6115.00 TO NODE 6120.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 =====

UPSTREAM ELEVATION(FEET) = 703.80 DOWNSTREAM ELEVATION(FEET) = 702.90  
 STREET LENGTH(FEET) = 386.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.02  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.49  
 HALFSTREET FLOOD WIDTH(FEET) = 18.09  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.45  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.70  
 STREET FLOW TRAVEL TIME(MIN.) = 4.44 Tc(MIN.) = 26.03

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.552  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	7.71	0.57	0.500	69
PUBLIC PARK	C	1.00	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.540  
 SUBAREA AREA(ACRES) = 8.71 SUBAREA RUNOFF(CFS) = 9.77  
 EFFECTIVE AREA(ACRES) = 11.86 AREA-AVERAGED Fm(INCH/HR) = 0.30  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 11.9 PEAK FLOW RATE(CFS) = 13.37

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 21.13  
 FLOW VELOCITY(FEET/SEC.) = 1.60 DEPTH\*VELOCITY(FT\*FT/SEC.) = 0.86  
 LONGEST FLOWPATH FROM NODE 6110.00 TO NODE 6120.00 = 981.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6120.00 TO NODE 6125.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 702.90 DOWNSTREAM(FEET) = 689.90  
 FLOW LENGTH(FEET) = 676.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 11.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.22  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 13.37  
 PIPE TRAVEL TIME(MIN.) = 1.22 Tc(MIN.) = 27.26  
 LONGEST FLOWPATH FROM NODE 6110.00 TO NODE 6125.00 = 1657.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6125.00 TO NODE 6125.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 27.26  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.510  
 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"	A	2.10	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	4.13	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 6.23 SUBAREA RUNOFF(CFS) = 6.49  
 EFFECTIVE AREA(ACRES) = 18.09 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 18.1 PEAK FLOW RATE(CFS) = 19.41

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6125.00 TO NODE 6130.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 689.90 DOWNSTREAM(FEET) = 679.50  
 FLOW LENGTH(FEET) = 1196.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.26  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 19.41  
 PIPE TRAVEL TIME(MIN.) = 2.75 Tc(MIN.) = 30.00  
 LONGEST FLOWPATH FROM NODE 6110.00 TO NODE 6130.00 = 2853.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 30.00  
 \* 25 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
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	8.18	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 8.18 SUBAREA RUNOFF(CFS) = 8.41  
 EFFECTIVE AREA(ACRES) = 26.27 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 26.3 PEAK FLOW RATE(CFS) = 26.44

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 6130.00 TO NODE 6130.00 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.) = 30.00  
 RAINFALL INTENSITY(INCH/HR) = 1.43  
 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.60  
 AREA-AVERAGED Ap = 0.51  
 EFFECTIVE STREAM AREA(ACRES) = 26.27  
 TOTAL STREAM AREA(ACRES) = 26.27  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 26.44

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	100.89	29.21	1.449	0.68 ( 0.17)	0.25	85.5	6080.00
1	96.31	38.81	1.221	0.69 ( 0.17)	0.24	99.7	6000.00
2	26.44	30.00	1.425	0.60 ( 0.31)	0.51	26.3	6110.00

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	127.17	29.21	1.449	0.65 ( 0.20)	0.31	111.1	6080.00
2	126.96	30.00	1.425	0.65 ( 0.20)	0.31	113.0	6110.00
3	117.93	38.81	1.221	0.66 ( 0.19)	0.30	126.0	6000.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 127.17 Tc(MIN.) = 29.21  
 EFFECTIVE AREA(ACRES) = 111.09 AREA-AVERAGED Fm(INCH/HR) = 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.31  
 TOTAL AREA(ACRES) = 126.0  
 LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6130.00 = 12690.00 FEET.

=====  
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 126.0 TC(MIN.) = 29.21  
 EFFECTIVE AREA(ACRES) = 111.09 AREA-AVERAGED Fm(INCH/HR)= 0.20  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.314  
 PEAK FLOW RATE(CFS) = 127.17

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	127.17	29.21	1.449	0.65 ( 0.20)	0.31	111.1	6080.00
2	126.96	30.00	1.425	0.65 ( 0.20)	0.31	113.0	6110.00
3	117.93	38.81	1.221	0.66 ( 0.19)	0.30	126.0	6000.00

=====  
 END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* MERRILL AVE. - EAST OF CUCAMONGA CREEK \*  
\* 100-YR STUDY \*  
\* AREA 'H' \*  
\*\*\*\*\*

FILE NAME: MRL-E.DAT  
TIME/DATE OF STUDY: 08:20 10/17/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====  
--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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 GUTTER-GEOMETRIES:		MANNING	
	WIDTH	CROSSFALL	IN- / OUT-	PARK- HEIGHT	WIDTH	LIP	HIKE	FACTOR
===	(FT)	(FT)	SIDE / SIDE/	(FT)	(FT)	(FT)	(FT)	(n)
===	=====	=====	=====	=====	=====	=====	=====	=====
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1800.00 TO NODE 1802.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 680.80 DOWNSTREAM(FEET) = 672.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.416  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.088  
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.)  
COMMERCIAL C 5.82 0.57 0.100 69 12.42  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 15.88  
TOTAL AREA(ACRES) = 5.82 PEAK FLOW RATE(CFS) = 15.88

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1802.00 TO NODE 1804.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
===== UPSTREAM ELEVATION(FEET) = 672.00 DOWNSTREAM ELEVATION(FEET) = 669.20  
STREET LENGTH(FEET) = 620.00 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) = 28.44  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.61  
HALFSTREET FLOOD WIDTH(FEET) = 24.96  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.47  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.50  
STREET FLOW TRAVEL TIME(MIN.) = 4.18 Tc(MIN.) = 16.60  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.594

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 10.97 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.97 SUBAREA RUNOFF(CFS) = 25.05  
EFFECTIVE AREA(ACRES) = 16.79 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 16.8 PEAK FLOW RATE(CFS) = 38.35

END OF SUBAREA STREET FLOW HYDRAULICS:



DEPTH(FEET) = 0.66 HALFSTREET FLOOD WIDTH(FEET) = 28.09  
FLOW VELOCITY(FEET/SEC.) = 2.65 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.76  
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1804.00 = 1620.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1804.00 TO NODE 1806.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 669.20 DOWNSTREAM(FEET) = 656.40  
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.20  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 38.35  
PIPE TRAVEL TIME(MIN.) = 1.16 Tc(MIN.) = 17.76  
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1806.00 = 2400.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1806.00 TO NODE 1806.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 17.76  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.491  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 13.94 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 13.94 SUBAREA RUNOFF(CFS) = 30.54  
EFFECTIVE AREA(ACRES) = 30.73 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 30.7 PEAK FLOW RATE(CFS) = 67.33

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1806.00 TO NODE 1808.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 656.40 DOWNSTREAM(FEET) = 649.00  
FLOW LENGTH(FEET) = 740.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.62  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 67.33  
PIPE TRAVEL TIME(MIN.) = 1.16 Tc(MIN.) = 18.92  
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1808.00 = 3140.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1808.00 TO NODE 1808.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 18.92  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.398  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 13.20 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 13.20 SUBAREA RUNOFF(CFS) = 27.82  
EFFECTIVE AREA(ACRES) = 43.93 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 43.9 PEAK FLOW RATE(CFS) = 92.58

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1808.00 TO NODE 1820.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 649.00 DOWNSTREAM(FEET) = 648.00  
FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.99  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 92.58  
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 19.16  
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1820.00 = 3280.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1820.00 TO NODE 1820.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 19.16  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.381  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
URBAN GOOD COVER  
"TURF" C 1.10 0.52 1.000 72  
COMMERCIAL C 1.89 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.53  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431  
SUBAREA AREA(ACRES) = 2.99 SUBAREA RUNOFF(CFS) = 5.80  
EFFECTIVE AREA(ACRES) = 46.92 AREA-AVERAGED Fm(INCH/HR) = 0.07  
AREA-AVERAGED Fp(INCH/HR) = 0.56 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 46.9 PEAK FLOW RATE(CFS) = 97.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1820.00 TO NODE 1840.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 648.00 DOWNSTREAM(FEET) = 644.00

FLOW LENGTH(FEET) = 790.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.03  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 97.68  
PIPE TRAVEL TIME(MIN.) = 1.46 Tc(MIN.) = 20.61  
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1840.00 = 4070.00 FEET.

SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL C 5.98 0.57 0.100 69 12.59  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 16.18  
TOTAL AREA(ACRES) = 5.98 PEAK FLOW RATE(CFS) = 16.18

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1840.00 TO NODE 1840.00 IS CODE = 81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1852.00 TO NODE 1854.00 IS CODE = 62

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

-----  
MAINLINE Tc(MIN.) = 20.61  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.278  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
URBAN GOOD COVER  
"TURF" C 1.20 0.52 1.000 72  
COMMERCIAL C 1.92 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.446  
SUBAREA AREA(ACRES) = 3.12 SUBAREA RUNOFF(CFS) = 5.74  
EFFECTIVE AREA(ACRES) = 50.04 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.55 AREA-AVERAGED Ap = 0.14  
TOTAL AREA(ACRES) = 50.0 PEAK FLOW RATE(CFS) = 99.09

-----  
UPSTREAM ELEVATION(FEET) = 675.00 DOWNSTREAM ELEVATION(FEET) = 668.20  
STREET LENGTH(FEET) = 620.00 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) = 29.70

STRETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.54  
HALFSTREET FLOOD WIDTH(FEET) = 21.37  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.48  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.89  
STREET FLOW TRAVEL TIME(MIN.) = 2.97 Tc(MIN.) = 15.56  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.696

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 11.36 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 11.36 SUBAREA RUNOFF(CFS) = 26.99  
EFFECTIVE AREA(ACRES) = 17.34 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 17.3 PEAK FLOW RATE(CFS) = 41.20

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 24.26  
FLOW VELOCITY(FEET/SEC.) = 3.78 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.25  
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1854.00 = 1620.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1854.00 TO NODE 1856.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1840.00 TO NODE 1840.00 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.) = 20.61  
RAINFALL INTENSITY(INCH/HR) = 2.28  
AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.55  
AREA-AVERAGED Ap = 0.14  
EFFECTIVE STREAM AREA(ACRES) = 50.04  
TOTAL STREAM AREA(ACRES) = 50.04  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 99.09

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1850.00 TO NODE 1852.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 683.20 DOWNSTREAM(FEET) = 675.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.592  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.062

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 668.20 DOWNSTREAM(FEET) = 655.40
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.35
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.20
PIPE TRAVEL TIME(MIN.) = 1.15 Tc(MIN.) = 16.71
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1856.00 = 2400.00 FEET.

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*****
FLOW PROCESS FROM NODE 1856.00 TO NODE 1856.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 16.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.584
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp   Ap   SCS
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL         C      14.48  0.57  0.100  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 14.48 SUBAREA RUNOFF(CFS) = 32.94
EFFECTIVE AREA(ACRES) = 31.82 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 31.8 PEAK FLOW RATE(CFS) = 72.38

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*****
FLOW PROCESS FROM NODE 1856.00 TO NODE 1858.00 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) = 655.40 DOWNSTREAM(FEET) = 648.00
FLOW LENGTH(FEET) = 740.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.72
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 72.38
PIPE TRAVEL TIME(MIN.) = 1.15 Tc(MIN.) = 17.86
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1858.00 = 3140.00 FEET.

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*****
FLOW PROCESS FROM NODE 1858.00 TO NODE 1858.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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```

MAINLINE Tc(MIN.) = 17.86
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.483
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp   Ap   SCS
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL         C      13.56  0.57  0.100  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57

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SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 13.56 SUBAREA RUNOFF(CFS) = 29.61
EFFECTIVE AREA(ACRES) = 45.38 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 45.4 PEAK FLOW RATE(CFS) = 99.09

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*****
FLOW PROCESS FROM NODE 1858.00 TO NODE 1840.00 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) = 648.00 DOWNSTREAM(FEET) = 644.00
FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.38
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 99.09
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 17.89
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1840.00 = 3190.00 FEET.

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*****
FLOW PROCESS FROM NODE 1840.00 TO NODE 1840.00 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.) = 17.89
RAINFALL INTENSITY(INCH/HR) = 2.48
AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.57
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 45.38
TOTAL STREAM AREA(ACRES) = 45.38
PEAK FLOW RATE(CFS) AT CONFLUENCE = 99.09

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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       99.09 20.61 2.278 0.55(0.08) 0.14 50.0 1800.00
2       99.09 17.89 2.480 0.57(0.06) 0.10 45.4 1850.00

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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       193.00 17.89 2.480 0.56(0.07) 0.12 88.8 1850.00
2       189.93 20.61 2.278 0.56(0.07) 0.12 95.4 1800.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 193.00 Tc(MIN.) = 17.89
EFFECTIVE AREA(ACRES) = 88.82 AREA-AVERAGED Fm(INCH/HR) = 0.07

```

AREA-AVERAGED Fp(INCH/HR) = 0.56 AREA-AVERAGED Ap = 0.12  
 TOTAL AREA(ACRES) = 95.4  
 LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1840.00 = 4070.00 FEET.

=====  
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 95.4 TC(MIN.) = 17.89  
 EFFECTIVE AREA(ACRES) = 88.82 AREA-AVERAGED Fm(INCH/HR)= 0.07  
 AREA-AVERAGED Fp(INCH/HR) = 0.56 AREA-AVERAGED Ap = 0.120  
 PEAK FLOW RATE(CFS) = 193.00

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	193.00	17.89	2.480	0.56( 0.07)	0.12	88.8	1850.00
2	189.93	20.61	2.278	0.56( 0.07)	0.12	95.4	1800.00

=====  
 END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* MERRILL AVE. - EAST OF CUCAMONGA CREEK \*  
\* 10-YR STUDY \*  
\* AREA 'H' \*  
\*\*\*\*\*

FILE NAME: MRL-E.DAT  
TIME/DATE OF STUDY: 08:24 10/17/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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 GUTTER-GEOMETRIES:		MANNING	
	WIDTH	CROSSFALL	IN- / OUT-	PARK- HEIGHT	WIDTH	LIP	HIKE	FACTOR
===	(FT)	(FT)	SIDE / SIDE/	(FT)	(FT)	(FT)	(FT)	(n)
===	=====	=====	=====	=====	=====	=====	=====	=====
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1800.00 TO NODE 1802.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 680.80 DOWNSTREAM(FEET) = 672.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.416  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.059  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL C 5.82 0.57 0.100 69 12.42  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 10.49  
TOTAL AREA(ACRES) = 5.82 PEAK FLOW RATE(CFS) = 10.49

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1802.00 TO NODE 1804.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
===== UPSTREAM ELEVATION(FEET) = 672.00 DOWNSTREAM ELEVATION(FEET) = 669.20  
STREET LENGTH(FEET) = 620.00 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) = 18.64  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.54  
HALFSTREET FLOOD WIDTH(FEET) = 21.13  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.23  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.20  
STREET FLOW TRAVEL TIME(MIN.) = 4.64 Tc(MIN.) = 17.05  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.702

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 10.97 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.97 SUBAREA RUNOFF(CFS) = 16.24  
EFFECTIVE AREA(ACRES) = 16.79 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 16.8 PEAK FLOW RATE(CFS) = 24.86

END OF SUBAREA STREET FLOW HYDRAULICS:



DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 23.71  
FLOW VELOCITY(FEET/SEC.) = 2.38 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.40  
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1804.00 = 1620.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1804.00 TO NODE 1806.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 669.20 DOWNSTREAM(FEET) = 656.40  
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.91  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 24.86  
PIPE TRAVEL TIME(MIN.) = 1.31 Tc(MIN.) = 18.37  
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1806.00 = 2400.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1806.00 TO NODE 1806.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 18.37  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.628  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 13.94 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 13.94 SUBAREA RUNOFF(CFS) = 19.71  
EFFECTIVE AREA(ACRES) = 30.73 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 30.7 PEAK FLOW RATE(CFS) = 43.45

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1806.00 TO NODE 1808.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 656.40 DOWNSTREAM(FEET) = 649.00  
FLOW LENGTH(FEET) = 740.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.51  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 43.45  
PIPE TRAVEL TIME(MIN.) = 1.30 Tc(MIN.) = 19.66  
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1808.00 = 3140.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1808.00 TO NODE 1808.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 19.66  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.562  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 13.20 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 13.20 SUBAREA RUNOFF(CFS) = 17.89  
EFFECTIVE AREA(ACRES) = 43.93 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 43.9 PEAK FLOW RATE(CFS) = 59.54

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1808.00 TO NODE 1820.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 649.00 DOWNSTREAM(FEET) = 648.00  
FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.03  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 59.54  
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 19.92  
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1820.00 = 3280.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1820.00 TO NODE 1820.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 19.92  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.550  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
URBAN GOOD COVER  
"TURF" C 1.10 0.52 1.000 72  
COMMERCIAL C 1.89 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.53  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431  
SUBAREA AREA(ACRES) = 2.99 SUBAREA RUNOFF(CFS) = 3.56  
EFFECTIVE AREA(ACRES) = 46.92 AREA-AVERAGED Fm(INCH/HR) = 0.07  
AREA-AVERAGED Fp(INCH/HR) = 0.56 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 46.9 PEAK FLOW RATE(CFS) = 62.62

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1820.00 TO NODE 1840.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 648.00 DOWNSTREAM(FEET) = 644.00

FLOW LENGTH(FEET) = 790.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.01  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 62.62  
PIPE TRAVEL TIME(MIN.) = 1.64 Tc(MIN.) = 21.56  
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1840.00 = 4070.00 FEET.

SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL C 5.98 0.57 0.100 69 12.59  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 10.68  
TOTAL AREA(ACRES) = 5.98 PEAK FLOW RATE(CFS) = 10.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1840.00 TO NODE 1840.00 IS CODE = 81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1852.00 TO NODE 1854.00 IS CODE = 62

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

-----  
MAINLINE Tc(MIN.) = 21.56  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.478  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
URBAN GOOD COVER  
"TURF" C 1.20 0.52 1.000 72  
COMMERCIAL C 1.92 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.446  
SUBAREA AREA(ACRES) = 3.12 SUBAREA RUNOFF(CFS) = 3.49  
EFFECTIVE AREA(ACRES) = 50.04 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.55 AREA-AVERAGED Ap = 0.14  
TOTAL AREA(ACRES) = 50.0 PEAK FLOW RATE(CFS) = 63.07

-----  
UPSTREAM ELEVATION(FEET) = 675.00 DOWNSTREAM ELEVATION(FEET) = 668.20  
STREET LENGTH(FEET) = 620.00 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) = 19.49

STRETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.48  
HALFSTREET FLOOD WIDTH(FEET) = 18.01  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.15  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.53  
STREET FLOW TRAVEL TIME(MIN.) = 3.28 Tc(MIN.) = 15.87  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.777

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 11.36 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 11.36 SUBAREA RUNOFF(CFS) = 17.59  
EFFECTIVE AREA(ACRES) = 17.34 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 17.3 PEAK FLOW RATE(CFS) = 26.85

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.51  
FLOW VELOCITY(FEET/SEC.) = 3.40 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.80  
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1854.00 = 1620.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1854.00 TO NODE 1856.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1840.00 TO NODE 1840.00 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.) = 21.56  
RAINFALL INTENSITY(INCH/HR) = 1.48  
AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.55  
AREA-AVERAGED Ap = 0.14  
EFFECTIVE STREAM AREA(ACRES) = 50.04  
TOTAL STREAM AREA(ACRES) = 50.04  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 63.07

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1850.00 TO NODE 1852.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 683.20 DOWNSTREAM(FEET) = 675.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.592  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.041

```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 668.20 DOWNSTREAM(FEET) = 655.40
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.97
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.85
PIPE TRAVEL TIME(MIN.) = 1.30 Tc(MIN.) = 17.17
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1856.00 = 2400.00 FEET.

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*****
FLOW PROCESS FROM NODE 1856.00 TO NODE 1856.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 17.17
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.695
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C      14.48  0.57  0.100  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 14.48 SUBAREA RUNOFF(CFS) = 21.35
EFFECTIVE AREA(ACRES) = 31.82 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 31.8 PEAK FLOW RATE(CFS) = 46.91

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*****
FLOW PROCESS FROM NODE 1856.00 TO NODE 1858.00 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) = 655.40 DOWNSTREAM(FEET) = 648.00
FLOW LENGTH(FEET) = 740.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.60
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 46.91
PIPE TRAVEL TIME(MIN.) = 1.28 Tc(MIN.) = 18.46
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1858.00 = 3140.00 FEET.

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*****
FLOW PROCESS FROM NODE 1858.00 TO NODE 1858.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 18.46
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.623
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C      13.56  0.57  0.100  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57

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```

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 13.56 SUBAREA RUNOFF(CFS) = 19.11
EFFECTIVE AREA(ACRES) = 45.38 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 45.4 PEAK FLOW RATE(CFS) = 63.97

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*****
FLOW PROCESS FROM NODE 1858.00 TO NODE 1840.00 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) = 648.00 DOWNSTREAM(FEET) = 644.00
FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.05
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 63.97
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 18.49
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1840.00 = 3190.00 FEET.

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*****
FLOW PROCESS FROM NODE 1840.00 TO NODE 1840.00 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.) = 18.49
RAINFALL INTENSITY(INCH/HR) = 1.62
AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.57
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 45.38
TOTAL STREAM AREA(ACRES) = 45.38
PEAK FLOW RATE(CFS) AT CONFLUENCE = 63.97

```

```

** CONFLUENCE DATA **
STREAM   Q      Tc  Intensity  Fp(Fm)   Ap   Ae  HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1       63.07 21.56 1.478 0.55( 0.08) 0.14 50.0 1800.00
2       63.97 18.49 1.621 0.57( 0.06) 0.10 45.4 1850.00

```

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

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```

** PEAK FLOW RATE TABLE **
STREAM   Q      Tc  Intensity  Fp(Fm)   Ap   Ae  HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1       123.57 18.49 1.621 0.56( 0.07) 0.12 88.3 1850.00
2       121.20 21.56 1.478 0.56( 0.07) 0.12 95.4 1800.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 123.57 Tc(MIN.) = 18.49
EFFECTIVE AREA(ACRES) = 88.29 AREA-AVERAGED Fm(INCH/HR) = 0.07

```

AREA-AVERAGED Fp(INCH/HR) = 0.56 AREA-AVERAGED Ap = 0.12  
 TOTAL AREA(ACRES) = 95.4  
 LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1840.00 = 4070.00 FEET.

=====  
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 95.4 TC(MIN.) = 18.49  
 EFFECTIVE AREA(ACRES) = 88.29 AREA-AVERAGED Fm(INCH/HR)= 0.07  
 AREA-AVERAGED Fp(INCH/HR) = 0.56 AREA-AVERAGED Ap = 0.120  
 PEAK FLOW RATE(CFS) = 123.57

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	123.57	18.49	1.621	0.56( 0.07)	0.12	88.3	1850.00
2	121.20	21.56	1.478	0.56( 0.07)	0.12	95.4	1800.00

=====  
 END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* MERRILL AVE. - EAST OF CUCAMONGA CREEK \*  
\* 25-YR STUDY \*  
\* AREA 'H' \*  
\*\*\*\*\*

FILE NAME: MRL-E.DAT  
TIME/DATE OF STUDY: 08:26 10/17/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*  
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING  
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR  
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)  
=== =====  
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1800.00 TO NODE 1802.00 IS CODE = 21

----->>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 680.80 DOWNSTREAM(FEET) = 672.00

Tc = K\*[ (LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.416  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.420  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
COMMERCIAL C 5.82 0.57 0.100 69 12.42  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 12.38  
TOTAL AREA(ACRES) = 5.82 PEAK FLOW RATE(CFS) = 12.38

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1802.00 TO NODE 1804.00 IS CODE = 62

----->>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<<<<

===== UPSTREAM ELEVATION(FEET) = 672.00 DOWNSTREAM ELEVATION(FEET) = 669.20  
STREET LENGTH(FEET) = 620.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 22.07

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.57  
HALFSTREET FLOOD WIDTH(FEET) = 22.62  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.32  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.31  
STREET FLOW TRAVEL TIME(MIN.) = 4.46 Tc(MIN.) = 16.87  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.013

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 10.97 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.97 SUBAREA RUNOFF(CFS) = 19.32  
EFFECTIVE AREA(ACRES) = 16.79 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 16.8 PEAK FLOW RATE(CFS) = 29.57



END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.62 HALFSTREET FLOOD WIDTH(FEET) = 25.35  
 FLOW VELOCITY(FEET/SEC.) = 2.49 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.53  
 LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1804.00 = 1620.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1804.00 TO NODE 1806.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 669.20 DOWNSTREAM(FEET) = 656.40  
 FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.48  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 29.57  
 PIPE TRAVEL TIME(MIN.) = 1.24 Tc(MIN.) = 18.12  
 LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1806.00 = 2400.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1806.00 TO NODE 1806.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 -----  
 MAINLINE Tc(MIN.) = 18.12  
 \* 25 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
COMMERCIAL	C	13.94	0.57	0.100	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 13.94 SUBAREA RUNOFF(CFS) = 23.49  
 EFFECTIVE AREA(ACRES) = 30.73 AREA-AVERAGED Fm(INCH/HR) = 0.06  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 30.7 PEAK FLOW RATE(CFS) = 51.79

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1806.00 TO NODE 1808.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 656.40 DOWNSTREAM(FEET) = 649.00  
 FLOW LENGTH(FEET) = 740.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.99  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 51.79  
 PIPE TRAVEL TIME(MIN.) = 1.24 Tc(MIN.) = 19.35  
 LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1808.00 = 3140.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1808.00 TO NODE 1808.00 IS CODE = 81  
 -----

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 -----

MAINLINE Tc(MIN.) = 19.35  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.854  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	13.20	0.57	0.100	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 13.20 SUBAREA RUNOFF(CFS) = 21.36  
 EFFECTIVE AREA(ACRES) = 43.93 AREA-AVERAGED Fm(INCH/HR) = 0.06  
 AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 43.9 PEAK FLOW RATE(CFS) = 71.08

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1808.00 TO NODE 1820.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 649.00 DOWNSTREAM(FEET) = 648.00  
 FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.46  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 71.08  
 PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 19.60  
 LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1820.00 = 3280.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1820.00 TO NODE 1820.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 -----  
 MAINLINE Tc(MIN.) = 19.60  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.840  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
URBAN GOOD COVER					
"TURF"	C	1.10	0.52	1.000	72
COMMERCIAL	C	1.89	0.57	0.100	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.53  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431  
 SUBAREA AREA(ACRES) = 2.99 SUBAREA RUNOFF(CFS) = 4.34  
 EFFECTIVE AREA(ACRES) = 46.92 AREA-AVERAGED Fm(INCH/HR) = 0.07  
 AREA-AVERAGED Fp(INCH/HR) = 0.56 AREA-AVERAGED Ap = 0.12  
 TOTAL AREA(ACRES) = 46.9 PEAK FLOW RATE(CFS) = 74.87

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1820.00 TO NODE 1840.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 648.00 DOWNSTREAM(FEET) = 644.00
FLOW LENGTH(FEET) = 790.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.38
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 74.87
PIPE TRAVEL TIME(MIN.) = 1.57 Tc(MIN.) = 21.17
LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1840.00 = 4070.00 FEET.

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*****
FLOW PROCESS FROM NODE 1840.00 TO NODE 1840.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 21.17
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.757
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
URBAN GOOD COVER
"TURF"                C        1.20    0.52    1.000   72
COMMERCIAL            C        1.92    0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.446
SUBAREA AREA(ACRES) = 3.12 SUBAREA RUNOFF(CFS) = 4.28
EFFECTIVE AREA(ACRES) = 50.04 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.55 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 50.0 PEAK FLOW RATE(CFS) = 75.63

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*****
FLOW PROCESS FROM NODE 1840.00 TO NODE 1840.00 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.) = 21.17
RAINFALL INTENSITY(INCH/HR) = 1.76
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.55
AREA-AVERAGED Ap = 0.14
EFFECTIVE STREAM AREA(ACRES) = 50.04
TOTAL STREAM AREA(ACRES) = 50.04
PEAK FLOW RATE(CFS) AT CONFLUENCE = 75.63

```

```

*****
FLOW PROCESS FROM NODE 1850.00 TO NODE 1852.00 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) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 683.20 DOWNSTREAM(FEET) = 675.00

```

$Tc = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

```

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.592
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.400
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            C        5.98    0.57    0.100   69  12.59
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 12.61
TOTAL AREA(ACRES) = 5.98 PEAK FLOW RATE(CFS) = 12.61

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*****
FLOW PROCESS FROM NODE 1852.00 TO NODE 1854.00 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) = 675.00 DOWNSTREAM ELEVATION(FEET) = 668.20
STREET LENGTH(FEET) = 620.00 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

```

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 23.07
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.51
HALFSTREET FLOOD WIDTH(FEET) = 19.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.27
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.66
STREET FLOW TRAVEL TIME(MIN.) = 3.16 Tc(MIN.) = 15.76
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.098

```

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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            C       11.36    0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.36 SUBAREA RUNOFF(CFS) = 20.87
EFFECTIVE AREA(ACRES) = 17.34 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 17.3 PEAK FLOW RATE(CFS) = 31.85

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.55 HALFSTREET FLOOD WIDTH(FEET) = 21.91
FLOW VELOCITY(FEET/SEC.) = 3.55 DEPTH*VELOCITY(FT*FT/SEC.) = 1.97
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1854.00 = 1620.00 FEET.

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*****
FLOW PROCESS FROM NODE 1854.00 TO NODE 1856.00 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) = 668.20 DOWNSTREAM(FEET) = 655.40
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.62
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.85
PIPE TRAVEL TIME(MIN.) = 1.22 Tc(MIN.) = 16.98
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1856.00 = 2400.00 FEET.

*****
FLOW PROCESS FROM NODE 1856.00 TO NODE 1856.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.98
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.006
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 14.48 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 14.48 SUBAREA RUNOFF(CFS) = 25.40
EFFECTIVE AREA(ACRES) = 31.82 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 31.8 PEAK FLOW RATE(CFS) = 55.81

*****
FLOW PROCESS FROM NODE 1856.00 TO NODE 1858.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 655.40 DOWNSTREAM(FEET) = 648.00
FLOW LENGTH(FEET) = 740.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.10
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 55.81
PIPE TRAVEL TIME(MIN.) = 1.22 Tc(MIN.) = 18.20
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1858.00 = 3140.00 FEET.

*****
FLOW PROCESS FROM NODE 1858.00 TO NODE 1858.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.924
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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COMMERCIAL C 13.56 0.57 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 13.56 SUBAREA RUNOFF(CFS) = 22.79
EFFECTIVE AREA(ACRES) = 45.38 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 45.4 PEAK FLOW RATE(CFS) = 76.26

*****
FLOW PROCESS FROM NODE 1858.00 TO NODE 1840.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 648.00 DOWNSTREAM(FEET) = 644.00
FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.71
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 76.26
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 18.24
LONGEST FLOWPATH FROM NODE 1850.00 TO NODE 1840.00 = 3190.00 FEET.

*****
FLOW PROCESS FROM NODE 1840.00 TO NODE 1840.00 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.) = 18.24
RAINFALL INTENSITY(INCH/HR) = 1.92
AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.57
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 45.38
TOTAL STREAM AREA(ACRES) = 45.38
PEAK FLOW RATE(CFS) AT CONFLUENCE = 76.26

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 75.63 21.17 1.757 0.55( 0.08) 0.14 50.0 1800.00
2 76.26 18.24 1.921 0.57( 0.06) 0.10 45.4 1850.00

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
1 147.80 18.24 1.921 0.56( 0.07) 0.12 88.5 1850.00
2 145.17 21.17 1.757 0.56( 0.07) 0.12 95.4 1800.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 147.80 Tc(MIN.) = 18.24  
 EFFECTIVE AREA(ACRES) = 88.49 AREA-AVERAGED Fm(INCH/HR) = 0.07  
 AREA-AVERAGED Fp(INCH/HR) = 0.56 AREA-AVERAGED Ap = 0.12  
 TOTAL AREA(ACRES) = 95.4  
 LONGEST FLOWPATH FROM NODE 1800.00 TO NODE 1840.00 = 4070.00 FEET.

=====  
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 95.4 TC(MIN.) = 18.24  
 EFFECTIVE AREA(ACRES) = 88.49 AREA-AVERAGED Fm(INCH/HR)= 0.07  
 AREA-AVERAGED Fp(INCH/HR) = 0.56 AREA-AVERAGED Ap = 0.120  
 PEAK FLOW RATE(CFS) = 147.80

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	147.80	18.24	1.921	0.56( 0.07)	0.12	88.5	1850.00
2	145.17	21.17	1.757	0.56( 0.07)	0.12	95.4	1800.00

=====  
 END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* MERRILL AVE. - WEST OF CUCAMONGA CREEK \*  
\* 10-YR STUDY \*  
\* AREA 'J' \*  
\*\*\*\*\*

FILE NAME: MRL-W.DAT  
TIME/DATE OF STUDY: 08:41 10/17/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*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- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GUTTER LIP (FT)	GEOMETRIES 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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1700.00 TO NODE 1701.00 IS CODE = 21

=====  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 907.00  
ELEVATION DATA: UPSTREAM(FEET) = 697.50 DOWNSTREAM(FEET) = 693.10

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.451  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.962  
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 A 7.00 0.98 0.100 32 13.45  
COMMERCIAL C 0.83 0.57 0.100 69 13.45  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.93  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 13.17  
TOTAL AREA(ACRES) = 7.83 PEAK FLOW RATE(CFS) = 13.17

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1701.00 TO NODE 1702.00 IS CODE = 62

=====  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

===== UPSTREAM ELEVATION(FEET) = 693.10 DOWNSTREAM ELEVATION(FEET) = 689.12  
STREET LENGTH(FEET) = 382.00 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) = 20.54  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.50  
HALFSTREET FLOOD WIDTH(FEET) = 18.63  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.12  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.54  
STREET FLOW TRAVEL TIME(MIN.) = 2.04 Tc(MIN.) = 15.49  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.803

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 6.00 0.98 0.100 32  
COMMERCIAL C 3.52 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.82  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 9.52 SUBAREA RUNOFF(CFS) = 14.74  
EFFECTIVE AREA(ACRES) = 17.35 AREA-AVERAGED Fm(INCH/HR) = 0.09  
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 17.4 PEAK FLOW RATE(CFS) = 26.79



END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.74  
 FLOW VELOCITY(FEET/SEC.) = 3.32 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.77  
 LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1702.00 = 1289.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1702.00 TO NODE 1704.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 689.12 DOWNSTREAM ELEVATION(FEET) = 685.50  
 STREET LENGTH(FEET) = 817.00 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) = 37.40  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.66  
 HALFSTREET FLOOD WIDTH(FEET) = 27.93  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.73  
 STREET FLOW TRAVEL TIME(MIN.) = 5.21 Tc(MIN.) = 20.71  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.515

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	12.17	0.98	0.100	32
PUBLIC PARK	A	9.00	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.419  
 SUBAREA AREA(ACRES) = 21.17 SUBAREA RUNOFF(CFS) = 21.08  
 EFFECTIVE AREA(ACRES) = 38.52 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 43.37

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.69 HALFSTREET FLOOD WIDTH(FEET) = 30.77  
 FLOW VELOCITY(FEET/SEC.) = 2.70 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.87  
 LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1704.00 = 2106.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1704.00 TO NODE 1706.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 679.50 DOWNSTREAM(FEET) = 671.50  
 FLOW LENGTH(FEET) = 611.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.34  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 43.37  
 PIPE TRAVEL TIME(MIN.) = 0.99 Tc(MIN.) = 21.69  
 LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1706.00 = 2717.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1706.00 TO NODE 1706.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 21.69  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.473  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	8.06	0.98	0.100	32
PUBLIC PARK	A	8.06	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
 SUBAREA AREA(ACRES) = 16.12 SUBAREA RUNOFF(CFS) = 14.65  
 EFFECTIVE AREA(ACRES) = 54.64 AREA-AVERAGED Fm(INCH/HR) = 0.32  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.33  
 TOTAL AREA(ACRES) = 54.6 PEAK FLOW RATE(CFS) = 56.58

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1706.00 TO NODE 1708.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 671.50 DOWNSTREAM(FEET) = 666.50  
 FLOW LENGTH(FEET) = 970.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.96  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 56.58  
 PIPE TRAVEL TIME(MIN.) = 2.03 Tc(MIN.) = 23.72  
 LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1708.00 = 3687.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 23.72  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.396  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	17.81	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 17.81 SUBAREA RUNOFF(CFS) = 20.81  
EFFECTIVE AREA(ACRES) = 72.45 AREA-AVERAGED Fm(INCH/HR) = 0.27  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.28  
TOTAL AREA(ACRES) = 72.4 PEAK FLOW RATE(CFS) = 73.60

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

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 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.) = 23.72  
RAINFALL INTENSITY(INCH/HR) = 1.40  
AREA-AVERAGED Fm(INCH/HR) = 0.27  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.28  
EFFECTIVE STREAM AREA(ACRES) = 72.45  
TOTAL STREAM AREA(ACRES) = 72.45  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 73.60

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1710.00 TO NODE 1711.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 787.00  
ELEVATION DATA: UPSTREAM(FEET) = 702.50 DOWNSTREAM(FEET) = 698.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.591  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.042  
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 A 5.05 0.98 0.100 32 12.59  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 8.84  
TOTAL AREA(ACRES) = 5.05 PEAK FLOW RATE(CFS) = 8.84

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1711.00 TO NODE 1712.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

-----  
UPSTREAM ELEVATION(FEET) = 698.50 DOWNSTREAM ELEVATION(FEET) = 694.90  
STREET LENGTH(FEET) = 239.00 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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.13

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.45  
HALFSTREET FLOOD WIDTH(FEET) = 16.05  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.43  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.54  
STREET FLOW TRAVEL TIME(MIN.) = 1.16 Tc(MIN.) = 13.75  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.936

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 10.02 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.02 SUBAREA RUNOFF(CFS) = 16.58  
EFFECTIVE AREA(ACRES) = 15.07 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 15.1 PEAK FLOW RATE(CFS) = 24.94

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 18.71  
FLOW VELOCITY(FEET/SEC.) = 3.76 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.87  
LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1712.00 = 1026.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1712.00 TO NODE 1714.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 688.90 DOWNSTREAM(FEET) = 684.30  
FLOW LENGTH(FEET) = 723.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.03  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 24.94  
PIPE TRAVEL TIME(MIN.) = 1.71 Tc(MIN.) = 15.47  
LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1714.00 = 1749.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1714.00 TO NODE 1714.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 15.47  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.805  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 22.07 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 22.07 SUBAREA RUNOFF(CFS) = 33.91  
 EFFECTIVE AREA(ACRES) = 37.14 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 37.1 PEAK FLOW RATE(CFS) = 57.06

\*\*\*\*\*

FLOW PROCESS FROM NODE 1714.00 TO NODE 1716.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 684.30 DOWNSTREAM(FEET) = 681.80  
 FLOW LENGTH(FEET) = 689.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 34.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.81  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 57.06  
 PIPE TRAVEL TIME(MIN.) = 1.69 Tc(MIN.) = 17.15  
 LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1716.00 = 2438.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1716.00 TO NODE 1716.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 17.15  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.696  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	10.45	0.98	0.100	32
PUBLIC PARK	A	10.44	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
 SUBAREA AREA(ACRES) = 20.89 SUBAREA RUNOFF(CFS) = 23.18  
 EFFECTIVE AREA(ACRES) = 58.03 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.23  
 TOTAL AREA(ACRES) = 58.0 PEAK FLOW RATE(CFS) = 76.61

\*\*\*\*\*

FLOW PROCESS FROM NODE 1716.00 TO NODE 1708.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 681.80 DOWNSTREAM(FEET) = 666.50  
 FLOW LENGTH(FEET) = 1015.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.53  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 76.61  
 PIPE TRAVEL TIME(MIN.) = 1.35 Tc(MIN.) = 18.50  
 LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1708.00 = 3453.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.50  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.621  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	22.34	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 22.34 SUBAREA RUNOFF(CFS) = 30.62  
 EFFECTIVE AREA(ACRES) = 80.37 AREA-AVERAGED Fm(INCH/HR) = 0.19  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 80.4 PEAK FLOW RATE(CFS) = 103.30

\*\*\*\*\*

FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 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.) = 18.50  
 RAINFALL INTENSITY(INCH/HR) = 1.62  
 AREA-AVERAGED Fm(INCH/HR) = 0.19  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.20  
 EFFECTIVE STREAM AREA(ACRES) = 80.37  
 TOTAL STREAM AREA(ACRES) = 80.37  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 103.30

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	73.60	23.72	1.396	0.97( 0.27)	0.28	72.4	1700.00
2	103.30	18.50	1.621	0.98( 0.19)	0.20	80.4	1710.00

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	172.12	18.50	1.621	0.97( 0.22)	0.23	136.9	1710.00
2	160.65	23.72	1.396	0.97( 0.23)	0.23	152.8	1700.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 172.12 Tc(MIN.) = 18.50  
 EFFECTIVE AREA(ACRES) = 136.87 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.23  
 TOTAL AREA(ACRES) = 152.8  
 LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1708.00 = 3687.00 FEET.

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*****
FLOW PROCESS FROM NODE 1708.00 TO NODE 1722.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 666.50 DOWNSTREAM(FEET) = 649.40
FLOW LENGTH(FEET) = 3800.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.88
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 172.12
PIPE TRAVEL TIME(MIN.) = 6.41 Tc(MIN.) = 24.91
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1722.00 = 7487.00 FEET.

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*****
FLOW PROCESS FROM NODE 1722.00 TO NODE 1722.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.91
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.356
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 76.22 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 76.22 SUBAREA RUNOFF(CFS) = 86.31
EFFECTIVE AREA(ACRES) = 213.09 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 229.0 PEAK FLOW RATE(CFS) = 225.80

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*****
FLOW PROCESS FROM NODE 1722.00 TO NODE 1724.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 649.40 DOWNSTREAM(FEET) = 643.00
FLOW LENGTH(FEET) = 1335.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 51.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.84
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 225.80
PIPE TRAVEL TIME(MIN.) = 2.05 Tc(MIN.) = 26.96
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1724.00 = 8822.00 FEET.

