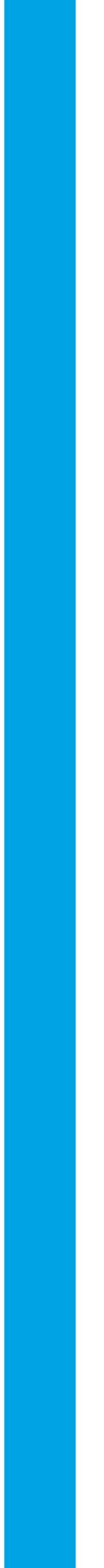


APPENDIX G – HYDROLOGY REPORT



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CITY OF NEWPORT BEACH
NEWPORT BOULEVARD AND 32ND ST MODIFICATION
HYDROLOGY REPORT

October 2013

Prepared for:

City of Newport Beach
Public Works Department
100 Civic Center Drive
Newport Beach, CA 92660

Prepared by:

VA Consulting, Inc.
46 Discovery, Suite 250
Irvine, CA. 92618



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1. INTRODUCTION

The City of Newport Beach has retained VA Consulting, Inc (VA) to provide professional engineering services for approximately 1,600 feet long widening improvements along Newport Boulevard between Via Lido and 30th Street (Project). The Project is located in a fully developed retail/commercial area in the City of Newport Beach, California (See Figure 1, Vicinity Map). Newport Boulevard is a major arterial roadway with raised and striped center medians and two continuous through lanes in each direction. The improvements provide one additional northbound thru lane from 30th Street to 32nd Street and one additional southbound thru lane from Via Lido to 32nd Street terminating as a right-turn only lane at 32nd Street.

In the pre-Project condition, the runoff generated from the retail/commercial lots mostly sheet flow onto the street, and gets conveyed by the street gutters into the existing storm drain system. Some runoff from residential areas and commercial lots is conveyed by v-gutters located in the alleys, and gets collected by the existing catch basins. The Project is divided into two subareas – the southerly portion of the Project (Area A as shown in Figure 2, Hydrology Map) generally flows southeasterly towards Newport Blvd and enters existing catch basins located in Newport Blvd. The existing storm drain located in 30th Street conveys the flow easterly in an existing 36-inch Reinforced Concrete Pipe (RCP) and ultimately discharge into Lower Newport Bay. The runoff generated from northerly portion of the Project (Area B) flows onto Newport Blvd and enters existing catch basins. The flow is conveyed by existing 36" storm drain system located at intersection with 32nd Street and discharged into the boat channel that is a part of the Lower Newport Bay.

In the post-Project condition, one additional lane is proposed along Newport Boulevard for both northbound, from 30th Street to 32nd Street, and southbound, from Via Lido to 32nd Street. A 6-foot wide bike lane is also proposed on both northbound and southbound of Newport Boulevard. A public parking lot with minimum of 26 parking spaces which would replace the 26 curb side public parking spaces on Newport Boulevard is proposed on the west side of Newport Boulevard between 32nd Street and Finley Avenue. To enhance the visual quality of the project area and improve safety, raised landscape medians along Newport Boulevard, as well as, additional landscape areas around the new parking lot, the sidewalk on the southeast corner of 32nd Street and Newport Boulevard, and the northeast corner of Finley and Newport Boulevard are proposed. The general flow pattern and the major drainage boundary remain the same; however, there will be an increase of pervious cover ratio due to the proposed landscaped medians and landscape areas. The existing catch basins will be relocated to align with the proposed curb and gutters.

This report contains the pre-Project and post-Project condition Rational Method hydrology study.

2. RATIONAL METHOD HYDROLOGIC ANALYSIS

The Orange County Hydrology Manual, published in 1986, (Hydrology Manual) and the Addendum No.1, published in 1995, provided the guidelines and procedures for the 100-year, 25-year and 10-year Rational Method analysis. The parameters used for the rational method are summarized below.

- Hydrologic boundaries were based on the topography as depicted on Figures 2 and 3, Rational Method Hydrology Maps, included in this report.
- The underlying hydrologic soil groups are Type A as shown on Plate B of the Hydrology Manual.
- The land use includes commercial and high-density condominiums.

The Rational Method analysis was performed with software developed by Advanced Engineering Software (AES) for the 100-year, 25-year and 10-year storm events. The software was designed to accept watershed data and perform Rational Method analyses in accordance with the Hydrology Manual. The software defines subareas and routing paths by means of upstream and downstream node numbers, node elevation, travel distance, soil group, land use and type of conveyance. The Rational Method Hydrology Map, included in this report as Figures 2 and 3, show the locations of all node numbers used in the rational method analysis.

3. RESULTS

The summary of results of the Rational Method hydrology analysis is listed in the Table 3-1 and 3-2 below.

**Table 3-1
Rational Method Hydrology Analysis Summary
Pre-Project Condition**

Drainage Area	Node	100-Year Peak Flow Rate	25-Year Peak Flow Rate	10-Year Peak Flow Rate	Tributary Area (ac)
A	20	25.9	20.1	16.7	8.9
B	68	43.1	33.2	27.5	15.8

**Table 3-2
Rational Method Hydrology Analysis Summary
Post-Project Condition**

Drainage Area	Node	100-Year Peak Flow Rate	25-Year Peak Flow Rate	10-Year Peak Flow Rate	Tributary Area (ac)
A	20	25.9	20.1	16.7	8.9
B	68	43.0	33.2	27.4	15.8

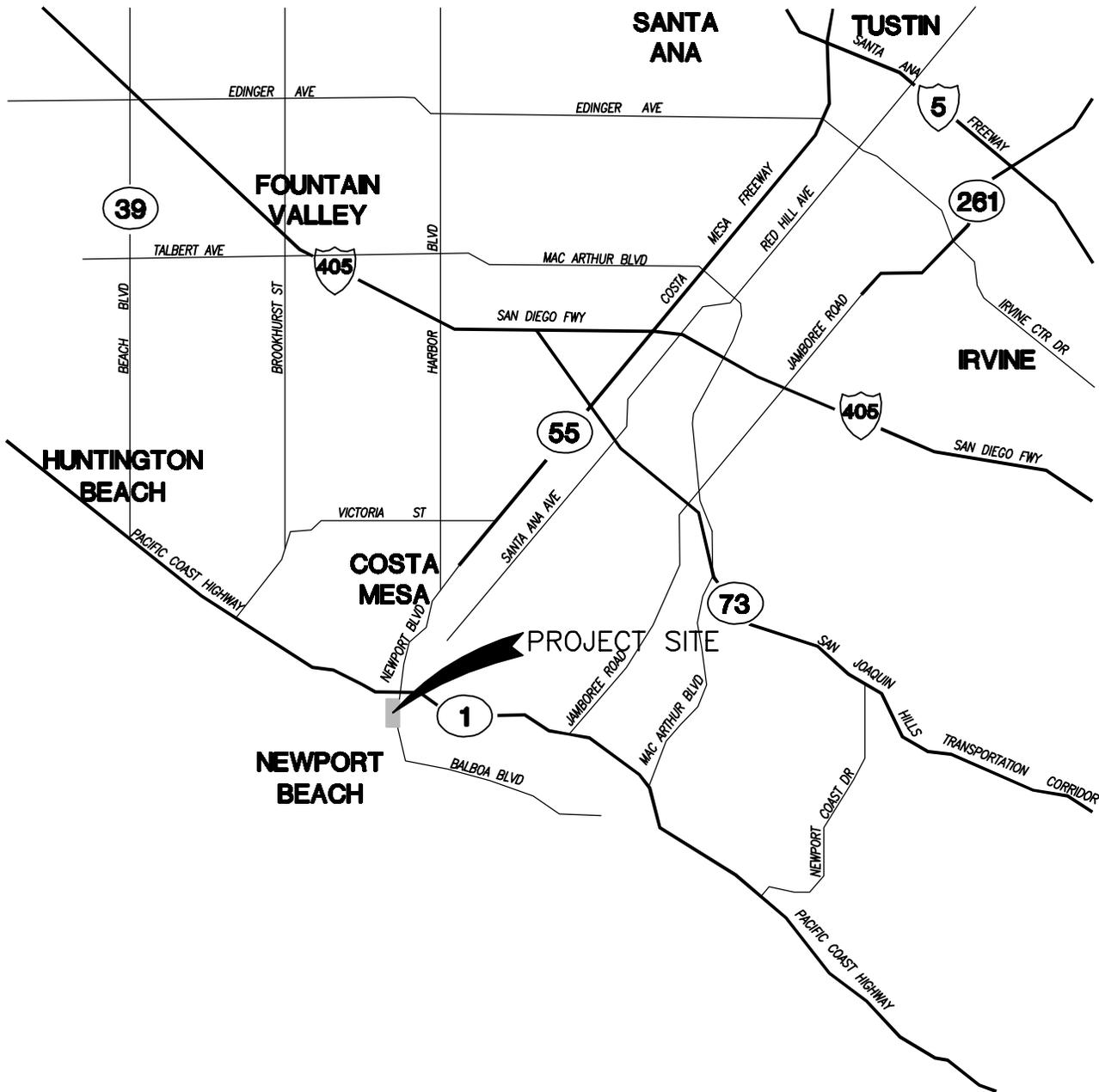
The results of the Rational Method hydrology studies are included in the technical appendices to this report.