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*****
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 26.96
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.293
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
COMMERCIAL A 2.02 0.98 0.100 32
URBAN GOOD COVER
"TRUF" A 1.12 0.97 1.000 33
COMMERCIAL C 1.12 0.57 0.100 69
URBAN GOOD COVER
"TRUF" C 0.66 0.52 1.000 72
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426
SUBAREA AREA(ACRES) = 4.92 SUBAREA RUNOFF(CFS) = 4.20
EFFECTIVE AREA(ACRES) = 218.01 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.19
TOTAL AREA(ACRES) = 234.0 PEAK FLOW RATE(CFS) = 225.80
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 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.) = 26.96
RAINFALL INTENSITY(INCH/HR) = 1.29
AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.96
AREA-AVERAGED Ap = 0.19
EFFECTIVE STREAM AREA(ACRES) = 218.01
TOTAL STREAM AREA(ACRES) = 233.96
PEAK FLOW RATE(CFS) AT CONFLUENCE = 225.80

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*****
FLOW PROCESS FROM NODE 1726.00 TO NODE 1728.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 810.00
ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 670.40
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.888
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.360
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 A 2.90 0.98 0.100 32 9.89
COMMERCIAL C 4.62 0.57 0.100 69 9.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 15.48
TOTAL AREA(ACRES) = 7.52 PEAK FLOW RATE(CFS) = 15.48

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*****
FLOW PROCESS FROM NODE 1728.00 TO NODE 1730.00 IS CODE = 62

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-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
-----
UPSTREAM ELEVATION(FEET) = 670.40  DOWNSTREAM ELEVATION(FEET) = 665.20
STREET LENGTH(FEET) = 541.00  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) = 21.38
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.51
HALFSTREET FLOOD WIDTH(FEET) = 19.26
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.05
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.54
STREET FLOW TRAVEL TIME(MIN.) = 2.96  Tc(MIN.) = 12.85
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.017
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      2.20    0.98    0.100   32
COMMERCIAL              C      4.51    0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 6.71  SUBAREA RUNOFF(CFS) = 11.76
EFFECTIVE AREA(ACRES) = 14.23  AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.71  AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 14.2  PEAK FLOW RATE(CFS) = 24.92

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53  HALFSTREET FLOOD WIDTH(FEET) = 20.43
FLOW VELOCITY(FEET/SEC.) = 3.18  DEPTH*VELOCITY(FT*FT/SEC.) = 1.68
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1730.00 = 1351.00 FEET.

*****
FLOW PROCESS FROM NODE 1730.00 TO NODE 1730.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 12.85
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.017
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C      10.54   0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 10.54  SUBAREA RUNOFF(CFS) = 18.60
EFFECTIVE AREA(ACRES) = 26.99  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.61  AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 27.0  PEAK FLOW RATE(CFS) = 47.06

*****
FLOW PROCESS FROM NODE 1730.00 TO NODE 1732.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 661.45  DOWNSTREAM(FEET) = 656.79
FLOW LENGTH(FEET) = 491.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.37
ESTIMATED PIPE DIAMETER(INCH) = 33.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 47.06
PIPE TRAVEL TIME(MIN.) = 0.87  Tc(MIN.) = 13.72
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1732.00 = 1842.00 FEET.

*****
FLOW PROCESS FROM NODE 1732.00 TO NODE 1732.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 13.72
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.939
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      4.47    0.98    0.100   32
COMMERCIAL              C      9.67    0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 14.14  SUBAREA RUNOFF(CFS) = 23.79
EFFECTIVE AREA(ACRES) = 41.13  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.64  AREA-AVERAGED Ap = 0.12

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SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.469
SUBAREA AREA(ACRES) = 2.22  SUBAREA RUNOFF(CFS) = 3.54
EFFECTIVE AREA(ACRES) = 16.45  AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.63  AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 16.4  PEAK FLOW RATE(CFS) = 28.46

*****
FLOW PROCESS FROM NODE 1730.00 TO NODE 1730.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 12.85
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.017
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C      10.54   0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 10.54  SUBAREA RUNOFF(CFS) = 18.60
EFFECTIVE AREA(ACRES) = 26.99  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.61  AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 27.0  PEAK FLOW RATE(CFS) = 47.06

*****
FLOW PROCESS FROM NODE 1730.00 TO NODE 1732.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 661.45  DOWNSTREAM(FEET) = 656.79
FLOW LENGTH(FEET) = 491.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.37
ESTIMATED PIPE DIAMETER(INCH) = 33.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 47.06
PIPE TRAVEL TIME(MIN.) = 0.87  Tc(MIN.) = 13.72
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1732.00 = 1842.00 FEET.

*****
FLOW PROCESS FROM NODE 1732.00 TO NODE 1732.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 13.72
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.939
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      4.47    0.98    0.100   32
COMMERCIAL              C      9.67    0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 14.14  SUBAREA RUNOFF(CFS) = 23.79
EFFECTIVE AREA(ACRES) = 41.13  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.64  AREA-AVERAGED Ap = 0.12

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TOTAL AREA(ACRES) =      41.1      PEAK FLOW RATE(CFS) =      68.95
*****
FLOW PROCESS FROM NODE 1732.00 TO NODE 1732.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 13.72
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.939
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C      7.31     0.57     0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.31      SUBAREA RUNOFF(CFS) = 12.39
EFFECTIVE AREA(ACRES) = 48.44   AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 48.4      PEAK FLOW RATE(CFS) = 81.34
*****
FLOW PROCESS FROM NODE 1732.00 TO NODE 1734.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 656.79 DOWNSTREAM(FEET) = 652.05
FLOW LENGTH(FEET) = 511.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.79
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 81.34
PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 14.51
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1734.00 = 2353.00 FEET.
*****
FLOW PROCESS FROM NODE 1734.00 TO NODE 1734.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 14.51
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.875
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      8.45     0.98     0.100   32
COMMERCIAL              C      6.00     0.57     0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 14.45   SUBAREA RUNOFF(CFS) = 23.34
EFFECTIVE AREA(ACRES) = 62.89 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.11
TOTAL AREA(ACRES) = 62.9      PEAK FLOW RATE(CFS) = 101.89
*****
FLOW PROCESS FROM NODE 1734.00 TO NODE 1734.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 14.51
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.875
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C      2.02     0.57     0.100   69
URBAN GOOD COVER
"TURF"                  C      1.38     0.52     1.000   72
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.465
SUBAREA AREA(ACRES) = 3.40   SUBAREA RUNOFF(CFS) = 4.99
EFFECTIVE AREA(ACRES) = 66.29 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 66.3      PEAK FLOW RATE(CFS) = 106.88
*****
FLOW PROCESS FROM NODE 1734.00 TO NODE 1734.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 14.51
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.875
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C      7.52     0.57     0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.52   SUBAREA RUNOFF(CFS) = 12.31
EFFECTIVE AREA(ACRES) = 73.81 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 73.8      PEAK FLOW RATE(CFS) = 119.19
*****
FLOW PROCESS FROM NODE 1734.00 TO NODE 1736.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 652.05 DOWNSTREAM(FEET) = 648.15
FLOW LENGTH(FEET) = 412.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.94
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 119.19
PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 15.08
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1736.00 = 2765.00 FEET.
*****
FLOW PROCESS FROM NODE 1736.00 TO NODE 1736.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

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MAINLINE Tc(MIN.) = 15.08  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.832  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 7.38 0.98 0.100 32  
 COMMERCIAL C 4.28 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.82  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 11.66 SUBAREA RUNOFF(CFS) = 18.36  
 EFFECTIVE AREA(ACRES) = 85.47 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.12  
 TOTAL AREA(ACRES) = 85.5 PEAK FLOW RATE(CFS) = 134.67

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1736.00 TO NODE 1736.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1736.00 TO NODE 1736.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 \*\*\*\*\*  
 MAINLINE Tc(MIN.) = 15.08  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.832  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 5.16 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 5.16 SUBAREA RUNOFF(CFS) = 8.24  
 EFFECTIVE AREA(ACRES) = 90.63 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.12  
 TOTAL AREA(ACRES) = 90.6 PEAK FLOW RATE(CFS) = 142.92

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1736.00 TO NODE 1724.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 \*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 648.15 DOWNSTREAM(FEET) = 643.00  
 FLOW LENGTH(FEET) = 481.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.14  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 142.92  
 PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 15.69  
 LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1724.00 = 3246.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 \*\*\*\*\*  
 MAINLINE Tc(MIN.) = 15.69  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.789  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 6.08 0.98 0.100 32  
 COMMERCIAL C 4.03 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 10.11 SUBAREA RUNOFF(CFS) = 15.54  
 EFFECTIVE AREA(ACRES) = 100.74 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.12  
 TOTAL AREA(ACRES) = 100.7 PEAK FLOW RATE(CFS) = 154.94

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 \*\*\*\*\*

MAINLINE Tc(MIN.) = 15.69  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.789  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 1.65 0.57 0.100 69  
 URBAN GOOD COVER "TURF" C 1.11 0.52 1.000 72  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462  
 SUBAREA AREA(ACRES) = 2.76 SUBAREA RUNOFF(CFS) = 3.84  
 EFFECTIVE AREA(ACRES) = 103.50 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.13  
 TOTAL AREA(ACRES) = 103.5 PEAK FLOW RATE(CFS) = 158.78

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 \*\*\*\*\*

MAINLINE Tc(MIN.) = 15.69  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.789  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 5.87 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 5.87 SUBAREA RUNOFF(CFS) = 9.15  
 EFFECTIVE AREA(ACRES) = 109.37 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.13  
 TOTAL AREA(ACRES) = 109.4 PEAK FLOW RATE(CFS) = 167.93

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 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.) = 15.69  
 RAINFALL INTENSITY(INCH/HR) = 1.79  
 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.65  
 AREA-AVERAGED Ap = 0.13  
 EFFECTIVE STREAM AREA(ACRES) = 109.37  
 TOTAL STREAM AREA(ACRES) = 109.37  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 167.93

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	225.80	26.96	1.293	0.96( 0.18)	0.19	218.0	1710.00
1	210.39	32.41	1.158	0.96( 0.19)	0.20	234.0	1700.00
2	167.93	15.69	1.789	0.65( 0.08)	0.13	109.4	1726.00

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	358.05	15.69	1.789	0.85( 0.14)	0.16	236.3	1726.00
2	344.91	26.96	1.293	0.88( 0.15)	0.17	327.4	1710.00
3	316.19	32.41	1.158	0.89( 0.15)	0.17	343.3	1700.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 358.05 Tc(MIN.) = 15.69  
 EFFECTIVE AREA(ACRES) = 236.26 AREA-AVERAGED Fm(INCH/HR) = 0.14  
 AREA-AVERAGED Fp(INCH/HR) = 0.85 AREA-AVERAGED Ap = 0.16  
 TOTAL AREA(ACRES) = 343.3  
 LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1724.00 = 8822.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1724.00 TO NODE 1738.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 643.00 DOWNSTREAM(FEET) = 641.90  
 FLOW LENGTH(FEET) = 784.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 102.0 INCH PIPE IS 78.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.63  
 ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 358.05  
 PIPE TRAVEL TIME(MIN.) = 1.71 Tc(MIN.) = 17.40  
 LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1738.00 = 9606.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1738.00 TO NODE 1738.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 17.40  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.681  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.99	0.57	0.100	69
URBAN GOOD COVER "TURF"	C	1.03	0.52	1.000	72

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.53  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407  
 SUBAREA AREA(ACRES) = 3.02 SUBAREA RUNOFF(CFS) = 3.99  
 EFFECTIVE AREA(ACRES) = 239.28 AREA-AVERAGED Fm(INCH/HR) = 0.14  
 AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.16  
 TOTAL AREA(ACRES) = 346.4 PEAK FLOW RATE(CFS) = 358.05  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 346.4 TC(MIN.) = 17.40  
 EFFECTIVE AREA(ACRES) = 239.28 AREA-AVERAGED Fm(INCH/HR) = 0.14  
 AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.164  
 PEAK FLOW RATE(CFS) = 358.05

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	358.05	17.40	1.681	0.84( 0.14)	0.16	239.3	1726.00
2	344.91	28.68	1.246	0.87( 0.15)	0.17	330.4	1710.00
3	316.19	34.19	1.121	0.88( 0.15)	0.18	346.4	1700.00

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* MERRILL AVE. - WEST OF CUCAMONGA CREEK \*  
\* 100-YR STUDY \*  
\* AREA 'J' \*  
\*\*\*\*\*

FILE NAME: MRL-W.DAT  
TIME/DATE OF STUDY: 08:39 10/17/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====  
--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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- / SIDE / SIDE / WAY	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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1700.00 TO NODE 1701.00 IS CODE = 21

-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 907.00  
ELEVATION DATA: UPSTREAM(FEET) = 697.50 DOWNSTREAM(FEET) = 693.10

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.451  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.943  
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 A 7.00 0.98 0.100 32 13.45  
COMMERCIAL C 0.83 0.57 0.100 69 13.45  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.93  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 20.08  
TOTAL AREA(ACRES) = 7.83 PEAK FLOW RATE(CFS) = 20.08

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1701.00 TO NODE 1702.00 IS CODE = 62

-----  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

===== UPSTREAM ELEVATION(FEET) = 693.10 DOWNSTREAM ELEVATION(FEET) = 689.12  
STREET LENGTH(FEET) = 382.00 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) = 31.41  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.56  
HALFSTREET FLOOD WIDTH(FEET) = 22.07  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.46  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.92  
STREET FLOW TRAVEL TIME(MIN.) = 1.84 Tc(MIN.) = 15.29  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.725

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 6.00 0.98 0.100 32  
COMMERCIAL C 3.52 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.82  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 9.52 SUBAREA RUNOFF(CFS) = 22.64  
EFFECTIVE AREA(ACRES) = 17.35 AREA-AVERAGED Fm(INCH/HR) = 0.09  
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 17.4 PEAK FLOW RATE(CFS) = 41.19

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.60  HALFSTREET FLOOD WIDTH(FEET) = 24.57
FLOW VELOCITY(FEET/SEC.) = 3.69  DEPTH*VELOCITY(FT*FT/SEC.) = 2.22
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1702.00 = 1289.00 FEET.

*****
FLOW PROCESS FROM NODE 1702.00 TO NODE 1704.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
-----
UPSTREAM ELEVATION(FEET) = 689.12  DOWNSTREAM ELEVATION(FEET) = 685.50
STREET LENGTH(FEET) = 817.00  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) = 59.64
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.75
HALFSTREET FLOOD WIDTH(FEET) = 34.06
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.02
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.26
STREET FLOW TRAVEL TIME(MIN.) = 4.51  Tc(MIN.) = 19.80
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.334
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS
LAND USE  GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL  A  12.17  0.98  0.100  32
PUBLIC PARK  A  9.00  0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.419
SUBAREA AREA(ACRES) = 21.17  SUBAREA RUNOFF(CFS) = 36.68
EFFECTIVE AREA(ACRES) = 38.52  AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 38.5  PEAK FLOW RATE(CFS) = 71.76

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.78  HALFSTREET FLOOD WIDTH(FEET) = 35.89
FLOW VELOCITY(FEET/SEC.) = 3.22  DEPTH*VELOCITY(FT*FT/SEC.) = 2.52
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 817.0 FT WITH ELEVATION-DROP = 3.6 FT, IS 49.1 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 1704.00
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1704.00 = 2106.00 FEET.

*****
FLOW PROCESS FROM NODE 1704.00 TO NODE 1706.00 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) = 679.50  DOWNSTREAM(FEET) = 671.50
FLOW LENGTH(FEET) = 611.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.68
ESTIMATED PIPE DIAMETER(INCH) = 36.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 71.76
PIPE TRAVEL TIME(MIN.) = 0.87  Tc(MIN.) = 20.68
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1706.00 = 2717.00 FEET.

*****
FLOW PROCESS FROM NODE 1706.00 TO NODE 1706.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 20.68
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.274
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS
LAND USE  GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL  A  8.06  0.98  0.100  32
PUBLIC PARK  A  8.06  0.98  0.850  32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475
SUBAREA AREA(ACRES) = 16.12  SUBAREA RUNOFF(CFS) = 26.27
EFFECTIVE AREA(ACRES) = 54.64  AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 54.6  PEAK FLOW RATE(CFS) = 95.97

*****
FLOW PROCESS FROM NODE 1706.00 TO NODE 1708.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 671.50  DOWNSTREAM(FEET) = 666.50
FLOW LENGTH(FEET) = 970.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 38.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.87
ESTIMATED PIPE DIAMETER(INCH) = 48.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 95.97
PIPE TRAVEL TIME(MIN.) = 1.82  Tc(MIN.) = 22.50
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1708.00 = 3687.00 FEET.

*****
FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 22.50
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.162
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS

```

LAND USE            GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN  
COMMERCIAL            A        17.81     0.98       0.100    32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 17.81    SUBAREA RUNOFF(CFS) = 33.09  
EFFECTIVE AREA(ACRES) = 72.45    AREA-AVERAGED Fm(INCH/HR) = 0.27  
AREA-AVERAGED Fp(INCH/HR) = 0.97    AREA-AVERAGED Ap = 0.28  
TOTAL AREA(ACRES) = 72.4        PEAK FLOW RATE(CFS) = 123.53

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 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.) = 22.50  
RAINFALL INTENSITY(INCH/HR) = 2.16  
AREA-AVERAGED Fm(INCH/HR) = 0.27  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.28  
EFFECTIVE STREAM AREA(ACRES) = 72.45  
TOTAL STREAM AREA(ACRES) = 72.45  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 123.53

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1710.00 TO NODE 1711.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 787.00  
ELEVATION DATA: UPSTREAM(FEET) = 702.50    DOWNSTREAM(FEET) = 698.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.591  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.062  
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            A        5.05     0.98       0.100    32   12.59  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 13.47  
TOTAL AREA(ACRES) = 5.05    PEAK FLOW RATE(CFS) = 13.47

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1711.00 TO NODE 1712.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
-----  
UPSTREAM ELEVATION(FEET) = 698.50    DOWNSTREAM ELEVATION(FEET) = 694.90  
STREET LENGTH(FEET) = 239.00    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) = 26.20  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.50  
HALFSTREET FLOOD WIDTH(FEET) = 19.10  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.79  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.91  
STREET FLOW TRAVEL TIME(MIN.) = 1.05    Tc(MIN.) = 13.64  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.919  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/    SCS SOIL    AREA       Fp       Ap       SCS  
LAND USE            GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN  
COMMERCIAL            A        10.02     0.98       0.100    32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.02    SUBAREA RUNOFF(CFS) = 25.44  
EFFECTIVE AREA(ACRES) = 15.07    AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98    AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 15.1        PEAK FLOW RATE(CFS) = 38.26

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.56    HALFSTREET FLOOD WIDTH(FEET) = 22.15  
FLOW VELOCITY(FEET/SEC.) = 4.18    DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.33  
LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1712.00 = 1026.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1712.00 TO NODE 1714.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 688.90    DOWNSTREAM(FEET) = 684.30  
FLOW LENGTH(FEET) = 723.00    MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.67  
ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 38.26  
PIPE TRAVEL TIME(MIN.) = 1.57    Tc(MIN.) = 15.21  
LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1714.00 = 1749.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1714.00 TO NODE 1714.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 15.21  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.734  
SUBAREA LOSS RATE DATA(AMC II):



DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 22.07 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 22.07 SUBAREA RUNOFF(CFS) = 52.37  
 EFFECTIVE AREA(ACRES) = 37.14 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 37.1 PEAK FLOW RATE(CFS) = 88.12

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1714.00 TO NODE 1716.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 684.30 DOWNSTREAM(FEET) = 681.80  
 FLOW LENGTH(FEET) = 689.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.71  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 88.12  
 PIPE TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 16.70  
 LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1716.00 = 2438.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1716.00 TO NODE 1716.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 16.70  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.585  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 10.45 0.98 0.100 32  
 PUBLIC PARK A 10.44 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
 SUBAREA AREA(ACRES) = 20.89 SUBAREA RUNOFF(CFS) = 39.89  
 EFFECTIVE AREA(ACRES) = 58.03 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.23  
 TOTAL AREA(ACRES) = 58.0 PEAK FLOW RATE(CFS) = 123.04

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1716.00 TO NODE 1708.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 681.80 DOWNSTREAM(FEET) = 666.50  
 FLOW LENGTH(FEET) = 1015.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 32.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.37  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 123.04

PIPE TRAVEL TIME(MIN.) = 1.18 Tc(MIN.) = 17.88  
 LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1708.00 = 3453.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 17.88  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.481  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 22.34 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 22.34 SUBAREA RUNOFF(CFS) = 47.93  
 EFFECTIVE AREA(ACRES) = 80.37 AREA-AVERAGED Fm(INCH/HR) = 0.19  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 80.4 PEAK FLOW RATE(CFS) = 165.56

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 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.) = 17.88  
 RAINFALL INTENSITY(INCH/HR) = 2.48  
 AREA-AVERAGED Fm(INCH/HR) = 0.19  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.20  
 EFFECTIVE STREAM AREA(ACRES) = 80.37  
 TOTAL STREAM AREA(ACRES) = 80.37  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 165.56

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	123.53	22.50	2.162	0.97( 0.27)	0.28	72.4	1700.00
2	165.56	17.88	2.481	0.98( 0.19)	0.20	80.4	1710.00

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	280.29	17.88	2.481	0.97( 0.22)	0.23	137.9	1710.00
2	265.97	22.50	2.162	0.97( 0.23)	0.23	152.8	1700.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 280.29 Tc(MIN.) = 17.88  
 EFFECTIVE AREA(ACRES) = 137.94 AREA-AVERAGED Fm(INCH/HR) = 0.22

AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.23  
TOTAL AREA(ACRES) = 152.8  
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1708.00 = 3687.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1708.00 TO NODE 1722.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 666.50 DOWNSTREAM(FEET) = 649.40  
FLOW LENGTH(FEET) = 3800.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 75.0 INCH PIPE IS 57.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.13  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 280.29  
PIPE TRAVEL TIME(MIN.) = 5.69 Tc(MIN.) = 23.57  
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1722.00 = 7487.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1722.00 TO NODE 1722.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 23.57  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.102  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 76.22 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 76.22 SUBAREA RUNOFF(CFS) = 137.52  
EFFECTIVE AREA(ACRES) = 214.16 AREA-AVERAGED Fm(INCH/HR) = 0.18  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.18  
TOTAL AREA(ACRES) = 229.0 PEAK FLOW RATE(CFS) = 370.73

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1722.00 TO NODE 1724.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 649.40 DOWNSTREAM(FEET) = 643.00  
FLOW LENGTH(FEET) = 1335.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 64.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.13  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 370.73  
PIPE TRAVEL TIME(MIN.) = 1.83 Tc(MIN.) = 25.40  
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1724.00 = 8822.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 25.40  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.010  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 2.02 0.98 0.100 32  
URBAN GOOD COVER  
"TURF" A 1.12 0.97 1.000 33  
COMMERCIAL C 1.12 0.57 0.100 69  
URBAN GOOD COVER  
"TURF" C 0.66 0.52 1.000 72  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426  
SUBAREA AREA(ACRES) = 4.92 SUBAREA RUNOFF(CFS) = 7.38  
EFFECTIVE AREA(ACRES) = 219.08 AREA-AVERAGED Fm(INCH/HR) = 0.18  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.19  
TOTAL AREA(ACRES) = 234.0 PEAK FLOW RATE(CFS) = 370.73  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 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.) = 25.40  
RAINFALL INTENSITY(INCH/HR) = 2.01  
AREA-AVERAGED Fm(INCH/HR) = 0.18  
AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.19  
EFFECTIVE STREAM AREA(ACRES) = 219.08  
TOTAL STREAM AREA(ACRES) = 233.96  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 370.73

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1726.00 TO NODE 1728.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 810.00  
ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 670.40

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.888  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.540  
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 A 2.90 0.98 0.100 32 9.89  
COMMERCIAL C 4.62 0.57 0.100 69 9.89  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 23.47

TOTAL AREA(ACRES) = 7.52 PEAK FLOW RATE(CFS) = 23.47

\*\*\*\*\*

FLOW PROCESS FROM NODE 1728.00 TO NODE 1730.00 IS CODE = 62

-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 670.40 DOWNSTREAM ELEVATION(FEET) = 665.20

STREET LENGTH(FEET) = 541.00 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) = 32.54

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.57

HALFSTREET FLOOD WIDTH(FEET) = 22.70

AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.39

PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.93

STREET FLOW TRAVEL TIME(MIN.) = 2.66 Tc(MIN.) = 12.54

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.069

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.20	0.98	0.100	32
COMMERCIAL	C	4.51	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 6.71 SUBAREA RUNOFF(CFS) = 18.11

EFFECTIVE AREA(ACRES) = 14.23 AREA-AVERAGED Fm(INCH/HR) = 0.07

AREA-AVERAGED Fp(INCH/HR) = 0.71 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 14.2 PEAK FLOW RATE(CFS) = 38.39

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 24.26

FLOW VELOCITY(FEET/SEC.) = 3.52 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.10

LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1730.00 = 1351.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1730.00 TO NODE 1730.00 IS CODE = 81

-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 12.54

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.069

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	4.47	0.98	0.100	32
COMMERCIAL	C	9.67	0.57	0.100	69

COMMERCIAL C 1.31 0.57 0.100 69

URBAN GOOD COVER

"TURF" C 0.91 0.52 1.000 72

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.469

SUBAREA AREA(ACRES) = 2.22 SUBAREA RUNOFF(CFS) = 5.64

EFFECTIVE AREA(ACRES) = 16.45 AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.15

TOTAL AREA(ACRES) = 16.4 PEAK FLOW RATE(CFS) = 44.03

\*\*\*\*\*

FLOW PROCESS FROM NODE 1730.00 TO NODE 1730.00 IS CODE = 81

-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 12.54

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.069

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	10.54	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 10.54 SUBAREA RUNOFF(CFS) = 28.58

EFFECTIVE AREA(ACRES) = 26.99 AREA-AVERAGED Fm(INCH/HR) = 0.08

AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.13

TOTAL AREA(ACRES) = 27.0 PEAK FLOW RATE(CFS) = 72.61

\*\*\*\*\*

FLOW PROCESS FROM NODE 1730.00 TO NODE 1732.00 IS CODE = 31

-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 661.45 DOWNSTREAM(FEET) = 656.79

FLOW LENGTH(FEET) = 491.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 10.47

ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 72.61

PIPE TRAVEL TIME(MIN.) = 0.78 Tc(MIN.) = 13.33

LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1732.00 = 1842.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1732.00 TO NODE 1732.00 IS CODE = 81

-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 13.33

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.960

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	4.47	0.98	0.100	32
COMMERCIAL	C	9.67	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 14.14 SUBAREA RUNOFF(CFS) = 36.78  
EFFECTIVE AREA(ACRES) = 41.13 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 41.1 PEAK FLOW RATE(CFS) = 106.73

TOTAL AREA(ACRES) = 62.9 PEAK FLOW RATE(CFS) = 158.10

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1734.00 TO NODE 1734.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	2.02	0.57	0.100	69
URBAN GOOD COVER "TURF"	C	1.38	0.52	1.000	72

MAINLINE Tc(MIN.) = 14.04  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.868  
SUBAREA LOSS RATE DATA(AMC II):  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.465  
SUBAREA AREA(ACRES) = 3.40 SUBAREA RUNOFF(CFS) = 8.03  
EFFECTIVE AREA(ACRES) = 66.29 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.13  
TOTAL AREA(ACRES) = 66.3 PEAK FLOW RATE(CFS) = 166.13

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1734.00 TO NODE 1734.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	7.52	0.57	0.100	69

MAINLINE Tc(MIN.) = 14.04  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.868  
SUBAREA LOSS RATE DATA(AMC II):  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 7.52 SUBAREA RUNOFF(CFS) = 19.03  
EFFECTIVE AREA(ACRES) = 73.81 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.13  
TOTAL AREA(ACRES) = 73.8 PEAK FLOW RATE(CFS) = 185.16

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1734.00 TO NODE 1736.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 652.05 DOWNSTREAM(FEET) = 648.15  
FLOW LENGTH(FEET) = 412.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.36  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 185.16  
PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 14.56  
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1736.00 = 2765.00 FEET.

\*\*\*\*\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1732.00 TO NODE 1732.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	7.31	0.57	0.100	69

MAINLINE Tc(MIN.) = 13.33  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.960  
SUBAREA LOSS RATE DATA(AMC II):  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 7.31 SUBAREA RUNOFF(CFS) = 19.10  
EFFECTIVE AREA(ACRES) = 48.44 AREA-AVERAGED Fm(INCH/HR) = 0.07  
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 48.4 PEAK FLOW RATE(CFS) = 125.83

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1732.00 TO NODE 1734.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 656.79 DOWNSTREAM(FEET) = 652.05  
FLOW LENGTH(FEET) = 511.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.89  
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 125.83  
PIPE TRAVEL TIME(MIN.) = 0.72 Tc(MIN.) = 14.04  
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1734.00 = 2353.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1734.00 TO NODE 1734.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	8.45	0.98	0.100	32
COMMERCIAL	C	6.00	0.57	0.100	69

MAINLINE Tc(MIN.) = 14.04  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.868  
SUBAREA LOSS RATE DATA(AMC II):  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 14.45 SUBAREA RUNOFF(CFS) = 36.25  
EFFECTIVE AREA(ACRES) = 62.89 AREA-AVERAGED Fm(INCH/HR) = 0.07  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.11

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FLOW PROCESS FROM NODE 1736.00 TO NODE 1736.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.56
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.807
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A      7.38    0.98    0.100   32
COMMERCIAL          C      4.28    0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.82
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.66      SUBAREA RUNOFF(CFS) = 28.59
EFFECTIVE AREA(ACRES) = 85.47   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 85.5       PEAK FLOW RATE(CFS) = 209.68

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*****
FLOW PROCESS FROM NODE 1736.00 TO NODE 1736.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.56
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.807
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C      5.16    0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.16      SUBAREA RUNOFF(CFS) = 12.77
EFFECTIVE AREA(ACRES) = 90.63   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 90.6       PEAK FLOW RATE(CFS) = 222.45

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*****
FLOW PROCESS FROM NODE 1736.00 TO NODE 1724.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 648.15 DOWNSTREAM(FEET) = 643.00
FLOW LENGTH(FEET) = 481.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 46.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.34
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 222.45
PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 15.12
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1724.00 = 3246.00 FEET.

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*****
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

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MAINLINE Tc(MIN.) = 15.12
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.744
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          A      6.08    0.98    0.100   32
COMMERCIAL          C      4.03    0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 10.11     SUBAREA RUNOFF(CFS) = 24.23
EFFECTIVE AREA(ACRES) = 100.74  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 100.7       PEAK FLOW RATE(CFS) = 241.57

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*****
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.12
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.744
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C      1.65    0.57    0.100   69
URBAN GOOD COVER
"TURF"              C      1.11    0.52    1.000   72
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462
SUBAREA AREA(ACRES) = 2.76      SUBAREA RUNOFF(CFS) = 6.22
EFFECTIVE AREA(ACRES) = 103.50  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 103.5       PEAK FLOW RATE(CFS) = 247.78

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*****
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.12
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.744
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C      5.87    0.57    0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.87      SUBAREA RUNOFF(CFS) = 14.20
EFFECTIVE AREA(ACRES) = 109.37  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 109.4       PEAK FLOW RATE(CFS) = 261.98

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*****
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.12
RAINFALL INTENSITY(INCH/HR) = 2.74
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.65
AREA-AVERAGED Ap = 0.13
EFFECTIVE STREAM AREA(ACRES) = 109.37
TOTAL STREAM AREA(ACRES) = 109.37
PEAK FLOW RATE(CFS) AT CONFLUENCE = 261.98

\*\* 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 1-2.

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 1-3.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 571.25 Tc(MIN.) = 15.12
EFFECTIVE AREA(ACRES) = 239.73 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.85 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 343.3
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1724.00 = 8822.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 1724.00 TO NODE 1738.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 643.00 DOWNSTREAM(FEET) = 641.90
FLOW LENGTH(FEET) = 784.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 120.0 INCH PIPE IS 95.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.53
ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 571.25
PIPE TRAVEL TIME(MIN.) = 1.53 Tc(MIN.) = 16.65
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1738.00 = 9606.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 1738.00 TO NODE 1738.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.65
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.590
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.99 0.57 0.100 69
URBAN GOOD COVER
"TURF" C 1.03 0.52 1.000 72
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.53
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
SUBAREA AREA(ACRES) = 3.02 SUBAREA RUNOFF(CFS) = 6.46
EFFECTIVE AREA(ACRES) = 242.75 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 346.4 PEAK FLOW RATE(CFS) = 571.25
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 346.4 TC(MIN.) = 16.65
EFFECTIVE AREA(ACRES) = 242.75 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.164
PEAK FLOW RATE(CFS) = 571.25

\*\* 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 1-3.

END OF RATIONAL METHOD ANALYSIS





\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* MERRILL AVE. - WEST OF CUCAMONGA CREEK \*  
\* 25-YR STUDY \*  
\* AREA 'J' \*  
\*\*\*\*\*

FILE NAME: MRL-W.DAT  
TIME/DATE OF STUDY: 08:43 10/17/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*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 STREET-CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY (FT)	CURB GUTTER-GEOMETRIES: HEIGHT (FT)	WIDTH 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

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.00 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 1700.00 TO NODE 1701.00 IS CODE = 21

-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 907.00  
ELEVATION DATA: UPSTREAM(FEET) = 697.50 DOWNSTREAM(FEET) = 693.10

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.451  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.307  
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	A	7.00	0.98	0.100	32	13.45
COMMERCIAL	C	0.83	0.57	0.100	69	13.45

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.93  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 15.60  
TOTAL AREA(ACRES) = 7.83 PEAK FLOW RATE(CFS) = 15.60

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1701.00 TO NODE 1702.00 IS CODE = 62

----->>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

===== UPSTREAM ELEVATION(FEET) = 693.10 DOWNSTREAM ELEVATION(FEET) = 689.12  
STREET LENGTH(FEET) = 382.00 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) = 24.36  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.52  
HALFSTREET FLOOD WIDTH(FEET) = 19.96  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.25  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.68  
STREET FLOW TRAVEL TIME(MIN.) = 1.96 Tc(MIN.) = 15.41  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.126

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	6.00	0.98	0.100	32
COMMERCIAL	C	3.52	0.57	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.82  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 9.52 SUBAREA RUNOFF(CFS) = 17.51  
EFFECTIVE AREA(ACRES) = 17.35 AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 17.4 PEAK FLOW RATE(CFS) = 31.83

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.56 HALFSTREET FLOOD WIDTH(FEET) = 22.15  
FLOW VELOCITY(FEET/SEC.) = 3.48 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.94  
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1702.00 = 1289.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1702.00 TO NODE 1704.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 689.12 DOWNSTREAM ELEVATION(FEET) = 685.50  
STREET LENGTH(FEET) = 817.00 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) = 45.17  
\*\*\*STREET FLOWING FULL\*\*\*

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.70  
HALFSTREET FLOOD WIDTH(FEET) = 31.61  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.73  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.91  
STREET FLOW TRAVEL TIME(MIN.) = 4.99 Tc(MIN.) = 20.40  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.796

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	12.17	0.98	0.100	32
PUBLIC PARK	A	9.00	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.419  
SUBAREA AREA(ACRES) = 21.17 SUBAREA RUNOFF(CFS) = 26.45  
EFFECTIVE AREA(ACRES) = 38.52 AREA-AVERAGED Fm(INCH/HR) = 0.26  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.28  
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 53.14

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.73 HALFSTREET FLOOD WIDTH(FEET) = 32.96  
FLOW VELOCITY(FEET/SEC.) = 2.91 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.11  
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1704.00 = 2106.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1704.00 TO NODE 1706.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 679.50 DOWNSTREAM(FEET) = 671.50  
FLOW LENGTH(FEET) = 611.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.97  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 53.14  
PIPE TRAVEL TIME(MIN.) = 0.93 Tc(MIN.) = 21.33  
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1706.00 = 2717.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1706.00 TO NODE 1706.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 21.33  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.749  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	8.06	0.98	0.100	32
PUBLIC PARK	A	8.06	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
SUBAREA AREA(ACRES) = 16.12 SUBAREA RUNOFF(CFS) = 18.66  
EFFECTIVE AREA(ACRES) = 54.64 AREA-AVERAGED Fm(INCH/HR) = 0.32  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.33  
TOTAL AREA(ACRES) = 54.6 PEAK FLOW RATE(CFS) = 70.16

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1706.00 TO NODE 1708.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 671.50 DOWNSTREAM(FEET) = 666.50  
FLOW LENGTH(FEET) = 970.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.37  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 70.16  
PIPE TRAVEL TIME(MIN.) = 1.93 Tc(MIN.) = 23.26  
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1708.00 = 3687.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 23.26  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.661  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	8.06	0.98	0.100	32
PUBLIC PARK	A	8.06	0.98	0.850	32

COMMERCIAL A 17.81 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 17.81 SUBAREA RUNOFF(CFS) = 25.05  
EFFECTIVE AREA(ACRES) = 72.45 AREA-AVERAGED Fm(INCH/HR) = 0.27  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.28  
TOTAL AREA(ACRES) = 72.4 PEAK FLOW RATE(CFS) = 90.85

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) = 20.31  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.47  
HALFSTREET FLOOD WIDTH(FEET) = 17.23  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.57  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.68  
STREET FLOW TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 13.71  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.281

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 10.02 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.02 SUBAREA RUNOFF(CFS) = 19.69  
EFFECTIVE AREA(ACRES) = 15.07 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 15.1 PEAK FLOW RATE(CFS) = 29.61

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 20.04  
FLOW VELOCITY(FEET/SEC.) = 3.92 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.04  
LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1712.00 = 1026.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1712.00 TO NODE 1714.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 688.90 DOWNSTREAM(FEET) = 684.30  
FLOW LENGTH(FEET) = 723.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.20  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 29.61  
PIPE TRAVEL TIME(MIN.) = 1.67 Tc(MIN.) = 15.38  
LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1714.00 = 1749.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1714.00 TO NODE 1714.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
-----  
MAINLINE Tc(MIN.) = 15.38  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.128  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 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.) = 23.26  
RAINFALL INTENSITY(INCH/HR) = 1.66  
AREA-AVERAGED Fm(INCH/HR) = 0.27  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.28  
EFFECTIVE STREAM AREA(ACRES) = 72.45  
TOTAL STREAM AREA(ACRES) = 72.45  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 90.85

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1710.00 TO NODE 1711.00 IS CODE = 21

-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 787.00  
ELEVATION DATA: UPSTREAM(FEET) = 702.50 DOWNSTREAM(FEET) = 698.50

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.591  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.400  
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 A 5.05 0.98 0.100 32 12.59  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 10.46  
TOTAL AREA(ACRES) = 5.05 PEAK FLOW RATE(CFS) = 10.46

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1711.00 TO NODE 1712.00 IS CODE = 62

-----  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<<

-----  
UPSTREAM ELEVATION(FEET) = 698.50 DOWNSTREAM ELEVATION(FEET) = 694.90  
STREET LENGTH(FEET) = 239.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00

LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
 COMMERCIAL            A            22.07        0.98        0.100        32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 22.07        SUBAREA RUNOFF(CFS) = 40.34  
 EFFECTIVE AREA(ACRES) = 37.14        AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.98        AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 37.1            PEAK FLOW RATE(CFS) = 67.88

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1714.00 TO NODE 1716.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 684.30    DOWNSTREAM(FEET) = 681.80  
 FLOW LENGTH(FEET) = 689.00    MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.2 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC. ) = 7.13  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00    NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 67.88  
 PIPE TRAVEL TIME(MIN.) = 1.61    Tc(MIN.) = 16.99  
 LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1716.00 = 2438.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1716.00 TO NODE 1716.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 16.99  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.005  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp            Ap        SCS  
 LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
 COMMERCIAL            A            10.45        0.98        0.100        32  
 PUBLIC PARK            A            10.44        0.98        0.850        32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.475  
 SUBAREA AREA(ACRES) = 20.89        SUBAREA RUNOFF(CFS) = 28.99  
 EFFECTIVE AREA(ACRES) = 58.03        AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.98        AREA-AVERAGED Ap = 0.23  
 TOTAL AREA(ACRES) = 58.0            PEAK FLOW RATE(CFS) = 92.75

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1716.00 TO NODE 1708.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 681.80    DOWNSTREAM(FEET) = 666.50  
 FLOW LENGTH(FEET) = 1015.00    MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.8 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC. ) = 13.21  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00    NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 92.75  
 PIPE TRAVEL TIME(MIN.) = 1.28    Tc(MIN.) = 18.27

LONGEST FLOWPATH FROM NODE 1710.00 TO NODE 1708.00 = 3453.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 18.27  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.919  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp            Ap        SCS  
 LAND USE            GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN  
 COMMERCIAL            A            22.34        0.98        0.100        32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 22.34        SUBAREA RUNOFF(CFS) = 36.63  
 EFFECTIVE AREA(ACRES) = 80.37        AREA-AVERAGED Fm(INCH/HR) = 0.19  
 AREA-AVERAGED Fp(INCH/HR) = 0.98        AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 80.4            PEAK FLOW RATE(CFS) = 124.91

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1708.00 TO NODE 1708.00 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.) = 18.27  
 RAINFALL INTENSITY(INCH/HR) = 1.92  
 AREA-AVERAGED Fm(INCH/HR) = 0.19  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.20  
 EFFECTIVE STREAM AREA(ACRES) = 80.37  
 TOTAL STREAM AREA(ACRES) = 80.37  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 124.91

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	90.85	23.26	1.661	0.97( 0.27)	0.28	72.4	1700.00
2	124.91	18.27	1.919	0.98( 0.19)	0.20	80.4	1710.00

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	209.53	18.27	1.919	0.97( 0.22)	0.23	137.3	1710.00
2	197.04	23.26	1.661	0.97( 0.23)	0.23	152.8	1700.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 209.53    Tc(MIN.) = 18.27  
 EFFECTIVE AREA(ACRES) = 137.28    AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.97    AREA-AVERAGED Ap = 0.23

TOTAL AREA(ACRES) = 152.8  
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1708.00 = 3687.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1708.00 TO NODE 1722.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 666.50 DOWNSTREAM(FEET) = 649.40  
FLOW LENGTH(FEET) = 3800.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 53.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.25  
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 209.53  
PIPE TRAVEL TIME(MIN.) = 6.18 Tc(MIN.) = 24.45  
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1722.00 = 7487.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1722.00 TO NODE 1722.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
-----

MAINLINE Tc(MIN.) = 24.45  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.612  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 76.22 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 76.22 SUBAREA RUNOFF(CFS) = 103.86  
EFFECTIVE AREA(ACRES) = 213.50 AREA-AVERAGED Fm(INCH/HR) = 0.18  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.18  
TOTAL AREA(ACRES) = 229.0 PEAK FLOW RATE(CFS) = 275.38

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1722.00 TO NODE 1724.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 649.40 DOWNSTREAM(FEET) = 643.00  
FLOW LENGTH(FEET) = 1335.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 58.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.22  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 275.38  
PIPE TRAVEL TIME(MIN.) = 1.98 Tc(MIN.) = 26.43  
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1724.00 = 8822.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
-----

MAINLINE Tc(MIN.) = 26.43  
\* 25 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 A 2.02 0.98 0.100 32  
URBAN GOOD COVER  
"TURF" A 1.12 0.97 1.000 33  
COMMERCIAL C 1.12 0.57 0.100 69  
URBAN GOOD COVER  
"TURF" C 0.66 0.52 1.000 72  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426  
SUBAREA AREA(ACRES) = 4.92 SUBAREA RUNOFF(CFS) = 5.29  
EFFECTIVE AREA(ACRES) = 218.42 AREA-AVERAGED Fm(INCH/HR) = 0.18  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.19  
TOTAL AREA(ACRES) = 234.0 PEAK FLOW RATE(CFS) = 275.38  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 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.) = 26.43  
RAINFALL INTENSITY(INCH/HR) = 1.54  
AREA-AVERAGED Fm(INCH/HR) = 0.18  
AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.19  
EFFECTIVE STREAM AREA(ACRES) = 218.42  
TOTAL STREAM AREA(ACRES) = 233.96  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 275.38

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1726.00 TO NODE 1728.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 810.00  
ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 670.40

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.888  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.774  
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 A 2.90 0.98 0.100 32 9.89  
COMMERCIAL C 4.62 0.57 0.100 69 9.89  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.72  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 18.29  
TOTAL AREA(ACRES) = 7.52 PEAK FLOW RATE(CFS) = 18.29



\*\*\*\*\*  
FLOW PROCESS FROM NODE 1728.00 TO NODE 1730.00 IS CODE = 62

-----  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

-----  
UPSTREAM ELEVATION(FEET) = 670.40 DOWNSTREAM ELEVATION(FEET) = 665.20  
STREET LENGTH(FEET) = 541.00 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) = 0.53  
HALFSTREET FLOOD WIDTH(FEET) = 20.59  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.18  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.69  
STREET FLOW TRAVEL TIME(MIN.) = 2.84 Tc(MIN.) = 12.72

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.385  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 2.20 0.98 0.100 32  
COMMERCIAL C 4.51 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 6.71 SUBAREA RUNOFF(CFS) = 13.98  
EFFECTIVE AREA(ACRES) = 14.23 AREA-AVERAGED Fm(INCH/HR) = 0.07  
AREA-AVERAGED Fp(INCH/HR) = 0.71 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 14.2 PEAK FLOW RATE(CFS) = 29.63

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.55 HALFSTREET FLOOD WIDTH(FEET) = 21.91  
FLOW VELOCITY(FEET/SEC.) = 3.31 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.83  
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1730.00 = 1351.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1730.00 TO NODE 1730.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 12.72  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.385  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 1.31 0.57 0.100 69

URBAN GOOD COVER  
"TURF" C 0.91 0.52 1.000 72  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.469  
SUBAREA AREA(ACRES) = 2.22 SUBAREA RUNOFF(CFS) = 4.27  
EFFECTIVE AREA(ACRES) = 16.45 AREA-AVERAGED Fm(INCH/HR) = 0.09  
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.15  
TOTAL AREA(ACRES) = 16.4 PEAK FLOW RATE(CFS) = 33.90

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1730.00 TO NODE 1730.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 12.72  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.385  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 10.54 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 10.54 SUBAREA RUNOFF(CFS) = 22.08  
EFFECTIVE AREA(ACRES) = 26.99 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.13  
TOTAL AREA(ACRES) = 27.0 PEAK FLOW RATE(CFS) = 55.99

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1730.00 TO NODE 1732.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 661.45 DOWNSTREAM(FEET) = 656.79  
FLOW LENGTH(FEET) = 491.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.88  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 55.99  
PIPE TRAVEL TIME(MIN.) = 0.83 Tc(MIN.) = 13.55  
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1732.00 = 1842.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1732.00 TO NODE 1732.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 13.55  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.296  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 4.47 0.98 0.100 32  
COMMERCIAL C 9.67 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.70  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 14.14 SUBAREA RUNOFF(CFS) = 28.34  
EFFECTIVE AREA(ACRES) = 41.13 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 41.1 PEAK FLOW RATE(CFS) = 82.17

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1732.00 TO NODE 1732.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 13.55  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.296  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 7.31 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 7.31 SUBAREA RUNOFF(CFS) = 14.73  
EFFECTIVE AREA(ACRES) = 48.44 AREA-AVERAGED Fm(INCH/HR) = 0.07  
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.12  
TOTAL AREA(ACRES) = 48.4 PEAK FLOW RATE(CFS) = 96.91

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1732.00 TO NODE 1734.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 656.79 DOWNSTREAM(FEET) = 652.05  
FLOW LENGTH(FEET) = 511.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 32.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.28  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 96.91  
PIPE TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 14.31  
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1734.00 = 2353.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1734.00 TO NODE 1734.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 14.31  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.223  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 8.45 0.98 0.100 32  
COMMERCIAL C 6.00 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 14.45 SUBAREA RUNOFF(CFS) = 27.86  
EFFECTIVE AREA(ACRES) = 62.89 AREA-AVERAGED Fm(INCH/HR) = 0.07  
AREA-AVERAGED Fp(INCH/HR) = 0.66 AREA-AVERAGED Ap = 0.11  
TOTAL AREA(ACRES) = 62.9 PEAK FLOW RATE(CFS) = 121.56

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1734.00 TO NODE 1734.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 14.31  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.223  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 2.02 0.57 0.100 69  
URBAN GOOD COVER  
"TURF" C 1.38 0.52 1.000 72  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.465  
SUBAREA AREA(ACRES) = 3.40 SUBAREA RUNOFF(CFS) = 6.06  
EFFECTIVE AREA(ACRES) = 66.29 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.13  
TOTAL AREA(ACRES) = 66.3 PEAK FLOW RATE(CFS) = 127.62

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1734.00 TO NODE 1734.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 14.31  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.223  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 7.52 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 7.52 SUBAREA RUNOFF(CFS) = 14.66  
EFFECTIVE AREA(ACRES) = 73.81 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.13  
TOTAL AREA(ACRES) = 73.8 PEAK FLOW RATE(CFS) = 142.28

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1734.00 TO NODE 1736.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 652.05 DOWNSTREAM(FEET) = 648.15  
FLOW LENGTH(FEET) = 412.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.45  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 142.28  
PIPE TRAVEL TIME(MIN.) = 0.55 Tc(MIN.) = 14.86  
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1736.00 = 2765.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1736.00 TO NODE 1736.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.86
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.173
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A        7.38    0.98    0.100    32
COMMERCIAL              C        4.28    0.57    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.82
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.66      SUBAREA RUNOFF(CFS) = 21.94
EFFECTIVE AREA(ACRES) = 85.47    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.65  AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 85.5        PEAK FLOW RATE(CFS) = 160.90

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*****
FLOW PROCESS FROM NODE 1736.00 TO NODE 1736.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.86
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.173
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              C        5.16    0.57    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.16      SUBAREA RUNOFF(CFS) = 9.83
EFFECTIVE AREA(ACRES) = 90.63    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.65  AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 90.6        PEAK FLOW RATE(CFS) = 170.73

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*****
FLOW PROCESS FROM NODE 1736.00 TO NODE 1724.00 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) = 648.15  DOWNSTREAM(FEET) = 643.00
FLOW LENGTH(FEET) = 481.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 39.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.70
ESTIMATED PIPE DIAMETER(INCH) = 54.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 170.73
PIPE TRAVEL TIME(MIN.) = 0.58  Tc(MIN.) = 15.44
LONGEST FLOWPATH FROM NODE 1726.00 TO NODE 1724.00 = 3246.00 FEET.

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*****
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.44

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* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.123
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A        6.08    0.98    0.100    32
COMMERCIAL              C        4.03    0.57    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 10.11      SUBAREA RUNOFF(CFS) = 18.58
EFFECTIVE AREA(ACRES) = 100.74    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.66  AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 100.7        PEAK FLOW RATE(CFS) = 185.25

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*****
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.44
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.123
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              C        1.65    0.57    0.100    69
URBAN GOOD COVER
"TURF"                  C        1.11    0.52    1.000    72
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.52
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462
SUBAREA AREA(ACRES) = 2.76      SUBAREA RUNOFF(CFS) = 4.67
EFFECTIVE AREA(ACRES) = 103.50    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.65  AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 103.5        PEAK FLOW RATE(CFS) = 189.92

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*****
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.44
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.123
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              C        5.87    0.57    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.87      SUBAREA RUNOFF(CFS) = 10.92
EFFECTIVE AREA(ACRES) = 109.37    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.65  AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 109.4        PEAK FLOW RATE(CFS) = 200.84

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*****
FLOW PROCESS FROM NODE 1724.00 TO NODE 1724.00 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.) = 15.44
RAINFALL INTENSITY(INCH/HR) = 2.12
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.65
AREA-AVERAGED Ap = 0.13
EFFECTIVE STREAM AREA(ACRES) = 109.37
TOTAL STREAM AREA(ACRES) = 109.37
PEAK FLOW RATE(CFS) AT CONFLUENCE = 200.84