4. FIGURES

Figure 1 Vicinity Map

Figure 2 Rational Method Hydrology Map : Pre-Project Condition

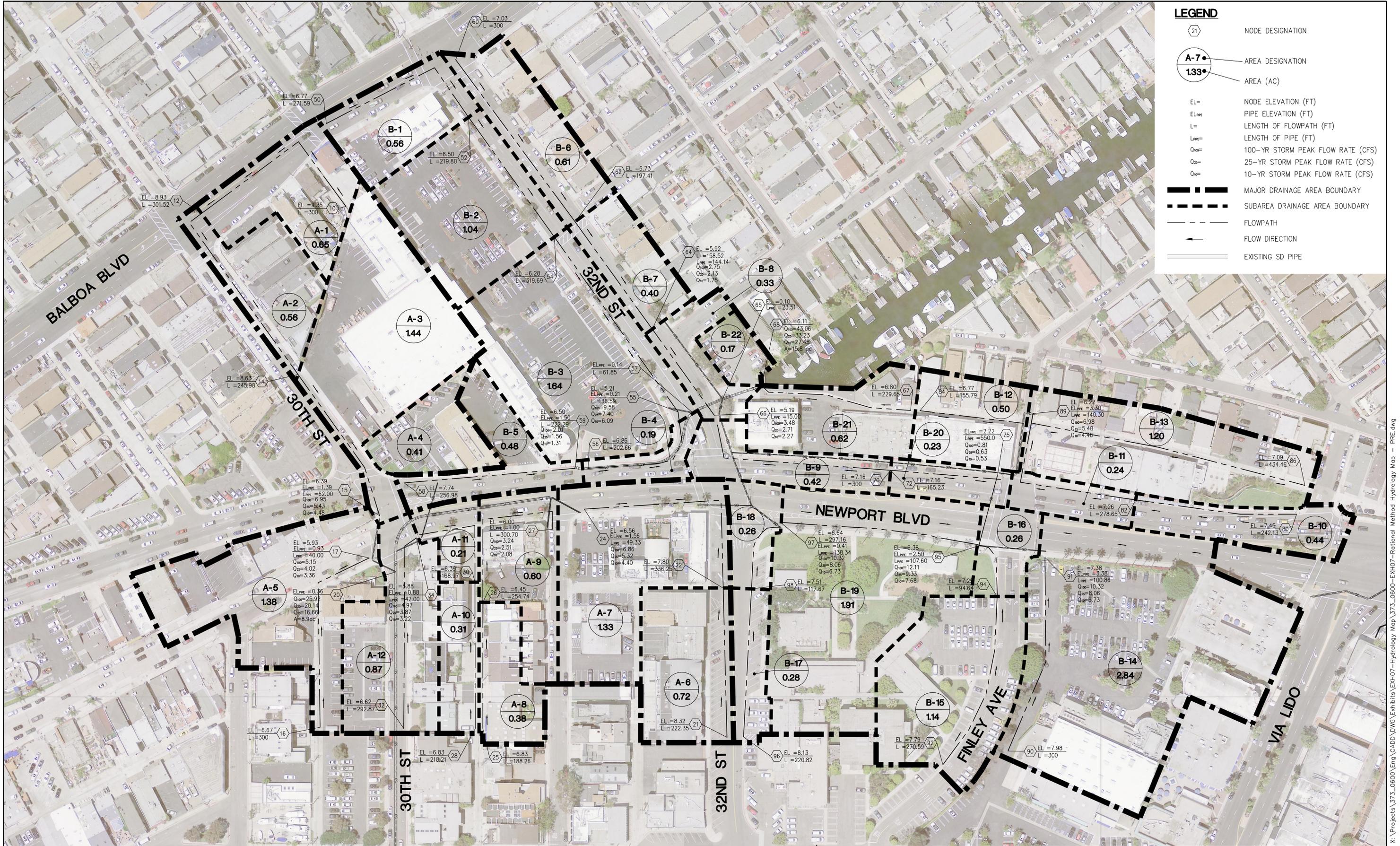
Figure 3 Rational Method Hydrology Map : Post-Project Condition



VICINITY MAP
NOT TO SCALE

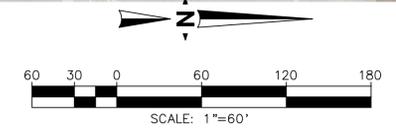


 VA Consulting, Inc. ENGINEERS PLANNERS SURVEYORS 46 DISCOVERY SUITE 250 (949) 474-1400 TEL IRVINE, CA 92618 (949) 261-8482 FAX	CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND STREET MODIFICATION	DATE 10/13
	VICINITY MAP	FIGURE 1



LEGEND

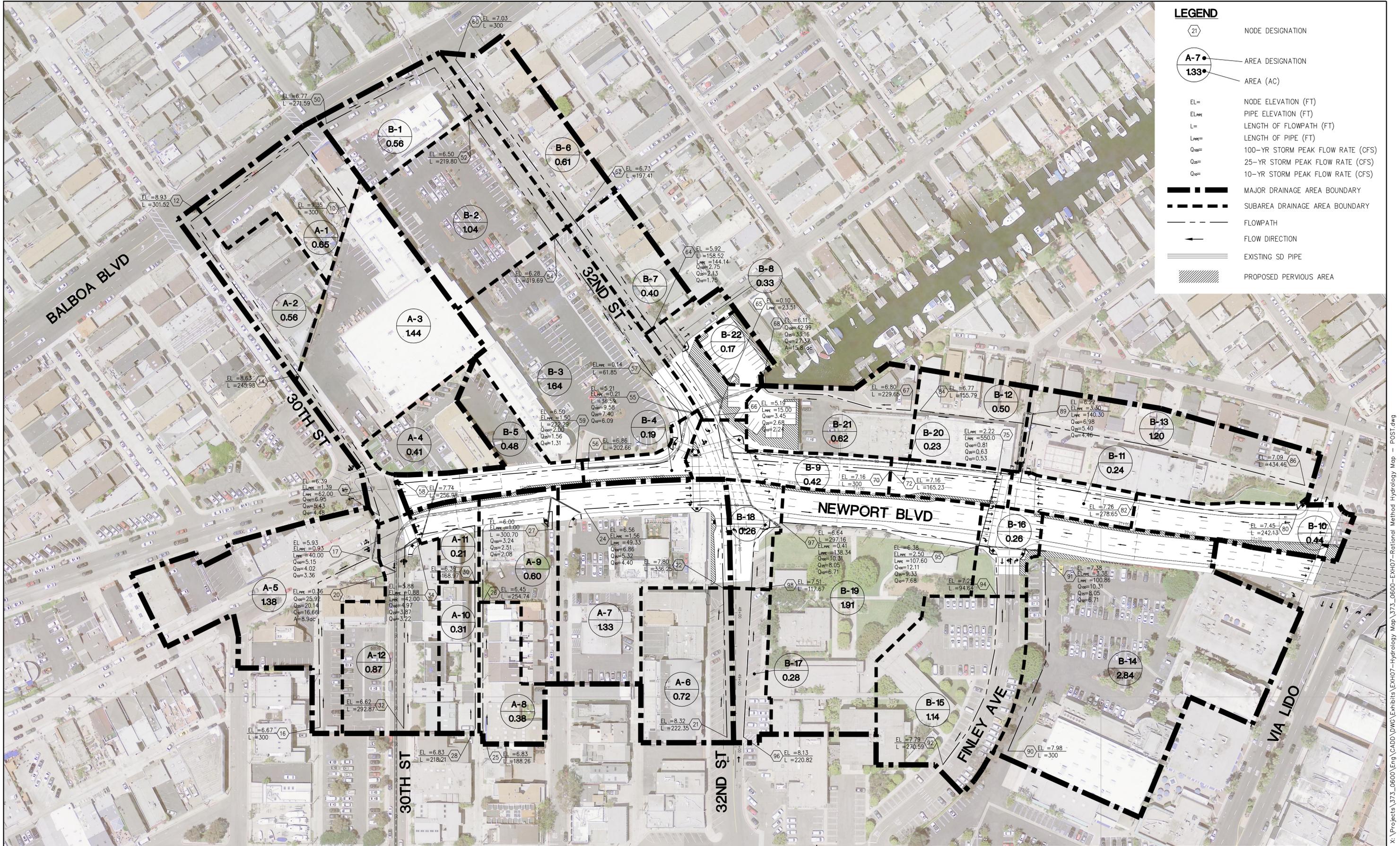
- (21) NODE DESIGNATION
- A-7 ● AREA DESIGNATION
- 1.33 ● AREA (AC)
- EL= NODE ELEVATION (FT)
- EL_{PIPE} PIPE ELEVATION (FT)
- L= LENGTH OF FLOWPATH (FT)
- L_{PIPE} LENGTH OF PIPE (FT)
- Q₁₀₀= 100-YR STORM PEAK FLOW RATE (CFS)
- Q₂₅= 25-YR STORM PEAK FLOW RATE (CFS)
- Q₁₀= 10-YR STORM PEAK FLOW RATE (CFS)
- MAJOR DRAINAGE AREA BOUNDARY
- SUBAREA DRAINAGE AREA BOUNDARY
- FLOWPATH
- FLOW DIRECTION
- EXISTING SD PIPE



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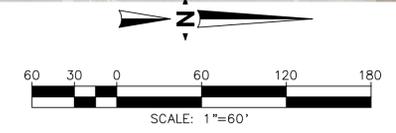
CITY OF NEWPORT BEACH
NEWPORT BLVD & 32ND ST IMPROVEMENTS
 PRE-PROJECT CONDITION
 RATIONAL METHOD HYDROLOGY MAP

FIGURE
2



LEGEND

- (21) NODE DESIGNATION
- A-7 ● AREA DESIGNATION
- 1.33 ● AREA (AC)
- EL= NODE ELEVATION (FT)
- EL_{PIPE} PIPE ELEVATION (FT)
- L= LENGTH OF FLOWPATH (FT)
- L_{PIPE} LENGTH OF PIPE (FT)
- Q₁₀₀= 100-YR STORM PEAK FLOW RATE (CFS)
- Q₂₅= 25-YR STORM PEAK FLOW RATE (CFS)
- Q₁₀= 10-YR STORM PEAK FLOW RATE (CFS)
- MAJOR DRAINAGE AREA BOUNDARY
- SUBAREA DRAINAGE AREA BOUNDARY
- FLOWPATH
- FLOW DIRECTION
- EXISTING SD PIPE
- PROPOSED PERVIOUS AREA



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CITY OF NEWPORT BEACH
NEWPORT BLVD & 32ND ST IMPROVEMENTS
POST-PROJECT CONDITION
RATIONAL METHOD HYDROLOGY MAP

FIGURE
3

5. TECHNICAL APPENDICES

APPENDIX A	Orange County Hydrology Manual References
APPENDIX B	Rational Method Hydrology Analysis : 100-Year Storm
APPENDIX C	Rational Method Hydrology Analysis : 25-Year Storm
APPENDIX D	Rational Method Hydrology Analysis : 10-Year Storm

APPENDIX A

Orange County Hydrology Manual
Reference Information

Curve Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II					
Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>NATURAL COVERS -</u>					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
<u>URBAN COVERS -</u>					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
<u>AGRICULTURAL COVERS -</u>					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

**ORANGE COUNTY
HYDROLOGY MANUAL**

**CURVE NUMBERS
FOR
PERVIOUS AREAS**

ACTUAL IMPERVIOUS COVER		
Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 0	0
Public Park	10 - 25	15
School	30 - 50	40
Single Family Residential: (3)		
2.5 acre lots	5 - 15	10
1 acre lots	10 - 25	20
2 dwellings/acre	20 - 40	30
3-4 dwellings/acre	30 - 50	40
5-7 dwellings/acre	35 - 55	50
8-10 dwellings/acre	50 - 70	60
More than 10 dwellings/acre	65 - 90	80
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 - 100	90

Notes:

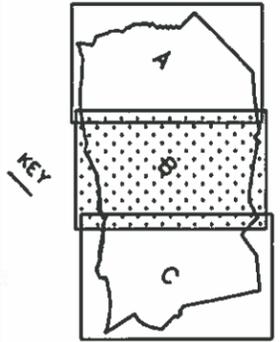
1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.
2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.
3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