```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	275.38	26.43	1.538	0.96 ( 0.18)	0.19	218.4	1710.00
1	258.99	31.45	1.385	0.96 ( 0.19)	0.20	234.0	1700.00
2	200.84	15.44	2.123	0.65 ( 0.08)	0.13	109.4	1726.00

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	431.18	15.44	2.123	0.85 ( 0.14)	0.16	237.0	1726.00
2	418.61	26.43	1.538	0.88 ( 0.15)	0.17	327.8	1710.00
3	387.23	31.45	1.385	0.89 ( 0.15)	0.17	343.3	1700.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 431.18 Tc(MIN.) = 15.44
EFFECTIVE AREA(ACRES) = 236.99 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.85 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 343.3
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1724.00 = 8822.00 FEET.

```

\*\*\*\*\*  
FLOW PROCESS FROM NODE 1724.00 TO NODE 1738.00 IS CODE = 31

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

```

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 643.00 DOWNSTREAM(FEET) = 641.90
FLOW LENGTH(FEET) = 784.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 108.0 INCH PIPE IS 85.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.95
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 431.18
PIPE TRAVEL TIME(MIN.) = 1.64 Tc(MIN.) = 17.09
LONGEST FLOWPATH FROM NODE 1700.00 TO NODE 1738.00 = 9606.00 FEET.

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 1738.00 TO NODE 1738.00 IS CODE = 81

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

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```

MAINLINE Tc(MIN.) = 17.09
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.998
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.99 0.57 0.100 69
URBAN GOOD COVER
"TURF" C 1.03 0.52 1.000 72
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.53
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
SUBAREA AREA(ACRES) = 3.02 SUBAREA RUNOFF(CFS) = 4.85
EFFECTIVE AREA(ACRES) = 240.01 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 346.4 PEAK FLOW RATE(CFS) = 431.18
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

```

END OF STUDY SUMMARY:

```

TOTAL AREA(ACRES) = 346.4 TC(MIN.) = 17.09
EFFECTIVE AREA(ACRES) = 240.01 AREA-AVERAGED Fm(INCH/HR)= 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.164
PEAK FLOW RATE(CFS) = 431.18

```

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	431.18	17.09	1.998	0.84 ( 0.14)	0.16	240.0	1726.00
2	418.61	28.08	1.483	0.88 ( 0.15)	0.17	330.8	1710.00
3	387.23	33.12	1.343	0.88 ( 0.15)	0.18	346.4	1700.00

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* TURNER AVE. \*  
\* 10-YR STUDY \*  
\* AREA 'L' \*  
\*\*\*\*\*

FILE NAME: TURN.DAT  
TIME/DATE OF STUDY: 09:09 08/24/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====  
--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
  
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	16.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.50 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH

FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.30
30-MINUTES	0.61
1-HOUR	0.80
3-HOUR	1.38
6-HOUR	1.94
24-HOUR	3.65

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* FLOW PROCESS FROM NODE 3000.00 TO NODE 3005.00 IS CODE = 21 \*\*\*\*\*

=====  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 792.30 DOWNSTREAM(FEET) = 788.30

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.537  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.873  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ LAND USE SCS SOIL GROUP (ACRES) Fp (INCH/HR) Ap (DECIMAL) SCS CN Tc (MIN.)  
COMMERCIAL A 9.45 0.98 0.100 32 14.54  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 15.10  
TOTAL AREA(ACRES) = 9.45 PEAK FLOW RATE(CFS) = 15.10

\*\*\*\*\* FLOW PROCESS FROM NODE 3005.00 TO NODE 3010.00 IS CODE = 62 \*\*\*\*\*

=====  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
===== UPSTREAM ELEVATION(FEET) = 788.30 DOWNSTREAM ELEVATION(FEET) = 785.74  
STREET LENGTH(FEET) = 852.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 18.55  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.59



HALFSTREET FLOOD WIDTH(FEET) = 21.34  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.95  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.14  
 STREET FLOW TRAVEL TIME(MIN.) = 7.27 Tc(MIN.) = 21.80  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.468  
 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" A 7.73 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 7.73 SUBAREA RUNOFF(CFS) = 6.82  
 EFFECTIVE AREA(ACRES) = 17.18 AREA-AVERAGED Fm(INCH/HR) = 0.27  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 18.48

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 21.34  
 FLOW VELOCITY(FEET/SEC.) = 1.95 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.14  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3010.00 = 1852.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3010.00 TO NODE 3015.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 =====  
 UPSTREAM ELEVATION(FEET) = 785.74 DOWNSTREAM ELEVATION(FEET) = 782.90  
 STREET LENGTH(FEET) = 870.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 25.04  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.63  
 HALFSTREET FLOOD WIDTH(FEET) = 23.59  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.18  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.37  
 STREET FLOW TRAVEL TIME(MIN.) = 6.67 Tc(MIN.) = 28.47  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.251  
 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" A 18.95 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500

SUBAREA AREA(ACRES) = 18.95 SUBAREA RUNOFF(CFS) = 13.03  
 EFFECTIVE AREA(ACRES) = 36.13 AREA-AVERAGED Fm(INCH/HR) = 0.39  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA(ACRES) = 36.1 PEAK FLOW RATE(CFS) = 28.15

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.65 HALFSTREET FLOOD WIDTH(FEET) = 24.72  
 FLOW VELOCITY(FEET/SEC.) = 2.23 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.46  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3015.00 = 2722.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3015.00 TO NODE 3020.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====  
 ELEVATION DATA: UPSTREAM(FEET) = 755.50 DOWNSTREAM(FEET) = 753.63  
 FLOW LENGTH(FEET) = 660.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.33  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 28.15  
 PIPE TRAVEL TIME(MIN.) = 2.06 Tc(MIN.) = 30.53  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3020.00 = 3382.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3020.00 TO NODE 3020.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====  
 MAINLINE Tc(MIN.) = 30.53  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.200  
 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" A 18.69 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 18.69 SUBAREA RUNOFF(CFS) = 11.98  
 EFFECTIVE AREA(ACRES) = 54.82 AREA-AVERAGED Fm(INCH/HR) = 0.42  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 54.8 PEAK FLOW RATE(CFS) = 38.46

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3020.00 TO NODE 3025.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====  
 ELEVATION DATA: UPSTREAM(FEET) = 753.63 DOWNSTREAM(FEET) = 742.00  
 FLOW LENGTH(FEET) = 620.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.52  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 38.46

PIPE TRAVEL TIME(MIN.) = 0.90 Tc(MIN.) = 31.43  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3025.00 = 4002.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3025.00 TO NODE 3025.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 31.43  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.179  
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" A 16.64 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 16.64 SUBAREA RUNOFF(CFS) = 10.36  
EFFECTIVE AREA(ACRES) = 71.46 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 71.5 PEAK FLOW RATE(CFS) = 47.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3025.00 TO NODE 3027.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 742.00 DOWNSTREAM(FEET) = 741.00  
FLOW LENGTH(FEET) = 70.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.21  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 47.80  
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 31.53  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3027.00 = 4072.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3027.00 TO NODE 3027.00 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.) = 31.53  
RAINFALL INTENSITY(INCH/HR) = 1.18  
AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.45  
EFFECTIVE STREAM AREA(ACRES) = 71.46  
TOTAL STREAM AREA(ACRES) = 71.46  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 47.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3021.00 TO NODE 3022.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 779.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 21.297  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.489  
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 A 5.83 0.98 0.850 32 21.30  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA RUNOFF(CFS) = 3.47  
TOTAL AREA(ACRES) = 5.83 PEAK FLOW RATE(CFS) = 3.47

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3022.00 TO NODE 3023.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 779.00 DOWNSTREAM(FEET) = 776.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 1057.00 CHANNEL SLOPE = 0.0028  
CHANNEL FLOW THRU SUBAREA(CFS) = 3.47  
FLOW VELOCITY(FEET/SEC) = 1.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 17.05 Tc(MIN.) = 38.35  
LONGEST FLOWPATH FROM NODE 3021.00 TO NODE 3023.00 = 2057.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3023.00 TO NODE 3023.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
-----  
MAINLINE Tc(MIN.) = 38.35  
\* 10 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  
PUBLIC PARK A 7.13 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 7.13 SUBAREA RUNOFF(CFS) = 1.40  
EFFECTIVE AREA(ACRES) = 12.96 AREA-AVERAGED Fm(INCH/HR) = 0.83  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.85  
TOTAL AREA(ACRES) = 13.0 PEAK FLOW RATE(CFS) = 3.47  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3023.00 TO NODE 3024.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 776.00 DOWNSTREAM(FEET) = 762.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 609.00 CHANNEL SLOPE = 0.0230  
CHANNEL FLOW THRU SUBAREA(CFS) = 3.47  
FLOW VELOCITY(FEET/SEC) = 2.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 3.45 Tc(MIN.) = 41.80  
LONGEST FLOWPATH FROM NODE 3021.00 TO NODE 3024.00 = 2666.00 FEET.

EFFECTIVE AREA(ACRES) = 21.53 AREA-AVERAGED Fm(INCH/HR) = 0.68  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.70  
TOTAL AREA(ACRES) = 21.5 PEAK FLOW RATE(CFS) = 5.89

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3027.00 TO NODE 3027.00 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.) = 42.52  
RAINFALL INTENSITY(INCH/HR) = 0.98  
AREA-AVERAGED Fm(INCH/HR) = 0.68  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.70  
EFFECTIVE STREAM AREA(ACRES) = 21.53  
TOTAL STREAM AREA(ACRES) = 21.53  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.89

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	47.80	31.53	1.177	0.98( 0.44)	0.45	71.5	3000.00
2	5.89	42.52	0.984	0.98( 0.68)	0.70	21.5	3021.00

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	53.69	31.53	1.177	0.97( 0.48)	0.49	87.4	3000.00
2	41.23	42.52	0.984	0.98( 0.49)	0.50	93.0	3021.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 53.69 Tc(MIN.) = 31.53  
EFFECTIVE AREA(ACRES) = 87.43 AREA-AVERAGED Fm(INCH/HR) = 0.48  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 93.0  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3027.00 = 4072.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3027.00 TO NODE 3030.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 741.00 DOWNSTREAM(FEET) = 739.00  
FLOW LENGTH(FEET) = 330.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.29  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 53.69  
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 32.19

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3024.00 TO NODE 3024.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 41.80  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.994  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 4.18 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 4.18 SUBAREA RUNOFF(CFS) = 0.62  
EFFECTIVE AREA(ACRES) = 17.14 AREA-AVERAGED Fm(INCH/HR) = 0.83  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85  
TOTAL AREA(ACRES) = 17.1 PEAK FLOW RATE(CFS) = 3.47  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3024.00 TO NODE 3027.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 741.00  
FLOW LENGTH(FEET) = 314.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.00  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 5.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.30  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 3.47  
PIPE TRAVEL TIME(MIN.) = 0.72 Tc(MIN.) = 42.52  
LONGEST FLOWPATH FROM NODE 3021.00 TO NODE 3027.00 = 2980.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3027.00 TO NODE 3027.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 42.52  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.984  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 4.39 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 4.39 SUBAREA RUNOFF(CFS) = 3.50

LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3030.00 = 4402.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3030.00 TO NODE 3030.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 32.19  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.162  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 7.22 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 7.22 SUBAREA RUNOFF(CFS) = 2.17  
EFFECTIVE AREA(ACRES) = 94.65 AREA-AVERAGED Fm(INCH/HR) = 0.51  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 100.2 PEAK FLOW RATE(CFS) = 55.82

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3030.00 TO NODE 3035.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 739.00 DOWNSTREAM(FEET) = 731.70  
FLOW LENGTH(FEET) = 1344.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.93  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 55.82  
PIPE TRAVEL TIME(MIN.) = 2.83 Tc(MIN.) = 35.02  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3035.00 = 5746.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3035.00 TO NODE 3035.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 35.02  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.105  
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" A 27.80 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 27.80 SUBAREA RUNOFF(CFS) = 15.45  
EFFECTIVE AREA(ACRES) = 122.45 AREA-AVERAGED Fm(INCH/HR) = 0.50  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 128.0 PEAK FLOW RATE(CFS) = 66.40

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3035.00 TO NODE 3050.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 731.70 DOWNSTREAM(FEET) = 729.20  
FLOW LENGTH(FEET) = 425.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.62  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 66.40  
PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 35.84  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3050.00 = 6171.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3050.00 TO NODE 3050.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 35.84  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.090  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 5.00 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 5.00 SUBAREA RUNOFF(CFS) = 1.17  
EFFECTIVE AREA(ACRES) = 127.45 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 133.0 PEAK FLOW RATE(CFS) = 66.40  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3050.00 TO NODE 3050.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 35.84  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.090  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
SCHOOL A 10.00 0.98 0.600 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 4.54  
EFFECTIVE AREA(ACRES) = 137.45 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 143.0 PEAK FLOW RATE(CFS) = 70.43

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3050.00 TO NODE 3055.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 729.20 DOWNSTREAM(FEET) = 727.30  
 FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.87  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 70.43  
 PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 36.25  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3055.00 = 6411.00 FEET.

TOTAL STREAM AREA(ACRES) = 158.05  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 77.58

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3056.00 TO NODE 3057.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

\*\*\*\*\*  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 878.00  
 ELEVATION DATA: UPSTREAM(FEET) = 762.00 DOWNSTREAM(FEET) = 755.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 19.100  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.590  
 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	A	3.05	0.98	0.850	32	19.10

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA RUNOFF(CFS) = 2.09  
 TOTAL AREA(ACRES) = 3.05 PEAK FLOW RATE(CFS) = 2.09

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3057.00 TO NODE 3058.00 IS CODE = 52

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA<<<<<

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 755.00 DOWNSTREAM(FEET) = 745.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 926.00 CHANNEL SLOPE = 0.0108  
 CHANNEL FLOW THRU SUBAREA(CFS) = 2.09  
 FLOW VELOCITY(FEET/SEC) = 1.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
 TRAVEL TIME(MIN.) = 8.55 Tc(MIN.) = 27.65  
 LONGEST FLOWPATH FROM NODE 3056.00 TO NODE 3058.00 = 1804.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3058.00 TO NODE 3058.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 27.65  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.273  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	3.65	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 3.65 SUBAREA RUNOFF(CFS) = 1.46  
 EFFECTIVE AREA(ACRES) = 6.70 AREA-AVERAGED Fm(INCH/HR) = 0.83  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85  
 TOTAL AREA(ACRES) = 6.7 PEAK FLOW RATE(CFS) = 2.68

\*\*\*\*\*

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3055.00 TO NODE 3055.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 36.25  
 \* 10 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
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	15.04	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 15.04 SUBAREA RUNOFF(CFS) = 8.05  
 EFFECTIVE AREA(ACRES) = 152.49 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 158.0 PEAK FLOW RATE(CFS) = 77.58

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3055.00 TO NODE 3060.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 727.30 DOWNSTREAM(FEET) = 725.70  
 FLOW LENGTH(FEET) = 340.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.12  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 77.58  
 PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 36.94  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3060.00 = 6751.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3060.00 TO NODE 3060.00 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.) = 36.94  
 RAINFALL INTENSITY(INCH/HR) = 1.07  
 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.53  
 EFFECTIVE STREAM AREA(ACRES) = 152.49

FLOW PROCESS FROM NODE 3058.00 TO NODE 3060.00 IS CODE = 52

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 745.00 DOWNSTREAM(FEET) = 744.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 232.00 CHANNEL SLOPE = 0.0043
CHANNEL FLOW THRU SUBAREA(CFS) = 2.68
FLOW VELOCITY(FEET/SEC) = 1.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 3.21 Tc(MIN.) = 30.86
LONGEST FLOWPATH FROM NODE 3056.00 TO NODE 3060.00 = 2036.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 3060.00 TO NODE 3060.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 30.86
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.192
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 2.34 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 2.34 SUBAREA RUNOFF(CFS) = 0.77
EFFECTIVE AREA(ACRES) = 9.04 AREA-AVERAGED Fm(INCH/HR) = 0.83
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 9.0 PEAK FLOW RATE(CFS) = 2.96

\*\*\*\*\*
FLOW PROCESS FROM NODE 3060.00 TO NODE 3060.00 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.) = 30.86
RAINFALL INTENSITY(INCH/HR) = 1.19
AREA-AVERAGED Fm(INCH/HR) = 0.83
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.85
EFFECTIVE STREAM AREA(ACRES) = 9.04
TOTAL STREAM AREA(ACRES) = 9.04
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.96

\*\* 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) = 80.53 Tc(MIN.) = 30.86
EFFECTIVE AREA(ACRES) = 136.43 AREA-AVERAGED Fm(INCH/HR) = 0.54
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 167.1
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3060.00 = 6751.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 3060.00 TO NODE 3065.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 725.70 DOWNSTREAM(FEET) = 720.40
FLOW LENGTH(FEET) = 930.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.91
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 80.53
PIPE TRAVEL TIME(MIN.) = 1.74 Tc(MIN.) = 32.61
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3065.00 = 7681.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 3065.00 TO NODE 3065.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 32.61
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.153
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" A 16.79 0.98 0.500 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 12.88 0.57 0.500 69
COMMERCIAL A 1.92 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.476
SUBAREA AREA(ACRES) = 31.59 SUBAREA RUNOFF(CFS) = 21.98
EFFECTIVE AREA(ACRES) = 168.02 AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 198.7 PEAK FLOW RATE(CFS) = 97.57

\*\*\*\*\*
FLOW PROCESS FROM NODE 3065.00 TO NODE 3080.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<



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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 720.40 DOWNSTREAM(FEET) = 704.00
FLOW LENGTH(FEET) = 2750.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.51
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 97.57
PIPE TRAVEL TIME(MIN.) = 4.82 Tc(MIN.) = 37.43
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3080.00 = 10431.00 FEET.

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*****
FLOW PROCESS FROM NODE 3080.00 TO NODE 3080.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 37.43
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.062
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"  A      39.95    0.98    0.500    32
RESIDENTIAL
"11+ DWELLINGS/ACRE"  A      20.00    0.98    0.200    32
PUBLIC PARK           A      20.58    0.98    0.850    32
COMMERCIAL            A      8.40     0.98    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.476
SUBAREA AREA(ACRES) = 88.93 SUBAREA RUNOFF(CFS) = 47.87
EFFECTIVE AREA(ACRES) = 256.95 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 287.6 PEAK FLOW RATE(CFS) = 131.59

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*****
FLOW PROCESS FROM NODE 3080.00 TO NODE 3200.00 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) = 704.00 DOWNSTREAM(FEET) = 702.00
FLOW LENGTH(FEET) = 180.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.96
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 131.59
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 37.66
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3200.00 = 10611.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 3200.00 TO NODE 3200.00 IS CODE = 10
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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
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FLOW PROCESS FROM NODE 3085.00 TO NODE 3090.00 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) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 747.50 DOWNSTREAM(FEET) = 741.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.059
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.911
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS  Tc
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN  (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"  A      2.43     0.98    0.200    32  14.06
PUBLIC PARK           A      1.00     0.98    0.850    32  20.96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.390
SUBAREA RUNOFF(CFS) = 4.73
TOTAL AREA(ACRES) = 3.43 PEAK FLOW RATE(CFS) = 4.73

```

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*****
FLOW PROCESS FROM NODE 3090.00 TO NODE 3095.00 IS CODE = 62
-----

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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====

```

```

UPSTREAM ELEVATION(FEET) = 741.00 DOWNSTREAM ELEVATION(FEET) = 732.00
STREET LENGTH(FEET) = 710.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

```

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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) = 11.53
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 13.11
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.02
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.27
STREET FLOW TRAVEL TIME(MIN.) = 3.92 Tc(MIN.) = 17.98
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.649

```

```

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
PUBLIC PARK           A      0.69     0.98    0.850    32
RESIDENTIAL
"11+ DWELLINGS/ACRE"  A      10.00    0.98    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

```

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.242  
SUBAREA AREA(ACRES) = 10.69 SUBAREA RUNOFF(CFS) = 13.59  
EFFECTIVE AREA(ACRES) = 14.12 AREA-AVERAGED Fm(INCH/HR) = 0.27  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.28  
TOTAL AREA(ACRES) = 14.1 PEAK FLOW RATE(CFS) = 17.51

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 15.59  
FLOW VELOCITY(FEET/SEC.) = 3.34 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.57  
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3095.00 = 1710.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3095.00 TO NODE 3125.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 732.00 DOWNSTREAM(FEET) = 712.00  
FLOW LENGTH(FEET) = 1200.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 13.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.33  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 17.51  
PIPE TRAVEL TIME(MIN.) = 2.14 Tc(MIN.) = 20.12  
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3125.00 = 2910.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3125.00 TO NODE 3125.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 20.12  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.541  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 15.00 0.98 0.100 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 8.43 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 4.77 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.198  
SUBAREA AREA(ACRES) = 28.20 SUBAREA RUNOFF(CFS) = 34.22  
EFFECTIVE AREA(ACRES) = 42.32 AREA-AVERAGED Fm(INCH/HR) = 0.22  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.22  
TOTAL AREA(ACRES) = 42.3 PEAK FLOW RATE(CFS) = 50.37

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3125.00 TO NODE 3130.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 712.00 DOWNSTREAM(FEET) = 707.30

FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.19  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 50.37  
PIPE TRAVEL TIME(MIN.) = 1.59 Tc(MIN.) = 21.71  
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3130.00 = 3690.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3130.00 TO NODE 3130.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 21.71  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.472  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 3.39 0.98 0.100 32  
PUBLIC PARK A 2.00 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.378  
SUBAREA AREA(ACRES) = 5.39 SUBAREA RUNOFF(CFS) = 5.35  
EFFECTIVE AREA(ACRES) = 47.71 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.24  
TOTAL AREA(ACRES) = 47.7 PEAK FLOW RATE(CFS) = 53.11

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3130.00 TO NODE 3135.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 707.30 DOWNSTREAM(FEET) = 705.00  
FLOW LENGTH(FEET) = 430.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.84  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 53.11  
PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 22.62  
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3135.00 = 4120.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3135.00 TO NODE 3135.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 22.62  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.436  
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" A 12.75 0.98 0.200 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200

SUBAREA AREA(ACRES) = 12.75 SUBAREA RUNOFF(CFS) = 14.25  
EFFECTIVE AREA(ACRES) = 60.46 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.23  
TOTAL AREA(ACRES) = 60.5 PEAK FLOW RATE(CFS) = 65.81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3135.00 TO NODE 3140.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 705.00 DOWNSTREAM(FEET) = 703.50  
FLOW LENGTH(FEET) = 370.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.49  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 65.81  
PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 23.44  
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3140.00 = 4490.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3140.00 TO NODE 3140.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 23.44  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.406  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 3.07 0.98 0.100 32  
PUBLIC PARK A 2.00 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.396  
SUBAREA AREA(ACRES) = 5.07 SUBAREA RUNOFF(CFS) = 4.65  
EFFECTIVE AREA(ACRES) = 65.53 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.25  
TOTAL AREA(ACRES) = 65.5 PEAK FLOW RATE(CFS) = 68.80

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3140.00 TO NODE 3200.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 703.50 DOWNSTREAM(FEET) = 702.00  
FLOW LENGTH(FEET) = 160.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.36  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 68.80  
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 23.70  
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3200.00 = 4650.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3200.00 TO NODE 3200.00 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	68.80	23.70	1.397	0.97( 0.24)	0.25	65.5	3085.00

LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3200.00 = 4650.00 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	131.59	37.66	1.058	0.96( 0.49)	0.52	257.0	3056.00
2	120.49	43.78	0.967	0.96( 0.50)	0.52	282.0	3000.00
3	104.14	55.61	0.837	0.96( 0.50)	0.52	287.6	3021.00

LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3200.00 = 10611.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	200.39	23.70	1.397	0.96( 0.42)	0.44	227.3	3085.00
2	180.25	37.66	1.058	0.96( 0.44)	0.46	322.5	3056.00
3	163.84	43.78	0.967	0.96( 0.45)	0.47	347.6	3000.00
4	141.69	55.61	0.837	0.96( 0.45)	0.47	353.1	3021.00

TOTAL AREA(ACRES) = 353.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 200.39 Tc(MIN.) = 23.701  
EFFECTIVE AREA(ACRES) = 227.25 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 353.1  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3200.00 = 10611.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3200.00 TO NODE 3200.00 IS CODE = 12  
-----

>>>>CLEAR MEMORY BANK # 1 <<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3200.00 TO NODE 3215.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 702.00 DOWNSTREAM(FEET) = 692.30  
FLOW LENGTH(FEET) = 960.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.88  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 200.39  
PIPE TRAVEL TIME(MIN.) = 1.15 Tc(MIN.) = 24.85  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3215.00 = 11571.00 FEET.

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FLOW PROCESS FROM NODE 3215.00 TO NODE 3215.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.85
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.358
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.97 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.97 SUBAREA RUNOFF(CFS) = 2.23
EFFECTIVE AREA(ACRES) = 229.22 AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 355.1 PEAK FLOW RATE(CFS) = 200.39
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 3215.00 TO NODE 3215.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.85
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.358
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" A 28.42 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 28.42 SUBAREA RUNOFF(CFS) = 22.25
EFFECTIVE AREA(ACRES) = 257.64 AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 383.5 PEAK FLOW RATE(CFS) = 216.28

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*****
FLOW PROCESS FROM NODE 3215.00 TO NODE 3220.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 692.30 DOWNSTREAM(FEET) = 684.00
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 43.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.19
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 216.28
PIPE TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 25.83
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3220.00 = 12401.00 FEET.

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*****
FLOW PROCESS FROM NODE 3220.00 TO NODE 3220.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 25.83
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.327
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 2.14 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 2.14 SUBAREA RUNOFF(CFS) = 2.37
EFFECTIVE AREA(ACRES) = 259.78 AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 385.7 PEAK FLOW RATE(CFS) = 216.28
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 3220.00 TO NODE 3220.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.83
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.327
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 15.18 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
SUBAREA AREA(ACRES) = 16.58 SUBAREA RUNOFF(CFS) = 12.09
EFFECTIVE AREA(ACRES) = 276.36 AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 402.2 PEAK FLOW RATE(CFS) = 223.55

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*****
FLOW PROCESS FROM NODE 3220.00 TO NODE 3225.00 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) = 684.00 DOWNSTREAM(FEET) = 675.00
FLOW LENGTH(FEET) = 790.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 45.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.79
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 223.55
PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 26.72
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3225.00 = 13191.00 FEET.

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*****
FLOW PROCESS FROM NODE 3225.00 TO NODE 3225.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 26.72

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\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.300  
 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" A 4.20 0.98 0.500 32  
 PUBLIC PARK A 25.51 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.801  
 SUBAREA AREA(ACRES) = 29.71 SUBAREA RUNOFF(CFS) = 13.89  
 EFFECTIVE AREA(ACRES) = 306.07 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 432.0 PEAK FLOW RATE(CFS) = 230.80

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3225.00 TO NODE 3230.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM( FEET) = 675.00 DOWNSTREAM( FEET) = 673.50  
 FLOW LENGTH( FEET) = 110.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.0 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC.) = 16.11  
 ESTIMATED PIPE DIAMETER( INCH) = 57.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 230.80  
 PIPE TRAVEL TIME( MIN.) = 0.11 Tc( MIN.) = 26.83  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3230.00 = 13301.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3230.00 TO NODE 3230.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc( MIN.) = 26.83  
 \* 10 YEAR RAINFALL INTENSITY( INCH/HR) = 1.297  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 5.34 0.98 0.100 32  
 PUBLIC PARK A 1.71 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.282  
 SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 6.48  
 EFFECTIVE AREA(ACRES) = 313.12 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 439.0 PEAK FLOW RATE(CFS) = 236.37

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3230.00 TO NODE 3235.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM( FEET) = 673.50 DOWNSTREAM( FEET) = 668.00  
 FLOW LENGTH( FEET) = 680.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 63.0 INCH PIPE IS 48.3 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC.) = 13.28  
 ESTIMATED PIPE DIAMETER( INCH) = 63.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 236.37  
 PIPE TRAVEL TIME( MIN.) = 0.85 Tc( MIN.) = 27.69  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3235.00 = 13981.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3235.00 TO NODE 3235.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====

MAINLINE Tc( MIN.) = 27.69  
 \* 10 YEAR RAINFALL INTENSITY( INCH/HR) = 1.272  
 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" A 11.95 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 11.95 SUBAREA RUNOFF(CFS) = 8.44  
 EFFECTIVE AREA(ACRES) = 325.07 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 451.0 PEAK FLOW RATE(CFS) = 238.01

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3235.00 TO NODE 3240.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====

ELEVATION DATA: UPSTREAM( FEET) = 668.00 DOWNSTREAM( FEET) = 666.50  
 FLOW LENGTH( FEET) = 150.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.3 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC.) = 14.33  
 ESTIMATED PIPE DIAMETER( INCH) = 60.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 238.01  
 PIPE TRAVEL TIME( MIN.) = 0.17 Tc( MIN.) = 27.86  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3240.00 = 14131.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3240.00 TO NODE 3240.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====

MAINLINE Tc( MIN.) = 27.86  
 \* 10 YEAR RAINFALL INTENSITY( INCH/HR) = 1.268  
 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" A 6.30 0.98 0.500 32  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 1.07 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.92

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 7.37 SUBAREA RUNOFF(CFS) = 5.37  
EFFECTIVE AREA(ACRES) = 332.44 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 458.3 PEAK FLOW RATE(CFS) = 241.98

SUBAREA AREA(ACRES) = 2.42 SUBAREA RUNOFF(CFS) = 1.82  
EFFECTIVE AREA(ACRES) = 336.18 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 462.1 PEAK FLOW RATE(CFS) = 243.10

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3240.00 TO NODE 3245.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	666.50	DOWNSTREAM(FEET) =	664.00
FLOW LENGTH(FEET) =	230.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	60.0 INCH PIPE IS	46.2 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	14.92		
ESTIMATED PIPE DIAMETER(INCH) =	60.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	241.98		
PIPE TRAVEL TIME(MIN.) =	0.26	Tc(MIN.) =	28.12
LONGEST FLOWPATH FROM NODE	3000.00 TO NODE	3245.00 =	14361.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3245.00 TO NODE 3245.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) =	28.12
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =	1.261
SUBAREA LOSS RATE DATA(AMC II):	
DEVELOPMENT TYPE/	SCS SOIL AREA Fp Ap SCS
LAND USE	GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL	A 1.32 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97	
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100	
SUBAREA AREA(ACRES) =	1.32 SUBAREA RUNOFF(CFS) = 1.38
EFFECTIVE AREA(ACRES) =	333.76 AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) =	0.96 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) =	459.6 PEAK FLOW RATE(CFS) = 241.98
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE	

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3245.00 TO NODE 3245.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) =	28.12
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =	1.261
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"	A 1.70 0.98 0.500 32
RESIDENTIAL	
"5-7 DWELLINGS/ACRE"	C 0.72 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85	
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500	

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3245.00 TO NODE 3250.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	664.00	DOWNSTREAM(FEET) =	661.50
FLOW LENGTH(FEET) =	340.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	66.0 INCH PIPE IS	48.5 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	12.99		
ESTIMATED PIPE DIAMETER(INCH) =	66.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	243.10		
PIPE TRAVEL TIME(MIN.) =	0.44	Tc(MIN.) =	28.55
LONGEST FLOWPATH FROM NODE	3000.00 TO NODE	3250.00 =	14701.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3250.00 TO NODE 3250.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) =	28.55
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =	1.249
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"	A 1.10 0.98 0.500 32
RESIDENTIAL	
"5-7 DWELLINGS/ACRE"	C 2.01 0.57 0.500 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.71	
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500	
SUBAREA AREA(ACRES) =	3.11 SUBAREA RUNOFF(CFS) = 2.50
EFFECTIVE AREA(ACRES) =	339.29 AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) =	0.96 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) =	465.2 PEAK FLOW RATE(CFS) = 243.10
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE	

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3250.00 TO NODE 3250.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) =	28.55
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =	1.249
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"	A 6.85 0.98 0.500 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98	
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500	



SUBAREA AREA(ACRES) = 6.85 SUBAREA RUNOFF(CFS) = 4.70  
EFFECTIVE AREA(ACRES) = 346.14 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 472.0 PEAK FLOW RATE(CFS) = 246.79

TOTAL AREA(ACRES) = 4.64 PEAK FLOW RATE(CFS) = 6.01

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3305.00 TO NODE 3310.00 IS CODE = 62  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3250.00 TO NODE 3255.00 IS CODE = 31  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 661.50 DOWNSTREAM(FEET) = 660.50  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 49.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.34  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 246.79  
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 28.67  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3255.00 = 14801.00 FEET.

UPSTREAM ELEVATION(FEET) = 682.00 DOWNSTREAM ELEVATION(FEET) = 674.00  
STREET LENGTH(FEET) = 490.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00  
  
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020  
  
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3255.00 TO NODE 3255.00 IS CODE = 1  
-----

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.87  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.39  
HALFSTREET FLOOD WIDTH(FEET) = 11.61  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.21  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.25  
STREET FLOW TRAVEL TIME(MIN.) = 2.54 Tc(MIN.) = 16.41  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.742  
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" A 6.82 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 6.82 SUBAREA RUNOFF(CFS) = 7.70  
EFFECTIVE AREA(ACRES) = 11.46 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 11.5 PEAK FLOW RATE(CFS) = 12.94

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 28.67  
RAINFALL INTENSITY(INCH/HR) = 1.25  
AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.48  
EFFECTIVE STREAM AREA(ACRES) = 346.14  
TOTAL STREAM AREA(ACRES) = 472.03  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 246.79

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 13.02  
FLOW VELOCITY(FEET/SEC.) = 3.43 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.44  
LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3310.00 = 1420.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3300.00 TO NODE 3305.00 IS CODE = 21  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3310.00 TO NODE 3315.00 IS CODE = 31  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 930.00  
ELEVATION DATA: UPSTREAM(FEET) = 696.00 DOWNSTREAM(FEET) = 682.00  
  
Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.862  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.927  
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  
"5-7 DWELLINGS/ACRE" A 4.64 0.98 0.500 32 13.86  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 6.01

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 674.00 DOWNSTREAM(FEET) = 670.00  
FLOW LENGTH(FEET) = 730.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.64

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 12.94  
 PIPE TRAVEL TIME(MIN.) = 2.16 Tc(MIN.) = 18.57  
 LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3315.00 = 2150.00 FEET.

TOTAL AREA(ACRES) = 36.8 PEAK FLOW RATE(CFS) = 34.55

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3320.00 TO NODE 3255.00 IS CODE = 31  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3315.00 TO NODE 3315.00 IS CODE = 81  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<  
 =====

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 666.00 DOWNSTREAM(FEET) = 660.50

MAINLINE Tc(MIN.) = 18.57  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.617  
 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" A 10.71 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 10.71 SUBAREA RUNOFF(CFS) = 10.89  
 EFFECTIVE AREA(ACRES) = 22.17 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 22.2 PEAK FLOW RATE(CFS) = 22.54

FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.13  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 34.55  
 PIPE TRAVEL TIME(MIN.) = 1.39 Tc(MIN.) = 21.73  
 LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3255.00 = 3530.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3255.00 TO NODE 3255.00 IS CODE = 1  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3315.00 TO NODE 3320.00 IS CODE = 31  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<  
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<<  
 =====

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<  
 =====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 21.73  
 RAINFALL INTENSITY(INCH/HR) = 1.47  
 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA(ACRES) = 36.78  
 TOTAL STREAM AREA(ACRES) = 36.78  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 34.55

ELEVATION DATA: UPSTREAM(FEET) = 670.00 DOWNSTREAM(FEET) = 666.00  
 FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.60  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 22.54  
 PIPE TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 20.33  
 LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3320.00 = 2850.00 FEET.