**ORANGE COUNTY
HYDROLOGY MANUAL**

**ACTUAL IMPERVIOUS COVER
FOR
DEVELOPED AREAS**



PROJECT



KEY



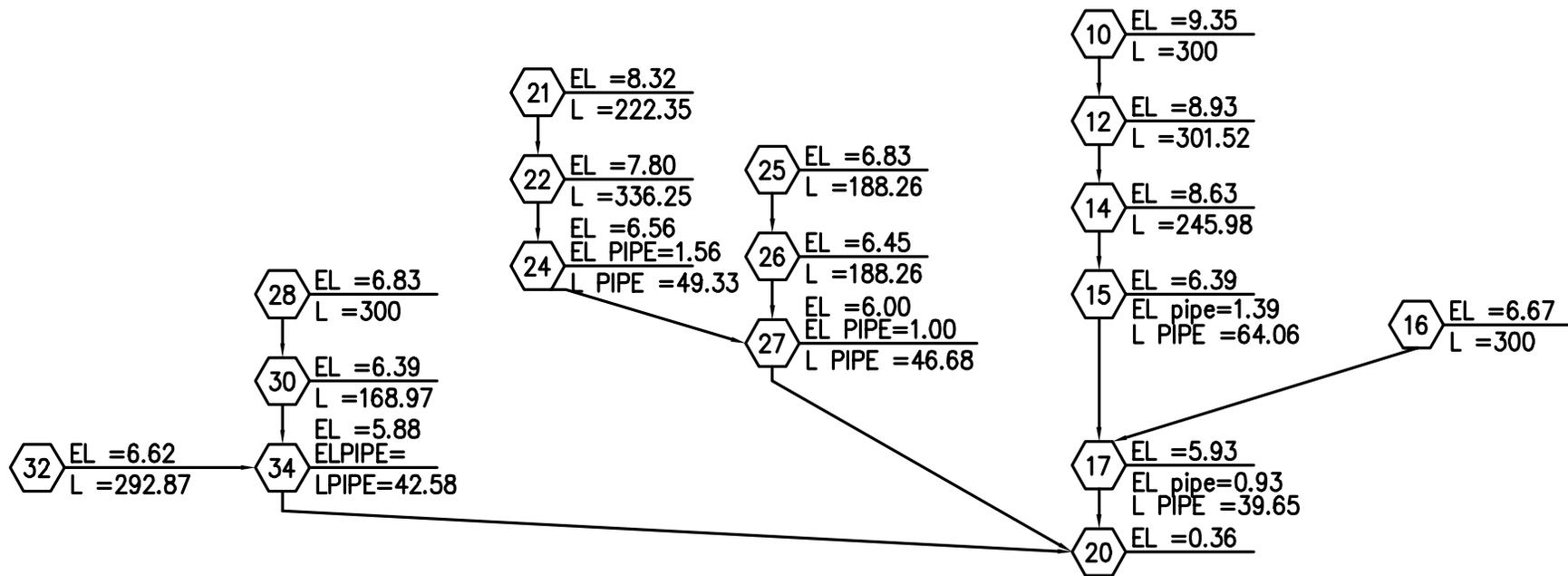
LEGEND
A B C D HYDROLOGIC SOIL GROUPS
— HYDROLOGIC SOIL GROUP BOUNDARY

SOURCES:
BASE MAP - ORANGE COUNTY/RESOURCES & DEVELOPMENT MANAGEMENT DEPT
GEOMATICS AND LAND INFORMATION SYSTEMS DIVISION
SOIL GROUPS - SOIL SURVEY OF ORANGE COUNTY AND
WESTERN PART OF RIVERSIDE COUNTY, CALIFORNIA,
USDA, SOIL CONSERVATION SERVICE, 1978.

APPENDIX B

Rational Method Hydrology Analysis 100-Year Storm Event

PRE-PROJECT CONDITION



AREA A

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2013 Advanced Engineering Software (aes)
Ver. 20.0 Release Date: 06/01/2013 License ID 1271

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
* PRE-PROJECT CONDITION *
* 100-YR STORM AREA A 10/23/13 SWL *

FILE NAME: PREA100.DAT
TIME/DATE OF STUDY: 11:19 10/25/2013

=====

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 = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

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

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES: LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	35.0	30.0	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
3	15.0	10.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	10.0	5.0	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 = 0.67 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 10.0 (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 10.00 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) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 9.35 DOWNSTREAM(FEET) = 8.93

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 11.079
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.922
SUBAREA T_c AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	A	0.65	0.40	0.100	52	11.08

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 2.27
TOTAL AREA(ACRES) = 0.65 PEAK FLOW RATE(CFS) = 2.27

FLOW PROCESS FROM NODE 12.00 TO NODE 14.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.93 DOWNSTREAM ELEVATION(FEET) = 8.63
STREET LENGTH(FEET) = 301.52 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 3.04

STREET FLOW SPLITS OVER STREET-CROWN

FULL DEPTH(FEET) = 0.46 FLOOD WIDTH(FEET) = 15.00
FULL HALF-STREET VELOCITY(FEET/SEC.) = 0.91
SPLIT DEPTH(FEET) = 0.35 SPLIT FLOOD WIDTH(FEET) = 9.73
SPLIT FLOW(CFS) = 0.82 SPLIT VELOCITY(FEET/SEC.) = 0.72

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 15.00
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.91
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.42
STREET FLOW TRAVEL TIME(MIN.) = 5.52 Tc(MIN.) = 16.60

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.111

SUBAREA LOSS RATE DATA(AMC III):

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Row 1: COMMERCIAL, A, 0.56, 0.40, 0.100, 52.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.55

EFFECTIVE AREA(ACRES) = 1.21 AREA-AVERAGED Fm(INCH/HR) = 0.04

AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 3.34

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 15.00
FLOW VELOCITY(FEET/SEC.) = 0.91 DEPTH*VELOCITY(FT*FT/SEC.) = 0.42
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 14.00 = 601.52 FEET.

FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.63 DOWNSTREAM ELEVATION(FEET) = 6.39
STREET LENGTH(FEET) = 245.98 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 5.23

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 13.48
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.12
STREET FLOW TRAVEL TIME(MIN.) = 1.57 Tc(MIN.) = 18.17

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.954
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 1.44 0.40 0.100 52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.44 SUBAREA RUNOFF(CFS) = 3.78
 EFFECTIVE AREA(ACRES) = 2.65 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 6.95

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 15.00
 FLOW VELOCITY(FEET/SEC.) = 2.76 DEPTH*VELOCITY(FT*FT/SEC.) = 1.26
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.00 = 847.50 FEET.

 FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 18.17
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.954
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.41 0.40 0.100 52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 1.08
 EFFECTIVE AREA(ACRES) = 3.06 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.1 PEAK FLOW RATE(CFS) = 8.03

 FLOW PROCESS FROM NODE 15.00 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) = 1.39 DOWNSTREAM(FEET) = 0.93
 FLOW LENGTH(FEET) = 62.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.65
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 8.03
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 18.35
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

 FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 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.) = 18.35
 RAINFALL INTENSITY(INCH/HR) = 2.94
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 3.06
 TOTAL STREAM AREA(ACRES) = 3.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.03

 FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00

PREA100.RES
ELEVATION DATA: UPSTREAM(FEET) = 6.67 DOWNSTREAM(FEET) = 5.93

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.892
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.185
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 1.38 0.40 0.100 52 9.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 5.15
TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 5.15

FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.89
RAINFALL INTENSITY(INCH/HR) = 4.19
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.38
TOTAL STREAM AREA(ACRES) = 1.38
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.15

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.03	18.35	2.937	0.40(0.04)	0.10	3.1	10.00
2	5.15	9.89	4.185	0.40(0.04)	0.10	1.4	16.00

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	11.34	9.89	4.185	0.40(0.04)	0.10	3.0	16.00
2	11.62	18.35	2.937	0.40(0.04)	0.10	4.4	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 11.62 Tc(MIN.) = 18.35
EFFECTIVE AREA(ACRES) = 4.44 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 4.4
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

FLOW PROCESS FROM NODE 17.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 0.93 DOWNSTREAM(FEET) = 0.36
FLOW LENGTH(FEET) = 40.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.87
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.62
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 18.43
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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) = 222.35
 ELEVATION DATA: UPSTREAM(FEET) = 8.32 DOWNSTREAM(FEET) = 7.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.869
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.455
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.72	0.40	0.100	52	8.87

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.86
 TOTAL AREA(ACRES) = 0.72 PEAK FLOW RATE(CFS) = 2.86

 FLOW PROCESS FROM NODE 22.00 TO NODE 24.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 7.80 DOWNSTREAM ELEVATION(FEET) = 6.56
 STREET LENGTH(FEET) = 336.25 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 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) = 5.09
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.48
 HALFSTREET FLOOD WIDTH(FEET) = 16.10
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.83
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.88
 STREET FLOW TRAVEL TIME(MIN.) = 3.06 Tc(MIN.) = 11.93
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.759

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.33	0.40	0.100	52

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.33 SUBAREA RUNOFF(CFS) = 4.45
 EFFECTIVE AREA(ACRES) = 2.05 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.1 PEAK FLOW RATE(CFS) = 6.86

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 18.15
 FLOW VELOCITY(FEET/SEC.) = 1.97 DEPTH*VELOCITY(FT*FT/SEC.) = 1.03
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 24.00 = 558.60 FEET.

 FLOW PROCESS FROM NODE 24.00 TO NODE 27.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 1.56 DOWNSTREAM(FEET) = 1.00
 FLOW LENGTH(FEET) = 49.33 MANNING'S N = 0.013

DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.52
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.86
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 12.06
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 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.) = 12.06
RAINFALL INTENSITY(INCH/HR) = 3.74
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.05
TOTAL STREAM AREA(ACRES) = 2.05
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.86

FLOW PROCESS FROM NODE 25.00 TO NODE 26.00 IS CODE = 21

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

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 188.26
ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.546
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.551
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 0.38 0.40 0.100 52 8.55
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.54
TOTAL AREA(ACRES) = 0.38 PEAK FLOW RATE(CFS) = 1.54

FLOW PROCESS FROM NODE 26.00 TO NODE 27.00 IS CODE = 62

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

=====
UPSTREAM ELEVATION(FEET) = 6.45 DOWNSTREAM ELEVATION(FEET) = 6.00
STREET LENGTH(FEET) = 254.74 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
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) = 2.54
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 14.05
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.17
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.52
STREET FLOW TRAVEL TIME(MIN.) = 3.62 Tc(MIN.) = 12.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.717

SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

PREA100.RES

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.60 0.40 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 1.99
EFFECTIVE AREA(ACRES) = 0.98 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 3.24

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 15.58
FLOW VELOCITY(FEET/SEC.) = 1.24 DEPTH*VELOCITY(FT*FT/SEC.) = 0.58
LONGEST FLOWPATH FROM NODE 25.00 TO NODE 27.00 = 443.00 FEET.

FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 IS CODE = 1

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

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 12.17
RAINFALL INTENSITY(INCH/HR) = 3.72
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.98
TOTAL STREAM AREA(ACRES) = 0.98
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.24

** CONFLUENCE DATA **

Table with columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1 and 2.

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

** PEAK FLOW RATE TABLE **

Table with columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1 and 2.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 10.09 Tc(MIN.) = 12.06
EFFECTIVE AREA(ACRES) = 3.02 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.0
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

FLOW PROCESS FROM NODE 27.00 TO NODE 20.00 IS CODE = 31

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

=====
ELEVATION DATA: UPSTREAM(FEET) = 1.00 DOWNSTREAM(FEET) = 0.36
FLOW LENGTH(FEET) = 300.70 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.69
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.09
PIPE TRAVEL TIME(MIN.) = 1.36 Tc(MIN.) = 13.42
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11

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

PREA100.RES

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.09	13.42	3.515	0.40(0.04)	0.10	3.0	21.00
2	10.07	13.52	3.499	0.40(0.04)	0.10	3.0	25.00

LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 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	11.34	9.98	4.165	0.40(0.04)	0.10	3.0	16.00
2	11.62	18.43	2.930	0.40(0.04)	0.10	4.4	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	20.25	9.98	4.165	0.40(0.04)	0.10	5.3	16.00
2	21.55	13.42	3.515	0.40(0.04)	0.10	6.6	21.00
3	21.53	13.52	3.499	0.40(0.04)	0.10	6.7	25.00
4	20.04	18.43	2.930	0.40(0.04)	0.10	7.5	10.00

TOTAL AREA(ACRES) = 7.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 21.55 Tc(MIN.) = 13.416
 EFFECTIVE AREA(ACRES) = 6.62 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 7.5
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 28.00 TO NODE 30.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 218.21
 ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.39

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.068
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.399
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL A 0.31 0.40 0.100 52 9.07
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.22
 TOTAL AREA(ACRES) = 0.31 PEAK FLOW RATE(CFS) = 1.22

 FLOW PROCESS FROM NODE 30.00 TO NODE 34.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 6.39 DOWNSTREAM ELEVATION(FEET) = 5.88
 STREET LENGTH(FEET) = 168.97 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
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PREA100.RES

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.58
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.36
HALFSTREET FLOOD WIDTH(FEET) = 10.19
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.29
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.47
STREET FLOW TRAVEL TIME(MIN.) = 2.19 Tc(MIN.) = 11.25
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.887

SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.21 0.40 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.21 SUBAREA RUNOFF(CFS) = 0.73
EFFECTIVE AREA(ACRES) = 0.52 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.80

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 10.77
FLOW VELOCITY(FEET/SEC.) = 1.33 DEPTH*VELOCITY(FT*FT/SEC.) = 0.50
LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 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.) = 11.25
RAINFALL INTENSITY(INCH/HR) = 3.89
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.52
TOTAL STREAM AREA(ACRES) = 0.52
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.80

FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 21

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

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 292.87
ELEVATION DATA: UPSTREAM(FEET) = 6.62 DOWNSTREAM(FEET) = 5.88

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.751
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.220
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 0.87 0.40 0.100 52 9.75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.27
TOTAL AREA(ACRES) = 0.87 PEAK FLOW RATE(CFS) = 3.27

FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 1

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

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 9.75
 RAINFALL INTENSITY(INCH/HR) = 4.22
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.87
 TOTAL STREAM AREA(ACRES) = 0.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.27

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.80	11.25	3.887	0.40(0.04)	0.10	0.5	28.00
2	3.27	9.75	4.220	0.40(0.04)	0.10	0.9	32.00

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	4.97	9.75	4.220	0.40(0.04)	0.10	1.3	32.00
2	4.81	11.25	3.887	0.40(0.04)	0.10	1.4	28.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 4.97 Tc(MIN.) = 9.75
 EFFECTIVE AREA(ACRES) = 1.32 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

 FLOW PROCESS FROM NODE 34.00 TO NODE 20.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 0.88 DOWNSTREAM(FEET) = 0.36
 FLOW LENGTH(FEET) = 42.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.22
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.97
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 9.86
 LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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	4.97	9.86	4.192	0.40(0.04)	0.10	1.3	32.00
2	4.81	11.37	3.865	0.40(0.04)	0.10	1.4	28.00

LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 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	20.25	9.98	4.165	0.40(0.04)	0.10	5.3	16.00
2	21.55	13.42	3.515	0.40(0.04)	0.10	6.6	21.00
3	21.53	13.52	3.499	0.40(0.04)	0.10	6.7	25.00
4	20.04	18.43	2.930	0.40(0.04)	0.10	7.5	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	25.12	9.86	4.192	0.40(0.04)	0.10	6.5	32.00

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                                PREA100.RES
2      25.20   9.98   4.165  0.40( 0.04) 0.10   6.6   16.00
3      25.59  11.37   3.865  0.40( 0.04) 0.10   7.2   28.00
4      25.92  13.42   3.515  0.40( 0.04) 0.10   8.0   21.00
5      25.88  13.52   3.499  0.40( 0.04) 0.10   8.0   25.00
6      23.67  18.43   2.930  0.40( 0.04) 0.10   8.9   10.00
TOTAL AREA(ACRES) =          8.9

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) =      25.92  Tc(MIN.) =      13.416
EFFECTIVE AREA(ACRES) =      8.01  AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =      8.9
LONGEST FLOWPATH FROM NODE      10.00 TO NODE      20.00 =      949.50 FEET.