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	246.79	28.67	1.246	0.96( 0.46)	0.48	346.1	3085.00
1	205.20	42.81	0.980	0.96( 0.46)	0.48	441.4	3056.00
1	194.79	49.03	0.903	0.96( 0.47)	0.49	466.5	3000.00
1	171.96	61.04	0.792	0.96( 0.47)	0.49	472.0	3021.00
2	34.55	21.73	1.472	0.98( 0.49)	0.50	36.8	3300.00

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3320.00 TO NODE 3320.00 IS CODE = 81  
 -----

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO  
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
 =====

\*\* PEAK FLOW RATE TABLE \*\*

MAINLINE Tc(MIN.) = 20.33  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.531  
 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" A 14.61 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 14.61 SUBAREA RUNOFF(CFS) = 13.73  
 EFFECTIVE AREA(ACRES) = 36.78 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	275.03	21.73	1.472	0.96( 0.46)	0.48	299.1	3300.00
2	273.42	28.67	1.246	0.96( 0.46)	0.48	382.9	3085.00
3	222.48	42.81	0.980	0.96( 0.47)	0.49	478.2	3056.00
4	210.65	49.03	0.903	0.96( 0.47)	0.49	503.2	3000.00
5	185.86	61.04	0.792	0.96( 0.47)	0.49	508.8	3021.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 275.03 Tc(MIN.) = 21.73  
EFFECTIVE AREA(ACRES) = 299.09 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 508.8  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3255.00 = 14801.00 FEET.

AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 527.9 PEAK FLOW RATE(CFS) = 282.07

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3400.00 TO NODE 3405.00 IS CODE = 31

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3255.00 TO NODE 3255.00 IS CODE = 81

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 655.00 DOWNSTREAM(FEET) = 653.00  
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 69.0 INCH PIPE IS 52.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.26  
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 282.07  
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 22.73  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3405.00 = 15651.00 FEET.

-----  
MAINLINE Tc(MIN.) = 21.73  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.472  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.36 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 1.36 SUBAREA RUNOFF(CFS) = 1.68  
EFFECTIVE AREA(ACRES) = 300.45 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 510.2 PEAK FLOW RATE(CFS) = 275.03  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3405.00 TO NODE 3405.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3255.00 TO NODE 3400.00 IS CODE = 31

-----  
MAINLINE Tc(MIN.) = 22.73  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.432  
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" A 10.67 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 10.67 SUBAREA RUNOFF(CFS) = 9.07  
EFFECTIVE AREA(ACRES) = 328.82 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 538.5 PEAK FLOW RATE(CFS) = 287.29

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 660.50 DOWNSTREAM(FEET) = 655.00  
FLOW LENGTH(FEET) = 570.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 63.0 INCH PIPE IS 51.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.56  
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 275.03  
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 22.38  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3400.00 = 15371.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3405.00 TO NODE 3410.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3400.00 TO NODE 3400.00 IS CODE = 81

-----  
ELEVATION DATA: UPSTREAM(FEET) = 653.00 DOWNSTREAM(FEET) = 650.00  
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 63.0 INCH PIPE IS 50.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.34  
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 287.29  
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 23.04  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3410.00 = 15931.00 FEET.

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 22.38  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.446  
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" A 17.70 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 17.70 SUBAREA RUNOFF(CFS) = 15.26  
EFFECTIVE AREA(ACRES) = 318.15 AREA-AVERAGED Fm(INCH/HR) = 0.46

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3410.00 TO NODE 3410.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

```

=====
MAINLINE Tc(MIN.) = 23.04
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.421
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"  A        7.25    0.98    0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 7.25      SUBAREA RUNOFF(CFS) = 6.09
EFFECTIVE AREA(ACRES) = 336.07  AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 545.8      PEAK FLOW RATE(CFS) = 290.01

*****
FLOW PROCESS FROM NODE 3410.00 TO NODE 3410.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.04
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.421
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL
A        1.37    0.98    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.37      SUBAREA RUNOFF(CFS) = 1.63
EFFECTIVE AREA(ACRES) = 337.44  AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 547.2      PEAK FLOW RATE(CFS) = 291.64

*****
FLOW PROCESS FROM NODE 3410.00 TO NODE 3410.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 23.04
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.421
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
SCHOOL
C        4.03    0.57    0.600    69
SCHOOL
A        5.84    0.98    0.600    32
PUBLIC PARK
A        5.67    0.98    0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.88
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.691
SUBAREA AREA(ACRES) = 15.54     SUBAREA RUNOFF(CFS) = 11.34
EFFECTIVE AREA(ACRES) = 352.98  AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 562.7      PEAK FLOW RATE(CFS) = 302.98

*****
FLOW PROCESS FROM NODE 3410.00 TO NODE 3415.00 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) = 650.00  DOWNSTREAM(FEET) = 648.80
FLOW LENGTH(FEET) = 120.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 51.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.26
ESTIMATED PIPE DIAMETER(INCH) = 66.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 302.98
PIPE TRAVEL TIME(MIN.) = 0.13  Tc(MIN.) = 23.17
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3415.00 = 16051.00 FEET.

*****
FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 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.) = 23.17
RAINFALL INTENSITY(INCH/HR) = 1.42
AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.96
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA(ACRES) = 352.98
TOTAL STREAM AREA(ACRES) = 562.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 302.98

*****
FLOW PROCESS FROM NODE 3500.00 TO NODE 3505.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 950.00
ELEVATION DATA: UPSTREAM(FEET) = 685.00  DOWNSTREAM(FEET) = 675.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 18.646
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.613
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
A        5.42    0.98    0.850    32  18.65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA RUNOFF(CFS) = 3.83
TOTAL AREA(ACRES) = 5.42  PEAK FLOW RATE(CFS) = 3.83

*****
FLOW PROCESS FROM NODE 3505.00 TO NODE 3510.00 IS CODE = 52
-----
>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 675.00  DOWNSTREAM(FEET) = 673.00

```

CHANNEL LENGTH THRU SUBAREA(FEET) = 600.00 CHANNEL SLOPE = 0.0033  
CHANNEL FLOW THRU SUBAREA(CFS) = 3.83  
FLOW VELOCITY(FEET/SEC) = 1.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 8.73 Tc(MIN.) = 27.38  
LONGEST FLOWPATH FROM NODE 3500.00 TO NODE 3510.00 = 1550.00 FEET.

EFFECTIVE AREA(ACRES) = 10.25 AREA-AVERAGED Fm(INCH/HR) = 0.76  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.78  
TOTAL AREA(ACRES) = 10.2 PEAK FLOW RATE(CFS) = 4.76

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3515.00 TO NODE 3415.00 IS CODE = 31

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3510.00 TO NODE 3510.00 IS CODE = 81

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 27.38  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.281  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 3.15 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 3.15 SUBAREA RUNOFF(CFS) = 1.28  
EFFECTIVE AREA(ACRES) = 8.57 AREA-AVERAGED Fm(INCH/HR) = 0.83  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.85  
TOTAL AREA(ACRES) = 8.6 PEAK FLOW RATE(CFS) = 3.83  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

-----  
ELEVATION DATA: UPSTREAM(FEET) = 665.00 DOWNSTREAM(FEET) = 648.80  
FLOW LENGTH(FEET) = 1010.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 6.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.50  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 4.76  
PIPE TRAVEL TIME(MIN.) = 2.59 Tc(MIN.) = 30.12  
LONGEST FLOWPATH FROM NODE 3500.00 TO NODE 3415.00 = 2660.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3510.00 TO NODE 3515.00 IS CODE = 31

-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 665.00  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 4.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.79  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 3.83  
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 27.54  
LONGEST FLOWPATH FROM NODE 3500.00 TO NODE 3515.00 = 1650.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 IS CODE = 1

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3515.00 TO NODE 3515.00 IS CODE = 81

-----  
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 27.54  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.277  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 0.95 0.98 0.100 32  
PUBLIC PARK A 0.73 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426  
SUBAREA AREA(ACRES) = 1.68 SUBAREA RUNOFF(CFS) = 1.30

-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
TIME OF CONCENTRATION(MIN.) = 30.12  
RAINFALL INTENSITY(INCH/HR) = 1.21  
AREA-AVERAGED Fm(INCH/HR) = 0.66  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.67  
EFFECTIVE STREAM AREA(ACRES) = 14.49  
TOTAL STREAM AREA(ACRES) = 14.49  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.22

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	302.98	23.17	1.416	0.96 ( 0.47)	0.49	353.0	3300.00
1	294.03	30.11	1.210	0.96 ( 0.47)	0.49	436.8	3085.00
1	235.17	44.32	0.959	0.96 ( 0.47)	0.49	532.0	3056.00
1	225.98	50.57	0.886	0.96 ( 0.47)	0.49	557.1	3000.00
1	199.93	62.60	0.780	0.96 ( 0.47)	0.49	562.7	3021.00
2	7.22	30.12	1.210	0.97 ( 0.66)	0.67	14.5	3500.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO  
CONFLUENCE FORMULA USED FOR 2 STREAMS.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	310.20	23.17	1.416	0.96 ( 0.47)	0.49	364.1	3300.00
2	301.24	30.11	1.210	0.96 ( 0.47)	0.49	451.3	3085.00
3	301.19	30.12	1.210	0.96 ( 0.47)	0.49	451.4	3500.00
4	239.26	44.32	0.959	0.96 ( 0.48)	0.50	546.5	3056.00
5	229.76	50.57	0.886	0.96 ( 0.48)	0.50	571.6	3000.00
6	203.26	62.60	0.780	0.96 ( 0.48)	0.50	577.2	3021.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 310.20 Tc(MIN.) = 23.17  
EFFECTIVE AREA(ACRES) = 364.12 AREA-AVERAGED Fm(INCH/HR) = 0.47  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 577.2  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3415.00 = 16051.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 23.17

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.416

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.10	0.98	0.100	32
PUBLIC PARK	A	0.75	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.404

SUBAREA AREA(ACRES) = 1.85 SUBAREA RUNOFF(CFS) = 1.70

EFFECTIVE AREA(ACRES) = 365.97 AREA-AVERAGED Fm(INCH/HR) = 0.47

AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49

TOTAL AREA(ACRES) = 579.0 PEAK FLOW RATE(CFS) = 310.77

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3415.00 TO NODE 3530.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 648.80 DOWNSTREAM(FEET) = 648.40

FLOW LENGTH(FEET) = 440.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 108.0 INCH PIPE IS 77.9 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 6.32

ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 310.77

PIPE TRAVEL TIME(MIN.) = 1.16 Tc(MIN.) = 24.33

LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3530.00 = 16491.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 3530.00 TO NODE 3530.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 24.33

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.375

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL	A	3.42	0.98	0.500	32

"5-7 DWELLINGS/ACRE"

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500

SUBAREA AREA(ACRES) = 3.42 SUBAREA RUNOFF(CFS) = 2.73

EFFECTIVE AREA(ACRES) = 369.39 AREA-AVERAGED Fm(INCH/HR) = 0.47

AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49

TOTAL AREA(ACRES) = 582.5 PEAK FLOW RATE(CFS) = 310.77

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 3530.00 TO NODE 3540.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 648.40 DOWNSTREAM(FEET) = 648.00

FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 102.0 INCH PIPE IS 80.7 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 6.46

ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 310.77

PIPE TRAVEL TIME(MIN.) = 1.03 Tc(MIN.) = 25.36

LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3540.00 = 16891.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 3540.00 TO NODE 3540.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 25.36

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.341

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL	A	11.00	0.98	0.500	32

"5-7 DWELLINGS/ACRE"

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98



SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p = 0.500$   
 SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 8.45  
 EFFECTIVE AREA(ACRES) = 380.39 AREA-AVERAGED  $F_m$ (INCH/HR) = 0.47  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.96 AREA-AVERAGED  $A_p = 0.49$   
 TOTAL AREA(ACRES) = 593.5 PEAK FLOW RATE(CFS) = 310.77  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====  
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 593.5 TC(MIN.) = 25.36  
 EFFECTIVE AREA(ACRES) = 380.39 AREA-AVERAGED  $F_m$ (INCH/HR)= 0.47  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.96 AREA-AVERAGED  $A_p = 0.493$   
 PEAK FLOW RATE(CFS) = 310.77

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	$F_p(F_m)$ (INCH/HR)	$A_p$	Ae (ACRES)	HEADWATER NODE
1	310.77	25.36	1.341	0.96 ( 0.47)	0.49	380.4	3300.00
2	301.35	32.34	1.159	0.96 ( 0.47)	0.49	467.6	3085.00
3	301.29	32.35	1.159	0.96 ( 0.47)	0.49	467.7	3500.00
4	239.26	46.69	0.930	0.96 ( 0.48)	0.50	562.8	3056.00
5	230.26	52.95	0.862	0.96 ( 0.48)	0.50	587.9	3000.00
6	204.07	65.05	0.762	0.96 ( 0.48)	0.50	593.5	3021.00

=====  
 END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*

\* TURNER AVE. \*  
\* 100-YR STUDY \*  
\* AREA 'L' \*  
\*\*\*\*\*

FILE NAME: TURN.DAT  
TIME/DATE OF STUDY: 08:32 08/03/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====

---\*TIME-OF-CONCENTRATION MODEL\*---

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
  
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	16.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH

FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.44
30-MINUTES	0.91
1-HOUR	1.20
3-HOUR	2.10
6-HOUR	3.00
24-HOUR	6.00

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* FLOW PROCESS FROM NODE 3000.00 TO NODE 3005.00 IS CODE = 21 \*\*\*\*\*

=====  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 792.30 DOWNSTREAM(FEET) = 788.30

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.537  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.809  
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	A	9.45	0.98	0.100	32	14.54

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 23.06  
TOTAL AREA(ACRES) = 9.45 PEAK FLOW RATE(CFS) = 23.06

\*\*\*\*\* FLOW PROCESS FROM NODE 3005.00 TO NODE 3010.00 IS CODE = 62 \*\*\*\*\*

=====  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
=====

UPSTREAM ELEVATION(FEET) = 788.30 DOWNSTREAM ELEVATION(FEET) = 785.74  
STREET LENGTH(FEET) = 852.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 29.24  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.67

HALFSTREET FLOOD WIDTH(FEET) = 25.52  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.19  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.46  
 STREET FLOW TRAVEL TIME(MIN.) = 6.49 Tc(MIN.) = 21.02  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.251  
 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" A 7.73 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 7.73 SUBAREA RUNOFF(CFS) = 12.27  
 EFFECTIVE AREA(ACRES) = 17.18 AREA-AVERAGED Fm(INCH/HR) = 0.27  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 30.59

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.68 HALFSTREET FLOOD WIDTH(FEET) = 26.52  
 FLOW VELOCITY(FEET/SEC.) = 2.21 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.49  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3010.00 = 1852.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3010.00 TO NODE 3015.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====  
 UPSTREAM ELEVATION(FEET) = 785.74 DOWNSTREAM ELEVATION(FEET) = 782.90  
 STREET LENGTH(FEET) = 870.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.02  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.74  
 HALFSTREET FLOOD WIDTH(FEET) = 32.77  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.45  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.81  
 STREET FLOW TRAVEL TIME(MIN.) = 5.92 Tc(MIN.) = 26.95  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.940  
 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" A 18.95 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500

SUBAREA AREA(ACRES) = 18.95 SUBAREA RUNOFF(CFS) = 24.77  
 EFFECTIVE AREA(ACRES) = 36.13 AREA-AVERAGED Fm(INCH/HR) = 0.39  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA(ACRES) = 36.1 PEAK FLOW RATE(CFS) = 50.54

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.77 HALFSTREET FLOOD WIDTH(FEET) = 35.28  
 FLOW VELOCITY(FEET/SEC.) = 2.56 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.97  
 \*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
 AND L = 870.0 FT WITH ELEVATION-DROP = 2.8 FT, IS 33.4 CFS,  
 WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 3015.00  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3015.00 = 2722.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3015.00 TO NODE 3020.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====  
 ELEVATION DATA: UPSTREAM(FEET) = 755.50 DOWNSTREAM(FEET) = 753.63  
 FLOW LENGTH(FEET) = 660.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 34.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.02  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 50.54  
 PIPE TRAVEL TIME(MIN.) = 1.83 Tc(MIN.) = 28.77  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3020.00 = 3382.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3020.00 TO NODE 3020.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 28.77  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.865  
 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" A 18.69 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 18.69 SUBAREA RUNOFF(CFS) = 23.17  
 EFFECTIVE AREA(ACRES) = 54.82 AREA-AVERAGED Fm(INCH/HR) = 0.42  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 54.8 PEAK FLOW RATE(CFS) = 71.28

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3020.00 TO NODE 3025.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====  
 ELEVATION DATA: UPSTREAM(FEET) = 753.63 DOWNSTREAM(FEET) = 742.00  
 FLOW LENGTH(FEET) = 620.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.9 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 13.69  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 71.28  
 PIPE TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 29.53  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3025.00 = 4002.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3025.00 TO NODE 3025.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----

MAINLINE Tc(MIN.) = 29.53  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.836  
 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"	A	16.64	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 16.64 SUBAREA RUNOFF(CFS) = 20.20  
 EFFECTIVE AREA(ACRES) = 71.46 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 71.5 PEAK FLOW RATE(CFS) = 90.06

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3025.00 TO NODE 3027.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----

ELEVATION DATA: UPSTREAM(FEET) = 742.00 DOWNSTREAM(FEET) = 741.00  
 FLOW LENGTH(FEET) = 70.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.85  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 90.06  
 PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 29.62  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3027.00 = 4072.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3027.00 TO NODE 3027.00 IS CODE = 1  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 -----

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 29.62  
 RAINFALL INTENSITY(INCH/HR) = 1.83  
 AREA-AVERAGED Fm(INCH/HR) = 0.44  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.45  
 EFFECTIVE STREAM AREA(ACRES) = 71.46  
 TOTAL STREAM AREA(ACRES) = 71.46  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 90.06

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3021.00 TO NODE 3022.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 -----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
 ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 779.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 21.297  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.234  
 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	A	5.83	0.98	0.850	32	21.30

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA RUNOFF(CFS) = 7.37  
 TOTAL AREA(ACRES) = 5.83 PEAK FLOW RATE(CFS) = 7.37

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3022.00 TO NODE 3023.00 IS CODE = 52  
 -----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA<<<<<  
 -----

ELEVATION DATA: UPSTREAM(FEET) = 779.00 DOWNSTREAM(FEET) = 776.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1057.00 CHANNEL SLOPE = 0.0028  
 CHANNEL FLOW THRU SUBAREA(CFS) = 7.37  
 FLOW VELOCITY(FEET/SEC) = 1.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
 TRAVEL TIME(MIN.) = 14.28 Tc(MIN.) = 35.57  
 LONGEST FLOWPATH FROM NODE 3021.00 TO NODE 3023.00 = 2057.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3023.00 TO NODE 3023.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----

MAINLINE Tc(MIN.) = 35.57  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.642  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	7.13	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 7.13 SUBAREA RUNOFF(CFS) = 5.22  
 EFFECTIVE AREA(ACRES) = 12.96 AREA-AVERAGED Fm(INCH/HR) = 0.83  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.85  
 TOTAL AREA(ACRES) = 13.0 PEAK FLOW RATE(CFS) = 9.49

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3023.00 TO NODE 3024.00 IS CODE = 52  
 -----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<

```

>>>>TRAVELTIME THRU SUBAREA<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 776.00 DOWNSTREAM(FEET) = 762.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 609.00 CHANNEL SLOPE = 0.0230
CHANNEL FLOW THRU SUBAREA(CFS) = 9.49
FLOW VELOCITY(FEET/SEC) = 3.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 2.71 Tc(MIN.) = 38.29
LONGEST FLOWPATH FROM NODE 3021.00 TO NODE 3024.00 = 2666.00 FEET.

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*****
FLOW PROCESS FROM NODE 3024.00 TO NODE 3024.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 38.29
* 100 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
PUBLIC PARK A 4.18 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 4.18 SUBAREA RUNOFF(CFS) = 2.79
EFFECTIVE AREA(ACRES) = 17.14 AREA-AVERAGED Fm(INCH/HR) = 0.83
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 17.1 PEAK FLOW RATE(CFS) = 11.45

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*****
FLOW PROCESS FROM NODE 3024.00 TO NODE 3027.00 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) = 750.00 DOWNSTREAM(FEET) = 741.00
FLOW LENGTH(FEET) = 314.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
DEPTH OF FLOW IN 24.0 INCH PIPE IS 9.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.25
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.45
PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 38.80
LONGEST FLOWPATH FROM NODE 3021.00 TO NODE 3027.00 = 2980.00 FEET.

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*****
FLOW PROCESS FROM NODE 3027.00 TO NODE 3027.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 38.80
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.559
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 4.39 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

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SUBAREA AREA(ACRES) = 4.39 SUBAREA RUNOFF(CFS) = 5.77
EFFECTIVE AREA(ACRES) = 21.53 AREA-AVERAGED Fm(INCH/HR) = 0.68
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.70
TOTAL AREA(ACRES) = 21.5 PEAK FLOW RATE(CFS) = 17.03

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*****
FLOW PROCESS FROM NODE 3027.00 TO NODE 3027.00 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.) = 38.80
RAINFALL INTENSITY(INCH/HR) = 1.56
AREA-AVERAGED Fm(INCH/HR) = 0.68
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.70
EFFECTIVE STREAM AREA(ACRES) = 21.53
TOTAL STREAM AREA(ACRES) = 21.53
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.03

```

```

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 90.06 29.62 1.833 0.98( 0.44) 0.45 71.5 3000.00
2 17.03 38.80 1.559 0.98( 0.68) 0.70 21.5 3021.00

```

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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
1 107.09 29.62 1.833 0.98( 0.48) 0.49 87.9 3000.00
2 89.42 38.80 1.559 0.98( 0.49) 0.50 93.0 3021.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 107.09 Tc(MIN.) = 29.62
EFFECTIVE AREA(ACRES) = 87.90 AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 93.0
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3027.00 = 4072.00 FEET.

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*****
FLOW PROCESS FROM NODE 3027.00 TO NODE 3030.00 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) = 741.00 DOWNSTREAM(FEET) = 739.00
FLOW LENGTH(FEET) = 330.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.88
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 107.09

```



PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 30.18  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3030.00 = 4402.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3030.00 TO NODE 3030.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 30.18  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.812  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 7.22 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 7.22 SUBAREA RUNOFF(CFS) = 6.39  
EFFECTIVE AREA(ACRES) = 95.12 AREA-AVERAGED Fm(INCH/HR) = 0.51  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 100.2 PEAK FLOW RATE(CFS) = 111.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3030.00 TO NODE 3035.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 739.00 DOWNSTREAM(FEET) = 731.70  
FLOW LENGTH(FEET) = 1344.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.47  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 111.68  
PIPE TRAVEL TIME(MIN.) = 2.37 Tc(MIN.) = 32.54  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3035.00 = 5746.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3035.00 TO NODE 3035.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 32.54  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.732  
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" A 27.80 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 27.80 SUBAREA RUNOFF(CFS) = 31.14  
EFFECTIVE AREA(ACRES) = 122.92 AREA-AVERAGED Fm(INCH/HR) = 0.50  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 128.0 PEAK FLOW RATE(CFS) = 135.95

\*\*\*\*\*

FLOW PROCESS FROM NODE 3035.00 TO NODE 3050.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 731.70 DOWNSTREAM(FEET) = 729.20  
FLOW LENGTH(FEET) = 425.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 54.0 INCH PIPE IS 42.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.24  
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 135.95  
PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 33.23  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3050.00 = 6171.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3050.00 TO NODE 3050.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 33.23  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.710  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 5.00 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 5.00 SUBAREA RUNOFF(CFS) = 3.97  
EFFECTIVE AREA(ACRES) = 127.92 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 133.0 PEAK FLOW RATE(CFS) = 137.52

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3050.00 TO NODE 3050.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 33.23  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.710  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
SCHOOL A 10.00 0.98 0.600 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 10.13  
EFFECTIVE AREA(ACRES) = 137.92 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 143.0 PEAK FLOW RATE(CFS) = 147.65

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3050.00 TO NODE 3055.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 729.20 DOWNSTREAM(FEET) = 727.30  
FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 54.0 INCH PIPE IS 39.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.79  
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 147.65  
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 33.57  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3055.00 = 6411.00 FEET.

TOTAL STREAM AREA(ACRES) = 158.05  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 162.77

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3056.00 TO NODE 3057.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

\*\*\*\*\*  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 878.00  
ELEVATION DATA: UPSTREAM(FEET) = 762.00 DOWNSTREAM(FEET) = 755.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 19.100  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.385  
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 A 3.05 0.98 0.850 32 19.10  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA RUNOFF(CFS) = 4.27  
TOTAL AREA(ACRES) = 3.05 PEAK FLOW RATE(CFS) = 4.27

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3057.00 TO NODE 3058.00 IS CODE = 52

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<

\*\*\*\*\*  
ELEVATION DATA: UPSTREAM(FEET) = 755.00 DOWNSTREAM(FEET) = 745.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 926.00 CHANNEL SLOPE = 0.0108  
CHANNEL FLOW THRU SUBAREA(CFS) = 4.27  
FLOW VELOCITY(FEET/SEC) = 2.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 7.30 Tc(MIN.) = 26.40  
LONGEST FLOWPATH FROM NODE 3056.00 TO NODE 3058.00 = 1804.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3058.00 TO NODE 3058.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
MAINLINE Tc(MIN.) = 26.40  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.964  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 3.65 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 3.65 SUBAREA RUNOFF(CFS) = 3.73  
EFFECTIVE AREA(ACRES) = 6.70 AREA-AVERAGED Fm(INCH/HR) = 0.83  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85  
TOTAL AREA(ACRES) = 6.7 PEAK FLOW RATE(CFS) = 6.84

\*\*\*\*\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3055.00 TO NODE 3055.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
MAINLINE Tc(MIN.) = 33.57  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.700  
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" A 15.04 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 15.04 SUBAREA RUNOFF(CFS) = 16.41  
EFFECTIVE AREA(ACRES) = 152.96 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 158.0 PEAK FLOW RATE(CFS) = 162.77

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3055.00 TO NODE 3060.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

\*\*\*\*\*  
ELEVATION DATA: UPSTREAM(FEET) = 727.30 DOWNSTREAM(FEET) = 725.70  
FLOW LENGTH(FEET) = 340.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.83  
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 162.77  
PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 34.15  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3060.00 = 6751.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3060.00 TO NODE 3060.00 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.) = 34.15  
RAINFALL INTENSITY(INCH/HR) = 1.68  
AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.53  
EFFECTIVE STREAM AREA(ACRES) = 152.96

FLOW PROCESS FROM NODE 3058.00 TO NODE 3060.00 IS CODE = 52

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 745.00 DOWNSTREAM(FEET) = 744.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 232.00 CHANNEL SLOPE = 0.0043
CHANNEL FLOW THRU SUBAREA(CFS) = 6.84
FLOW VELOCITY(FEET/SEC) = 1.49 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 2.59 Tc(MIN.) = 28.99
LONGEST FLOWPATH FROM NODE 3056.00 TO NODE 3060.00 = 2036.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 3060.00 TO NODE 3060.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 28.99
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.857
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 2.34 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 2.34 SUBAREA RUNOFF(CFS) = 2.16
EFFECTIVE AREA(ACRES) = 9.04 AREA-AVERAGED Fm(INCH/HR) = 0.83
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 9.0 PEAK FLOW RATE(CFS) = 8.36

\*\*\*\*\*
FLOW PROCESS FROM NODE 3060.00 TO NODE 3060.00 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.) = 28.99
RAINFALL INTENSITY(INCH/HR) = 1.86
AREA-AVERAGED Fm(INCH/HR) = 0.83
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.85
EFFECTIVE STREAM AREA(ACRES) = 9.04
TOTAL STREAM AREA(ACRES) = 9.04
PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.36

\*\* 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) = 169.72 Tc(MIN.) = 34.15
EFFECTIVE AREA(ACRES) = 162.00 AREA-AVERAGED Fm(INCH/HR) = 0.54
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 167.1
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3060.00 = 6751.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 3060.00 TO NODE 3065.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 725.70 DOWNSTREAM(FEET) = 720.40
FLOW LENGTH(FEET) = 930.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.76
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 169.72
PIPE TRAVEL TIME(MIN.) = 1.44 Tc(MIN.) = 35.59
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3065.00 = 7681.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 3065.00 TO NODE 3065.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 35.59
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.642
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" A 16.79 0.98 0.500 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 12.88 0.57 0.500 69
COMMERCIAL A 1.92 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.476
SUBAREA AREA(ACRES) = 31.59 SUBAREA RUNOFF(CFS) = 35.86
EFFECTIVE AREA(ACRES) = 193.59 AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 198.7 PEAK FLOW RATE(CFS) = 197.19

\*\* 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 1 row of data.

2 197.19 35.59 1.642 0.95 ( 0.51) 0.54 193.6 3000.00  
3 162.86 45.06 1.425 0.95 ( 0.51) 0.54 198.7 3021.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 198.62 Tc(MIN.) = 30.43  
AREA-AVERAGED Fm(INCH/HR) = 0.51 AREA-AVERAGED Fp(INCH/HR) = 0.95  
AREA-AVERAGED Ap = 0.54 EFFECTIVE AREA(ACRES) = 170.48

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3065.00 TO NODE 3080.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 720.40 DOWNSTREAM(FEET) = 704.00  
FLOW LENGTH(FEET) = 2750.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.38  
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 198.62  
PIPE TRAVEL TIME(MIN.) = 4.03 Tc(MIN.) = 34.46  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3080.00 = 10431.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3080.00 TO NODE 3080.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 34.46  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.674  
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" A 39.95 0.98 0.500 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 20.00 0.98 0.200 32  
PUBLIC PARK A 20.58 0.98 0.850 32  
COMMERCIAL A 8.40 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.476  
SUBAREA AREA(ACRES) = 88.93 SUBAREA RUNOFF(CFS) = 96.83  
EFFECTIVE AREA(ACRES) = 259.41 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 287.6 PEAK FLOW RATE(CFS) = 275.57

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3080.00 TO NODE 3200.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 704.00 DOWNSTREAM(FEET) = 702.00  
FLOW LENGTH(FEET) = 180.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 63.0 INCH PIPE IS 48.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.56  
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 275.57  
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 34.65  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3200.00 = 10611.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3200.00 TO NODE 3200.00 IS CODE = 10  
-----

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3085.00 TO NODE 3090.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 747.50 DOWNSTREAM(FEET) = 741.00

Tc = K\*(LENGTH\*\* 3.00)/(ELEVATION CHANGE)\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.059  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.866  
SUBAREA Tc AND LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" A 2.43 0.98 0.200 32 14.06  
PUBLIC PARK A 1.00 0.98 0.850 32 20.96  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.390  
SUBAREA RUNOFF(CFS) = 7.68  
TOTAL AREA(ACRES) = 3.43 PEAK FLOW RATE(CFS) = 7.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3090.00 TO NODE 3095.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

-----  
UPSTREAM ELEVATION(FEET) = 741.00 DOWNSTREAM ELEVATION(FEET) = 732.00  
STREET LENGTH(FEET) = 710.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 18.63  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.48  
HALFSTREET FLOOD WIDTH(FEET) = 16.03

AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.38  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.62  
 STREET FLOW TRAVEL TIME(MIN.) = 3.51 Tc(MIN.) = 17.57  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.508  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 PUBLIC PARK A 0.69 0.98 0.850 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 10.00 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.242  
 SUBAREA AREA(ACRES) = 10.69 SUBAREA RUNOFF(CFS) = 21.86  
 EFFECTIVE AREA(ACRES) = 14.12 AREA-AVERAGED Fm(INCH/HR) = 0.27  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 14.1 PEAK FLOW RATE(CFS) = 28.43

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 19.03  
 FLOW VELOCITY(FEET/SEC.) = 3.73 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.01  
 LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3095.00 = 1710.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3095.00 TO NODE 3125.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 732.00 DOWNSTREAM(FEET) = 712.00  
 FLOW LENGTH(FEET) = 1200.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.47  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 28.43  
 PIPE TRAVEL TIME(MIN.) = 1.91 Tc(MIN.) = 19.48  
 LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3125.00 = 2910.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3125.00 TO NODE 3125.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 19.48  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.357  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 15.00 0.98 0.100 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 8.43 0.98 0.200 32  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 4.77 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.198  
 SUBAREA AREA(ACRES) = 28.20 SUBAREA RUNOFF(CFS) = 54.93  
 EFFECTIVE AREA(ACRES) = 42.32 AREA-AVERAGED Fm(INCH/HR) = 0.22

AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.22  
 TOTAL AREA(ACRES) = 42.3 PEAK FLOW RATE(CFS) = 81.45

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3125.00 TO NODE 3130.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 712.00 DOWNSTREAM(FEET) = 707.30  
 FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.14  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 81.45  
 PIPE TRAVEL TIME(MIN.) = 1.42 Tc(MIN.) = 20.90  
 LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3130.00 = 3690.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3130.00 TO NODE 3130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 20.90  
 \* 100 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  
 COMMERCIAL A 3.39 0.98 0.100 32  
 PUBLIC PARK A 2.00 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.378  
 SUBAREA AREA(ACRES) = 5.39 SUBAREA RUNOFF(CFS) = 9.17  
 EFFECTIVE AREA(ACRES) = 47.71 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.24  
 TOTAL AREA(ACRES) = 47.7 PEAK FLOW RATE(CFS) = 86.90

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3130.00 TO NODE 3135.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 707.30 DOWNSTREAM(FEET) = 705.00  
 FLOW LENGTH(FEET) = 430.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.94  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 86.90  
 PIPE TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 21.70  
 LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3135.00 = 4120.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3135.00 TO NODE 3135.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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=====
MAINLINE Tc(MIN.) = 21.70
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.209
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"  A      12.75    0.98     0.200   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 12.75      SUBAREA RUNOFF(CFS) = 23.11
EFFECTIVE AREA(ACRES) = 60.46    AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.23
TOTAL AREA(ACRES) = 60.5        PEAK FLOW RATE(CFS) = 107.84

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*****
FLOW PROCESS FROM NODE 3135.00 TO NODE 3140.00 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) = 705.00 DOWNSTREAM(FEET) = 703.50
FLOW LENGTH(FEET) = 370.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.46
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 107.84
PIPE TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 22.43
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3140.00 = 4490.00 FEET.

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*****
FLOW PROCESS FROM NODE 3140.00 TO NODE 3140.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 22.43
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.166
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          A      3.07    0.98     0.100   32
PUBLIC PARK         A      2.00    0.98     0.850   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.396
SUBAREA AREA(ACRES) = 5.07      SUBAREA RUNOFF(CFS) = 8.12
EFFECTIVE AREA(ACRES) = 65.53   AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 65.5        PEAK FLOW RATE(CFS) = 113.60

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*****
FLOW PROCESS FROM NODE 3140.00 TO NODE 3200.00 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) = 703.50 DOWNSTREAM(FEET) = 702.00

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FLOW LENGTH(FEET) = 160.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.81
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 113.60
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 22.65
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3200.00 = 4650.00 FEET.

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*****
FLOW PROCESS FROM NODE 3200.00 TO NODE 3200.00 IS CODE = 11
-----

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>>>>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           113.60 22.65 2.153 0.97( 0.24) 0.25 65.5 3085.00
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3200.00 = 4650.00 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           275.57 34.65 1.668 0.96( 0.49) 0.52 259.4 3056.00
2           265.44 39.81 1.535 0.96( 0.50) 0.52 282.5 3000.00
3           220.23 49.55 1.346 0.96( 0.50) 0.52 287.6 3021.00
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3200.00 = 10611.00 FEET.

```

```

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap      Ae  HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1           368.07 22.65 2.153 0.96( 0.42) 0.44 235.1 3085.00
2           360.40 34.65 1.668 0.96( 0.44) 0.46 324.9 3056.00
3           342.36 39.81 1.535 0.96( 0.45) 0.47 348.0 3000.00
4           285.94 49.55 1.346 0.96( 0.45) 0.47 353.1 3021.00
TOTAL AREA(ACRES) = 353.1

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 368.07 Tc(MIN.) = 22.655
EFFECTIVE AREA(ACRES) = 235.12 AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 353.1
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3200.00 = 10611.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 3200.00 TO NODE 3200.00 IS CODE = 12
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>>>>CLEAR MEMORY BANK # 1 <<<<

```

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*****
FLOW PROCESS FROM NODE 3200.00 TO NODE 3215.00 IS CODE = 31
-----

```

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

```



ELEVATION DATA: UPSTREAM(FEET) = 702.00 DOWNSTREAM(FEET) = 692.30  
FLOW LENGTH(FEET) = 960.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 54.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.19  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 368.07  
PIPE TRAVEL TIME(MIN.) = 0.99 Tc(MIN.) = 23.64  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3215.00 = 11571.00 FEET.

PIPE-FLOW VELOCITY(FEET/SEC.) = 16.20  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 399.32  
PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 24.50  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3220.00 = 12401.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3220.00 TO NODE 3220.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 24.50  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.054  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	2.14	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 2.14 SUBAREA RUNOFF(CFS) = 3.77  
EFFECTIVE AREA(ACRES) = 267.65 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 385.7 PEAK FLOW RATE(CFS) = 399.32  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3220.00 TO NODE 3220.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 24.50  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.054  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	1.40	0.98	0.850	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	15.18	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530  
SUBAREA AREA(ACRES) = 16.58 SUBAREA RUNOFF(CFS) = 22.95  
EFFECTIVE AREA(ACRES) = 284.23 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 402.2 PEAK FLOW RATE(CFS) = 415.48

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3220.00 TO NODE 3225.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 684.00 DOWNSTREAM(FEET) = 675.00  
FLOW LENGTH(FEET) = 790.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 57.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.28  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3215.00 TO NODE 3215.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 23.64  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.098  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.97	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 1.97 SUBAREA RUNOFF(CFS) = 3.55  
EFFECTIVE AREA(ACRES) = 237.09 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 355.1 PEAK FLOW RATE(CFS) = 368.07  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3215.00 TO NODE 3215.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 23.64  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.098  
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"	A	28.42	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 28.42 SUBAREA RUNOFF(CFS) = 41.20  
EFFECTIVE AREA(ACRES) = 265.51 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 383.5 PEAK FLOW RATE(CFS) = 399.32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3215.00 TO NODE 3220.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 692.30 DOWNSTREAM(FEET) = 684.00  
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 58.6 INCHES

PIPE-FLOW(CFS) = 415.48  
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 25.26  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3225.00 = 13191.00 FEET.

TOTAL AREA(ACRES) = 439.0 PEAK FLOW RATE(CFS) = 448.67

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3225.00 TO NODE 3225.00 IS CODE = 81  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3230.00 TO NODE 3235.00 IS CODE = 31  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
MAINLINE Tc(MIN.) = 25.26  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.017  
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" A 4.20 0.98 0.500 32  
PUBLIC PARK A 25.51 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.801  
SUBAREA AREA(ACRES) = 29.71 SUBAREA RUNOFF(CFS) = 33.05  
EFFECTIVE AREA(ACRES) = 313.94 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 432.0 PEAK FLOW RATE(CFS) = 438.96

=====

ELEVATION DATA: UPSTREAM(FEET) = 673.50 DOWNSTREAM(FEET) = 668.00  
FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 60.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.66  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 448.67  
PIPE TRAVEL TIME(MIN.) = 0.72 Tc(MIN.) = 26.08  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3235.00 = 13981.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3225.00 TO NODE 3230.00 IS CODE = 31  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3235.00 TO NODE 3235.00 IS CODE = 81  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 675.00 DOWNSTREAM(FEET) = 673.50  
FLOW LENGTH(FEET) = 110.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 55.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.86  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 438.96  
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 25.36  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3230.00 = 13301.00 FEET.

=====

MAINLINE Tc(MIN.) = 26.08  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.978  
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" A 11.95 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 11.95 SUBAREA RUNOFF(CFS) = 16.03  
EFFECTIVE AREA(ACRES) = 332.94 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 451.0 PEAK FLOW RATE(CFS) = 454.97

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3230.00 TO NODE 3230.00 IS CODE = 81  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3235.00 TO NODE 3240.00 IS CODE = 31  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
MAINLINE Tc(MIN.) = 25.36  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.012  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 5.34 0.98 0.100 32  
PUBLIC PARK A 1.71 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.282  
SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 11.02  
EFFECTIVE AREA(ACRES) = 320.99 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48

=====

ELEVATION DATA: UPSTREAM(FEET) = 668.00 DOWNSTREAM(FEET) = 666.50  
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.99  
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 454.97  
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 26.23  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3240.00 = 14131.00 FEET.