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END OF STUDY SUMMARY:

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TOTAL AREA(ACRES) =      8.9  TC(MIN.) =      13.42
EFFECTIVE AREA(ACRES) =      8.01  AREA-AVERAGED Fm(INCH/HR)=  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.100
PEAK FLOW RATE(CFS) =      25.92

```

** PEAK FLOW RATE TABLE **

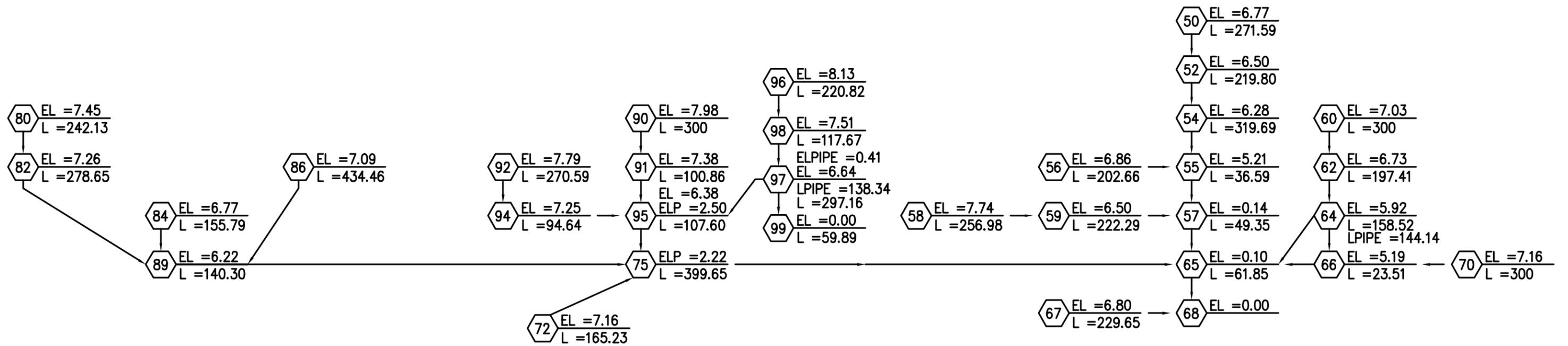
```

STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)  (ACRES)  NODE
1      25.12   9.86   4.192  0.40( 0.04) 0.10   6.5   32.00
2      25.20   9.98   4.165  0.40( 0.04) 0.10   6.6   16.00
3      25.59  11.37   3.865  0.40( 0.04) 0.10   7.2   28.00
4      25.92  13.42   3.515  0.40( 0.04) 0.10   8.0   21.00
5      25.88  13.52   3.499  0.40( 0.04) 0.10   8.0   25.00
6      23.67  18.43   2.930  0.40( 0.04) 0.10   8.9   10.00

```

=====
END OF RATIONAL METHOD ANALYSIS

♀



AREA B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 20.0 Release Date: 06/01/2013 License ID 1271

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
* PRE-PROJECT CONDITION *
* 100-YR STORM AREA B 10/23/13 SWL *

FILE NAME: PREB100.DAT
TIME/DATE OF STUDY: 17:01 10/25/2013

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 = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

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

Table with 10 columns: 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). Rows 1-4 show street section data.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.67 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 10.0 (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 50.00 TO NODE 52.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 217.59
ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.981
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.164
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ LAND USE SCS SOIL GROUP AREA (ACRES) Fp (INCH/HR) Ap (DECIMAL) SCS CN Tc (MIN.)
COMMERCIAL A 0.56 0.40 0.100 52 9.98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.08
TOTAL AREA(ACRES) = 0.56 PEAK FLOW RATE(CFS) = 2.08

FLOW PROCESS FROM NODE 52.00 TO NODE 54.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.50 DOWNSTREAM ELEVATION(FEET) = 6.28
STREET LENGTH(FEET) = 219.80 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 = 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) = 3.70
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.53
HALFSTREET FLOOD WIDTH(FEET) = 18.42
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.03
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.54
STREET FLOW TRAVEL TIME(MIN.) = 3.55 Tc(MIN.) = 13.53
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.498

SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.04 0.40 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.04 SUBAREA RUNOFF(CFS) = 3.24
EFFECTIVE AREA(ACRES) = 1.60 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 4.98

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 20.74
FLOW VELOCITY(FEET/SEC.) = 1.11 DEPTH*VELOCITY(FT*FT/SEC.) = 0.64
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 437.39 FEET.

FLOW PROCESS FROM NODE 54.00 TO NODE 55.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.28 DOWNSTREAM ELEVATION(FEET) = 5.21
STREET LENGTH(FEET) = 319.69 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 = 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) = 7.27
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.54
HALFSTREET FLOOD WIDTH(FEET) = 18.95
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.92
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.03
STREET FLOW TRAVEL TIME(MIN.) = 2.77 Tc(MIN.) = 16.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.144

SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.64 0.40 0.100 52

PREB100.RES

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.64 SUBAREA RUNOFF(CFS) = 4.58
EFFECTIVE AREA(ACRES) = 3.24 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 9.05

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 20.69
FLOW VELOCITY(FEET/SEC.) = 2.02 DEPTH*VELOCITY(FT*FT/SEC.) = 1.16
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 757.08 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 55.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.144
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.19 0.40 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.19 SUBAREA RUNOFF(CFS) = 0.53
EFFECTIVE AREA(ACRES) = 3.43 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.4 PEAK FLOW RATE(CFS) = 9.58

FLOW PROCESS FROM NODE 55.00 TO NODE 57.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 0.21 DOWNSTREAM(FEET) = 0.14
FLOW LENGTH(FEET) = 49.35 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.21
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.58
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 16.55
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 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.) = 16.55
RAINFALL INTENSITY(INCH/HR) = 3.12
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 3.43
TOTAL STREAM AREA(ACRES) = 3.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.58

FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 256.98
ELEVATION DATA: UPSTREAM(FEET) = 7.74 DOWNSTREAM(FEET) = 6.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.131
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.683

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.48	0.40	0.100	52	8.13

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.01
 TOTAL AREA(ACRES) = 0.48 PEAK FLOW RATE(CFS) = 2.01

 FLOW PROCESS FROM NODE 59.00 TO NODE 57.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1.50 DOWNSTREAM(FEET) = 0.14
 FLOW LENGTH(FEET) = 222.29 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.) = 3.77
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.01
 PIPE TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 9.11
 LONGEST FLOWPATH FROM NODE 58.00 TO NODE 57.00 = 479.27 FEET.

 FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.11
 RAINFALL INTENSITY(INCH/HR) = 4.39
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.48
 TOTAL STREAM AREA(ACRES) = 0.48
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.01

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.58	16.55	3.116	0.40(0.04)	0.10	3.4	50.00
2	2.01	9.11	4.386	0.40(0.04)	0.10	0.5	58.00

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	9.46	9.11	4.386	0.40(0.04)	0.10	2.4	58.00
2	11.00	16.55	3.116	0.40(0.04)	0.10	3.9	50.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 11.00 Tc(MIN.) = 16.55
 EFFECTIVE AREA(ACRES) = 3.91 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.9
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

 FLOW PROCESS FROM NODE 57.00 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) = 0.14 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 61.85 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 2.47
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 11.00
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 16.97
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 60.00 TO NODE 62.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
 ELEVATION DATA: UPSTREAM(FEET) = 7.03 DOWNSTREAM(FEET) = 6.73

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.033
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.425
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
CONDOMINIUMS	A	0.61	0.40	0.350	52	14.03

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
 SUBAREA RUNOFF(CFS) = 1.80
 TOTAL AREA(ACRES) = 0.61 PEAK FLOW RATE(CFS) = 1.80

 FLOW PROCESS FROM NODE 62.00 TO NODE 64.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 2 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 6.73 DOWNSTREAM ELEVATION(FEET) = 5.92
 STREET LENGTH(FEET) = 197.41 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 = 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) = 2.35
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.39
 HALFSTREET FLOOD WIDTH(FEET) = 11.35
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.59
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.61
 STREET FLOW TRAVEL TIME(MIN.) = 2.07 Tc(MIN.) = 16.10
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.165

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	A	0.40	0.40	0.350	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
 SUBAREA AREA(ACRES) = 0.40 SUBAREA RUNOFF(CFS) = 1.09
 EFFECTIVE AREA(ACRES) = 1.01 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.35
 TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 2.75

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.40 HALFSTREET FLOOD WIDTH(FEET) = 12.15

PREB100.RES

FLOW VELOCITY(FEET/SEC.) = 1.65 DEPTH*VELOCITY(FT*FT/SEC.) = 0.66
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 64.00 = 497.41 FEET.

FLOW PROCESS FROM NODE 64.00 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) = 0.92 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 144.14 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.00
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.75
PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 16.71
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 16.71
RAINFALL INTENSITY(INCH/HR) = 3.10
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.35
EFFECTIVE STREAM AREA(ACRES) = 1.01
TOTAL STREAM AREA(ACRES) = 1.01
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.75

FLOW PROCESS FROM NODE 64.00 TO NODE 66.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 158.52
ELEVATION DATA: UPSTREAM(FEET) = 5.92 DOWNSTREAM(FEET) = 5.19

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.765
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.203
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.30	0.40	0.100	52	6.76
NATURAL GOOD COVER "GRASS"	A	0.03	0.40	1.000	58	20.81

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.182
SUBAREA RUNOFF(CFS) = 1.52
TOTAL AREA(ACRES) = 0.33 PEAK FLOW RATE(CFS) = 1.52

FLOW PROCESS FROM NODE 70.00 TO NODE 66.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 6.76
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.203
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.42	0.40	0.100	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 1.95
EFFECTIVE AREA(ACRES) = 0.75 AREA-AVERAGED Fm(INCH/HR) = 0.05

AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 3.48

FLOW PROCESS FROM NODE 66.00 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) = 0.19 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 15.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.34
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.48
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 6.82
LONGEST FLOWPATH FROM NODE 64.00 TO NODE 65.00 = 173.52 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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.) = 6.82
RAINFALL INTENSITY(INCH/HR) = 5.18
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.14
EFFECTIVE STREAM AREA(ACRES) = 0.75
TOTAL STREAM AREA(ACRES) = 0.75
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.48

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.75	16.71	3.100	0.40(0.14)	0.35	1.0	60.00
2	3.48	6.82	5.178	0.40(0.05)	0.14	0.8	64.00

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	5.39	6.82	5.178	0.40(0.08)	0.21	1.2	64.00
2	4.82	16.71	3.100	0.40(0.10)	0.26	1.8	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 5.39 Tc(MIN.) = 6.82
EFFECTIVE AREA(ACRES) = 1.16 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 1.8
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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	5.39	6.82	5.178	0.40(0.08)	0.21	1.2	64.00
2	4.82	16.71	3.100	0.40(0.10)	0.26	1.8	60.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
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PREB100.RES

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	9.46	9.55	4.270	0.40(0.04)	0.10	2.4 58.00
2	11.00	16.97	3.072	0.40(0.04)	0.10	3.9 50.00

LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	13.59	6.82	5.178	0.40(0.06)	0.15	2.9	64.00
2	14.69	9.55	4.270	0.40(0.06)	0.14	3.7	58.00
3	15.76	16.71	3.100	0.40(0.06)	0.15	5.6	60.00
4	15.77	16.97	3.072	0.40(0.06)	0.15	5.7	50.00

TOTAL AREA(ACRES) = 5.7

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 15.77 Tc(MIN.) = 16.971
 EFFECTIVE AREA(ACRES) = 5.67 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.15
 TOTAL AREA(ACRES) = 5.7
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 80.00 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) = 242.13
 ELEVATION DATA: UPSTREAM(FEET) = 7.45 DOWNSTREAM(FEET) = 7.26

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.417
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.855
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.44	0.40	0.100	52	11.42

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.51
 TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 1.51

 FLOW PROCESS FROM NODE 82.00 TO NODE 89.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 7.26 DOWNSTREAM ELEVATION(FEET) = 6.22
 STREET LENGTH(FEET) = 278.65 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 = 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) = 1.87
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.37
 HALFSTREET FLOOD WIDTH(FEET) = 10.46
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.46
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.53

PREB100.RES

STREET FLOW TRAVEL TIME(MIN.) = 3.19 Tc(MIN.) = 14.61
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.347

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.24 0.40 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.24 SUBAREA RUNOFF(CFS) = 0.71
EFFECTIVE AREA(ACRES) = 0.68 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 2.02

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 10.83
FLOW VELOCITY(FEET/SEC.) = 1.49 DEPTH*VELOCITY(FT*FT/SEC.) = 0.56
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 520.78 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 155.79
ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.085