MAINLINE Tc(MIN.) = 26.23  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.972  
 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"	A	6.30	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	1.07	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.92  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 7.37 SUBAREA RUNOFF(CFS) = 10.04  
 EFFECTIVE AREA(ACRES) = 340.31 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 458.3 PEAK FLOW RATE(CFS) = 463.01

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.962  
 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"	A	1.70	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	0.72	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 2.42 SUBAREA RUNOFF(CFS) = 3.34  
 EFFECTIVE AREA(ACRES) = 344.05 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 462.1 PEAK FLOW RATE(CFS) = 465.54

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3240.00 TO NODE 3245.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 666.50 DOWNSTREAM(FEET) = 664.00  
 FLOW LENGTH(FEET) = 230.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 75.0 INCH PIPE IS 60.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.35  
 ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 463.01  
 PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 26.45  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3245.00 = 14361.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3245.00 TO NODE 3250.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 664.00 DOWNSTREAM(FEET) = 661.50  
 FLOW LENGTH(FEET) = 340.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 81.0 INCH PIPE IS 65.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.02  
 ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 465.54  
 PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 26.83  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3250.00 = 14701.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3245.00 TO NODE 3245.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 26.45  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.962  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.32	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 1.32 SUBAREA RUNOFF(CFS) = 2.21  
 EFFECTIVE AREA(ACRES) = 341.63 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 459.6 PEAK FLOW RATE(CFS) = 463.01  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3250.00 TO NODE 3250.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 26.83  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.945  
 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"	A	1.10	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	2.01	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.71  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 3.11 SUBAREA RUNOFF(CFS) = 4.45  
 EFFECTIVE AREA(ACRES) = 347.16 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 465.2 PEAK FLOW RATE(CFS) = 465.54  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3245.00 TO NODE 3245.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 26.45

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3250.00 TO NODE 3250.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

```

=====
MAINLINE Tc(MIN.) = 26.83
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.945
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"   A          6.85    0.98    0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 6.85      SUBAREA RUNOFF(CFS) = 8.99
EFFECTIVE AREA(ACRES) = 354.01  AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 472.0      PEAK FLOW RATE(CFS) = 473.84

*****
FLOW PROCESS FROM NODE 3250.00 TO NODE 3255.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 661.50 DOWNSTREAM(FEET) = 660.50
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 60.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.06
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 473.84
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 26.92
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3255.00 = 14801.00 FEET.

*****
FLOW PROCESS FROM NODE 3255.00 TO NODE 3255.00 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.) = 26.92
RAINFALL INTENSITY(INCH/HR) = 1.94
AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.96
AREA-AVERAGED Ap = 0.48
EFFECTIVE STREAM AREA(ACRES) = 354.01
TOTAL STREAM AREA(ACRES) = 472.03
PEAK FLOW RATE(CFS) AT CONFLUENCE = 473.84

*****
FLOW PROCESS FROM NODE 3300.00 TO NODE 3305.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 930.00
ELEVATION DATA: UPSTREAM(FEET) = 696.00 DOWNSTREAM(FEET) = 682.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

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SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.862
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.891
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
"5-7 DWELLINGS/ACRE"   A          4.64    0.98    0.500    32  13.86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 10.04
TOTAL AREA(ACRES) = 4.64      PEAK FLOW RATE(CFS) = 10.04

*****
FLOW PROCESS FROM NODE 3305.00 TO NODE 3310.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
-----
UPSTREAM ELEVATION(FEET) = 682.00 DOWNSTREAM ELEVATION(FEET) = 674.00
STREET LENGTH(FEET) = 490.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.65
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.45
HALFSTREET FLOOD WIDTH(FEET) = 14.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.62
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.62
STREET FLOW TRAVEL TIME(MIN.) = 2.26 Tc(MIN.) = 16.12
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.640
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"   A          6.82    0.98    0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 6.82      SUBAREA RUNOFF(CFS) = 13.21
EFFECTIVE AREA(ACRES) = 11.46  AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 11.5      PEAK FLOW RATE(CFS) = 22.21

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 16.34
FLOW VELOCITY(FEET/SEC.) = 3.88 DEPTH*VELOCITY(FT*FT/SEC.) = 1.88
LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3310.00 = 1420.00 FEET.

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*****
FLOW PROCESS FROM NODE 3310.00 TO NODE 3315.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 674.00 DOWNSTREAM(FEET) = 670.00
FLOW LENGTH(FEET) = 730.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.47
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 22.21
PIPE TRAVEL TIME(MIN.) = 1.88 Tc(MIN.) = 18.00
LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3315.00 = 2150.00 FEET.

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*****
FLOW PROCESS FROM NODE 3315.00 TO NODE 3315.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.471
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"   A       10.71   0.98   0.500   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 10.71 SUBAREA RUNOFF(CFS) = 19.12
EFFECTIVE AREA(ACRES) = 22.17 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 22.2 PEAK FLOW RATE(CFS) = 39.58

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*****
FLOW PROCESS FROM NODE 3315.00 TO NODE 3320.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 670.00 DOWNSTREAM(FEET) = 666.00
FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.56
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 39.58
PIPE TRAVEL TIME(MIN.) = 1.54 Tc(MIN.) = 19.54
LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3320.00 = 2850.00 FEET.

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*****
FLOW PROCESS FROM NODE 3320.00 TO NODE 3320.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.54
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.352

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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
"5-7 DWELLINGS/ACRE"   A       14.61   0.98   0.500   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 14.61 SUBAREA RUNOFF(CFS) = 24.52
EFFECTIVE AREA(ACRES) = 36.78 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 36.8 PEAK FLOW RATE(CFS) = 61.73

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*****
FLOW PROCESS FROM NODE 3320.00 TO NODE 3255.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 666.00 DOWNSTREAM(FEET) = 660.50
FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.58
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 61.73
PIPE TRAVEL TIME(MIN.) = 1.18 Tc(MIN.) = 20.72
LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3255.00 = 3530.00 FEET.

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*****
FLOW PROCESS FROM NODE 3255.00 TO NODE 3255.00 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.) = 20.72
RAINFALL INTENSITY(INCH/HR) = 2.27
AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 36.78
TOTAL STREAM AREA(ACRES) = 36.78
PEAK FLOW RATE(CFS) AT CONFLUENCE = 61.73

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** CONFLUENCE DATA **

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STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	473.84	26.92	1.941	0.96( 0.46)	0.48	354.0	3085.00
1	436.12	38.98	1.554	0.96( 0.47)	0.48	443.8	3056.00
1	410.09	44.20	1.442	0.96( 0.47)	0.49	466.9	3000.00
1	343.37	54.11	1.277	0.96( 0.47)	0.49	472.0	3021.00
2	61.73	20.72	2.271	0.98( 0.49)	0.50	36.8	3300.00

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

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\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	507.63	20.72	2.271	0.96 ( 0.46)	0.48	309.3	3300.00
2	524.15	26.92	1.941	0.96 ( 0.46)	0.48	390.8	3085.00
3	473.05	38.98	1.554	0.96 ( 0.47)	0.49	480.6	3056.00
4	443.12	44.20	1.442	0.96 ( 0.47)	0.49	503.7	3000.00
5	370.69	54.11	1.277	0.96 ( 0.47)	0.49	508.8	3021.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 524.15 Tc(MIN.) = 26.92  
EFFECTIVE AREA(ACRES) = 390.79 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 508.8  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3255.00 = 14801.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3255.00 TO NODE 3255.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 26.92  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.941  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.36 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 1.36 SUBAREA RUNOFF(CFS) = 2.26  
EFFECTIVE AREA(ACRES) = 392.15 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 510.2 PEAK FLOW RATE(CFS) = 524.15  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3255.00 TO NODE 3400.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 660.50 DOWNSTREAM(FEET) = 655.00  
FLOW LENGTH(FEET) = 570.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 64.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.20  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 524.15  
PIPE TRAVEL TIME(MIN.) = 0.55 Tc(MIN.) = 27.48  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3400.00 = 15371.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3400.00 TO NODE 3400.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 27.48

\* 100 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  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 17.70 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 17.70 SUBAREA RUNOFF(CFS) = 22.78  
EFFECTIVE AREA(ACRES) = 409.85 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 527.9 PEAK FLOW RATE(CFS) = 537.34

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3400.00 TO NODE 3405.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 655.00 DOWNSTREAM(FEET) = 653.00  
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 87.0 INCH PIPE IS 68.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.51  
ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 537.34  
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 27.78  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3405.00 = 15651.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3405.00 TO NODE 3405.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 27.78  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.905  
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" A 10.67 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 10.67 SUBAREA RUNOFF(CFS) = 13.61  
EFFECTIVE AREA(ACRES) = 420.52 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 538.5 PEAK FLOW RATE(CFS) = 546.34

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3405.00 TO NODE 3410.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 653.00 DOWNSTREAM(FEET) = 650.00  
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 63.6 INCHES



PIPE-FLOW VELOCITY(FEET/SEC.) = 18.12  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 546.34  
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 28.03  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3410.00 = 15931.00 FEET.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.88  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.691  
SUBAREA AREA(ACRES) = 15.54 SUBAREA RUNOFF(CFS) = 17.96  
EFFECTIVE AREA(ACRES) = 444.68 AREA-AVERAGED Fm(INCH/HR) = 0.47  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 562.7 PEAK FLOW RATE(CFS) = 571.71

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3410.00 TO NODE 3410.00 IS CODE = 81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3410.00 TO NODE 3415.00 IS CODE = 31

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
MAINLINE Tc(MIN.) = 28.03  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.894  
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" A 7.25 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 7.25 SUBAREA RUNOFF(CFS) = 9.18  
EFFECTIVE AREA(ACRES) = 427.77 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 545.8 PEAK FLOW RATE(CFS) = 551.54

-----  
ELEVATION DATA: UPSTREAM(FEET) = 650.00 DOWNSTREAM(FEET) = 648.80  
FLOW LENGTH(FEET) = 120.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 84.0 INCH PIPE IS 64.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.91  
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 571.71  
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 28.15  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3415.00 = 16051.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3410.00 TO NODE 3410.00 IS CODE = 81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 IS CODE = 1

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

-----  
MAINLINE Tc(MIN.) = 28.03  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.894  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.37 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 1.37 SUBAREA RUNOFF(CFS) = 2.22  
EFFECTIVE AREA(ACRES) = 429.14 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 547.2 PEAK FLOW RATE(CFS) = 553.76

-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 28.15  
RAINFALL INTENSITY(INCH/HR) = 1.89  
AREA-AVERAGED Fm(INCH/HR) = 0.47  
AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.49  
EFFECTIVE STREAM AREA(ACRES) = 444.68  
TOTAL STREAM AREA(ACRES) = 562.70  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 571.71

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3410.00 TO NODE 3410.00 IS CODE = 81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3500.00 TO NODE 3505.00 IS CODE = 21

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
MAINLINE Tc(MIN.) = 28.03  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.894  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
SCHOOL C 4.03 0.57 0.600 69  
SCHOOL A 5.84 0.98 0.600 32  
PUBLIC PARK A 5.67 0.98 0.850 32

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 950.00  
ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 675.00  
  
Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 18.646  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.419  
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 A 5.42 0.98 0.850 32 18.65  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850

```

SUBAREA RUNOFF(CFS) = 7.76
TOTAL AREA(ACRES) = 5.42 PEAK FLOW RATE(CFS) = 7.76
*****
FLOW PROCESS FROM NODE 3505.00 TO NODE 3510.00 IS CODE = 52
-----
>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 675.00 DOWNSTREAM(FEET) = 673.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 600.00 CHANNEL SLOPE = 0.0033
CHANNEL FLOW THRU SUBAREA(CFS) = 7.76
FLOW VELOCITY(FEET/SEC) = 1.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 7.38 Tc(MIN.) = 26.03
LONGEST FLOWPATH FROM NODE 3500.00 TO NODE 3510.00 = 1550.00 FEET.

*****
FLOW PROCESS FROM NODE 3510.00 TO NODE 3510.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 26.03
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.981
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 3.15 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 3.15 SUBAREA RUNOFF(CFS) = 3.27
EFFECTIVE AREA(ACRES) = 8.57 AREA-AVERAGED Fm(INCH/HR) = 0.83
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 8.6 PEAK FLOW RATE(CFS) = 8.88

*****
FLOW PROCESS FROM NODE 3510.00 TO NODE 3515.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 673.00 DOWNSTREAM(FEET) = 665.00
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
DEPTH OF FLOW IN 24.0 INCH PIPE IS 6.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.80
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.88
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 26.15
LONGEST FLOWPATH FROM NODE 3500.00 TO NODE 3515.00 = 1650.00 FEET.

*****
FLOW PROCESS FROM NODE 3515.00 TO NODE 3515.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 26.15

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```

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.975
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.95 0.98 0.100 32
PUBLIC PARK A 0.73 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.426
SUBAREA AREA(ACRES) = 1.68 SUBAREA RUNOFF(CFS) = 2.36
EFFECTIVE AREA(ACRES) = 10.25 AREA-AVERAGED Fm(INCH/HR) = 0.76
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.78
TOTAL AREA(ACRES) = 10.2 PEAK FLOW RATE(CFS) = 11.20

*****
FLOW PROCESS FROM NODE 3515.00 TO NODE 3415.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 665.00 DOWNSTREAM(FEET) = 648.80
FLOW LENGTH(FEET) = 1010.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
DEPTH OF FLOW IN 24.0 INCH PIPE IS 10.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.24
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.20
PIPE TRAVEL TIME(MIN.) = 2.04 Tc(MIN.) = 28.19
LONGEST FLOWPATH FROM NODE 3500.00 TO NODE 3415.00 = 2660.00 FEET.

*****
FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 28.19
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.888
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 2.47 0.98 0.100 32
PUBLIC PARK A 1.77 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.413
SUBAREA AREA(ACRES) = 4.24 SUBAREA RUNOFF(CFS) = 5.67
EFFECTIVE AREA(ACRES) = 14.49 AREA-AVERAGED Fm(INCH/HR) = 0.66
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) = 14.5 PEAK FLOW RATE(CFS) = 16.06

*****
FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 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.) = 28.19  
 RAINFALL INTENSITY(INCH/HR) = 1.89  
 AREA-AVERAGED Fm(INCH/HR) = 0.66  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.67  
 EFFECTIVE STREAM AREA(ACRES) = 14.49  
 TOTAL STREAM AREA(ACRES) = 14.49  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.06

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	566.46	21.95	2.194	0.96 ( 0.47)	0.49	363.2	3300.00
1	571.71	28.15	1.890	0.96 ( 0.47)	0.49	444.7	3085.00
1	508.66	40.23	1.525	0.96 ( 0.47)	0.49	534.5	3056.00
1	475.24	45.47	1.417	0.96 ( 0.47)	0.49	557.6	3000.00
1	397.89	55.44	1.258	0.96 ( 0.47)	0.49	562.7	3021.00
2	16.06	28.19	1.888	0.97 ( 0.66)	0.67	14.5	3500.00

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	582.07	21.95	2.194	0.96 ( 0.47)	0.49	374.5	3300.00
2	587.77	28.15	1.890	0.96 ( 0.47)	0.49	459.1	3085.00
3	587.52	28.19	1.888	0.96 ( 0.47)	0.49	459.5	3500.00
4	519.99	40.23	1.525	0.96 ( 0.48)	0.50	549.0	3056.00
5	485.17	45.47	1.417	0.96 ( 0.48)	0.50	572.1	3000.00
6	405.75	55.44	1.258	0.96 ( 0.48)	0.50	577.2	3021.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 587.77 Tc(MIN.) = 28.15  
 EFFECTIVE AREA(ACRES) = 459.14 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 577.2  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3415.00 = 16051.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 28.15  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.890  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.10 0.98 0.100 32  
 PUBLIC PARK A 0.75 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.404  
 SUBAREA AREA(ACRES) = 1.85 SUBAREA RUNOFF(CFS) = 2.49  
 EFFECTIVE AREA(ACRES) = 460.99 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49

TOTAL AREA(ACRES) = 579.0 PEAK FLOW RATE(CFS) = 588.46

\*\*\*\*\*

FLOW PROCESS FROM NODE 3415.00 TO NODE 3530.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 648.80 DOWNSTREAM(FEET) = 648.40  
 FLOW LENGTH(FEET) = 440.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 132.0 INCH PIPE IS 104.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.31  
 ESTIMATED PIPE DIAMETER(INCH) = 132.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 588.46  
 PIPE TRAVEL TIME(MIN.) = 1.00 Tc(MIN.) = 29.15  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3530.00 = 16491.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 3530.00 TO NODE 3530.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 29.15  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.851  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL A 3.42 0.98 0.500 32  
 "5-7 DWELLINGS/ACRE"  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 3.42 SUBAREA RUNOFF(CFS) = 4.20  
 EFFECTIVE AREA(ACRES) = 464.41 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 582.5 PEAK FLOW RATE(CFS) = 588.46  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 3530.00 TO NODE 3540.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 648.40 DOWNSTREAM(FEET) = 648.00  
 FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 132.0 INCH PIPE IS 99.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.64  
 ESTIMATED PIPE DIAMETER(INCH) = 132.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 588.46  
 PIPE TRAVEL TIME(MIN.) = 0.87 Tc(MIN.) = 30.02  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3540.00 = 16891.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 3540.00 TO NODE 3540.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

```

=====
MAINLINE Tc(MIN.) = 30.02
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.818
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"  A      11.00    0.98    0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.00      SUBAREA RUNOFF(CFS) = 13.17
EFFECTIVE AREA(ACRES) = 475.41  AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 593.5      PEAK FLOW RATE(CFS) = 588.46
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
=====

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=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 593.5  TC(MIN.) = 30.02
EFFECTIVE AREA(ACRES) = 475.41  AREA-AVERAGED Fm(INCH/HR)= 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.492
PEAK FLOW RATE(CFS) = 588.46
=====

```

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	582.87	23.83	2.089	0.96( 0.47)	0.49	390.7	3300.00
2	588.46	30.02	1.818	0.96( 0.47)	0.49	475.4	3085.00
3	588.12	30.07	1.816	0.96( 0.47)	0.49	475.8	3500.00
4	520.61	42.17	1.483	0.96( 0.48)	0.50	565.3	3056.00
5	485.77	47.44	1.382	0.96( 0.48)	0.50	588.4	3000.00
6	406.33	57.50	1.231	0.96( 0.48)	0.50	593.5	3021.00

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=====
END OF RATIONAL METHOD ANALYSIS
=====

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\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH  
FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

AREA-AVERAGED  
DURATION RAINFALL(INCH)  
5-MINUTES 0.35  
30-MINUTES 0.71  
1-HOUR 0.94  
3-HOUR 1.64  
6-HOUR 2.32  
24-HOUR 4.49

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* TURNER AVE. \*  
\* 25-YR STUDY \*  
\* AREA 'L' \*  
\*\*\*\*\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3000.00 TO NODE 3005.00 IS CODE = 21  
-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

FILE NAME: TURN.DAT  
TIME/DATE OF STUDY: 09:14 08/24/2011  
=====

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 792.30 DOWNSTREAM(FEET) = 788.30

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:  
=====

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.537  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.202  
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 A 9.45 0.98 0.100 32 14.54  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 17.90  
TOTAL AREA(ACRES) = 9.45 PEAK FLOW RATE(CFS) = 17.90

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3005.00 TO NODE 3010.00 IS CODE = 62  
-----  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- WIDTH (FT)	CROWN TO STREET-CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB GUTTER-GEOMETRIES: HEIGHT (FT)	STREET-CROSSFALL: WIDTH (FT)	STREET-CROSSFALL: LIP (FT)	STREET-CROSSFALL: HIKE (FT)	STREET-CROSSFALL: FACTOR (FT)	MANNING (n)
1	30.0	16.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150	

-----  
UPSTREAM ELEVATION(FEET) = 788.30 DOWNSTREAM ELEVATION(FEET) = 785.74  
STREET LENGTH(FEET) = 852.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.50 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:  
WATERSHED LAG = 0.80 \* Tc

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 22.29



STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.62  
 HALFSTREET FLOOD WIDTH(FEET) = 22.97  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.04  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.26  
 STREET FLOW TRAVEL TIME(MIN.) = 6.96 Tc(MIN.) = 21.50  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.741  
 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"	A	7.73	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 7.73 SUBAREA RUNOFF(CFS) = 8.72  
 EFFECTIVE AREA(ACRES) = 17.18 AREA-AVERAGED Fm(INCH/HR) = 0.27  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 22.70

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.62 HALFSTREET FLOOD WIDTH(FEET) = 23.09  
 FLOW VELOCITY(FEET/SEC.) = 2.05 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.27  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3010.00 = 1852.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3010.00 TO NODE 3015.00 IS CODE = 62  
 -----  
 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<  
 -----  
 UPSTREAM ELEVATION(FEET) = 785.74 DOWNSTREAM ELEVATION(FEET) = 782.90  
 STREET LENGTH(FEET) = 870.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 31.30  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.67  
 HALFSTREET FLOOD WIDTH(FEET) = 26.14  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.29  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.54  
 STREET FLOW TRAVEL TIME(MIN.) = 6.34 Tc(MIN.) = 27.83  
 \* 25 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
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	18.95	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 18.95 SUBAREA RUNOFF(CFS) = 17.11  
 EFFECTIVE AREA(ACRES) = 36.13 AREA-AVERAGED Fm(INCH/HR) = 0.39  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA(ACRES) = 36.1 PEAK FLOW RATE(CFS) = 35.95

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.70 HALFSTREET FLOOD WIDTH(FEET) = 28.89  
 FLOW VELOCITY(FEET/SEC.) = 2.37 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.66  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3015.00 = 2722.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3015.00 TO NODE 3020.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 755.50 DOWNSTREAM(FEET) = 753.63  
 FLOW LENGTH(FEET) = 660.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.65  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 35.95  
 PIPE TRAVEL TIME(MIN.) = 1.95 Tc(MIN.) = 29.78  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3020.00 = 3382.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3020.00 TO NODE 3020.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 29.78  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.432  
 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"	A	18.69	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 18.69 SUBAREA RUNOFF(CFS) = 15.88  
 EFFECTIVE AREA(ACRES) = 54.82 AREA-AVERAGED Fm(INCH/HR) = 0.42  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 54.8 PEAK FLOW RATE(CFS) = 49.90

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3020.00 TO NODE 3025.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 753.63 DOWNSTREAM(FEET) = 742.00  
 FLOW LENGTH(FEET) = 620.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.34

ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 49.90  
PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 30.62  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3025.00 = 4002.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3025.00 TO NODE 3025.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 30.62  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.408  
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" A 16.64 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 16.64 SUBAREA RUNOFF(CFS) = 13.79  
EFFECTIVE AREA(ACRES) = 71.46 AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 71.5 PEAK FLOW RATE(CFS) = 62.52

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3025.00 TO NODE 3027.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 742.00 DOWNSTREAM(FEET) = 741.00  
FLOW LENGTH(FEET) = 70.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.96  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 62.52  
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 30.72  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3027.00 = 4072.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3027.00 TO NODE 3027.00 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.) = 30.72  
RAINFALL INTENSITY(INCH/HR) = 1.41  
AREA-AVERAGED Fm(INCH/HR) = 0.44  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.45  
EFFECTIVE STREAM AREA(ACRES) = 71.46  
TOTAL STREAM AREA(ACRES) = 71.46  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 62.52

\*\*\*\*\*

FLOW PROCESS FROM NODE 3021.00 TO NODE 3022.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 779.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 21.297  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.751  
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 A 5.83 0.98 0.850 32 21.30  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA RUNOFF(CFS) = 4.84  
TOTAL AREA(ACRES) = 5.83 PEAK FLOW RATE(CFS) = 4.84

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3022.00 TO NODE 3023.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 779.00 DOWNSTREAM(FEET) = 776.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 1057.00 CHANNEL SLOPE = 0.0028  
CHANNEL FLOW THRU SUBAREA(CFS) = 4.84  
FLOW VELOCITY(FEET/SEC) = 1.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 15.80 Tc(MIN.) = 37.09  
LONGEST FLOWPATH FROM NODE 3021.00 TO NODE 3023.00 = 2057.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3023.00 TO NODE 3023.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

-----  
MAINLINE Tc(MIN.) = 37.09  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.255  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 7.13 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 7.13 SUBAREA RUNOFF(CFS) = 2.74  
EFFECTIVE AREA(ACRES) = 12.96 AREA-AVERAGED Fm(INCH/HR) = 0.83  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.85  
TOTAL AREA(ACRES) = 13.0 PEAK FLOW RATE(CFS) = 4.97

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3023.00 TO NODE 3024.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<

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=====
ELEVATION DATA: UPSTREAM( FEET ) = 776.00 DOWNSTREAM( FEET ) = 762.00
CHANNEL LENGTH THRU SUBAREA( FEET ) = 609.00 CHANNEL SLOPE = 0.0230
CHANNEL FLOW THRU SUBAREA( CFS ) = 4.97
FLOW VELOCITY( FEET/SEC ) = 3.19 ( PER LACFCD/RCFC&WCD HYDROLOGY MANUAL )
TRAVEL TIME( MIN. ) = 3.18 Tc( MIN. ) = 40.27
LONGEST FLOWPATH FROM NODE 3021.00 TO NODE 3024.00 = 2666.00 FEET.

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*****
FLOW PROCESS FROM NODE 3024.00 TO NODE 3024.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc( MIN. ) = 40.27
* 25 YEAR RAINFALL INTENSITY( INCH/HR ) = 1.195
SUBAREA LOSS RATE DATA( AMC II ):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK        A         4.18   0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR ) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA( ACRES ) = 4.18 SUBAREA RUNOFF( CFS ) = 1.38
EFFECTIVE AREA( ACRES ) = 17.14 AREA-AVERAGED Fm( INCH/HR ) = 0.83
AREA-AVERAGED Fp( INCH/HR ) = 0.98 AREA-AVERAGED Ap = 0.85
TOTAL AREA( ACRES ) = 17.1 PEAK FLOW RATE( CFS ) = 5.64

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*****
FLOW PROCESS FROM NODE 3024.00 TO NODE 3027.00 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 ) = 750.00 DOWNSTREAM( FEET ) = 741.00
FLOW LENGTH( FEET ) = 314.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER( INCH ) INCREASED TO 24.000
DEPTH OF FLOW IN 24.0 INCH PIPE IS 6.4 INCHES
PIPE-FLOW VELOCITY( FEET/SEC. ) = 8.40
ESTIMATED PIPE DIAMETER( INCH ) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS ) = 5.64
PIPE TRAVEL TIME( MIN. ) = 0.62 Tc( MIN. ) = 40.89
LONGEST FLOWPATH FROM NODE 3021.00 TO NODE 3027.00 = 2980.00 FEET.

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*****
FLOW PROCESS FROM NODE 3027.00 TO NODE 3027.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc( MIN. ) = 40.89
* 25 YEAR RAINFALL INTENSITY( INCH/HR ) = 1.184
SUBAREA LOSS RATE DATA( AMC II ):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL        A         4.39   0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR ) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA( ACRES ) = 4.39 SUBAREA RUNOFF( CFS ) = 4.29

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EFFECTIVE AREA( ACRES ) = 21.53 AREA-AVERAGED Fm( INCH/HR ) = 0.68
AREA-AVERAGED Fp( INCH/HR ) = 0.98 AREA-AVERAGED Ap = 0.70
TOTAL AREA( ACRES ) = 21.5 PEAK FLOW RATE( CFS ) = 9.77

```

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*****
FLOW PROCESS FROM NODE 3027.00 TO NODE 3027.00 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. ) = 40.89
RAINFALL INTENSITY( INCH/HR ) = 1.18
AREA-AVERAGED Fm( INCH/HR ) = 0.68
AREA-AVERAGED Fp( INCH/HR ) = 0.98
AREA-AVERAGED Ap = 0.70
EFFECTIVE STREAM AREA( ACRES ) = 21.53
TOTAL STREAM AREA( ACRES ) = 21.53
PEAK FLOW RATE( CFS ) AT CONFLUENCE = 9.77

```

```

** CONFLUENCE DATA **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	62.52	30.72	1.405	0.98( 0.44)	0.45	71.5	3000.00
2	9.77	40.89	1.184	0.98( 0.68)	0.70	21.5	3021.00

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

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** PEAK FLOW RATE TABLE **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	72.29	30.72	1.405	0.98( 0.48)	0.49	87.6	3000.00
2	57.99	40.89	1.184	0.98( 0.49)	0.50	93.0	3021.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE( CFS ) = 72.29 Tc( MIN. ) = 30.72
EFFECTIVE AREA( ACRES ) = 87.63 AREA-AVERAGED Fm( INCH/HR ) = 0.48
AREA-AVERAGED Fp( INCH/HR ) = 0.98 AREA-AVERAGED Ap = 0.49
TOTAL AREA( ACRES ) = 93.0
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3027.00 = 4072.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 3027.00 TO NODE 3030.00 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 ) = 741.00 DOWNSTREAM( FEET ) = 739.00
FLOW LENGTH( FEET ) = 330.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 33.4 INCHES
PIPE-FLOW VELOCITY( FEET/SEC. ) = 8.80
ESTIMATED PIPE DIAMETER( INCH ) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS ) = 72.29
PIPE TRAVEL TIME( MIN. ) = 0.62 Tc( MIN. ) = 31.34

```

LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3030.00 = 4402.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3030.00 TO NODE 3030.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 31.34  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.389  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 7.22 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 7.22 SUBAREA RUNOFF(CFS) = 3.64  
EFFECTIVE AREA(ACRES) = 94.85 AREA-AVERAGED Fm(INCH/HR) = 0.51  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 100.2 PEAK FLOW RATE(CFS) = 75.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3030.00 TO NODE 3035.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 739.00 DOWNSTREAM(FEET) = 731.70  
FLOW LENGTH(FEET) = 1344.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.65  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 75.22  
PIPE TRAVEL TIME(MIN.) = 2.59 Tc(MIN.) = 33.93  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3035.00 = 5746.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3035.00 TO NODE 3035.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 33.93  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.324  
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" A 27.80 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 27.80 SUBAREA RUNOFF(CFS) = 20.93  
EFFECTIVE AREA(ACRES) = 122.65 AREA-AVERAGED Fm(INCH/HR) = 0.50  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 128.0 PEAK FLOW RATE(CFS) = 90.63

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3035.00 TO NODE 3050.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 731.70 DOWNSTREAM(FEET) = 729.20  
FLOW LENGTH(FEET) = 425.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.36  
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 90.63  
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 34.69  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3050.00 = 6171.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3050.00 TO NODE 3050.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 34.69  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.307  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK A 5.00 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 5.00 SUBAREA RUNOFF(CFS) = 2.15  
EFFECTIVE AREA(ACRES) = 127.65 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 133.0 PEAK FLOW RATE(CFS) = 90.86

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3050.00 TO NODE 3050.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 34.69  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.307  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
SCHOOL A 10.00 0.98 0.600 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 6.49  
EFFECTIVE AREA(ACRES) = 137.65 AREA-AVERAGED Fm(INCH/HR) = 0.52  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 143.0 PEAK FLOW RATE(CFS) = 97.36

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3050.00 TO NODE 3055.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 729.20 DOWNSTREAM(FEET) = 727.30

FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.52  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 97.36  
 PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 35.07  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3055.00 = 6411.00 FEET.

PEAK FLOW RATE(CFS) AT CONFLUENCE = 107.27

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3056.00 TO NODE 3057.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 878.00  
 ELEVATION DATA: UPSTREAM(FEET) = 762.00 DOWNSTREAM(FEET) = 755.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 19.100  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.869  
 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	A	3.05	0.98	0.850	32	19.10

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA RUNOFF(CFS) = 2.86  
 TOTAL AREA(ACRES) = 3.05 PEAK FLOW RATE(CFS) = 2.86

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3057.00 TO NODE 3058.00 IS CODE = 52  
 -----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
 >>>>TRAVELTIME THRU SUBAREA<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 755.00 DOWNSTREAM(FEET) = 745.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 926.00 CHANNEL SLOPE = 0.0108  
 CHANNEL FLOW THRU SUBAREA(CFS) = 2.86  
 FLOW VELOCITY(FEET/SEC) = 1.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
 TRAVEL TIME(MIN.) = 8.00 Tc(MIN.) = 27.10  
 LONGEST FLOWPATH FROM NODE 3056.00 TO NODE 3058.00 = 1804.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3058.00 TO NODE 3058.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 27.10  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.515  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	3.65	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 3.65 SUBAREA RUNOFF(CFS) = 2.26  
 EFFECTIVE AREA(ACRES) = 6.70 AREA-AVERAGED Fm(INCH/HR) = 0.83  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85  
 TOTAL AREA(ACRES) = 6.7 PEAK FLOW RATE(CFS) = 4.14

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3058.00 TO NODE 3060.00 IS CODE = 52

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3055.00 TO NODE 3055.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 35.07  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.298  
 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"	A	15.04	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 15.04 SUBAREA RUNOFF(CFS) = 10.97  
 EFFECTIVE AREA(ACRES) = 152.69 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 158.0 PEAK FLOW RATE(CFS) = 107.27

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3055.00 TO NODE 3060.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 727.30 DOWNSTREAM(FEET) = 725.70  
 FLOW LENGTH(FEET) = 340.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.83  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 107.27  
 PIPE TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 35.71  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3060.00 = 6751.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3060.00 TO NODE 3060.00 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.) = 35.71  
 RAINFALL INTENSITY(INCH/HR) = 1.28  
 AREA-AVERAGED Fm(INCH/HR) = 0.52  
 AREA-AVERAGED Fp(INCH/HR) = 0.98  
 AREA-AVERAGED Ap = 0.53  
 EFFECTIVE STREAM AREA(ACRES) = 152.69  
 TOTAL STREAM AREA(ACRES) = 158.05

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-----
>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<
=====
ELEVATION DATA: UPSTREAM( FEET) = 745.00 DOWNSTREAM( FEET) = 744.00
CHANNEL LENGTH THRU SUBAREA( FEET) = 232.00 CHANNEL SLOPE = 0.0043
CHANNEL FLOW THRU SUBAREA( CFS) = 4.14
FLOW VELOCITY( FEET/SEC) = 1.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME( MIN.) = 2.92 Tc( MIN.) = 30.01
LONGEST FLOWPATH FROM NODE 3056.00 TO NODE 3060.00 = 2036.00 FEET.

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*****
FLOW PROCESS FROM NODE 3060.00 TO NODE 3060.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
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MAINLINE Tc( MIN.) = 30.01
* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 1.425
SUBAREA LOSS RATE DATA( AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 2.34 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA( ACRES) = 2.34 SUBAREA RUNOFF( CFS) = 1.26
EFFECTIVE AREA( ACRES) = 9.04 AREA-AVERAGED Fm( INCH/HR) = 0.83
AREA-AVERAGED Fp( INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.85
TOTAL AREA( ACRES) = 9.0 PEAK FLOW RATE( CFS) = 4.85

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*****
FLOW PROCESS FROM NODE 3060.00 TO NODE 3060.00 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.) = 30.01
RAINFALL INTENSITY( INCH/HR) = 1.43
AREA-AVERAGED Fm( INCH/HR) = 0.83
AREA-AVERAGED Fp( INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.85
EFFECTIVE STREAM AREA( ACRES) = 9.04
TOTAL STREAM AREA( ACRES) = 9.04
PEAK FLOW RATE( CFS) AT CONFLUENCE = 4.85

```

```

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 107.27 35.71 1.284 0.97( 0.52) 0.53 152.7 3000.00
1 83.54 46.18 1.100 0.98( 0.52) 0.54 158.0 3021.00
2 4.85 30.01 1.425 0.98( 0.83) 0.85 9.0 3056.00

```

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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
1 111.61 30.01 1.425 0.97( 0.54) 0.55 137.4 3056.00
2 110.98 35.71 1.284 0.97( 0.53) 0.55 161.7 3000.00
3 85.75 46.18 1.100 0.98( 0.54) 0.55 167.1 3021.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE( CFS) = 111.61 Tc( MIN.) = 30.01
EFFECTIVE AREA( ACRES) = 137.38 AREA-AVERAGED Fm( INCH/HR) = 0.54
AREA-AVERAGED Fp( INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.55
TOTAL AREA( ACRES) = 167.1
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3060.00 = 6751.00 FEET.

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*****
FLOW PROCESS FROM NODE 3060.00 TO NODE 3065.00 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) = 725.70 DOWNSTREAM( FEET) = 720.40
FLOW LENGTH( FEET) = 930.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.7 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 9.67
ESTIMATED PIPE DIAMETER( INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS) = 111.61
PIPE TRAVEL TIME( MIN.) = 1.60 Tc( MIN.) = 31.61
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3065.00 = 7681.00 FEET.

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*****
FLOW PROCESS FROM NODE 3065.00 TO NODE 3065.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
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MAINLINE Tc( MIN.) = 31.61
* 25 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
RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 16.79 0.98 0.500 32
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 12.88 0.57 0.500 69
COMMERCIAL A 1.92 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.476
SUBAREA AREA( ACRES) = 31.59 SUBAREA RUNOFF( CFS) = 28.46
EFFECTIVE AREA( ACRES) = 168.97 AREA-AVERAGED Fm( INCH/HR) = 0.51
AREA-AVERAGED Fp( INCH/HR) = 0.95 AREA-AVERAGED Ap = 0.54
TOTAL AREA( ACRES) = 198.7 PEAK FLOW RATE( CFS) = 132.73

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*****
FLOW PROCESS FROM NODE 3065.00 TO NODE 3080.00 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) = 720.40 DOWNSTREAM(FEET) = 704.00
FLOW LENGTH(FEET) = 2750.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.28
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 132.73
PIPE TRAVEL TIME(MIN.) = 4.46 Tc(MIN.) = 36.07
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3080.00 = 10431.00 FEET.

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*****
FLOW PROCESS FROM NODE 3080.00 TO NODE 3080.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 36.07
* 25 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
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  A       39.95   0.98   0.500   32
RESIDENTIAL
"11+ DWELLINGS/ACRE"  A       20.00   0.98   0.200   32
PUBLIC PARK           A       20.58   0.98   0.850   32
COMMERCIAL            A       8.40    0.98   0.100   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.476
SUBAREA AREA(ACRES) = 88.93 SUBAREA RUNOFF(CFS) = 65.01
EFFECTIVE AREA(ACRES) = 257.90 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 287.6 PEAK FLOW RATE(CFS) = 181.76

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*****
FLOW PROCESS FROM NODE 3080.00 TO NODE 3200.00 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) = 704.00 DOWNSTREAM(FEET) = 702.00
FLOW LENGTH(FEET) = 180.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.03
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 181.76
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 36.29
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3200.00 = 10611.00 FEET.

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*****
FLOW PROCESS FROM NODE 3200.00 TO NODE 3200.00 IS CODE = 10
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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
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*****
FLOW PROCESS FROM NODE 3085.00 TO NODE 3090.00 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) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 747.50 DOWNSTREAM(FEET) = 741.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.059
* 25 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.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"  A       2.43   0.98   0.200   32  14.06
PUBLIC PARK           A       1.00   0.98   0.850   32  20.96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.390
SUBAREA RUNOFF(CFS) = 5.76
TOTAL AREA(ACRES) = 3.43 PEAK FLOW RATE(CFS) = 5.76

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*****
FLOW PROCESS FROM NODE 3090.00 TO NODE 3095.00 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) = 741.00 DOWNSTREAM ELEVATION(FEET) = 732.00
STREET LENGTH(FEET) = 710.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

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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) = 14.02
STRETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 14.22
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.17
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.40
STREET FLOW TRAVEL TIME(MIN.) = 3.73 Tc(MIN.) = 17.79
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.950

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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           A       0.69   0.98   0.850   32
RESIDENTIAL
"11+ DWELLINGS/ACRE"  A      10.00   0.98   0.200   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.242

```

SUBAREA AREA(ACRES) = 10.69 SUBAREA RUNOFF(CFS) = 16.49  
EFFECTIVE AREA(ACRES) = 14.12 AREA-AVERAGED Fm(INCH/HR) = 0.27  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.28  
TOTAL AREA(ACRES) = 14.1 PEAK FLOW RATE(CFS) = 21.34

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 16.91  
FLOW VELOCITY(FEET/SEC.) = 3.50 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.74  
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3095.00 = 1710.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3095.00 TO NODE 3125.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	732.00	DOWNSTREAM(FEET) =	712.00
FLOW LENGTH(FEET) =	1200.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	24.0 INCH PIPE IS	15.8 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	9.73		
ESTIMATED PIPE DIAMETER(INCH) =	24.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	21.34		
PIPE TRAVEL TIME(MIN.) =	2.06	Tc(MIN.) =	19.85
LONGEST FLOWPATH FROM NODE	3085.00 TO NODE	3125.00 =	2910.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3125.00 TO NODE 3125.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) =	19.85				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.826				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	15.00	0.98	0.100	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	8.43	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	4.77	0.98	0.500	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.97				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.198				
SUBAREA AREA(ACRES) =	28.20	SUBAREA RUNOFF(CFS) =	41.46		
EFFECTIVE AREA(ACRES) =	42.32	AREA-AVERAGED Fm(INCH/HR) =	0.22		
AREA-AVERAGED Fp(INCH/HR) =	0.98	AREA-AVERAGED Ap =	0.22		
TOTAL AREA(ACRES) =	42.3	PEAK FLOW RATE(CFS) =	61.23		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3125.00 TO NODE 3130.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	712.00	DOWNSTREAM(FEET) =	707.30
FLOW LENGTH(FEET) =	780.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	42.0 INCH PIPE IS	29.1 INCHES	

PIPE-FLOW VELOCITY(FEET/SEC.) = 8.60  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 61.23  
PIPE TRAVEL TIME(MIN.) = 1.51 Tc(MIN.) = 21.36  
LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3130.00 = 3690.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3130.00 TO NODE 3130.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) =	21.36				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.748				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	3.39	0.98	0.100	32
PUBLIC PARK	A	2.00	0.98	0.850	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.98				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.378				
SUBAREA AREA(ACRES) =	5.39	SUBAREA RUNOFF(CFS) =	6.69		
EFFECTIVE AREA(ACRES) =	47.71	AREA-AVERAGED Fm(INCH/HR) =	0.24		
AREA-AVERAGED Fp(INCH/HR) =	0.97	AREA-AVERAGED Ap =	0.24		
TOTAL AREA(ACRES) =	47.7	PEAK FLOW RATE(CFS) =	64.93		

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3130.00 TO NODE 3135.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	707.30	DOWNSTREAM(FEET) =	705.00
FLOW LENGTH(FEET) =	430.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	42.0 INCH PIPE IS	32.1 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	8.24		
ESTIMATED PIPE DIAMETER(INCH) =	42.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	64.93		
PIPE TRAVEL TIME(MIN.) =	0.87	Tc(MIN.) =	22.23
LONGEST FLOWPATH FROM NODE	3085.00 TO NODE	3135.00 =	4120.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3135.00 TO NODE 3135.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) =	22.23				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.706				
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"	A	12.75	0.98	0.200	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.98				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.200				
SUBAREA AREA(ACRES) =	12.75	SUBAREA RUNOFF(CFS) =	17.34		
EFFECTIVE AREA(ACRES) =	60.46	AREA-AVERAGED Fm(INCH/HR) =	0.23		

AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.23  
TOTAL AREA(ACRES) = 60.5 PEAK FLOW RATE(CFS) = 80.49

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3135.00 TO NODE 3140.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	705.00	DOWNSTREAM(FEET) =	703.50	
FLOW LENGTH(FEET) =	370.00	MANNING'S N =	0.013	
DEPTH OF FLOW IN 48.0 INCH PIPE IS	36.5	INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	7.84			
ESTIMATED PIPE DIAMETER(INCH) =	48.00	NUMBER OF PIPES =	1	
PIPE-FLOW(CFS) =	80.49			
PIPE TRAVEL TIME(MIN.) =	0.79	Tc(MIN.) =	23.01	
LONGEST FLOWPATH FROM NODE	3085.00	TO NODE	3140.00 =	4490.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3140.00 TO NODE 3140.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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MAINLINE Tc(MIN.) = 23.01  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.671  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	3.07	0.98	0.100	32
PUBLIC PARK	A	2.00	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.396  
SUBAREA AREA(ACRES) = 5.07 SUBAREA RUNOFF(CFS) = 5.86  
EFFECTIVE AREA(ACRES) = 65.53 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.25  
TOTAL AREA(ACRES) = 65.5 PEAK FLOW RATE(CFS) = 84.44

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3140.00 TO NODE 3200.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	703.50	DOWNSTREAM(FEET) =	702.00	
FLOW LENGTH(FEET) =	160.00	MANNING'S N =	0.013	
DEPTH OF FLOW IN 42.0 INCH PIPE IS	31.6	INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	10.89			
ESTIMATED PIPE DIAMETER(INCH) =	42.00	NUMBER OF PIPES =	1	
PIPE-FLOW(CFS) =	84.44			
PIPE TRAVEL TIME(MIN.) =	0.24	Tc(MIN.) =	23.26	
LONGEST FLOWPATH FROM NODE	3085.00	TO NODE	3200.00 =	4650.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3200.00 TO NODE 3200.00 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	84.44	23.26	1.661	0.97( 0.24)	0.25	65.5	3085.00

LONGEST FLOWPATH FROM NODE 3085.00 TO NODE 3200.00 = 4650.00 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	181.76	36.29	1.272	0.96( 0.49)	0.52	257.9	3056.00
2	171.02	42.00	1.165	0.96( 0.50)	0.52	282.3	3000.00
3	134.01	52.95	1.014	0.96( 0.50)	0.52	287.6	3021.00

LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3200.00 = 10611.00 FEET.

\*\*\*\*\* PEAK FLOW RATE TABLE \*\*\*\*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	259.14	23.26	1.661	0.96( 0.42)	0.44	230.8	3085.00
2	243.09	36.29	1.272	0.96( 0.44)	0.46	323.4	3056.00
3	226.01	42.00	1.165	0.96( 0.45)	0.47	347.8	3000.00
4	180.02	52.95	1.014	0.96( 0.45)	0.47	353.1	3021.00

TOTAL AREA(ACRES) = 353.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 259.14 Tc(MIN.) = 23.260  
EFFECTIVE AREA(ACRES) = 230.84 AREA-AVERAGED Fm(INCH/HR) = 0.42  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.44  
TOTAL AREA(ACRES) = 353.1  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3200.00 = 10611.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3200.00 TO NODE 3200.00 IS CODE = 12  
-----

>>>>CLEAR MEMORY BANK # 1 <<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3200.00 TO NODE 3215.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	702.00	DOWNSTREAM(FEET) =	692.30	
FLOW LENGTH(FEET) =	960.00	MANNING'S N =	0.013	
DEPTH OF FLOW IN 63.0 INCH PIPE IS	47.4	INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	14.82			
ESTIMATED PIPE DIAMETER(INCH) =	63.00	NUMBER OF PIPES =	1	
PIPE-FLOW(CFS) =	259.14			
PIPE TRAVEL TIME(MIN.) =	1.08	Tc(MIN.) =	24.34	
LONGEST FLOWPATH FROM NODE	3000.00	TO NODE	3215.00 =	11571.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3215.00 TO NODE 3215.00 IS CODE = 81  
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.34
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.616
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      1.97    0.98    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.97      SUBAREA RUNOFF(CFS) = 2.69
EFFECTIVE AREA(ACRES) = 232.81  AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 355.1      PEAK FLOW RATE(CFS) = 259.14
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 3215.00 TO NODE 3215.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 24.34
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.616
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"  A      28.42   0.98   0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 28.42      SUBAREA RUNOFF(CFS) = 28.86
EFFECTIVE AREA(ACRES) = 261.23  AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 383.5      PEAK FLOW RATE(CFS) = 279.80

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*****
FLOW PROCESS FROM NODE 3215.00 TO NODE 3220.00 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) = 692.30  DOWNSTREAM(FEET) = 684.00
FLOW LENGTH(FEET) = 830.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 51.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.82
ESTIMATED PIPE DIAMETER(INCH) = 63.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 279.80
PIPE TRAVEL TIME(MIN.) = 0.93  Tc(MIN.) = 25.27
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3220.00 = 12401.00 FEET.

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*****
FLOW PROCESS FROM NODE 3220.00 TO NODE 3220.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.27

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* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.580
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      2.14    0.98    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 2.14      SUBAREA RUNOFF(CFS) = 2.86
EFFECTIVE AREA(ACRES) = 263.37  AREA-AVERAGED Fm(INCH/HR) = 0.42
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 385.7      PEAK FLOW RATE(CFS) = 279.80
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 3220.00 TO NODE 3220.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.27
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.580
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
PUBLIC PARK              A      1.40    0.98    0.850    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"  A      15.18   0.98   0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
SUBAREA AREA(ACRES) = 16.58      SUBAREA RUNOFF(CFS) = 15.87
EFFECTIVE AREA(ACRES) = 279.95  AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 402.2      PEAK FLOW RATE(CFS) = 290.04

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*****
FLOW PROCESS FROM NODE 3220.00 TO NODE 3225.00 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) = 684.00  DOWNSTREAM(FEET) = 675.00
FLOW LENGTH(FEET) = 790.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 49.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.81
ESTIMATED PIPE DIAMETER(INCH) = 63.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 290.04
PIPE TRAVEL TIME(MIN.) = 0.83  Tc(MIN.) = 26.11
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3225.00 = 13191.00 FEET.

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*****
FLOW PROCESS FROM NODE 3225.00 TO NODE 3225.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 26.11
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.549
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  
 "5-7 DWELLINGS/ACRE" A 4.20 0.98 0.500 32  
 PUBLIC PARK A 25.51 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.801  
 SUBAREA AREA(ACRES) = 29.71 SUBAREA RUNOFF(CFS) = 20.56  
 EFFECTIVE AREA(ACRES) = 309.66 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 432.0 PEAK FLOW RATE(CFS) = 302.93

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3225.00 TO NODE 3230.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 675.00 DOWNSTREAM(FEET) = 673.50  
 FLOW LENGTH(FEET) = 110.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.23  
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 302.93  
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 26.21  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3230.00 = 13301.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3230.00 TO NODE 3230.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 26.21  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.546  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 5.34 0.98 0.100 32  
 PUBLIC PARK A 1.71 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.282  
 SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 8.06  
 EFFECTIVE AREA(ACRES) = 316.71 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 439.0 PEAK FLOW RATE(CFS) = 309.94

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3230.00 TO NODE 3235.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 673.50 DOWNSTREAM(FEET) = 668.00  
 FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 69.0 INCH PIPE IS 54.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.15

ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 309.94  
 PIPE TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 27.01  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3235.00 = 13981.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3235.00 TO NODE 3235.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 27.01  
 \* 25 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  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 11.95 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 11.95 SUBAREA RUNOFF(CFS) = 11.08  
 EFFECTIVE AREA(ACRES) = 328.66 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 451.0 PEAK FLOW RATE(CFS) = 313.14

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3235.00 TO NODE 3240.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 668.00 DOWNSTREAM(FEET) = 666.50  
 FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 66.0 INCH PIPE IS 53.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.28  
 ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 313.14  
 PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 27.18  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3240.00 = 14131.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3240.00 TO NODE 3240.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====  
 MAINLINE Tc(MIN.) = 27.18  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.512  
 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" A 6.30 0.98 0.500 32  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 1.07 0.57 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.92  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 7.37 SUBAREA RUNOFF(CFS) = 7.00

EFFECTIVE AREA(ACRES) = 336.03 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 458.3 PEAK FLOW RATE(CFS) = 318.51

AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 462.1 PEAK FLOW RATE(CFS) = 320.11

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3240.00 TO NODE 3245.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	666.50	DOWNSTREAM(FEET) =	664.00
FLOW LENGTH(FEET) =	230.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	66.0 INCH PIPE IS	51.8 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	15.92		
ESTIMATED PIPE DIAMETER(INCH) =	66.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	318.51		
PIPE TRAVEL TIME(MIN.) =	0.24	Tc(MIN.) =	27.42
LONGEST FLOWPATH FROM NODE	3000.00 TO NODE	3245.00 =	14361.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3245.00 TO NODE 3245.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) =	27.42				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.505				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	A	1.32	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 1.32 SUBAREA RUNOFF(CFS) = 1.67  
EFFECTIVE AREA(ACRES) = 337.35 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 459.6 PEAK FLOW RATE(CFS) = 318.51  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3245.00 TO NODE 3245.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) =	27.42				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.505				
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"	A	1.70	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	0.72	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 2.42 SUBAREA RUNOFF(CFS) = 2.35  
EFFECTIVE AREA(ACRES) = 339.77 AREA-AVERAGED Fm(INCH/HR) = 0.46

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3245.00 TO NODE 3250.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	664.00	DOWNSTREAM(FEET) =	661.50
FLOW LENGTH(FEET) =	340.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	72.0 INCH PIPE IS	54.9 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	13.84		
ESTIMATED PIPE DIAMETER(INCH) =	72.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	320.11		
PIPE TRAVEL TIME(MIN.) =	0.41	Tc(MIN.) =	27.83
LONGEST FLOWPATH FROM NODE	3000.00 TO NODE	3250.00 =	14701.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3250.00 TO NODE 3250.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) =	27.83				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.491				
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"	A	1.10	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	2.01	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.71  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 3.11 SUBAREA RUNOFF(CFS) = 3.18  
EFFECTIVE AREA(ACRES) = 342.88 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 465.2 PEAK FLOW RATE(CFS) = 320.11  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3250.00 TO NODE 3250.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) =	27.83				
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.491				
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"	A	6.85	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 6.85 SUBAREA RUNOFF(CFS) = 6.19  
EFFECTIVE AREA(ACRES) = 349.73 AREA-AVERAGED Fm(INCH/HR) = 0.46



AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 472.0 PEAK FLOW RATE(CFS) = 325.41

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3250.00 TO NODE 3255.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 661.50 DOWNSTREAM(FEET) = 660.50  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 69.0 INCH PIPE IS 51.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.65  
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 325.41  
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 27.93  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3255.00 = 14801.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3255.00 TO NODE 3255.00 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.) = 27.93  
RAINFALL INTENSITY(INCH/HR) = 1.49  
AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96  
AREA-AVERAGED Ap = 0.48  
EFFECTIVE STREAM AREA(ACRES) = 349.73  
TOTAL STREAM AREA(ACRES) = 472.03  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 325.41

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3300.00 TO NODE 3305.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 930.00  
ELEVATION DATA: UPSTREAM(FEET) = 696.00 DOWNSTREAM(FEET) = 682.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.862  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.265  
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  
"5-7 DWELLINGS/ACRE" A 4.64 0.98 0.500 32 13.86  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 7.42  
TOTAL AREA(ACRES) = 4.64 PEAK FLOW RATE(CFS) = 7.42

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3305.00 TO NODE 3310.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<  
-----

UPSTREAM ELEVATION(FEET) = 682.00 DOWNSTREAM ELEVATION(FEET) = 674.00  
STREET LENGTH(FEET) = 490.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.25  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.41  
HALFSTREET FLOOD WIDTH(FEET) = 12.73  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.38  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.40  
STREET FLOW TRAVEL TIME(MIN.) = 2.42 Tc(MIN.) = 16.28  
\* 25 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  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 6.82 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 6.82 SUBAREA RUNOFF(CFS) = 9.63  
EFFECTIVE AREA(ACRES) = 11.46 AREA-AVERAGED Fm(INCH/HR) = 0.49  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 11.5 PEAK FLOW RATE(CFS) = 16.19

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.45 HALFSTREET FLOOD WIDTH(FEET) = 14.34  
FLOW VELOCITY(FEET/SEC.) = 3.60 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.60  
LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3310.00 = 1420.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3310.00 TO NODE 3315.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 674.00 DOWNSTREAM(FEET) = 670.00  
FLOW LENGTH(FEET) = 730.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.99  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 16.19

PIPE TRAVEL TIME(MIN.) = 2.03 Tc(MIN.) = 18.31  
 LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3315.00 = 2150.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3315.00 TO NODE 3315.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.31  
 \* 25 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  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 10.71 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 10.71 SUBAREA RUNOFF(CFS) = 13.78  
 EFFECTIVE AREA(ACRES) = 22.17 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 22.2 PEAK FLOW RATE(CFS) = 28.53

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3315.00 TO NODE 3320.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM( FEET) = 670.00 DOWNSTREAM( FEET) = 666.00  
 FLOW LENGTH( FEET) = 700.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.8 INCHES  
 PIPE-FLOW VELOCITY( FEET/ SEC.) = 6.83  
 ESTIMATED PIPE DIAMETER( INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 28.53  
 PIPE TRAVEL TIME( MIN.) = 1.71 Tc( MIN.) = 20.02  
 LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3320.00 = 2850.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3320.00 TO NODE 3320.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.02  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.817  
 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" A 14.61 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 14.61 SUBAREA RUNOFF(CFS) = 17.48  
 EFFECTIVE AREA(ACRES) = 36.78 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 36.8 PEAK FLOW RATE(CFS) = 44.01

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3320.00 TO NODE 3255.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM( FEET) = 666.00 DOWNSTREAM( FEET) = 660.50  
 FLOW LENGTH( FEET) = 680.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.3 INCHES  
 PIPE-FLOW VELOCITY( FEET/ SEC.) = 8.66  
 ESTIMATED PIPE DIAMETER( INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 44.01  
 PIPE TRAVEL TIME( MIN.) = 1.31 Tc( MIN.) = 21.32  
 LONGEST FLOWPATH FROM NODE 3300.00 TO NODE 3255.00 = 3530.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3255.00 TO NODE 3255.00 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.) = 21.32  
 RAINFALL INTENSITY( INCH/ HR) = 1.75  
 AREA-AVERAGED Fm( INCH/ HR) = 0.49  
 AREA-AVERAGED Fp( INCH/ HR) = 0.98  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA( ACRES) = 36.78  
 TOTAL STREAM AREA( ACRES) = 36.78  
 PEAK FLOW RATE( CFS) AT CONFLUENCE = 44.01

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	325.41	27.93	1.488	0.96( 0.46)	0.48	349.7	3085.00
1	285.63	41.08	1.180	0.96( 0.46)	0.48	442.3	3056.00
1	262.32	46.88	1.091	0.96( 0.47)	0.49	466.7	3000.00
1	208.21	58.10	0.959	0.96( 0.47)	0.49	472.0	3021.00
2	44.01	21.32	1.749	0.98( 0.49)	0.50	36.8	3300.00

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	355.50	21.32	1.749	0.96( 0.46)	0.48	303.8	3300.00
2	360.30	27.93	1.488	0.96( 0.46)	0.48	386.5	3085.00
3	309.79	41.08	1.180	0.96( 0.47)	0.49	479.1	3056.00
4	283.35	46.88	1.091	0.96( 0.47)	0.49	503.5	3000.00
5	224.93	58.10	0.959	0.96( 0.47)	0.49	508.8	3021.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 360.30 Tc(MIN.) = 27.93  
 EFFECTIVE AREA(ACRES) = 386.51 AREA-AVERAGED Fm(INCH/HR) = 0.46

AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 508.8  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3255.00 = 14801.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3255.00 TO NODE 3255.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 27.93  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.488  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 1.36 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 1.36 SUBAREA RUNOFF(CFS) = 1.70  
EFFECTIVE AREA(ACRES) = 387.87 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 510.2 PEAK FLOW RATE(CFS) = 360.30  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3255.00 TO NODE 3400.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 660.50 DOWNSTREAM(FEET) = 655.00  
FLOW LENGTH(FEET) = 570.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 54.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.82  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 360.30  
PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 28.53  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3400.00 = 15371.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3400.00 TO NODE 3400.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 28.53  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.469  
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" A 17.70 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 17.70 SUBAREA RUNOFF(CFS) = 15.63  
EFFECTIVE AREA(ACRES) = 405.57 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 527.9 PEAK FLOW RATE(CFS) = 368.19

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3400.00 TO NODE 3405.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 655.00 DOWNSTREAM(FEET) = 653.00  
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 75.0 INCH PIPE IS 59.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.06  
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 368.19  
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 28.87  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3405.00 = 15651.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3405.00 TO NODE 3405.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 28.87  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.459  
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" A 10.67 0.98 0.500 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 10.67 SUBAREA RUNOFF(CFS) = 9.33  
EFFECTIVE AREA(ACRES) = 416.24 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 538.5 PEAK FLOW RATE(CFS) = 373.81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3405.00 TO NODE 3410.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 653.00 DOWNSTREAM(FEET) = 650.00  
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 53.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.64  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 373.81  
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 29.15  
LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3410.00 = 15931.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3410.00 TO NODE 3410.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 29.15

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.450  
 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" A 7.25 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 7.25 SUBAREA RUNOFF(CFS) = 6.28  
 EFFECTIVE AREA(ACRES) = 423.49 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 545.8 PEAK FLOW RATE(CFS) = 376.94

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	377.18	22.54	1.692	0.96( 0.46)	0.48	340.7	3300.00
2	376.94	29.15	1.450	0.96( 0.46)	0.48	423.5	3085.00
3	321.42	42.35	1.159	0.96( 0.47)	0.49	516.1	3056.00
4	293.62	48.16	1.073	0.96( 0.47)	0.49	540.4	3000.00
5	236.91	59.47	0.945	0.96( 0.47)	0.49	545.8	3021.00

NEW PEAK FLOW DATA ARE:  
 PEAK FLOW RATE(CFS) = 377.18 Tc(MIN.) = 22.54  
 AREA-AVERAGED Fm(INCH/HR) = 0.46 AREA-AVERAGED Fp(INCH/HR) = 0.96  
 AREA-AVERAGED Ap = 0.48 EFFECTIVE AREA(ACRES) = 340.74

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3410.00 TO NODE 3410.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====

MAINLINE Tc(MIN.) = 22.54  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.692  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 1.37 0.98 0.100 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 1.37 SUBAREA RUNOFF(CFS) = 1.97  
 EFFECTIVE AREA(ACRES) = 342.11 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 547.2 PEAK FLOW RATE(CFS) = 379.14

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3410.00 TO NODE 3410.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
 =====

MAINLINE Tc(MIN.) = 22.54  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.692  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 SCHOOL C 4.03 0.57 0.600 69  
 SCHOOL A 5.84 0.98 0.600 32

PUBLIC PARK A 5.67 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.88  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.691  
 SUBAREA AREA(ACRES) = 15.54 SUBAREA RUNOFF(CFS) = 15.13  
 EFFECTIVE AREA(ACRES) = 357.65 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 562.7 PEAK FLOW RATE(CFS) = 394.27

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3410.00 TO NODE 3415.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 650.00 DOWNSTREAM(FEET) = 648.80  
 FLOW LENGTH(FEET) = 120.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 72.0 INCH PIPE IS 57.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.20  
 ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 394.27  
 PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 22.66  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3415.00 = 16051.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 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.) = 22.66  
 RAINFALL INTENSITY(INCH/HR) = 1.69  
 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.96  
 AREA-AVERAGED Ap = 0.49  
 EFFECTIVE STREAM AREA(ACRES) = 357.65  
 TOTAL STREAM AREA(ACRES) = 562.70  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 394.27

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3500.00 TO NODE 3505.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 =====  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 950.00  
 ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 675.00  
  
 $Tc = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 18.646  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.896  
 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 A 5.42 0.98 0.850 32 18.65  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA RUNOFF(CFS) = 5.21  
TOTAL AREA(ACRES) = 5.42 PEAK FLOW RATE(CFS) = 5.21

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3505.00 TO NODE 3510.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) =	675.00	DOWNSTREAM(FEET) =	673.00
CHANNEL LENGTH THRU SUBAREA(FEET) =	600.00	CHANNEL SLOPE =	0.0033
CHANNEL FLOW THRU SUBAREA(CFS) =	5.21		
FLOW VELOCITY(FEET/SEC) =	1.23	(PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)	
TRAVEL TIME(MIN.) =	8.13	Tc(MIN.) =	26.78
LONGEST FLOWPATH FROM NODE	3500.00 TO NODE	3510.00 =	1550.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3510.00 TO NODE 3510.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) =	26.78
* 25 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
PUBLIC PARK	A 3.15 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.850
SUBAREA AREA(ACRES) =	3.15 SUBAREA RUNOFF(CFS) = 1.98
EFFECTIVE AREA(ACRES) =	8.57 AREA-AVERAGED Fm(INCH/HR) = 0.83
AREA-AVERAGED Fp(INCH/HR) =	0.97 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) =	8.6 PEAK FLOW RATE(CFS) = 5.38

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3510.00 TO NODE 3515.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) =	673.00	DOWNSTREAM(FEET) =	665.00
FLOW LENGTH(FEET) =	100.00	MANNING'S N =	0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO	24.000		
DEPTH OF FLOW IN 24.0 INCH PIPE IS	4.8 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	11.93		
ESTIMATED PIPE DIAMETER(INCH) =	24.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	5.38		
PIPE TRAVEL TIME(MIN.) =	0.14	Tc(MIN.) =	26.92
LONGEST FLOWPATH FROM NODE	3500.00 TO NODE	3515.00 =	1650.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3515.00 TO NODE 3515.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 26.92  
\* 25 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
COMMERCIAL	A 0.95 0.98 0.100 32
PUBLIC PARK	A 0.73 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.426
SUBAREA AREA(ACRES) =	1.68 SUBAREA RUNOFF(CFS) = 1.67
EFFECTIVE AREA(ACRES) =	10.25 AREA-AVERAGED Fm(INCH/HR) = 0.76
AREA-AVERAGED Fp(INCH/HR) =	0.97 AREA-AVERAGED Ap = 0.78
TOTAL AREA(ACRES) =	10.2 PEAK FLOW RATE(CFS) = 7.01

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3515.00 TO NODE 3415.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) =	665.00	DOWNSTREAM(FEET) =	648.80
FLOW LENGTH(FEET) =	1010.00	MANNING'S N =	0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO	24.000		
DEPTH OF FLOW IN 24.0 INCH PIPE IS	8.3 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	7.26		
ESTIMATED PIPE DIAMETER(INCH) =	24.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	7.01		
PIPE TRAVEL TIME(MIN.) =	2.32	Tc(MIN.) =	29.24
LONGEST FLOWPATH FROM NODE	3500.00 TO NODE	3415.00 =	2660.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) =	29.24
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	1.448
SUBAREA LOSS RATE DATA(AMC II):	
DEVELOPMENT TYPE/	SCS SOIL AREA Fp Ap SCS
LAND USE	GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL	A 2.47 0.98 0.100 32
PUBLIC PARK	A 1.77 0.98 0.850 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.413
SUBAREA AREA(ACRES) =	4.24 SUBAREA RUNOFF(CFS) = 3.99
EFFECTIVE AREA(ACRES) =	14.49 AREA-AVERAGED Fm(INCH/HR) = 0.66
AREA-AVERAGED Fp(INCH/HR) =	0.97 AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) =	14.5 PEAK FLOW RATE(CFS) = 10.32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 IS CODE = 1  
-----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<  
=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 29.24  
 RAINFALL INTENSITY(INCH/HR) = 1.45  
 AREA-AVERAGED Fm(INCH/HR) = 0.66  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.67  
 EFFECTIVE STREAM AREA(ACRES) = 14.49  
 TOTAL STREAM AREA(ACRES) = 14.49  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.32

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	394.27	22.66	1.687	0.96 ( 0.47)	0.49	357.6	3300.00
1	390.35	29.27	1.447	0.96 ( 0.47)	0.49	440.4	3085.00
1	330.40	42.48	1.157	0.96 ( 0.47)	0.49	533.0	3056.00
1	301.29	48.29	1.071	0.96 ( 0.47)	0.49	557.3	3000.00
1	242.05	59.61	0.944	0.96 ( 0.47)	0.49	562.7	3021.00
2	10.32	29.24	1.448	0.97 ( 0.66)	0.67	14.5	3500.00

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	404.60	22.66	1.687	0.96 ( 0.47)	0.49	368.9	3300.00
2	400.69	29.24	1.448	0.96 ( 0.47)	0.49	454.5	3500.00
3	400.66	29.27	1.447	0.96 ( 0.47)	0.49	454.9	3085.00
4	336.94	42.48	1.157	0.96 ( 0.48)	0.50	547.5	3056.00
5	306.71	48.29	1.071	0.96 ( 0.48)	0.50	571.8	3000.00
6	246.07	59.61	0.944	0.96 ( 0.48)	0.50	577.2	3021.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 404.60 Tc(MIN.) = 22.66  
 EFFECTIVE AREA(ACRES) = 368.88 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 577.2  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3415.00 = 16051.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 3415.00 TO NODE 3415.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 22.66  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.687  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.10	0.98	0.100	32
PUBLIC PARK	A	0.75	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.404  
 SUBAREA AREA(ACRES) = 1.85 SUBAREA RUNOFF(CFS) = 2.15  
 EFFECTIVE AREA(ACRES) = 370.73 AREA-AVERAGED Fm(INCH/HR) = 0.47

AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 579.0 PEAK FLOW RATE(CFS) = 405.06

\*\*\*\*\*

FLOW PROCESS FROM NODE 3415.00 TO NODE 3530.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 648.80 DOWNSTREAM(FEET) = 648.40  
 FLOW LENGTH(FEET) = 440.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 114.0 INCH PIPE IS 91.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.63  
 ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 405.06  
 PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 23.77  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3530.00 = 16491.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 3530.00 TO NODE 3530.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 23.77  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.639  
 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"	A	3.42	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 3.42 SUBAREA RUNOFF(CFS) = 3.54  
 EFFECTIVE AREA(ACRES) = 374.15 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 582.5 PEAK FLOW RATE(CFS) = 405.06  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 3530.00 TO NODE 3540.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 648.40 DOWNSTREAM(FEET) = 648.00  
 FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 114.0 INCH PIPE IS 87.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.94  
 ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 405.06  
 PIPE TRAVEL TIME(MIN.) = 0.96 Tc(MIN.) = 24.73  
 LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3540.00 = 16891.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 3540.00 TO NODE 3540.00 IS CODE = 81



>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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=====
MAINLINE Tc(MIN.) = 24.73
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.601
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"   A      11.00    0.98    0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 11.00    SUBAREA RUNOFF(CFS) = 11.02
EFFECTIVE AREA(ACRES) = 385.15  AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 593.5    PEAK FLOW RATE(CFS) = 405.06
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
=====

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=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 593.5    TC(MIN.) = 24.73
EFFECTIVE AREA(ACRES) = 385.15  AREA-AVERAGED Fm(INCH/HR)= 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.96  AREA-AVERAGED Ap = 0.493
PEAK FLOW RATE(CFS) = 405.06
=====

```

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	405.06	24.73	1.601	0.96( 0.47)	0.49	385.1	3300.00
2	400.99	31.31	1.389	0.96( 0.47)	0.49	470.8	3500.00
3	400.96	31.34	1.389	0.96( 0.47)	0.49	471.2	3085.00
4	337.20	44.63	1.123	0.96( 0.48)	0.50	563.7	3056.00
5	306.96	50.49	1.043	0.96( 0.48)	0.50	588.1	3000.00
6	247.02	61.95	0.923	0.96( 0.48)	0.50	593.5	3021.00

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

AREA-AVERAGED  
DURATION RAINFALL(INCH)  
5-MINUTES 0.30  
30-MINUTES 0.61  
1-HOUR 0.80  
3-HOUR 1.38  
6-HOUR 1.94  
24-HOUR 3.65

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*

\* TRIANGLE - EAST OF TURNER & WEST OF HAVEN \*  
\* 10-YR STUDY \*  
\* AREA 'M' \*  
\*\*\*\*\*

FILE NAME: TURN-E.DAT  
TIME/DATE OF STUDY: 09:20 08/24/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====

---\*TIME-OF-CONCENTRATION MODEL\*---

USER SPECIFIED STORM EVENT(YEAR) = 10.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
  
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	16.0	0.020/0.020/0.020	0.67	2.00 0.0312 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH

\*\*\*\*\*

FLOW PROCESS FROM NODE 3600.00 TO NODE 3605.00 IS CODE = 21

-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

===== INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 693.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.631  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.728  
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  
"5-7 DWELLINGS/ACRE" A 5.62 0.98 0.500 32 16.63  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 6.27  
TOTAL AREA(ACRES) = 5.62 PEAK FLOW RATE(CFS) = 6.27

\*\*\*\*\*

FLOW PROCESS FROM NODE 3605.00 TO NODE 3610.00 IS CODE = 62

-----  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

===== UPSTREAM ELEVATION(FEET) = 693.00 DOWNSTREAM ELEVATION(FEET) = 691.00  
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.24  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.47  
 HALFSTREET FLOOD WIDTH(FEET) = 15.34  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.21  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.03  
 STREET FLOW TRAVEL TIME(MIN.) = 2.64 Tc(MIN.) = 19.27  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.581  
 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"	A	10.07	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 10.07 SUBAREA RUNOFF(CFS) = 9.91  
 EFFECTIVE AREA(ACRES) = 15.69 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 15.7 PEAK FLOW RATE(CFS) = 15.45

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 17.47  
 FLOW VELOCITY(FEET/SEC.) = 2.38 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.21  
 LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3610.00 = 1350.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3610.00 TO NODE 3615.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 691.00 DOWNSTREAM(FEET) = 681.00  
 FLOW LENGTH(FEET) = 520.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 12.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.56  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 15.45  
 PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 20.18  
 LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3615.00 = 1870.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3615.00 TO NODE 3615.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 20.18  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.538  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	8.23	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 8.23 SUBAREA RUNOFF(CFS) = 5.26  
 EFFECTIVE AREA(ACRES) = 23.92 AREA-AVERAGED Fm(INCH/HR) = 0.60  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.62  
 TOTAL AREA(ACRES) = 23.9 PEAK FLOW RATE(CFS) = 20.09

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3615.00 TO NODE 3620.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 681.00 DOWNSTREAM(FEET) = 676.00  
 FLOW LENGTH(FEET) = 820.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.51  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 20.09  
 PIPE TRAVEL TIME(MIN.) = 2.10 Tc(MIN.) = 22.28  
 LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3620.00 = 2690.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3620.00 TO NODE 3620.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 22.28  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.450  
 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"	A	14.61	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 14.61 SUBAREA RUNOFF(CFS) = 12.65  
 EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.56  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.57  
 TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 30.83

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3620.00 TO NODE 3625.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 676.00 DOWNSTREAM(FEET) = 666.00  
 FLOW LENGTH(FEET) = 1560.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.24  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 30.83  
 PIPE TRAVEL TIME(MIN.) = 3.59 Tc(MIN.) = 25.87  
 LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3625.00 = 4250.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3625.00 TO NODE 3625.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 25.87

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.325  
 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" A 29.71 0.98 0.500 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 29.71 SUBAREA RUNOFF(CFS) = 22.40  
 EFFECTIVE AREA(ACRES) = 68.24 AREA-AVERAGED Fm(INCH/HR) = 0.53  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.54  
 TOTAL AREA(ACRES) = 68.2 PEAK FLOW RATE(CFS) = 48.92

END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3625.00 TO NODE 3630.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 666.00 DOWNSTREAM(FEET) = 665.00  
 FLOW LENGTH(FEET) = 340.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.12  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 48.92  
 PIPE TRAVEL TIME(MIN.) = 0.93 Tc(MIN.) = 26.80  
 LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3630.00 = 4590.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3630.00 TO NODE 3630.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 26.80  
 \* 10 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  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 11.78 0.98 0.500 32  
 COMMERCIAL A 2.57 0.98 0.100 32  
 PUBLIC PARK A 1.10 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.458  
 SUBAREA AREA(ACRES) = 15.45 SUBAREA RUNOFF(CFS) = 11.83  
 EFFECTIVE AREA(ACRES) = 83.69 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.53  
 TOTAL AREA(ACRES) = 83.7 PEAK FLOW RATE(CFS) = 59.05

=====

END OF STUDY SUMMARY:  
 TOTAL AREA(ACRES) = 83.7 TC(MIN.) = 26.80  
 EFFECTIVE AREA(ACRES) = 83.69 AREA-AVERAGED Fm(INCH/HR) = 0.51  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.527  
 PEAK FLOW RATE(CFS) = 59.05  
 =====





\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*

\* TRIANGLE - EAST OF TURNER & WEST OF HAVEN \*  
\* 100-YR STUDY \*  
\* AREA 'M' \*  
\*\*\*\*\*

FILE NAME: TURN-E.DAT  
TIME/DATE OF STUDY: 08:55 08/03/2011

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====

---\*TIME-OF-CONCENTRATION MODEL\*---

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000  
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*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 GUTTER-GEOMETRIES:				MANNING FACTOR (n)
	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / SIDE	HEIGHT (FT)	WIDTH (FT)	LIP (FT)	HIKE (FT)	
1	30.0	16.0	0.020/0.020	0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 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

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH

FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.44
30-MINUTES	0.91
1-HOUR	1.20
3-HOUR	2.10
6-HOUR	3.00
24-HOUR	6.00

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\*

FLOW PROCESS FROM NODE 3600.00 TO NODE 3605.00 IS CODE = 21  
-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00  
ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 693.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.631  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.591  
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 "5-7 DWELLINGS/ACRE" A 5.62 0.98 0.500 32 16.63  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 10.64  
TOTAL AREA(ACRES) = 5.62 PEAK FLOW RATE(CFS) = 10.64

\*\*\*\*\*

FLOW PROCESS FROM NODE 3605.00 TO NODE 3610.00 IS CODE = 62  
-----  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
-----  
UPSTREAM ELEVATION(FEET) = 693.00 DOWNSTREAM ELEVATION(FEET) = 691.00  
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.30  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.54  
 HALFSTREET FLOOD WIDTH(FEET) = 19.09  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.52  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.36  
 STREET FLOW TRAVEL TIME(MIN.) = 2.32 Tc(MIN.) = 18.95  
 \* 100 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
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	10.07	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 10.07 SUBAREA RUNOFF(CFS) = 17.30  
 EFFECTIVE AREA(ACRES) = 15.69 AREA-AVERAGED Fm(INCH/HR) = 0.49  
 AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 15.7 PEAK FLOW RATE(CFS) = 26.95

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 21.78  
 FLOW VELOCITY(FEET/SEC.) = 2.73 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.62  
 LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3610.00 = 1350.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3610.00 TO NODE 3615.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 691.00 DOWNSTREAM(FEET) = 681.00  
 FLOW LENGTH(FEET) = 520.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.73  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 26.95  
 PIPE TRAVEL TIME(MIN.) = 0.81 Tc(MIN.) = 19.76  
 LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3615.00 = 1870.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3615.00 TO NODE 3615.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 19.76  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.337  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	8.23	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
 SUBAREA AREA(ACRES) = 8.23 SUBAREA RUNOFF(CFS) = 11.17  
 EFFECTIVE AREA(ACRES) = 23.92 AREA-AVERAGED Fm(INCH/HR) = 0.60  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.62  
 TOTAL AREA(ACRES) = 23.9 PEAK FLOW RATE(CFS) = 37.29

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3615.00 TO NODE 3620.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 681.00 DOWNSTREAM(FEET) = 676.00  
 FLOW LENGTH(FEET) = 820.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.51  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 37.29  
 PIPE TRAVEL TIME(MIN.) = 1.82 Tc(MIN.) = 21.58  
 LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3620.00 = 2690.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3620.00 TO NODE 3620.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 21.58  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.216  
 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"	A	14.61	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 14.61 SUBAREA RUNOFF(CFS) = 22.73  
 EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.56  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.57  
 TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 57.43

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3620.00 TO NODE 3625.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 676.00 DOWNSTREAM(FEET) = 666.00  
 FLOW LENGTH(FEET) = 1560.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.57  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 57.43  
 PIPE TRAVEL TIME(MIN.) = 3.03 Tc(MIN.) = 24.61  
 LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3625.00 = 4250.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 3625.00 TO NODE 3625.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 24.61  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.048

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"	A	29.71	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 29.71 SUBAREA RUNOFF(CFS) = 41.73  
EFFECTIVE AREA(ACRES) = 68.24 AREA-AVERAGED Fm(INCH/HR) = 0.53  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.54  
TOTAL AREA(ACRES) = 68.2 PEAK FLOW RATE(CFS) = 93.33

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3625.00 TO NODE 3630.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 666.00 DOWNSTREAM(FEET) = 665.00  
FLOW LENGTH(FEET) = 340.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.22  
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 93.33  
PIPE TRAVEL TIME(MIN.) = 0.78 Tc(MIN.) = 25.40  
LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3630.00 = 4590.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 3630.00 TO NODE 3630.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
=====

MAINLINE Tc(MIN.) = 25.40  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.010

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"	A	11.78	0.98	0.500	32
COMMERCIAL	A	2.57	0.98	0.100	32
PUBLIC PARK	A	1.10	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.458  
SUBAREA AREA(ACRES) = 15.45 SUBAREA RUNOFF(CFS) = 21.74  
EFFECTIVE AREA(ACRES) = 83.69 AREA-AVERAGED Fm(INCH/HR) = 0.51  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.53  
TOTAL AREA(ACRES) = 83.7 PEAK FLOW RATE(CFS) = 112.72

=====

END OF STUDY SUMMARY:  
TOTAL AREA(ACRES) = 83.7 TC(MIN.) = 25.40  
EFFECTIVE AREA(ACRES) = 83.69 AREA-AVERAGED Fm(INCH/HR) = 0.51  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.527  
PEAK FLOW RATE(CFS) = 112.72

=====

END OF RATIONAL METHOD ANALYSIS



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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*
\* TRIANGLE - EAST OF TURNER & WEST OF HAVEN \*
\* 25-YR STUDY \*
\* AREA 'M' \*

FILE NAME: TURN-E.DAT
TIME/DATE OF STUDY: 09:24 08/24/2011

=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

Table with 10 columns: NO., HALF WIDTH (FT), CROWN TO CROSSFALL (FT), STREET-CROSSFALL IN- / OUT- / PARK- SIDE / SIDE / WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GEOMETRIES LIP (FT), HIKES (FT), MANNING FACTOR (n). Row 1: 1, 30.0, 16.0, 0.020/0.020/0.020, 0.67, 2.00, 0.0312, 0.167, 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.50 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:
WATERSHED LAG = 0.80 \* Tc

USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE. SIERRA MADRE DEPTH-AREA FACTORS USED.

AREA-AVERAGED
DURATION RAINFALL(INCH)
5-MINUTES 0.35
30-MINUTES 0.71
1-HOUR 0.94
3-HOUR 1.64
6-HOUR 2.32
24-HOUR 4.49

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\*

FLOW PROCESS FROM NODE 3600.00 TO NODE 3605.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 693.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.631
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.031

Subarea Analysis Table with columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Includes Residential data: "5-7 DWELLINGS/ACRE" A, 5.62, 0.98, 0.500, 32, 16.63

\*\*\*\*\*

FLOW PROCESS FROM NODE 3605.00 TO NODE 3610.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====
UPSTREAM ELEVATION(FEET) = 693.00 DOWNSTREAM ELEVATION(FEET) = 691.00
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 16.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(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) =      14.07
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.49
HALFSTREET FLOOD WIDTH(FEET) = 16.78
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.34
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.16
STREET FLOW TRAVEL TIME(MIN.) = 2.49  Tc(MIN.) = 19.12
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.867
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"   A      10.07    0.98     0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 10.07  SUBAREA RUNOFF(CFS) = 12.51
EFFECTIVE AREA(ACRES) = 15.69  AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 15.7  PEAK FLOW RATE(CFS) = 19.49

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.54  HALFSTREET FLOOD WIDTH(FEET) = 19.16
FLOW VELOCITY(FEET/SEC.) = 2.52  DEPTH*VELOCITY(FT*FT/SEC.) = 1.37
LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3610.00 = 1350.00 FEET.

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*****
FLOW PROCESS FROM NODE 3610.00 TO NODE 3615.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 691.00  DOWNSTREAM(FEET) = 681.00
FLOW LENGTH(FEET) = 520.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.10
ESTIMATED PIPE DIAMETER(INCH) = 24.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.49
PIPE TRAVEL TIME(MIN.) = 0.86  Tc(MIN.) = 19.98
LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3615.00 = 1870.00 FEET.

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*****
FLOW PROCESS FROM NODE 3615.00 TO NODE 3615.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.98
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.819
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
  LAND USE              GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
PUBLIC PARK              A      8.23    0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 8.23  SUBAREA RUNOFF(CFS) = 7.33
EFFECTIVE AREA(ACRES) = 23.92  AREA-AVERAGED Fm(INCH/HR) = 0.60

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AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.62
TOTAL AREA(ACRES) = 23.9  PEAK FLOW RATE(CFS) = 26.14
*****
FLOW PROCESS FROM NODE 3615.00 TO NODE 3620.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 681.00  DOWNSTREAM(FEET) = 676.00
FLOW LENGTH(FEET) = 820.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.96
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.14
PIPE TRAVEL TIME(MIN.) = 1.96  Tc(MIN.) = 21.95
LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3620.00 = 2690.00 FEET.
*****
FLOW PROCESS FROM NODE 3620.00 TO NODE 3620.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.95
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.720
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"   A      14.61    0.98     0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 14.61  SUBAREA RUNOFF(CFS) = 16.20
EFFECTIVE AREA(ACRES) = 38.53  AREA-AVERAGED Fm(INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.57
TOTAL AREA(ACRES) = 38.5  PEAK FLOW RATE(CFS) = 40.19
*****
FLOW PROCESS FROM NODE 3620.00 TO NODE 3625.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 676.00  DOWNSTREAM(FEET) = 666.00
FLOW LENGTH(FEET) = 1560.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.95
ESTIMATED PIPE DIAMETER(INCH) = 36.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.19
PIPE TRAVEL TIME(MIN.) = 3.27  Tc(MIN.) = 25.22
LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3625.00 = 4250.00 FEET.
*****
FLOW PROCESS FROM NODE 3625.00 TO NODE 3625.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 25.22
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.582
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"   A      29.71    0.98     0.500    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 29.71      SUBAREA RUNOFF(CFS) = 29.27
EFFECTIVE AREA(ACRES) = 68.24    AREA-AVERAGED Fm(INCH/HR) = 0.53
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 68.2        PEAK FLOW RATE(CFS) = 64.69

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=====
END OF RATIONAL METHOD ANALYSIS
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*****
FLOW PROCESS FROM NODE 3625.00 TO NODE 3630.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 666.00 DOWNSTREAM(FEET) = 665.00
FLOW LENGTH(FEET) = 340.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.63
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 64.69
PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 26.07
LONGEST FLOWPATH FROM NODE 3600.00 TO NODE 3630.00 = 4590.00 FEET.

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*****
FLOW PROCESS FROM NODE 3630.00 TO NODE 3630.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 26.07
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.551
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"   A      11.78    0.98     0.500    32
COMMERCIAL              A      2.57    0.98     0.100    32
PUBLIC PARK             A      1.10    0.98     0.850    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.458
SUBAREA AREA(ACRES) = 15.45      SUBAREA RUNOFF(CFS) = 15.35
EFFECTIVE AREA(ACRES) = 83.69    AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.97  AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 83.7        PEAK FLOW RATE(CFS) = 78.12

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=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 83.7 TC(MIN.) = 26.07
EFFECTIVE AREA(ACRES) = 83.69 AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.527
PEAK FLOW RATE(CFS) = 78.12

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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*
\* W.O. #915-1, ONTARIO MPD \*
\* 10-YR STUDY \*
\* WALKER AVE. AREA 'C' \*
\*\*\*\*\*

FILE NAME: WALKER\_M.DAT
TIME/DATE OF STUDY: 15:55 11/11/2011

=====
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
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

Table with columns: NO., WIDTH (FT), CROWN TO CROSSFALL (FT), STREET-CROSSFALL IN- / OUT- / PARK- SIDE / SIDE / WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GUTTER LIP (FT), GUTTER HIKE (FT), GEOMETRIES (FT), MANNING FACTOR (n)

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.00 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
SIERRA MADRE DEPTH-AREA FACTORS USED.

Table with columns: DURATION, AREA-AVERAGED RAINFALL(INCH)
5-MINUTES 0.30
30-MINUTES 0.61
1-HOUR 0.80
3-HOUR 1.38
6-HOUR 1.94
24-HOUR 3.65

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\*

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 998.00
ELEVATION DATA: UPSTREAM(FEET) = 775.00 DOWNSTREAM(FEET) = 767.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.174
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.757
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ LAND USE SCS SOIL AREA Fp Ap SCS Tc
GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)

RESIDENTIAL
"5-7 DWELLINGS/ACRE" A 5.70 0.98 0.500 32 16.17
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 4.00 0.57 0.500 69 16.17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 11.82
TOTAL AREA(ACRES) = 9.70 PEAK FLOW RATE(CFS) = 11.82

\*\*\*\*\*

FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 767.00 DOWNSTREAM ELEVATION(FEET) = 750.00
STREET LENGTH(FEET) = 1686.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 65.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 60.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.04  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.50  
 HALFSTREET FLOOD WIDTH(FEET) = 16.92  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.12  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.55  
 STREET FLOW TRAVEL TIME(MIN.) = 9.01 Tc(MIN.) = 25.19  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.347

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"	A	13.90	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.70	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 17.60 SUBAREA RUNOFF(CFS) = 14.29  
 EFFECTIVE AREA(ACRES) = 27.30 AREA-AVERAGED Fm(INCH/HR) = 0.43  
 AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 27.3 PEAK FLOW RATE(CFS) = 22.53

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 18.15  
 FLOW VELOCITY(FEET/SEC.) = 3.23 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.69  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 83.00 = 2684.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 747.70  
 FLOW LENGTH(FEET) = 1333.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.18  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 22.53  
 PIPE TRAVEL TIME(MIN.) = 5.32 Tc(MIN.) = 30.50  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 84.00 = 4017.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 30.50

\* 10 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
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	72.10	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 72.10 SUBAREA RUNOFF(CFS) = 46.27  
 EFFECTIVE AREA(ACRES) = 99.40 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 99.4 PEAK FLOW RATE(CFS) = 65.21

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 30.50  
 \* 10 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
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	8.70	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	91.90	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.474  
 SUBAREA AREA(ACRES) = 100.60 SUBAREA RUNOFF(CFS) = 66.85  
 EFFECTIVE AREA(ACRES) = 200.00 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 200.0 PEAK FLOW RATE(CFS) = 132.06

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 747.70 DOWNSTREAM(FEET) = 722.70  
 FLOW LENGTH(FEET) = 2630.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 39.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.05  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 132.06  
 PIPE TRAVEL TIME(MIN.) = 3.64 Tc(MIN.) = 34.14  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 85.00 = 6647.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 34.14  
 \* 10 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
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	73.80	0.98	0.500	32
PUBLIC PARK	A	26.20	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.592  
SUBAREA AREA(ACRES) = 100.00 SUBAREA RUNOFF(CFS) = 49.07  
EFFECTIVE AREA(ACRES) = 300.00 AREA-AVERAGED Fm(INCH/HR) = 0.50  
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 300.0 PEAK FLOW RATE(CFS) = 167.01

\*\*\*\*\*  
FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 34.14  
\* 10 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
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	8.30	0.98	0.500	32
PUBLIC PARK	A	0.60	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524  
SUBAREA AREA(ACRES) = 8.90 SUBAREA RUNOFF(CFS) = 4.90  
EFFECTIVE AREA(ACRES) = 308.90 AREA-AVERAGED Fm(INCH/HR) = 0.50  
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 308.9 PEAK FLOW RATE(CFS) = 171.91

\*\*\*\*\*  
FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 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.) = 34.14  
RAINFALL INTENSITY(INCH/HR) = 1.12  
AREA-AVERAGED Fm(INCH/HR) = 0.50  
AREA-AVERAGED Fp(INCH/HR) = 0.97  
AREA-AVERAGED Ap = 0.52  
EFFECTIVE STREAM AREA(ACRES) = 308.90  
TOTAL STREAM AREA(ACRES) = 308.90  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 171.91

\*\*\*\*\*  
FLOW PROCESS FROM NODE 86.00 TO NODE 87.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 764.00

ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 740.00

Tc = K\*[LENGTH\*\* 3.00]/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.177  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.987

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						
"5-7 DWELLINGS/ACRE"	A	2.30	0.98	0.500	32	13.18
RESIDENTIAL						
"5-7 DWELLINGS/ACRE"	C	7.20	0.57	0.500	69	13.18

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.67  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA RUNOFF(CFS) = 14.14  
TOTAL AREA(ACRES) = 9.50 PEAK FLOW RATE(CFS) = 14.14

\*\*\*\*\*  
FLOW PROCESS FROM NODE 87.00 TO NODE 88.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 9 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 740.00 DOWNSTREAM ELEVATION(FEET) = 724.70  
STREET LENGTH(FEET) = 1880.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 28.04

\*\*\*STREET FLOWING FULL\*\*\*  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.56  
HALFSTREET FLOOD WIDTH(FEET) = 18.00  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.33  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.87  
STREET FLOW TRAVEL TIME(MIN.) = 9.41 Tc(MIN.) = 22.59  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.438

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	9.20	0.57	0.100	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	13.30	0.57	0.500	69
PUBLIC PARK	C	2.40	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.386  
SUBAREA AREA(ACRES) = 24.90 SUBAREA RUNOFF(CFS) = 27.32  
EFFECTIVE AREA(ACRES) = 34.40 AREA-AVERAGED Fm(INCH/HR) = 0.25

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.42  
TOTAL AREA(ACRES) = 34.4 PEAK FLOW RATE(CFS) = 36.77

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
FLOW VELOCITY(FEET/SEC.) = 3.69 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.23  
LONGEST FLOWPATH FROM NODE 86.00 TO NODE 88.00 = 2644.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 88.00 TO NODE 89.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 724.70	DOWNSTREAM(FEET) = 724.00
FLOW LENGTH(FEET) = 695.00	MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.0 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.86	
ESTIMATED PIPE DIAMETER(INCH) = 48.00	NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 36.77	
PIPE TRAVEL TIME(MIN.) = 3.00	Tc(MIN.) = 25.58
LONGEST FLOWPATH FROM NODE 86.00 TO NODE 89.00 = 3339.00 FEET.	

\*\*\*\*\*  
FLOW PROCESS FROM NODE 89.00 TO NODE 89.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 25.58					
* 10 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					
"5-7 DWELLINGS/ACRE"	A	5.20	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	31.70	0.57	0.500	69
PUBLIC PARK	C	2.70	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524					
SUBAREA AREA(ACRES) = 39.60	SUBAREA RUNOFF(CFS) = 36.02				
EFFECTIVE AREA(ACRES) = 74.00	AREA-AVERAGED Fm(INCH/HR) = 0.29				
AREA-AVERAGED Fp(INCH/HR) = 0.61	AREA-AVERAGED Ap = 0.47				
TOTAL AREA(ACRES) = 74.0	PEAK FLOW RATE(CFS) = 69.59				

\*\*\*\*\*  
FLOW PROCESS FROM NODE 89.00 TO NODE 90.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 724.00	DOWNSTREAM(FEET) = 722.90
FLOW LENGTH(FEET) = 1105.00	MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.2 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.49	
ESTIMATED PIPE DIAMETER(INCH) = 60.00	NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 69.59  
PIPE TRAVEL TIME(MIN.) = 4.10 Tc(MIN.) = 29.69  
LONGEST FLOWPATH FROM NODE 86.00 TO NODE 90.00 = 4444.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 90.00 TO NODE 90.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 29.69					
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.220					
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"	A	52.90	0.98	0.500	32
PUBLIC PARK	A	3.40	0.98	0.850	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	13.40	0.57	0.500	69
PUBLIC PARK	C	1.40	0.57	0.850	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524					
SUBAREA AREA(ACRES) = 71.10	SUBAREA RUNOFF(CFS) = 48.32				
EFFECTIVE AREA(ACRES) = 145.10	AREA-AVERAGED Fm(INCH/HR) = 0.38				
AREA-AVERAGED Fp(INCH/HR) = 0.75	AREA-AVERAGED Ap = 0.50				
TOTAL AREA(ACRES) = 145.1	PEAK FLOW RATE(CFS) = 110.32				

\*\*\*\*\*  
FLOW PROCESS FROM NODE 90.00 TO NODE 85.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 722.90	DOWNSTREAM(FEET) = 722.70
FLOW LENGTH(FEET) = 200.00	MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 54.9 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.98	
ESTIMATED PIPE DIAMETER(INCH) = 69.00	NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 110.32	
PIPE TRAVEL TIME(MIN.) = 0.67	Tc(MIN.) = 30.36
LONGEST FLOWPATH FROM NODE 86.00 TO NODE 85.00 = 4644.00 FEET.	

\*\*\*\*\*  
FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 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.) = 30.36	
RAINFALL INTENSITY(INCH/HR) = 1.20	
AREA-AVERAGED Fm(INCH/HR) = 0.38	
AREA-AVERAGED Fp(INCH/HR) = 0.75	
AREA-AVERAGED Ap = 0.50	
EFFECTIVE STREAM AREA(ACRES) = 145.10	



TOTAL STREAM AREA(ACRES) = 145.10  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 110.32

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	171.91	34.14	1.122	0.97 ( 0.50)	0.52	308.9	81.00
2	110.32	30.36	1.204	0.75 ( 0.38)	0.50	145.1	86.00

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	282.23	30.36	1.204	0.89 ( 0.46)	0.51	419.8	86.00
2	271.33	34.14	1.122	0.90 ( 0.46)	0.51	454.0	81.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 282.23 Tc(MIN.) = 30.36  
EFFECTIVE AREA(ACRES) = 419.79 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.51  
TOTAL AREA(ACRES) = 454.0  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 85.00 = 6647.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 85.00 TO NODE 91.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 722.70 DOWNSTREAM(FEET) = 697.00  
FLOW LENGTH(FEET) = 2645.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 66.0 INCH PIPE IS 48.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.96  
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 282.23  
PIPE TRAVEL TIME(MIN.) = 2.95 Tc(MIN.) = 33.30  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 91.00 = 9292.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 33.30  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.139  
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" A 2.00 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 6.50 0.98 0.500 32  
PUBLIC PARK A 0.60 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457  
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 5.68  
EFFECTIVE AREA(ACRES) = 428.89 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.51  
TOTAL AREA(ACRES) = 463.1 PEAK FLOW RATE(CFS) = 282.23  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 33.30  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.139  
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" A 19.20 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 60.30 0.98 0.500 32  
PUBLIC PARK A 5.40 0.98 0.850 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.454  
SUBAREA AREA(ACRES) = 84.90 SUBAREA RUNOFF(CFS) = 53.17  
EFFECTIVE AREA(ACRES) = 513.79 AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.50  
TOTAL AREA(ACRES) = 548.0 PEAK FLOW RATE(CFS) = 315.56

\*\*\*\*\*  
FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 1  
-----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
=====

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 33.30  
RAINFALL INTENSITY(INCH/HR) = 1.14  
AREA-AVERAGED Fm(INCH/HR) = 0.46  
AREA-AVERAGED Fp(INCH/HR) = 0.91  
AREA-AVERAGED Ap = 0.50  
EFFECTIVE STREAM AREA(ACRES) = 513.79  
TOTAL STREAM AREA(ACRES) = 548.00  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 315.56

\*\*\*\*\*  
FLOW PROCESS FROM NODE 92.00 TO NODE 93.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 780.00  
ELEVATION DATA: UPSTREAM(FEET) = 730.00 DOWNSTREAM(FEET) = 720.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.342

\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.972  
 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  
 "5-7 DWELLINGS/ACRE" A 0.50 0.98 0.500 32 13.34  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 8.80 0.57 0.500 69 13.34  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.59  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 14.04  
 TOTAL AREA(ACRES) = 9.30 PEAK FLOW RATE(CFS) = 14.04

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 93.00 TO NODE 94.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 9 USED)<<<<<  
 =====  
 UPSTREAM ELEVATION(FEET) = 720.00 DOWNSTREAM ELEVATION(FEET) = 701.00  
 STREET LENGTH(FEET) = 1920.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 27.60  
 \*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.55  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.50  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.91  
 STREET FLOW TRAVEL TIME(MIN.) = 9.15 Tc(MIN.) = 22.49  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.441

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" A 5.50 0.98 0.200 32  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 6.90 0.98 0.500 32  
 PUBLIC PARK A 1.40 0.98 0.850 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 5.20 0.57 0.200 69  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 6.40 0.57 0.500 69  
 PUBLIC PARK C 0.80 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407

SUBAREA AREA(ACRES) = 26.20 SUBAREA RUNOFF(CFS) = 26.45  
 EFFECTIVE AREA(ACRES) = 35.50 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 35.5 PEAK FLOW RATE(CFS) = 36.05

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.58 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 FLOW VELOCITY(FEET/SEC.) = 3.90 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.28  
 LONGEST FLOWPATH FROM NODE 92.00 TO NODE 94.00 = 2700.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 701.00 DOWNSTREAM(FEET) = 699.00  
 FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.68  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 36.05  
 PIPE TRAVEL TIME(MIN.) = 2.06 Tc(MIN.) = 24.55  
 LONGEST FLOWPATH FROM NODE 92.00 TO NODE 95.00 = 3400.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 24.55  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.368  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 9.30 0.57 0.200 69  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 29.20 0.57 0.500 69  
 PUBLIC PARK C 3.50 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463  
 SUBAREA AREA(ACRES) = 42.00 SUBAREA RUNOFF(CFS) = 41.80  
 EFFECTIVE AREA(ACRES) = 77.50 AREA-AVERAGED Fm(INCH/HR) = 0.29  
 AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 77.5 PEAK FLOW RATE(CFS) = 75.49

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 95.00 TO NODE 96.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 699.00 DOWNSTREAM(FEET) = 697.20  
 FLOW LENGTH(FEET) = 1100.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.0 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 5.54  
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 75.49  
PIPE TRAVEL TIME(MIN.) = 3.31 Tc(MIN.) = 27.86  
LONGEST FLOWPATH FROM NODE 92.00 TO NODE 96.00 = 4500.00 FEET.

TIME OF CONCENTRATION(MIN.) = 28.51  
RAINFALL INTENSITY(INCH/HR) = 1.25  
AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.76  
AREA-AVERAGED Ap = 0.45  
EFFECTIVE STREAM AREA(ACRES) = 149.00  
TOTAL STREAM AREA(ACRES) = 149.00  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 124.03

\*\*\*\*\*  
FLOW PROCESS FROM NODE 96.00 TO NODE 96.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 27.86  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.268  
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" A 6.80 0.98 0.200 32  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" A 43.50 0.98 0.500 32  
PUBLIC PARK A 2.90 0.98 0.850 32  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 9.00 0.57 0.200 69  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 7.40 0.57 0.500 69  
PUBLIC PARK C 1.90 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457  
SUBAREA AREA(ACRES) = 71.50 SUBAREA RUNOFF(CFS) = 55.51  
EFFECTIVE AREA(ACRES) = 149.00 AREA-AVERAGED Fm(INCH/HR) = 0.34  
AREA-AVERAGED Fp(INCH/HR) = 0.76 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 149.0 PEAK FLOW RATE(CFS) = 124.03

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	315.56	33.30	1.139	0.91( 0.46)	0.50	513.8	86.00
1	299.41	37.16	1.067	0.91( 0.46)	0.50	548.0	81.00
2	124.03	28.51	1.250	0.76( 0.34)	0.45	149.0	92.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO  
CONFLUENCE FORMULA USED FOR 2 STREAMS.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	438.23	28.51	1.250	0.87( 0.43)	0.49	588.8	92.00
2	424.36	33.30	1.139	0.88( 0.43)	0.49	662.8	86.00
3	398.33	37.16	1.067	0.88( 0.43)	0.49	697.0	81.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 438.23 Tc(MIN.) = 28.51  
EFFECTIVE AREA(ACRES) = 588.78 AREA-AVERAGED Fm(INCH/HR) = 0.43  
AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 697.0  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 91.00 = 9292.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 96.00 TO NODE 91.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 697.20 DOWNSTREAM(FEET) = 697.00  
FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 57.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.12  
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 124.03  
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 28.51  
LONGEST FLOWPATH FROM NODE 92.00 TO NODE 91.00 = 4700.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 71  
-----

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<<  
>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<<  
-----  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.62; LAG(HR) = 0.50; Fm(INCH/HR) = 0.43; Ybar = 0.49  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
3HR = 1.00; 6HR = 1.00; 24HR = 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 697.0  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 91.00 = 9292.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0436; Lca/L=0.4,n=.0391; Lca/L=0.5,n=.0359;Lca/L=0.6,n=.0335  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 113.97  
UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 501.67  
TOTAL PEAK FLOW RATE(CFS) = 501.67 (SOURCE FLOW INCLUDED)  
RATIONAL METHOD PEAK FLOW RATE(CFS) = 438.23  
(UPSTREAM NODE PEAK FLOW RATE(CFS) = 438.23)

\*\*\*\*\*  
FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 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:

PEAK FLOW RATE(CFS) USED = 501.67

\*\*\*\*\*  
FLOW PROCESS FROM NODE 91.00 TO NODE 97.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 697.00 DOWNSTREAM(FEET) = 685.00
FLOW LENGTH(FEET) = 2637.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 93.0 INCH PIPE IS 71.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.92
ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 501.67
PIPE TRAVEL TIME(MIN.) = 3.40 Tc(MIN.) = 40.56
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 97.00 = 11929.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====
MAINLINE Tc(MIN.) = 40.56
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.012
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 18.80 0.98 0.100 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 11.30 0.98 0.200 32
PUBLIC PARK A 22.50 0.98 0.850 32
COMMERCIAL C 10.00 0.57 0.100 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 13.40 0.57 0.200 69
PUBLIC PARK C 7.50 0.57 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.399
SUBAREA AREA(ACRES) = 83.50
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.68; LAG(HR) = 0.54; Fm(INCH/HR) = 0.42; Ybar = 0.48
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 780.5
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 97.00 = 11929.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0386; Lca/L=0.4,n=.0346; Lca/L=0.5,n=.0318;Lca/L=0.6,n=.0297
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 129.71
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 541.20
TOTAL AREA(ACRES) = 780.5 PEAK FLOW RATE(CFS) = 541.20

\*\*\*\*\*
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====
MAINLINE Tc(MIN.) = 40.56
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.012
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK A 28.00 0.98 0.850 32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 50.50 0.98 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.432
SUBAREA AREA(ACRES) = 78.50
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.68; LAG(HR) = 0.54; Fm(INCH/HR) = 0.42; Ybar = 0.48
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 859.0
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 97.00 = 11929.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0386; Lca/L=0.4,n=.0346; Lca/L=0.5,n=.0318;Lca/L=0.6,n=.0297
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 143.01
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 593.75
TOTAL AREA(ACRES) = 859.0 PEAK FLOW RATE(CFS) = 593.75

\*\*\*\*\*
FLOW PROCESS FROM NODE 97.00 TO NODE 102.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 660.00
FLOW LENGTH(FEET) = 2650.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 87.0 INCH PIPE IS 65.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.76
ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 593.75
PIPE TRAVEL TIME(MIN.) = 2.49 Tc(MIN.) = 43.04
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 102.00 = 14579.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====
MAINLINE Tc(MIN.) = 43.04
\* 10 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
COMMERCIAL A 37.80 0.98 0.100 32

COMMERCIAL C 6.30 0.57 0.100 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.92  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 44.10  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.72; LAG(HR) = 0.57; Fm(INCH/HR) = 0.41; Ybar = 0.47  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 903.1  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 102.00 = 14579.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0355; Lca/L=0.4,n=.0318; Lca/L=0.5,n=.0292;Lca/L=0.6,n=.0273  
 TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 154.45  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 595.41  
 TOTAL AREA(ACRES) = 903.1 PEAK FLOW RATE(CFS) = 595.41

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 43.04  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.976  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	82.60	0.98	0.100	32
COMMERCIAL	B	7.80	0.75	0.100	56
COMMERCIAL	C	26.50	0.57	0.100	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.87  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA(ACRES) = 116.90  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.72; LAG(HR) = 0.57; Fm(INCH/HR) = 0.37; Ybar = 0.43  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1020.0  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 102.00 = 14579.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0355; Lca/L=0.4,n=.0318; Lca/L=0.5,n=.0292;Lca/L=0.6,n=.0273  
 TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 184.88  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 691.40  
 TOTAL AREA(ACRES) = 1020.0 PEAK FLOW RATE(CFS) = 691.40

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 102.00 TO NODE 101.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 -----

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 660.00 DOWNSTREAM(FEET) = 658.00  
 FLOW LENGTH(FEET) = 1315.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 126.0 INCH PIPE IS 102.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.17  
 ESTIMATED PIPE DIAMETER(INCH) = 126.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 691.40  
 PIPE TRAVEL TIME(MIN.) = 2.39 Tc(MIN.) = 45.43  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 101.00 = 15894.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 101.00 TO NODE 101.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 =====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 PEAK FLOW RATE(CFS) = 691.40 Tc(MIN.) = 45.43  
 AREA-AVERAGED Fm(INCH/HR) = 0.37 Ybar = 0.43  
 TOTAL AREA(ACRES) = 1020.0

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 98.00 TO NODE 99.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 =====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 870.00  
 ELEVATION DATA: UPSTREAM(FEET) = 684.00 DOWNSTREAM(FEET) = 680.00  
 Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.371  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.969  
 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	A	9.90	0.98	0.100	32	13.37

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA RUNOFF(CFS) = 16.68  
 TOTAL AREA(ACRES) = 9.90 PEAK FLOW RATE(CFS) = 16.68

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 99.00 TO NODE 100.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 7 USED)<<<<<  
 =====

UPSTREAM ELEVATION(FEET) = 680.00 DOWNSTREAM ELEVATION(FEET) = 666.60  
 STREET LENGTH(FEET) = 1650.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 24.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 19.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 28.98  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.58  
HALFSTREET FLOOD WIDTH(FEET) = 20.92  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.17  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.83  
STREET FLOW TRAVEL TIME(MIN.) = 8.66 Tc(MIN.) = 22.04  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.459

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 19.90 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 19.90 SUBAREA RUNOFF(CFS) = 24.39  
EFFECTIVE AREA(ACRES) = 29.80 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 29.8 PEAK FLOW RATE(CFS) = 36.52

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.62 HALFSTREET FLOOD WIDTH(FEET) = 22.92  
FLOW VELOCITY(FEET/SEC.) = 3.35 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.07  
LONGEST FLOWPATH FROM NODE 98.00 TO NODE 100.00 = 2520.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 666.60 DOWNSTREAM(FEET) = 658.00  
FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.86  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 36.52  
PIPE TRAVEL TIME(MIN.) = 1.18 Tc(MIN.) = 23.22  
LONGEST FLOWPATH FROM NODE 98.00 TO NODE 101.00 = 3220.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 101.00 TO NODE 101.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 23.22  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.414  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 80.30 0.98 0.100 32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 80.30 SUBAREA RUNOFF(CFS) = 95.15  
EFFECTIVE AREA(ACRES) = 110.10 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 110.1 PEAK FLOW RATE(CFS) = 130.46

\*\*\*\*\*  
FLOW PROCESS FROM NODE 101.00 TO NODE 101.00 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.) = 23.22  
RAINFALL INTENSITY(INCH/HR) = 1.41  
AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.10  
EFFECTIVE STREAM AREA(ACRES) = 110.10  
TOTAL STREAM AREA(ACRES) = 110.10  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 130.46  
\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	AREA (ACRES)	HEADWATER NODE
1	691.40	45.43	1020.00	81.00
2	130.46	23.22	110.10	98.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.76; LAG(HR) = 0.61; Fm(INCH/HR) = 0.34; Ybar = 0.40  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;  
3HR = 0.99; 6HR = 1.00; 24HR = 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1130.1  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 101.00 = 15894.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0346; Lca/L=0.4,n=.0310; Lca/L=0.5,n=.0285; Lca/L=0.6,n=.0266  
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 213.29  
PEAK FLOW RATE(CFS) = 772.68

\*\*\*\*\*  
FLOW PROCESS FROM NODE 101.00 TO NODE 103.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 658.00 DOWNSTREAM(FEET) = 645.00  
FLOW LENGTH(FEET) = 2823.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 108.0 INCH PIPE IS 85.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.39  
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1



PIPE-FLOW(CFS) = 772.68  
PIPE TRAVEL TIME(MIN.) = 3.27 Tc(MIN.) = 48.70  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 103.00 = 18717.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 48.70  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.907  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 76.52 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
\* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;  
\* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.  
SUBAREA AREA(ACRES) = 76.52  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.81; LAG(HR) = 0.65; Fm(INCH/HR) = 0.33; Ybar = 0.39  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1206.6  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 103.00 = 18717.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0324; Lca/L=0.4,n=.0290; Lca/L=0.5,n=.0267;Lca/L=0.6,n=.0249  
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 233.02  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 791.63  
TOTAL AREA(ACRES) = 1206.6 PEAK FLOW RATE(CFS) = 791.63

\*\*\*\*\*  
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 645.00 DOWNSTREAM(FEET) = 638.70  
FLOW LENGTH(FEET) = 1376.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 108.0 INCH PIPE IS 87.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.36  
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 791.63  
PIPE TRAVEL TIME(MIN.) = 1.60 Tc(MIN.) = 50.30  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 104.00 = 20093.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 104.00 TO NODE 104.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 50.30  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.889  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 86.64 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
\* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;  
\* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.  
SUBAREA AREA(ACRES) = 86.64  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.84; LAG(HR) = 0.67; Fm(INCH/HR) = 0.31; Ybar = 0.37  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.94; 30M = 0.94; 1HR = 0.94;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1293.3  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 104.00 = 20093.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0316; Lca/L=0.4,n=.0283; Lca/L=0.5,n=.0260;Lca/L=0.6,n=.0243  
TIME OF PEAK FLOW(HR) = 16.75 RUNOFF VOLUME(AF) = 255.35  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 841.29  
TOTAL AREA(ACRES) = 1293.3 PEAK FLOW RATE(CFS) = 841.29

\*\*\*\*\*  
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) = 638.70 DOWNSTREAM(FEET) = 630.00  
FLOW LENGTH(FEET) = 1863.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 114.0 INCH PIPE IS 84.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.93  
ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 841.29  
PIPE TRAVEL TIME(MIN.) = 2.08 Tc(MIN.) = 52.38  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 105.00 = 21956.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 52.38  
\* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 0.868  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 43.70 0.98 0.100 32  
COMMERCIAL B 25.80 0.75 0.100 56  
COMMERCIAL C 47.70 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.76



SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 117.20  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.30;30M= 0.61;1H= 0.80;3H= 1.38;6H= 1.94;24H= 3.65  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.87; LAG(HR) = 0.70; Fm(INCH/HR) = 0.29; Ybar = 0.35  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.94; 30M = 0.94; 1HR = 0.94;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1410.5  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 105.00 = 21956.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0306; Lca/L=0.4,n=.0274; Lca/L=0.5,n=.0252;Lca/L=0.6,n=.0235  
TIME OF PEAK FLOW(HR) = 16.75 RUNOFF VOLUME(AF) = 286.02  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 918.99  
TOTAL AREA(ACRES) = 1410.5 PEAK FLOW RATE(CFS) = 918.99  
=====
END OF STUDY SUMMARY:  
TOTAL AREA(ACRES) = 1410.5 TC(MIN.) = 52.38  
AREA-AVERAGED Fm(INCH/HR)= 0.29 Ybar = 0.35  
PEAK FLOW RATE(CFS) = 918.99  
=====
END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS



\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 18.0 Release Date: 07/01/2011 License ID 1239

Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*

\* W.O. #915-1, ONTARIO MPD \*
\* 100-YR STUDY \*
\* WALKER AVE. AREA 'C' \*
\*\*\*\*\*

FILE NAME: WALKER\_M.DAT
TIME/DATE OF STUDY: 15:49 11/11/2011

=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

Table with columns: NO., WIDTH (FT), CROWN TO CROSSFALL (FT), STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GUTTER LIP (FT), GUTTER HIKE (FT), GEOMETRIES: (FT), MANNING FACTOR (n)

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.00 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
SIERRA MADRE DEPTH-AREA FACTORS USED.

Table with columns: DURATION, AREA-AVERAGED RAINFALL(INCH)
5-MINUTES 0.44
30-MINUTES 0.91
1-HOUR 1.20
3-HOUR 2.10
6-HOUR 3.00
24-HOUR 6.00

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\*

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 998.00
ELEVATION DATA: UPSTREAM(FEET) = 775.00 DOWNSTREAM(FEET) = 767.00

Table with columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.)

"5-7 DWELLINGS/ACRE" A 5.70 0.98 0.500 32 16.17
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 4.00 0.57 0.500 69 16.17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 19.48
TOTAL AREA(ACRES) = 9.70 PEAK FLOW RATE(CFS) = 19.48

\*\*\*\*\*

FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 767.00 DOWNSTREAM ELEVATION(FEET) = 750.00
STREET LENGTH(FEET) = 1686.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 65.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 60.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 32.50  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.58  
 HALFSTREET FLOOD WIDTH(FEET) = 20.97  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.54  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.05  
 STREET FLOW TRAVEL TIME(MIN.) = 7.93 Tc(MIN.) = 24.10  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.074

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"	A	13.90	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.70	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 17.60 SUBAREA RUNOFF(CFS) = 25.81  
 EFFECTIVE AREA(ACRES) = 27.30 AREA-AVERAGED Fm(INCH/HR) = 0.43  
 AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 27.3 PEAK FLOW RATE(CFS) = 40.40

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.62 HALFSTREET FLOOD WIDTH(FEET) = 22.84  
 FLOW VELOCITY(FEET/SEC.) = 3.74 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.30  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 83.00 = 2684.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 747.70  
 FLOW LENGTH(FEET) = 1333.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.84  
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 40.40  
 PIPE TRAVEL TIME(MIN.) = 4.59 Tc(MIN.) = 28.69  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 84.00 = 4017.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 28.69

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.868  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	72.10	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 72.10 SUBAREA RUNOFF(CFS) = 89.59  
 EFFECTIVE AREA(ACRES) = 99.40 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 99.4 PEAK FLOW RATE(CFS) = 124.93

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 28.69  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.868  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	8.70	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	91.90	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.474  
 SUBAREA AREA(ACRES) = 100.60 SUBAREA RUNOFF(CFS) = 127.30  
 EFFECTIVE AREA(ACRES) = 200.00 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 200.0 PEAK FLOW RATE(CFS) = 252.23

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 747.70 DOWNSTREAM(FEET) = 722.70  
 FLOW LENGTH(FEET) = 2630.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.38  
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 252.23  
 PIPE TRAVEL TIME(MIN.) = 3.05 Tc(MIN.) = 31.74  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 85.00 = 6647.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 31.74  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.758

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" A 73.80 0.98 0.500 32  
 PUBLIC PARK A 26.20 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.592  
 SUBAREA AREA(ACRES) = 100.00 SUBAREA RUNOFF(CFS) = 106.33  
 EFFECTIVE AREA(ACRES) = 300.00 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 300.0 PEAK FLOW RATE(CFS) = 338.79

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 31.74  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.758  
 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" A 8.30 0.98 0.500 32  
 PUBLIC PARK A 0.60 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524  
 SUBAREA AREA(ACRES) = 8.90 SUBAREA RUNOFF(CFS) = 10.00  
 EFFECTIVE AREA(ACRES) = 308.90 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 308.9 PEAK FLOW RATE(CFS) = 348.79

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 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.) = 31.74  
 RAINFALL INTENSITY(INCH/HR) = 1.76  
 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.52  
 EFFECTIVE STREAM AREA(ACRES) = 308.90  
 TOTAL STREAM AREA(ACRES) = 308.90  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 348.79

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 86.00 TO NODE 87.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 764.00

ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 740.00

Tc = K\*[LENGTH\*\* 3.00]/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.177  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.980  
 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  
 "5-7 DWELLINGS/ACRE" A 2.30 0.98 0.500 32 13.18  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 7.20 0.57 0.500 69 13.18  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.67  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 22.63  
 TOTAL AREA(ACRES) = 9.50 PEAK FLOW RATE(CFS) = 22.63

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 87.00 TO NODE 88.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 9 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 740.00 DOWNSTREAM ELEVATION(FEET) = 724.70  
 STREET LENGTH(FEET) = 1880.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 45.77

\*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.64  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.04  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.60  
 STREET FLOW TRAVEL TIME(MIN.) = 7.75 Tc(MIN.) = 20.93  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.258

SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 9.20 0.57 0.100 69  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 13.30 0.57 0.500 69  
 PUBLIC PARK C 2.40 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.386  
 SUBAREA AREA(ACRES) = 24.90 SUBAREA RUNOFF(CFS) = 45.70  
 EFFECTIVE AREA(ACRES) = 34.40 AREA-AVERAGED Fm(INCH/HR) = 0.25

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.42  
TOTAL AREA(ACRES) = 34.4 PEAK FLOW RATE(CFS) = 62.16

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH( FEET) = 0.71 HALFSTREET FLOOD WIDTH( FEET) = 20.01  
FLOW VELOCITY( FEET/ SEC. ) = 4.53 DEPTH\*VELOCITY( FT\*FT/ SEC. ) = 3.20  
\*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
AND L = 1880.0 FT WITH ELEVATION-DROP = 15.3 FT, IS 54.0 CFS,  
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 88.00  
LONGEST FLOWPATH FROM NODE 86.00 TO NODE 88.00 = 2644.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 88.00 TO NODE 89.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM( FEET) = 724.70 DOWNSTREAM( FEET) = 724.00  
FLOW LENGTH( FEET) = 695.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.6 INCHES  
PIPE-FLOW VELOCITY( FEET/ SEC. ) = 4.37  
ESTIMATED PIPE DIAMETER( INCH) = 57.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 62.16  
PIPE TRAVEL TIME( MIN. ) = 2.65 Tc( MIN. ) = 23.57  
LONGEST FLOWPATH FROM NODE 86.00 TO NODE 89.00 = 3339.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 89.00 TO NODE 89.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc( MIN. ) = 23.57  
\* 100 YEAR RAINFALL INTENSITY( INCH/ HR) = 2.102  
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" A 5.20 0.98 0.500 32  
RESIDENTIAL  
"5-7 DWELLINGS/ ACRE" C 31.70 0.57 0.500 69  
PUBLIC PARK C 2.70 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/ HR) = 0.62  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524  
SUBAREA AREA( ACRES) = 39.60 SUBAREA RUNOFF( CFS) = 63.39  
EFFECTIVE AREA( ACRES) = 74.00 AREA-AVERAGED Fm( INCH/ HR) = 0.29  
AREA-AVERAGED Fp( INCH/ HR) = 0.61 AREA-AVERAGED Ap = 0.47  
TOTAL AREA( ACRES) = 74.0 PEAK FLOW RATE( CFS) = 120.72

\*\*\*\*\*  
FLOW PROCESS FROM NODE 89.00 TO NODE 90.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM( FEET) = 724.00 DOWNSTREAM( FEET) = 722.90  
FLOW LENGTH( FEET) = 1105.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 72.0 INCH PIPE IS 56.2 INCHES  
PIPE-FLOW VELOCITY( FEET/ SEC. ) = 5.10  
ESTIMATED PIPE DIAMETER( INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 120.72  
PIPE TRAVEL TIME( MIN. ) = 3.61 Tc( MIN. ) = 27.18  
LONGEST FLOWPATH FROM NODE 86.00 TO NODE 90.00 = 4444.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 90.00 TO NODE 90.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc( MIN. ) = 27.18  
\* 100 YEAR RAINFALL INTENSITY( INCH/ HR) = 1.930  
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" A 52.90 0.98 0.500 32  
PUBLIC PARK A 3.40 0.98 0.850 32  
RESIDENTIAL  
"5-7 DWELLINGS/ ACRE" C 13.40 0.57 0.500 69  
PUBLIC PARK C 1.40 0.57 0.850 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/ HR) = 0.89  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524  
SUBAREA AREA( ACRES) = 71.10 SUBAREA RUNOFF( CFS) = 93.71  
EFFECTIVE AREA( ACRES) = 145.10 AREA-AVERAGED Fm( INCH/ HR) = 0.38  
AREA-AVERAGED Fp( INCH/ HR) = 0.75 AREA-AVERAGED Ap = 0.50  
TOTAL AREA( ACRES) = 145.1 PEAK FLOW RATE( CFS) = 202.97

\*\*\*\*\*  
FLOW PROCESS FROM NODE 90.00 TO NODE 85.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM( FEET) = 722.90 DOWNSTREAM( FEET) = 722.70  
FLOW LENGTH( FEET) = 200.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 87.0 INCH PIPE IS 68.7 INCHES  
PIPE-FLOW VELOCITY( FEET/ SEC. ) = 5.81  
ESTIMATED PIPE DIAMETER( INCH) = 87.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 202.97  
PIPE TRAVEL TIME( MIN. ) = 0.57 Tc( MIN. ) = 27.76  
LONGEST FLOWPATH FROM NODE 86.00 TO NODE 85.00 = 4644.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 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. ) = 27.76  
RAINFALL INTENSITY( INCH/ HR) = 1.91  
AREA-AVERAGED Fm( INCH/ HR) = 0.38



AREA-AVERAGED Fp(INCH/HR) = 0.75  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA(ACRES) = 145.10  
 TOTAL STREAM AREA(ACRES) = 145.10  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 202.97

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	348.79	31.74	1.758	0.97( 0.50)	0.52	308.9	81.00
2	202.97	27.76	1.906	0.75( 0.38)	0.50	145.1	86.00

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	543.80	27.76	1.906	0.89( 0.46)	0.51	415.2	86.00
2	532.22	31.74	1.758	0.90( 0.46)	0.51	454.0	81.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 543.80 Tc(MIN.) = 27.76  
 EFFECTIVE AREA(ACRES) = 415.25 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 454.0  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 85.00 = 6647.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 85.00 TO NODE 91.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 722.70 DOWNSTREAM(FEET) = 697.00  
 FLOW LENGTH(FEET) = 2645.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 84.0 INCH PIPE IS 62.9 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.59  
 ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 543.80  
 PIPE TRAVEL TIME(MIN.) = 2.51 Tc(MIN.) = 30.26  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 91.00 = 9292.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 30.26  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.809  
 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" A 2.00 0.98 0.200 32  
 RESIDENTIAL

"5-7 DWELLINGS/ACRE" A 6.50 0.98 0.500 32  
 PUBLIC PARK A 0.60 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457  
 SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 11.17  
 EFFECTIVE AREA(ACRES) = 424.35 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 463.1 PEAK FLOW RATE(CFS) = 543.80  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 30.26  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.809  
 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" A 19.20 0.98 0.200 32  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 60.30 0.98 0.500 32  
 PUBLIC PARK A 5.40 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.454  
 SUBAREA AREA(ACRES) = 84.90 SUBAREA RUNOFF(CFS) = 104.40  
 EFFECTIVE AREA(ACRES) = 509.25 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 548.0 PEAK FLOW RATE(CFS) = 620.23

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 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.) = 30.26  
 RAINFALL INTENSITY(INCH/HR) = 1.81  
 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.91  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA(ACRES) = 509.25  
 TOTAL STREAM AREA(ACRES) = 548.00  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 620.23

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 92.00 TO NODE 93.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<<<<  
 =====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 780.00  
 ELEVATION DATA: UPSTREAM(FEET) = 730.00 DOWNSTREAM(FEET) = 720.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.342  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.958  
 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						
"5-7 DWELLINGS/ACRE"	A	0.50	0.98	0.500	32	13.34
RESIDENTIAL						
"5-7 DWELLINGS/ACRE"	C	8.80	0.57	0.500	69	13.34

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.59  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 22.29  
 TOTAL AREA(ACRES) = 9.30 PEAK FLOW RATE(CFS) = 22.29

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 93.00 TO NODE 94.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 9 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 720.00 DOWNSTREAM ELEVATION(FEET) = 701.00  
 STREET LENGTH(FEET) = 1920.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 45.59  
 \*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.62  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.28  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.67  
 STREET FLOW TRAVEL TIME(MIN.) = 7.48 Tc(MIN.) = 20.82  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.264

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	5.50	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	6.90	0.98	0.500	32
PUBLIC PARK	A	1.40	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	5.20	0.57	0.200	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	6.40	0.57	0.500	69

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	C	0.80	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407  
 SUBAREA AREA(ACRES) = 26.20 SUBAREA RUNOFF(CFS) = 45.85  
 EFFECTIVE AREA(ACRES) = 35.50 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 35.5 PEAK FLOW RATE(CFS) = 62.34

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.68 HALFSTREET FLOOD WIDTH(FEET) = 18.91  
 FLOW VELOCITY(FEET/SEC.) = 4.84 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.32  
 LONGEST FLOWPATH FROM NODE 92.00 TO NODE 94.00 = 2700.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 701.00 DOWNSTREAM(FEET) = 699.00  
 FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.51  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 62.34  
 PIPE TRAVEL TIME(MIN.) = 1.79 Tc(MIN.) = 22.61  
 LONGEST FLOWPATH FROM NODE 92.00 TO NODE 95.00 = 3400.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 22.61  
 \* 100 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
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	9.30	0.57	0.200	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	29.20	0.57	0.500	69
PUBLIC PARK	C	3.50	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463  
 SUBAREA AREA(ACRES) = 42.00 SUBAREA RUNOFF(CFS) = 71.56  
 EFFECTIVE AREA(ACRES) = 77.50 AREA-AVERAGED Fm(INCH/HR) = 0.29  
 AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 77.5 PEAK FLOW RATE(CFS) = 130.40

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 95.00 TO NODE 96.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 699.00 DOWNSTREAM(FEET) = 697.20  
 FLOW LENGTH(FEET) = 1100.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 69.0 INCH PIPE IS 51.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.32  
 ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 130.40  
 PIPE TRAVEL TIME(MIN.) = 2.90 Tc(MIN.) = 25.51  
 LONGEST FLOWPATH FROM NODE 92.00 TO NODE 96.00 = 4500.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 96.00 TO NODE 96.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 25.51  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.004  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	6.80	0.98	0.200	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	43.50	0.98	0.500	32
PUBLIC PARK	A	2.90	0.98	0.850	32
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	9.00	0.57	0.200	69
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	7.40	0.57	0.500	69
PUBLIC PARK	C	1.90	0.57	0.850	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457  
 SUBAREA AREA(ACRES) = 71.50 SUBAREA RUNOFF(CFS) = 102.92  
 EFFECTIVE AREA(ACRES) = 149.00 AREA-AVERAGED Fm(INCH/HR) = 0.34  
 AREA-AVERAGED Fp(INCH/HR) = 0.76 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 149.0 PEAK FLOW RATE(CFS) = 222.83

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 96.00 TO NODE 91.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 697.20 DOWNSTREAM(FEET) = 697.00  
 FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 90.0 INCH PIPE IS 71.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.94  
 ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 222.83  
 PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 26.08  
 LONGEST FLOWPATH FROM NODE 92.00 TO NODE 91.00 = 4700.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 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.) = 26.08  
 RAINFALL INTENSITY(INCH/HR) = 1.98  
 AREA-AVERAGED Fm(INCH/HR) = 0.34  
 AREA-AVERAGED Fp(INCH/HR) = 0.76  
 AREA-AVERAGED Ap = 0.45  
 EFFECTIVE STREAM AREA(ACRES) = 149.00  
 TOTAL STREAM AREA(ACRES) = 149.00  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 222.83

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	620.23	30.26	1.809	0.91( 0.46)	0.50	509.2	86.00
1	601.31	34.29	1.679	0.91( 0.46)	0.50	548.0	81.00
2	222.83	26.08	1.978	0.76( 0.34)	0.45	149.0	92.00

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	824.02	26.08	1.978	0.87( 0.43)	0.49	587.8	92.00
2	820.02	30.26	1.809	0.88( 0.43)	0.49	658.2	86.00
3	783.28	34.29	1.679	0.88( 0.43)	0.49	697.0	81.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 824.02 Tc(MIN.) = 26.08  
 EFFECTIVE AREA(ACRES) = 587.77 AREA-AVERAGED Fm(INCH/HR) = 0.43  
 AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 697.0  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 91.00 = 9292.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 71  
 -----

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<  
 >>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<

\*\*\*\*\*  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.57; LAG(HR) = 0.46; Fm(INCH/HR) = 0.43; Ybar = 0.45  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
 3HR = 1.00; 6HR = 1.00; 24HR = 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 697.0  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 91.00 = 9292.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0403; Lca/L=0.4,n=.0361; Lca/L=0.5,n=.0332;Lca/L=0.6,n=.0309  
 TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 201.29  
 UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 865.37

TOTAL PEAK FLOW RATE(CFS) = 865.37 (SOURCE FLOW INCLUDED)  
 RATIONAL METHOD PEAK FLOW RATE(CFS) = 824.02  
 (UPSTREAM NODE PEAK FLOW RATE(CFS) = 824.02)  
 PEAK FLOW RATE(CFS) USED = 865.37

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 97.00 IS CODE = 31

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 97.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM(FEET) = 697.00 DOWNSTREAM(FEET) = 685.00  
 FLOW LENGTH(FEET) = 2637.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 114.0 INCH PIPE IS 87.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.80  
 ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 865.37  
 PIPE TRAVEL TIME(MIN.) = 2.97 Tc(MIN.) = 37.26  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 97.00 = 11929.00 FEET.

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----

MAINLINE Tc(MIN.) = 37.26  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.597  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 PUBLIC PARK A 28.00 0.98 0.850 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 50.50 0.98 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.432  
 SUBAREA AREA(ACRES) = 78.50  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.62; LAG(HR) = 0.50; Fm(INCH/HR) = 0.42; Ybar = 0.44  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 859.0  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 97.00 = 11929.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0355; Lca/L=0.4,n=.0318; Lca/L=0.5,n=.0292;Lca/L=0.6,n=.0272  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 251.69  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 997.32  
 TOTAL AREA(ACRES) = 859.0 PEAK FLOW RATE(CFS) = 997.32

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 81

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 97.00 TO NODE 102.00 IS CODE = 31

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc(MIN.) = 37.26  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.597  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 18.80 0.98 0.100 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 11.30 0.98 0.200 32  
 PUBLIC PARK A 22.50 0.98 0.850 32  
 COMMERCIAL C 10.00 0.57 0.100 69  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 13.40 0.57 0.200 69  
 PUBLIC PARK C 7.50 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.399  
 SUBAREA AREA(ACRES) = 83.50  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.62; LAG(HR) = 0.50; Fm(INCH/HR) = 0.42; Ybar = 0.44  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 780.5  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 97.00 = 11929.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0355; Lca/L=0.4,n=.0318; Lca/L=0.5,n=.0292;Lca/L=0.6,n=.0272  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 228.83  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 909.83  
 TOTAL AREA(ACRES) = 780.5 PEAK FLOW RATE(CFS) = 909.83

-----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----

ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 660.00  
 FLOW LENGTH(FEET) = 2650.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 108.0 INCH PIPE IS 77.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.36  
 ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 997.32  
 PIPE TRAVEL TIME(MIN.) = 2.17 Tc(MIN.) = 39.43  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 102.00 = 14579.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----

MAINLINE Tc(MIN.) = 39.43  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.544  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 37.80 0.98 0.100 32  
COMMERCIAL C 6.30 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.92  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 44.10  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.66; LAG(HR) = 0.53; Fm(INCH/HR) = 0.41; Ybar = 0.43  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 903.1  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 102.00 = 14579.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0325; Lca/L=0.4,n=.0291; Lca/L=0.5,n=.0268;Lca/L=0.6,n=.0250  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 271.05  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1035.71  
TOTAL AREA(ACRES) = 903.1 PEAK FLOW RATE(CFS) = 1035.71

\*\*\*\*\*  
FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
-----

MAINLINE Tc(MIN.) = 39.43  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.544  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 82.60 0.98 0.100 32  
COMMERCIAL B 7.80 0.75 0.100 56  
COMMERCIAL C 26.50 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.87  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 116.90  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.66; LAG(HR) = 0.53; Fm(INCH/HR) = 0.37; Ybar = 0.39  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1020.0  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 102.00 = 14579.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0325; Lca/L=0.4,n=.0291; Lca/L=0.5,n=.0268;Lca/L=0.6,n=.0250  
TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 322.62  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1192.82  
TOTAL AREA(ACRES) = 1020.0 PEAK FLOW RATE(CFS) = 1192.82

\*\*\*\*\*

FLOW PROCESS FROM NODE 102.00 TO NODE 101.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 660.00 DOWNSTREAM(FEET) = 658.00  
FLOW LENGTH(FEET) = 1315.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 120.0 INCH PIPE IS 95.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.88  
ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 2  
PIPE-FLOW(CFS) = 1192.82  
PIPE TRAVEL TIME(MIN.) = 2.47 Tc(MIN.) = 41.90  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 101.00 = 15894.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 101.00 TO NODE 101.00 IS CODE = 1  
-----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<  
-----

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
PEAK FLOW RATE(CFS) = 1192.82 Tc(MIN.) = 41.90  
AREA-AVERAGED Fm(INCH/HR) = 0.37 Ybar = 0.39  
TOTAL AREA(ACRES) = 1020.0

\*\*\*\*\*  
FLOW PROCESS FROM NODE 98.00 TO NODE 99.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 870.00  
ELEVATION DATA: UPSTREAM(FEET) = 684.00 DOWNSTREAM(FEET) = 680.00  
Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.371  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.954  
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 A 9.90 0.98 0.100 32 13.37  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA RUNOFF(CFS) = 25.45  
TOTAL AREA(ACRES) = 9.90 PEAK FLOW RATE(CFS) = 25.45

\*\*\*\*\*  
FLOW PROCESS FROM NODE 99.00 TO NODE 100.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>(STREET TABLE SECTION # 7 USED)<<<<<<  
-----

UPSTREAM ELEVATION(FEET) = 680.00 DOWNSTREAM ELEVATION(FEET) = 666.60  
STREET LENGTH(FEET) = 1650.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 24.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK( FEET) = 19.00  
 INSIDE STREET CROSSFALL( DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL( DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL( DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section( curb-to-curb) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 44.93  
 \*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH( FEET) = 0.65  
 HALFSTREET FLOOD WIDTH( FEET) = 24.00  
 AVERAGE FLOW VELOCITY( FEET/ SEC.) = 3.57  
 PRODUCT OF DEPTH&VELOCITY( FT\*FT/ SEC.) = 2.33  
 STREET FLOW TRAVEL TIME( MIN.) = 7.69 Tc( MIN.) = 21.07  
 \* 100 YEAR RAINFALL INTENSITY( INCH/ HR) = 2.249

SUBAREA LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	19.90	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/ HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA( ACRES) = 19.90 SUBAREA RUNOFF( CFS) = 38.53  
 EFFECTIVE AREA( ACRES) = 29.80 AREA-AVERAGED Fm( INCH/ HR) = 0.10  
 AREA-AVERAGED Fp( INCH/ HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA( ACRES) = 29.8 PEAK FLOW RATE( CFS) = 57.69

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH( FEET) = 0.69 HALFSTREET FLOOD WIDTH( FEET) = 25.36  
 FLOW VELOCITY( FEET/ SEC.) = 3.95 DEPTH\*VELOCITY( FT\*FT/ SEC.) = 2.74  
 LONGEST FLOWPATH FROM NODE 98.00 TO NODE 100.00 = 2520.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM( FEET) = 666.60 DOWNSTREAM( FEET) = 658.00  
 FLOW LENGTH( FEET) = 700.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.9 INCHES  
 PIPE-FLOW VELOCITY( FEET/ SEC.) = 11.08  
 ESTIMATED PIPE DIAMETER( INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 57.69  
 PIPE TRAVEL TIME( MIN.) = 1.05 Tc( MIN.) = 22.12  
 LONGEST FLOWPATH FROM NODE 98.00 TO NODE 101.00 = 3220.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 101.00 TO NODE 101.00 IS CODE = 81  
 -----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----  
 MAINLINE Tc( MIN.) = 22.12  
 \* 100 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
COMMERCIAL	A	80.30	0.98	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/ HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA( ACRES) = 80.30 SUBAREA RUNOFF( CFS) = 150.78  
 EFFECTIVE AREA( ACRES) = 110.10 AREA-AVERAGED Fm( INCH/ HR) = 0.10  
 AREA-AVERAGED Fp( INCH/ HR) = 0.98 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA( ACRES) = 110.1 PEAK FLOW RATE( CFS) = 206.73

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 101.00 TO NODE 101.00 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.) = 22.12  
 RAINFALL INTENSITY( INCH/ HR) = 2.18  
 AREA-AVERAGED Fm( INCH/ HR) = 0.10  
 AREA-AVERAGED Fp( INCH/ HR) = 0.98  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA( ACRES) = 110.10  
 TOTAL STREAM AREA( ACRES) = 110.10  
 PEAK FLOW RATE( CFS) AT CONFLUENCE = 206.73  
 \*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	AREA (ACRES)	HEADWATER NODE
1	1192.82	41.90	1020.00	81.00
2	206.73	22.12	110.10	98.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL( INCH): 5M= 0.44; 30M= 0.91; 1H= 1.20; 3H= 2.10; 6H= 3.00; 24H= 6.00  
 S-GRAPH: VALLEY( DEV.)=100.0%; VALLEY( UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%; FOOTHILL= 0.0%; DESERT( UNDEV.)= 0.0%  
 Tc( HR) = 0.70; LAG( HR) = 0.56; Fm( INCH/ HR) = 0.34; Ybar = 0.37  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;  
 3HR = 0.99; 6HR = 1.00; 24HR = 1.00  
 UNIT-INTERVAL( MIN) = 5.00 TOTAL AREA( ACRES) = 1130.1  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 101.00 = 15894.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3, n=.0319; Lca/L=0.4, n=.0286; Lca/L=0.5, n=.0263; Lca/L=0.6, n=.0245  
 TIME OF PEAK FLOW( HR) = 16.58 RUNOFF VOLUME( AF) = 370.58  
 PEAK FLOW RATE( CFS) = 1283.16

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 101.00 TO NODE 103.00 IS CODE = 31  
 -----  
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM( FEET) = 658.00 DOWNSTREAM( FEET) = 645.00



FLOW LENGTH(FEET) = 2823.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 132.0 INCH PIPE IS 101.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.41  
ESTIMATED PIPE DIAMETER(INCH) = 132.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 1283.16  
PIPE TRAVEL TIME(MIN.) = 2.87 Tc(MIN.) = 44.77  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 103.00 = 18717.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 44.77  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.431  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 76.52 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 76.52  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.75; LAG(HR) = 0.60; Fm(INCH/HR) = 0.33; Ybar = 0.35  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1206.6  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 103.00 = 18717.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0298; Lca/L=0.4,n=.0267; Lca/L=0.5,n=.0245;Lca/L=0.6,n=.0229  
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 403.89  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1331.94  
TOTAL AREA(ACRES) = 1206.6 PEAK FLOW RATE(CFS) = 1331.94

\*\*\*\*\*  
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 645.00 DOWNSTREAM(FEET) = 638.70  
FLOW LENGTH(FEET) = 1376.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 132.0 INCH PIPE IS 105.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.41  
ESTIMATED PIPE DIAMETER(INCH) = 132.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 1331.94  
PIPE TRAVEL TIME(MIN.) = 1.40 Tc(MIN.) = 46.16  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 104.00 = 20093.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 104.00 TO NODE 104.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 46.16  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.404  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 86.64 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 86.64  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.77; LAG(HR) = 0.62; Fm(INCH/HR) = 0.31; Ybar = 0.34  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.94; 30M = 0.94; 1HR = 0.94;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1293.3  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 104.00 = 20093.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0290; Lca/L=0.4,n=.0260; Lca/L=0.5,n=.0239;Lca/L=0.6,n=.0223  
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 441.59  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1416.34  
TOTAL AREA(ACRES) = 1293.3 PEAK FLOW RATE(CFS) = 1416.34

\*\*\*\*\*  
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) = 638.70 DOWNSTREAM(FEET) = 630.00  
FLOW LENGTH(FEET) = 1863.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 138.0 INCH PIPE IS 103.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.98  
ESTIMATED PIPE DIAMETER(INCH) = 138.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 1416.34  
PIPE TRAVEL TIME(MIN.) = 1.83 Tc(MIN.) = 47.99  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 105.00 = 21956.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 47.99  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.372  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 43.70 0.98 0.100 32  
COMMERCIAL B 25.80 0.75 0.100 56  
COMMERCIAL C 47.70 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.76



```

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 117.20
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
          MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.80; LAG(HR) = 0.64; Fm(INCH/HR) = 0.29; Ybar = 0.32
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.94; 30M = 0.94; 1HR = 0.94;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1410.5
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 105.00 = 21956.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0280; Lca/L=0.4,n=.0251; Lca/L=0.5,n=.0231;Lca/L=0.6,n=.0215
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 493.80
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1516.61
TOTAL AREA(ACRES) = 1410.5 PEAK FLOW RATE(CFS) = 1516.61
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1410.5 TC(MIN.) = 47.99
AREA-AVERAGED Fm(INCH/HR)= 0.29 Ybar = 0.32
PEAK FLOW RATE(CFS) = 1516.61
=====
END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS

```



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* W.O. #915-1, ONTARIO MPD \*  
\* 25-YR STUDY \*  
\* WALKER AVE. AREA 'C' \*  
\*\*\*\*\*

FILE NAME: WALKER\_M.DAT  
TIME/DATE OF STUDY: 15:36 11/11/2011

===== 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  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.800  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.200  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 0.9404  
SLOPE OF INTENSITY DURATION CURVE = 0.6000

\*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- / SIDE / SIDE / WAY	STREET-CROSSFALL: CURB HEIGHT (FT)	GUTTER WIDTH (FT)	STREET-CROSSFALL: GUTTER HEIGHT (FT)	STREET-CROSSFALL: GUTTER WIDTH (FT)	STREET-CROSSFALL: GUTTER HEIGHT (FT)	STREET-CROSSFALL: GUTTER WIDTH (FT)	STREET-CROSSFALL: GUTTER HEIGHT (FT)	MANNING FACTOR (n)
1	65.0	60.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150			
2	54.0	49.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150			
3	47.0	42.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150			
4	42.0	37.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150			
5	38.0	33.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150			
6	32.0	27.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150			
7	24.0	19.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150			
8	20.0	15.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150			
9	18.0	13.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150			

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.00 FEET

as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:

WATERSHED LAG = 0.80 \* Tc  
USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF  
2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH  
FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.  
SIERRA MADRE DEPTH-AREA FACTORS USED.

DURATION	AREA-AVERAGED RAINFALL(INCH)
5-MINUTES	0.35
30-MINUTES	0.71
1-HOUR	0.94
3-HOUR	1.64
6-HOUR	2.32
24-HOUR	4.49

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD\*

\*\*\*\*\* FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 21 \*\*\*\*\*

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 998.00  
ELEVATION DATA: UPSTREAM(FEET) = 775.00 DOWNSTREAM(FEET) = 767.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.174

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.065

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.)
RESIDENTIAL						
"5-7 DWELLINGS/ACRE"	A	5.70	0.98	0.500	32	16.17
RESIDENTIAL						
"5-7 DWELLINGS/ACRE"	C	4.00	0.57	0.500	69	16.17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.81						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500						
SUBAREA RUNOFF(CFS) = 14.51						
TOTAL AREA(ACRES) = 9.70 PEAK FLOW RATE(CFS) = 14.51						

\*\*\*\*\* FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 62 \*\*\*\*\*

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<<<<

UPSTREAM ELEVATION(FEET) = 767.00 DOWNSTREAM ELEVATION(FEET) = 750.00  
STREET LENGTH(FEET) = 1686.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 65.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 60.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 23.76  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.53  
 HALFSTREET FLOOD WIDTH(FEET) = 18.51  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.29  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.74  
 STREET FLOW TRAVEL TIME(MIN.) = 8.55 Tc(MIN.) = 24.72  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.601

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"	A	13.90	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.70	0.57	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 17.60 SUBAREA RUNOFF(CFS) = 18.32  
 EFFECTIVE AREA(ACRES) = 27.30 AREA-AVERAGED Fm(INCH/HR) = 0.43  
 AREA-AVERAGED Fp(INCH/HR) = 0.86 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 27.3 PEAK FLOW RATE(CFS) = 28.77

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.56 HALFSTREET FLOOD WIDTH(FEET) = 19.97  
 FLOW VELOCITY(FEET/SEC.) = 3.44 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.92  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 83.00 = 2684.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 747.70  
 FLOW LENGTH(FEET) = 1333.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.43  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 28.77  
 PIPE TRAVEL TIME(MIN.) = 5.02 Tc(MIN.) = 29.74  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 84.00 = 4017.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 29.74  
 \* 25 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
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	72.10	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 72.10 SUBAREA RUNOFF(CFS) = 61.35  
 EFFECTIVE AREA(ACRES) = 99.40 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.94 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 99.4 PEAK FLOW RATE(CFS) = 85.99

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 29.74  
 \* 25 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
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	8.70	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	91.90	0.98	0.500	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.474  
 SUBAREA AREA(ACRES) = 100.60 SUBAREA RUNOFF(CFS) = 87.89  
 EFFECTIVE AREA(ACRES) = 200.00 AREA-AVERAGED Fm(INCH/HR) = 0.47  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 200.0 PEAK FLOW RATE(CFS) = 173.88

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 747.70 DOWNSTREAM(FEET) = 722.70  
 FLOW LENGTH(FEET) = 2630.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 42.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.02  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 173.88  
 PIPE TRAVEL TIME(MIN.) = 3.37 Tc(MIN.) = 33.11  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 85.00 = 6647.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 33.11  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.344  
 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" A 73.80 0.98 0.500 32  
 PUBLIC PARK A 26.20 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.592  
 SUBAREA AREA(ACRES) = 100.00 SUBAREA RUNOFF(CFS) = 69.00  
 EFFECTIVE AREA(ACRES) = 300.00 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 300.0 PEAK FLOW RATE(CFS) = 226.81

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 33.11  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.344  
 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" A 8.30 0.98 0.500 32  
 PUBLIC PARK A 0.60 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524  
 SUBAREA AREA(ACRES) = 8.90 SUBAREA RUNOFF(CFS) = 6.67  
 EFFECTIVE AREA(ACRES) = 308.90 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 308.9 PEAK FLOW RATE(CFS) = 233.48

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 1  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 33.11  
 RAINFALL INTENSITY(INCH/HR) = 1.34  
 AREA-AVERAGED Fm(INCH/HR) = 0.50  
 AREA-AVERAGED Fp(INCH/HR) = 0.97  
 AREA-AVERAGED Ap = 0.52  
 EFFECTIVE STREAM AREA(ACRES) = 308.90  
 TOTAL STREAM AREA(ACRES) = 308.90  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 233.48

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 86.00 TO NODE 87.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 764.00  
 ELEVATION DATA: UPSTREAM(FEET) = 750.00 DOWNSTREAM(FEET) = 740.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.177  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.335  
 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.)  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 2.30 0.98 0.500 32 13.18  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 7.20 0.57 0.500 69 13.18  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.67  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 17.12  
 TOTAL AREA(ACRES) = 9.50 PEAK FLOW RATE(CFS) = 17.12

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 87.00 TO NODE 88.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 9 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 740.00 DOWNSTREAM ELEVATION(FEET) = 724.70  
 STREET LENGTH(FEET) = 1880.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 34.23  
 \*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.59  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.60  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.13  
 STREET FLOW TRAVEL TIME(MIN.) = 8.71 Tc(MIN.) = 21.89  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.722  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 9.20 0.57 0.100 69  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 13.30 0.57 0.500 69  
 PUBLIC PARK C 2.40 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.386

SUBAREA AREA(ACRES) = 24.90 SUBAREA RUNOFF(CFS) = 33.70  
 EFFECTIVE AREA(ACRES) = 34.40 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA(ACRES) = 34.4 PEAK FLOW RATE(CFS) = 45.58

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.64 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 FLOW VELOCITY(FEET/SEC.) = 4.03 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.59  
 LONGEST FLOWPATH FROM NODE 86.00 TO NODE 88.00 = 2644.00 FEET.

PIPE-FLOW VELOCITY(FEET/SEC.) = 4.68  
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 87.29  
 PIPE TRAVEL TIME(MIN.) = 3.94 Tc(MIN.) = 28.69  
 LONGEST FLOWPATH FROM NODE 86.00 TO NODE 90.00 = 4444.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 90.00 TO NODE 90.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 28.69  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.464  
 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"	A	52.90	0.98	0.500	32
PUBLIC PARK	A	3.40	0.98	0.850	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	13.40	0.57	0.500	69
PUBLIC PARK	C	1.40	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524  
 SUBAREA AREA(ACRES) = 71.10 SUBAREA RUNOFF(CFS) = 63.93  
 EFFECTIVE AREA(ACRES) = 145.10 AREA-AVERAGED Fm(INCH/HR) = 0.38  
 AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 145.1 PEAK FLOW RATE(CFS) = 142.19

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 90.00 TO NODE 85.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 722.90 DOWNSTREAM(FEET) = 722.70  
 FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.37  
 ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 142.19  
 PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 29.31  
 LONGEST FLOWPATH FROM NODE 86.00 TO NODE 85.00 = 4644.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 1  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<  
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

\*\*\*\*\*  
 TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 29.31  
 RAINFALL INTENSITY(INCH/HR) = 1.45  
 AREA-AVERAGED Fm(INCH/HR) = 0.38  
 AREA-AVERAGED Fp(INCH/HR) = 0.75

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 88.00 TO NODE 89.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 724.70 DOWNSTREAM(FEET) = 724.00  
 FLOW LENGTH(FEET) = 695.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.05  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 45.58  
 PIPE TRAVEL TIME(MIN.) = 2.86 Tc(MIN.) = 24.75  
 LONGEST FLOWPATH FROM NODE 86.00 TO NODE 89.00 = 3339.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 89.00 TO NODE 89.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 24.75  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.600  
 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"	A	5.20	0.98	0.500	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	31.70	0.57	0.500	69
PUBLIC PARK	C	2.70	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524  
 SUBAREA AREA(ACRES) = 39.60 SUBAREA RUNOFF(CFS) = 45.50  
 EFFECTIVE AREA(ACRES) = 74.00 AREA-AVERAGED Fm(INCH/HR) = 0.29  
 AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 74.0 PEAK FLOW RATE(CFS) = 87.29

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 89.00 TO NODE 90.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 724.00 DOWNSTREAM(FEET) = 722.90  
 FLOW LENGTH(FEET) = 1105.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 50.7 INCHES



AREA-AVERAGED  $A_p = 0.50$   
 EFFECTIVE STREAM AREA(ACRES) = 145.10  
 TOTAL STREAM AREA(ACRES) = 145.10  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 142.19

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	233.48	33.11	1.344	0.97 (0.50)	0.52	308.9	81.00
2	142.19	29.31	1.446	0.75 (0.38)	0.50	145.1	86.00

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	373.96	29.31	1.446	0.89 (0.46)	0.51	418.6	86.00
2	362.12	33.11	1.344	0.90 (0.46)	0.51	454.0	81.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 373.96 Tc(MIN.) = 29.31  
 EFFECTIVE AREA(ACRES) = 418.55 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.89 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 454.0  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 85.00 = 6647.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 85.00 TO NODE 91.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 722.70 DOWNSTREAM(FEET) = 697.00  
 FLOW LENGTH(FEET) = 2645.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 72.0 INCH PIPE IS 55.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.93  
 ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 373.96  
 PIPE TRAVEL TIME(MIN.) = 2.77 Tc(MIN.) = 32.07  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 91.00 = 9292.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 32.07  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.369  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	2.00	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	6.50	0.98	0.500	32

PUBLIC PARK A 0.60 0.98 0.850 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457  
 SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 7.56  
 EFFECTIVE AREA(ACRES) = 427.65 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.90 AREA-AVERAGED Ap = 0.51  
 TOTAL AREA(ACRES) = 463.1 PEAK FLOW RATE(CFS) = 373.96  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 32.07  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.369  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	19.20	0.98	0.200	32
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	60.30	0.98	0.500	32
PUBLIC PARK	A	5.40	0.98	0.850	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.454  
 SUBAREA AREA(ACRES) = 84.90 SUBAREA RUNOFF(CFS) = 70.78  
 EFFECTIVE AREA(ACRES) = 512.55 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.91 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA(ACRES) = 548.0 PEAK FLOW RATE(CFS) = 421.17

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 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.) = 32.07  
 RAINFALL INTENSITY(INCH/HR) = 1.37  
 AREA-AVERAGED Fm(INCH/HR) = 0.46  
 AREA-AVERAGED Fp(INCH/HR) = 0.91  
 AREA-AVERAGED Ap = 0.50  
 EFFECTIVE STREAM AREA(ACRES) = 512.55  
 TOTAL STREAM AREA(ACRES) = 548.00  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 421.17

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 92.00 TO NODE 93.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 780.00  
 ELEVATION DATA: UPSTREAM(FEET) = 730.00 DOWNSTREAM(FEET) = 720.00

Tc = K \* [(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.342  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.318  
 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 "5-7 DWELLINGS/ACRE"	A	0.50	0.98	0.500	32	13.34
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	8.80	0.57	0.500	69	13.34

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.59  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA RUNOFF(CFS) = 16.94  
 TOTAL AREA(ACRES) = 9.30 PEAK FLOW RATE(CFS) = 16.94

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 93.00 TO NODE 94.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 9 USED)<<<<<  
 -----  
 UPSTREAM ELEVATION(FEET) = 720.00 DOWNSTREAM ELEVATION(FEET) = 701.00  
 STREET LENGTH(FEET) = 1920.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.90  
 \*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.58  
 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.81  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.19  
 STREET FLOW TRAVEL TIME(MIN.) = 8.40 Tc(MIN.) = 21.75

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.729  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	5.50	0.98	0.200	32
RESIDENTIAL "5-7 DWELLINGS/ACRE"	A	6.90	0.98	0.500	32
PUBLIC PARK "11+ DWELLINGS/ACRE"	A	1.40	0.98	0.850	32
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	5.20	0.57	0.200	69
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	6.40	0.57	0.500	69
PUBLIC PARK "5-7 DWELLINGS/ACRE"	C	0.80	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.79  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407  
 SUBAREA AREA(ACRES) = 26.20 SUBAREA RUNOFF(CFS) = 33.23  
 EFFECTIVE AREA(ACRES) = 35.50 AREA-AVERAGED Fm(INCH/HR) = 0.31  
 AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA(ACRES) = 35.5 PEAK FLOW RATE(CFS) = 45.24

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.62 HALFSTREET FLOOD WIDTH(FEET) = 18.00  
 FLOW VELOCITY(FEET/SEC.) = 4.26 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.65  
 LONGEST FLOWPATH FROM NODE 92.00 TO NODE 94.00 = 2700.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----

ELEVATION DATA: UPSTREAM(FEET) = 701.00 DOWNSTREAM(FEET) = 699.00  
 FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.99  
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 45.24  
 PIPE TRAVEL TIME(MIN.) = 1.95 Tc(MIN.) = 23.69  
 LONGEST FLOWPATH FROM NODE 92.00 TO NODE 95.00 = 3400.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----

MAINLINE Tc(MIN.) = 23.69  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.642  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	9.30	0.57	0.200	69
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	29.20	0.57	0.500	69
PUBLIC PARK "5-7 DWELLINGS/ACRE"	C	3.50	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463  
 SUBAREA AREA(ACRES) = 42.00 SUBAREA RUNOFF(CFS) = 52.18  
 EFFECTIVE AREA(ACRES) = 77.50 AREA-AVERAGED Fm(INCH/HR) = 0.29  
 AREA-AVERAGED Fp(INCH/HR) = 0.64 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 77.5 PEAK FLOW RATE(CFS) = 94.64

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 95.00 TO NODE 96.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----

ELEVATION DATA: UPSTREAM(FEET) = 699.00 DOWNSTREAM(FEET) = 697.20

FLOW LENGTH(FEET) = 1100.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 46.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.79  
 ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 94.64  
 PIPE TRAVEL TIME(MIN.) = 3.17 Tc(MIN.) = 26.86  
 LONGEST FLOWPATH FROM NODE 92.00 TO NODE 96.00 = 4500.00 FEET.

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 27.47  
 RAINFALL INTENSITY(INCH/HR) = 1.50  
 AREA-AVERAGED Fm(INCH/HR) = 0.34  
 AREA-AVERAGED Fp(INCH/HR) = 0.76  
 AREA-AVERAGED Ap = 0.45  
 EFFECTIVE STREAM AREA(ACRES) = 149.00  
 TOTAL STREAM AREA(ACRES) = 149.00  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 158.29

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 96.00 TO NODE 96.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\* CONFLUENCE DATA \*\*

-----  
 MAINLINE Tc(MIN.) = 26.86  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.523  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 6.80 0.98 0.200 32  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" A 43.50 0.98 0.500 32  
 PUBLIC PARK A 2.90 0.98 0.850 32  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 9.00 0.57 0.200 69  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 7.40 0.57 0.500 69  
 PUBLIC PARK C 1.90 0.57 0.850 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.89  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457  
 SUBAREA AREA(ACRES) = 71.50 SUBAREA RUNOFF(CFS) = 71.95  
 EFFECTIVE AREA(ACRES) = 149.00 AREA-AVERAGED Fm(INCH/HR) = 0.34  
 AREA-AVERAGED Fp(INCH/HR) = 0.76 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA(ACRES) = 149.00 PEAK FLOW RATE(CFS) = 158.29

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	421.17	32.07	1.369	0.91( 0.46)	0.50	512.6	86.00
1	404.82	35.88	1.280	0.91( 0.46)	0.50	548.0	81.00
2	158.29	27.47	1.503	0.76( 0.34)	0.45	149.0	92.00

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	571.70	27.47	1.503	0.87( 0.43)	0.49	587.9	92.00
2	561.23	32.07	1.369	0.88( 0.43)	0.49	661.6	86.00
3	532.72	35.88	1.280	0.88( 0.43)	0.49	697.0	81.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 571.70 Tc(MIN.) = 27.47  
 EFFECTIVE AREA(ACRES) = 587.90 AREA-AVERAGED Fm(INCH/HR) = 0.43  
 AREA-AVERAGED Fp(INCH/HR) = 0.87 AREA-AVERAGED Ap = 0.49  
 TOTAL AREA(ACRES) = 697.0  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 91.00 = 9292.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 96.00 TO NODE 91.00 IS CODE = 31

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 71

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<<  
 >>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<<

-----  
 ELEVATION DATA: UPSTREAM(FEET) = 697.20 DOWNSTREAM(FEET) = 697.00  
 FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 81.0 INCH PIPE IS 60.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.51  
 ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 158.29  
 PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 27.47  
 LONGEST FLOWPATH FROM NODE 92.00 TO NODE 91.00 = 4700.00 FEET.

-----  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.60; LAG(HR) = 0.48; Fm(INCH/HR) = 0.43; Ybar = 0.48  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
 3HR = 1.00; 6HR = 1.00; 24HR = 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 697.0  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 91.00 = 9292.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0421; Lca/L=0.4,n=.0378; Lca/L=0.5,n=.0347;Lca/L=0.6,n=.0324  
 TIME OF PEAK FLOW(HR) = 16.50 RUNOFF VOLUME(AF) = 143.76  
 UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) = 615.36  
 TOTAL PEAK FLOW RATE(CFS) = 615.36 (SOURCE FLOW INCLUDED)

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 91.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

RATIONAL METHOD PEAK FLOW RATE(CFS) = 571.70  
 (UPSTREAM NODE PEAK FLOW RATE(CFS) = 571.70)  
 PEAK FLOW RATE(CFS) USED = 615.36

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 97.00 IS CODE = 31  
 -----

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 91.00 TO NODE 97.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====  
 ELEVATION DATA: UPSTREAM(FEET) = 697.00 DOWNSTREAM(FEET) = 685.00  
 FLOW LENGTH(FEET) = 2637.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 102.0 INCH PIPE IS 75.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.68  
 ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 615.36  
 PIPE TRAVEL TIME(MIN.) = 3.21 Tc(MIN.) = 39.10  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 97.00 = 11929.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 39.10  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.216  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	18.80	0.98	0.100	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	11.30	0.98	0.200	32
PUBLIC PARK	A	22.50	0.98	0.850	32
COMMERCIAL	C	10.00	0.57	0.100	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	13.40	0.57	0.200	69
PUBLIC PARK	C	7.50	0.57	0.850	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.85  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.399  
 SUBAREA AREA(ACRES) = 83.50  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.65; LAG(HR) = 0.52; Fm(INCH/HR) = 0.42; Ybar = 0.47  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 780.5  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 97.00 = 11929.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0372; Lca/L=0.4,n=.0334; Lca/L=0.5,n=.0306;Lca/L=0.6,n=.0286  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 163.59  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 667.37  
 TOTAL AREA(ACRES) = 780.5 PEAK FLOW RATE(CFS) = 667.37

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 39.10  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.216  
 SUBAREA LOSS RATE DATA(AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	28.00	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	50.50	0.98	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.432  
 SUBAREA AREA(ACRES) = 78.50  
 UNIT-HYDROGRAPH DATA:  
 RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
 MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
 Tc(HR) = 0.65; LAG(HR) = 0.52; Fm(INCH/HR) = 0.42; Ybar = 0.47  
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;  
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
 UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 859.0  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 97.00 = 11929.00 FEET.  
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
 Lca/L=0.3,n=.0372; Lca/L=0.4,n=.0334; Lca/L=0.5,n=.0306;Lca/L=0.6,n=.0286  
 TIME OF PEAK FLOW(HR) = 16.58 RUNOFF VOLUME(AF) = 180.16  
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 731.77  
 TOTAL AREA(ACRES) = 859.0 PEAK FLOW RATE(CFS) = 731.77

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 97.00 TO NODE 102.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 =====

ELEVATION DATA: UPSTREAM(FEET) = 685.00 DOWNSTREAM(FEET) = 660.00  
 FLOW LENGTH(FEET) = 2650.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 93.0 INCH PIPE IS 72.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.62  
 ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 731.77  
 PIPE TRAVEL TIME(MIN.) = 2.37 Tc(MIN.) = 41.47  
 LONGEST FLOWPATH FROM NODE 81.00 TO NODE 102.00 = 14579.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====

MAINLINE Tc(MIN.) = 41.47  
 \* 25 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
PUBLIC PARK	A	28.00	0.98	0.850	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	50.50	0.98	0.200	32

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LAND USE          GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL        A      37.80    0.98      0.100     32
COMMERCIAL        C      6.30    0.57      0.100     69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.92
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 44.10
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
          MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.69; LAG(HR) = 0.55; Fm(INCH/HR) = 0.41; Ybar = 0.45
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00  TOTAL AREA(ACRES) = 903.1
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 102.00 = 14579.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0342; Lca/L=0.4,n=.0306; Lca/L=0.5,n=.0281;Lca/L=0.6,n=.0263
TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) = 194.41
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 747.37
TOTAL AREA(ACRES) = 903.1  PEAK FLOW RATE(CFS) = 747.37
*****
FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 41.47
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.174
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS
LAND USE          GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL        A      82.60    0.98  0.100  32
COMMERCIAL        B      7.80    0.75  0.100  56
COMMERCIAL        C      26.50    0.57  0.100  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.87
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 116.90
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%
          MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%
Tc(HR) = 0.69; LAG(HR) = 0.55; Fm(INCH/HR) = 0.37; Ybar = 0.42
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;
3HR = 0.99; 6HR = 1.00; 24HR= 1.00
UNIT-INTERVAL(MIN) = 5.00  TOTAL AREA(ACRES) = 1020.0
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 102.00 = 14579.00 FEET.
EQUIVALENT BASIN FACTOR APPROXIMATIONS:
Lca/L=0.3,n=.0342; Lca/L=0.4,n=.0306; Lca/L=0.5,n=.0281;Lca/L=0.6,n=.0263
TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) = 232.35
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 865.42
TOTAL AREA(ACRES) = 1020.0  PEAK FLOW RATE(CFS) = 865.42
*****
FLOW PROCESS FROM NODE 102.00 TO NODE 101.00 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) = 660.00  DOWNSTREAM(FEET) = 658.00
FLOW LENGTH(FEET) = 1315.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 138.0 INCH PIPE IS 110.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.74
ESTIMATED PIPE DIAMETER(INCH) = 138.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 865.42
PIPE TRAVEL TIME(MIN.) = 2.25  Tc(MIN.) = 43.72
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 101.00 = 15894.00 FEET.
*****
FLOW PROCESS FROM NODE 101.00 TO NODE 101.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
PEAK FLOW RATE(CFS) = 865.42  Tc(MIN.) = 43.72
AREA-AVERAGED Fm(INCH/HR) = 0.37  Ybar = 0.42
TOTAL AREA(ACRES) = 1020.0
*****
FLOW PROCESS FROM NODE 98.00 TO NODE 99.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 870.00
ELEVATION DATA: UPSTREAM(FEET) = 684.00  DOWNSTREAM(FEET) = 680.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.371
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.315
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        A      9.90    0.98  0.100  32  13.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 19.76
TOTAL AREA(ACRES) = 9.90  PEAK FLOW RATE(CFS) = 19.76
*****
FLOW PROCESS FROM NODE 99.00 TO NODE 100.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 7 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 680.00  DOWNSTREAM ELEVATION(FEET) = 666.60
STREET LENGTH(FEET) = 1650.00  CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 24.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 19.00

```

INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 34.51  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.61  
HALFSTREET FLOOD WIDTH(FEET) = 22.40  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.31  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.01  
STREET FLOW TRAVEL TIME(MIN.) = 8.30 Tc(MIN.) = 21.67  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.732

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 19.90 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 19.90 SUBAREA RUNOFF(CFS) = 29.28  
EFFECTIVE AREA(ACRES) = 29.80 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 29.8 PEAK FLOW RATE(CFS) = 43.85

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.65 HALFSTREET FLOOD WIDTH(FEET) = 24.00  
FLOW VELOCITY(FEET/SEC.) = 3.55 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.30  
LONGEST FLOWPATH FROM NODE 98.00 TO NODE 100.00 = 2520.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 666.60 DOWNSTREAM(FEET) = 658.00  
FLOW LENGTH(FEET) = 700.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.37  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 43.85  
PIPE TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 22.80  
LONGEST FLOWPATH FROM NODE 98.00 TO NODE 101.00 = 3220.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 101.00 TO NODE 101.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 22.80  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.681  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 80.30 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 80.30 SUBAREA RUNOFF(CFS) = 114.42  
EFFECTIVE AREA(ACRES) = 110.10 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.10  
TOTAL AREA(ACRES) = 110.1 PEAK FLOW RATE(CFS) = 156.88

\*\*\*\*\*  
FLOW PROCESS FROM NODE 101.00 TO NODE 101.00 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.) = 22.80  
RAINFALL INTENSITY(INCH/HR) = 1.68  
AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.98  
AREA-AVERAGED Ap = 0.10  
EFFECTIVE STREAM AREA(ACRES) = 110.10  
TOTAL STREAM AREA(ACRES) = 110.10  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 156.88

\*\* CONFLUENCE DATA \*\*  
STREAM Q Tc AREA HEADWATER  
NUMBER (CFS) (MIN.) (ACRES) NODE  
1 865.42 43.72 1020.00 81.00  
2 156.88 22.80 110.10 98.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GPAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.73; LAG(HR) = 0.58; Fm(INCH/HR) = 0.34; Ybar = 0.39  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;  
3HR = 0.99; 6HR = 1.00; 24HR = 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1130.1  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 101.00 = 15894.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0333; Lca/L=0.4,n=.0298; Lca/L=0.5,n=.0274;Lca/L=0.6,n=.0256  
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 267.70  
PEAK FLOW RATE(CFS) = 936.93

\*\*\*\*\*  
FLOW PROCESS FROM NODE 101.00 TO NODE 103.00 IS CODE = 31  
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 658.00 DOWNSTREAM(FEET) = 645.00  
FLOW LENGTH(FEET) = 2823.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 120.0 INCH PIPE IS 87.4 INCHES



PIPE-FLOW VELOCITY(FEET/SEC.) = 15.29  
ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 936.93  
PIPE TRAVEL TIME(MIN.) = 3.08 Tc(MIN.) = 46.79  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 103.00 = 18717.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

MAINLINE Tc(MIN.) = 46.79  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.092  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 76.52 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 76.52  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.78; LAG(HR) = 0.62; Fm(INCH/HR) = 0.33; Ybar = 0.38  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1206.6  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 103.00 = 18717.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0311; Lca/L=0.4,n=.0279; Lca/L=0.5,n=.0256;Lca/L=0.6,n=.0239  
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 292.26  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 982.58  
TOTAL AREA(ACRES) = 1206.6 PEAK FLOW RATE(CFS) = 982.58

\*\*\*\*\*  
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 645.00 DOWNSTREAM(FEET) = 638.70  
FLOW LENGTH(FEET) = 1376.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 120.0 INCH PIPE IS 91.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.34  
ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 982.58  
PIPE TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 48.29  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 104.00 = 20093.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 104.00 TO NODE 104.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

MAINLINE Tc(MIN.) = 48.29  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.071  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 86.64 0.98 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 86.64  
UNIT-HYDROGRAPH DATA:  
RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49  
S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%  
MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%  
Tc(HR) = 0.80; LAG(HR) = 0.64; Fm(INCH/HR) = 0.31; Ybar = 0.36  
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.  
DEPTH-AREA FACTORS: 5M = 0.94; 30M = 0.94; 1HR = 0.94;  
3HR = 0.99; 6HR = 1.00; 24HR= 1.00  
UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1293.3  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 104.00 = 20093.00 FEET.  
EQUIVALENT BASIN FACTOR APPROXIMATIONS:  
Lca/L=0.3,n=.0303; Lca/L=0.4,n=.0272; Lca/L=0.5,n=.0250;Lca/L=0.6,n=.0233  
TIME OF PEAK FLOW(HR) = 16.67 RUNOFF VOLUME(AF) = 320.04  
UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1035.69  
TOTAL AREA(ACRES) = 1293.3 PEAK FLOW RATE(CFS) = 1035.69

\*\*\*\*\*  
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) = 638.70 DOWNSTREAM(FEET) = 630.00  
FLOW LENGTH(FEET) = 1863.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 120.0 INCH PIPE IS 94.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.55  
ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 1035.69  
PIPE TRAVEL TIME(MIN.) = 2.00 Tc(MIN.) = 50.28  
LONGEST FLOWPATH FROM NODE 81.00 TO NODE 105.00 = 21956.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

MAINLINE Tc(MIN.) = 50.28  
\* 25 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  
COMMERCIAL A 43.70 0.98 0.100 32  
COMMERCIAL B 25.80 0.75 0.100 56  
COMMERCIAL C 47.70 0.57 0.100 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.76  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 117.20



UNIT-HYDROGRAPH DATA:

RAINFALL(INCH): 5M= 0.35;30M= 0.71;1H= 0.94;3H= 1.64;6H= 2.32;24H= 4.49

S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT= 0.0%

MOUNTAIN= 0.0%;FOOTHILL= 0.0%;DESERT(UNDEV.)= 0.0%

Tc(HR) = 0.84; LAG(HR) = 0.67; Fm(INCH/HR) = 0.29; Ybar = 0.34

USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC II CONDITION.

DEPTH-AREA FACTORS: 5M = 0.94; 30M = 0.94; 1HR = 0.94;

3HR = 0.99; 6HR = 1.00; 24HR= 1.00

UNIT-INTERVAL(MIN) = 5.00 TOTAL AREA(ACRES) = 1410.5

LONGEST FLOWPATH FROM NODE 81.00 TO NODE 105.00 = 21956.00 FEET.

EQUIVALENT BASIN FACTOR APPROXIMATIONS:

Lca/L=0.3,n=.0293; Lca/L=0.4,n=.0263; Lca/L=0.5,n=.0242;Lca/L=0.6,n=.0226

TIME OF PEAK FLOW(HR) = 16.75 RUNOFF VOLUME(AF) = 358.37

UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) = 1111.84

TOTAL AREA(ACRES) = 1410.5 PEAK FLOW RATE(CFS) = 1111.84

=====  
END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1410.5 TC(MIN.) = 50.28

AREA-AVERAGED Fm(INCH/HR)= 0.29 Ybar = 0.34

PEAK FLOW RATE(CFS) = 1111.84  
=====

=====  
END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS