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.067
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 0.25 0.40 0.100 52 7.08
CONDOMINIUMS A 0.25 0.40 0.350 52 8.39
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 0.50 INITIAL SUBAREA RUNOFF(CFS) = 2.24

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN.) = 14.61
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.347
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.47
EFFECTIVE AREA(ACRES) = 1.18 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 3.49

FLOW PROCESS FROM NODE 86.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 434.46
ELEVATION DATA: UPSTREAM(FEET) = 7.09 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.960
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.754
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 0.62 0.40 0.100 52 11.96
CONDOMINIUMS A 0.44 0.40 0.350 52 14.16
NATURAL GOOD COVER
"GRASS" A 0.14 0.40 1.000 58 36.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.297
SUBAREA AREA(ACRES) = 1.20 INITIAL SUBAREA RUNOFF(CFS) = 3.93

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN.) = 14.61
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.347

PREB100.RES

SUBAREA AREA(ACRES) = 1.20 SUBAREA RUNOFF(CFS) = 3.49
EFFECTIVE AREA(ACRES) = 2.38 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.23
TOTAL AREA(ACRES) = 2.4 PEAK FLOW RATE(CFS) = 6.98

FLOW PROCESS FROM NODE 89.00 TO NODE 75.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 3.00 DOWNSTREAM(FEET) = 2.22
FLOW LENGTH(FEET) = 140.30 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.90
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.98
PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 15.08
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 75.00 = 661.08 FEET.

FLOW PROCESS FROM NODE 75.00 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) = 2.22 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.35
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.98
PIPE TRAVEL TIME(MIN.) = 2.11 Tc(MIN.) = 17.19
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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	6.98	17.19	3.049	0.40(0.09)	0.23	2.4	80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 =					1211.08 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	13.59	6.82	5.178	0.40(0.06)	0.15	2.9	64.00
2	14.69	9.55	4.270	0.40(0.06)	0.14	3.7	58.00
3	15.76	16.71	3.100	0.40(0.06)	0.15	5.6	60.00
4	15.77	16.97	3.072	0.40(0.06)	0.15	5.7	50.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 =					868.28 FEET.		

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.36	6.82	5.178	0.40(0.07)	0.17	3.8	64.00
2	20.16	9.55	4.270	0.40(0.07)	0.17	5.0	58.00
3	22.66	16.71	3.100	0.40(0.07)	0.17	7.9	60.00
4	22.71	16.97	3.072	0.40(0.07)	0.17	8.0	50.00
5	22.63	17.19	3.049	0.40(0.07)	0.17	8.1	80.00
TOTAL AREA(ACRES) =		8.1					

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 22.71 Tc(MIN.) = 16.971
EFFECTIVE AREA(ACRES) = 8.02 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 8.1
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

PREB100.RES

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 90.00 TO NODE 91.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
 ELEVATION DATA: UPSTREAM(FEET) = 7.98 DOWNSTREAM(FEET) = 7.38

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 10.316
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.086
 SUBAREA T_c AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	A	2.77	0.40	0.100	52	10.32
NATURAL GOOD COVER "GRASS"	A	0.07	0.40	1.000	58	31.73

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.122
 SUBAREA RUNOFF(CFS) = 10.32
 TOTAL AREA(ACRES) = 2.84 PEAK FLOW RATE(CFS) = 10.32

 FLOW PROCESS FROM NODE 91.00 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) = 3.38 DOWNSTREAM(FEET) = 2.50
 FLOW LENGTH(FEET) = 100.86 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.52
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 10.32
 PIPE TRAVEL TIME(MIN.) = 0.26 T_c (MIN.) = 10.57
 LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 400.86 FEET.

 FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 10.57
 RAINFALL INTENSITY(INCH/HR) = 4.03
 AREA-AVERAGED F_m (INCH/HR) = 0.05
 AREA-AVERAGED F_p (INCH/HR) = 0.40
 AREA-AVERAGED A_p = 0.12
 EFFECTIVE STREAM AREA(ACRES) = 2.84
 TOTAL STREAM AREA(ACRES) = 2.84
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.32

 FLOW PROCESS FROM NODE 92.00 TO NODE 94.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 270.59
 ELEVATION DATA: UPSTREAM(FEET) = 7.79 DOWNSTREAM(FEET) = 7.25

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 9.903
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.182
 SUBAREA T_c AND LOSS RATE DATA(AMC III):

PREB100.RES

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	1.02	0.40	0.100	52	9.90
NATURAL GOOD COVER "GRASS"	A	0.12	0.40	1.000	58	30.46

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.195
SUBAREA RUNOFF(CFS) = 4.21
TOTAL AREA(ACRES) = 1.14 PEAK FLOW RATE(CFS) = 4.21

FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 4 USED)<<<<<
=====

UPSTREAM ELEVATION(FEET) = 7.25 DOWNSTREAM ELEVATION(FEET) = 6.38
STREET LENGTH(FEET) = 94.64 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 10.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 5.00
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) = 4.67
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 9.41
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.17
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.75
STREET FLOW TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 10.63
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.016
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.21	0.40	0.100	52
NATURAL GOOD COVER "GRASS"	A	0.05	0.40	1.000	58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.273
SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.91
EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 4.95

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 9.65
FLOW VELOCITY(FEET/SEC.) = 2.21 DEPTH*VELOCITY(FT*FT/SEC.) = 0.78
LONGEST FLOWPATH FROM NODE 92.00 TO NODE 95.00 = 365.23 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.63
RAINFALL INTENSITY(INCH/HR) = 4.02
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.21
EFFECTIVE STREAM AREA(ACRES) = 1.40
TOTAL STREAM AREA(ACRES) = 1.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.95

FLOW PROCESS FROM NODE 96.00 TO NODE 98.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 220.82
 ELEVATION DATA: UPSTREAM(FEET) = 8.13 DOWNSTREAM(FEET) = 7.51

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.527
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.557
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL A 0.28 0.40 0.100 52 8.53
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.14
 TOTAL AREA(ACRES) = 0.28 PEAK FLOW RATE(CFS) = 1.14

 FLOW PROCESS FROM NODE 98.00 TO NODE 97.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 7.51 DOWNSTREAM ELEVATION(FEET) = 6.64
 STREET LENGTH(FEET) = 117.67 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 = 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) = 1.63
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.32
 HALFSTREET FLOOD WIDTH(FEET) = 8.30
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.86
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.60
 STREET FLOW TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 9.58
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.262

SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.26 0.40 0.100 52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.99
 EFFECTIVE AREA(ACRES) = 0.54 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 2.05

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 9.30
 FLOW VELOCITY(FEET/SEC.) = 1.95 DEPTH*VELOCITY(FT*FT/SEC.) = 0.67
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 97.00 = 338.49 FEET.

 FLOW PROCESS FROM NODE 97.00 TO NODE 95.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 6.64 DOWNSTREAM ELEVATION(FEET) = 6.38
 STREET LENGTH(FEET) = 297.16 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00

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) = 4.84
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.58
 HALFSTREET FLOOD WIDTH(FEET) = 21.08
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.04
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.61
 STREET FLOW TRAVEL TIME(MIN.) = 4.74 Tc(MIN.) = 14.32
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.385

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.25	0.40	0.100	52
NATURAL GOOD COVER "GRASS"	A	0.66	0.40	1.000	58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.411
 SUBAREA AREA(ACRES) = 1.91 SUBAREA RUNOFF(CFS) = 5.54
 EFFECTIVE AREA(ACRES) = 2.45 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.34
 TOTAL AREA(ACRES) = 2.5 PEAK FLOW RATE(CFS) = 7.16

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.65 HALFSTREET FLOOD WIDTH(FEET) = 24.54
 FLOW VELOCITY(FEET/SEC.) = 1.15 DEPTH*VELOCITY(FT*FT/SEC.) = 0.75
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

 FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 14.32
 RAINFALL INTENSITY(INCH/HR) = 3.39
 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.34
 EFFECTIVE STREAM AREA(ACRES) = 2.45
 TOTAL STREAM AREA(ACRES) = 2.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.16

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.32	10.57	4.028	0.40(0.05)	0.12	2.8	90.00
2	4.95	10.63	4.016	0.40(0.08)	0.21	1.4	92.00
3	7.16	14.32	3.385	0.40(0.14)	0.34	2.5	96.00

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	21.60	10.57	4.028	0.40(0.08)	0.21	6.0	90.00
2	21.59	10.63	4.016	0.40(0.08)	0.21	6.1	92.00
3	19.97	14.32	3.385	0.40(0.09)	0.22	6.7	96.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 21.60 Tc(MIN.) = 10.57
 EFFECTIVE AREA(ACRES) = 6.04 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
 TOTAL AREA(ACRES) = 6.7

LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

 FLOW PROCESS FROM NODE 95.00 TO NODE 75.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 2.50 DOWNSTREAM(FEET) = 2.22
 FLOW LENGTH(FEET) = 107.60 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.94
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 21.60
 PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 10.94
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 75.00 = 743.25 FEET.

 FLOW PROCESS FROM NODE 72.00 TO NODE 75.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 10.94
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.951
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.23 0.40 0.100 52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.23 SUBAREA RUNOFF(CFS) = 0.81
 EFFECTIVE AREA(ACRES) = 6.27 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 21.84

 FLOW PROCESS FROM NODE 75.00 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) = 2.22 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.70
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 21.84
 PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 12.54
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 3 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	21.84	12.54	3.653	0.40(0.08)	0.20	6.3	90.00
2	21.83	12.60	3.643	0.40(0.08)	0.20	6.3	92.00
3	20.23	16.33	3.141	0.40(0.09)	0.22	6.9	96.00
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.							

** MEMORY BANK # 3 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.36	6.82	5.178	0.40(0.07)	0.17	3.8	64.00
2	20.16	9.55	4.270	0.40(0.07)	0.17	5.0	58.00
3	22.66	16.71	3.100	0.40(0.07)	0.17	7.9	60.00
4	22.71	16.97	3.072	0.40(0.07)	0.17	8.0	50.00
5	22.63	17.19	3.049	0.40(0.07)	0.17	8.1	80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.							

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	35.31	6.82	5.178	0.40(0.07)	0.18	7.2	64.00
2	39.67	9.55	4.270	0.40(0.07)	0.18	9.8	58.00
3	43.05	12.54	3.653	0.40(0.07)	0.19	12.5	90.00
4	43.06	12.60	3.643	0.40(0.07)	0.19	12.5	92.00
5	42.76	16.33	3.141	0.40(0.08)	0.19	14.7	96.00
6	42.62	16.71	3.100	0.40(0.08)	0.19	14.8	60.00
7	42.49	16.97	3.072	0.40(0.08)	0.19	14.9	50.00
8	42.25	17.19	3.049	0.40(0.08)	0.19	15.0	80.00
TOTAL AREA(ACRES) =			15.0				

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 43.06 Tc(MIN.) = 12.600
 EFFECTIVE AREA(ACRES) = 12.55 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
 TOTAL AREA(ACRES) = 15.0
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

 FLOW PROCESS FROM NODE 65.00 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) = 0.10 DOWNSTREAM(FEET) = 0.00
 FLOW LENGTH(FEET) = 23.51 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 26.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.06
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 43.06
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 12.66
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 68.00 = 1316.76 FEET.

 FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 12.66
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.634
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.62 0.40 0.100 52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.62 SUBAREA RUNOFF(CFS) = 2.01
 EFFECTIVE AREA(ACRES) = 13.17 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
 TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 43.06
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 12.66
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.634
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.17 0.40 0.100 52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.17 SUBAREA RUNOFF(CFS) = 0.55
 EFFECTIVE AREA(ACRES) = 13.34 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
 TOTAL AREA(ACRES) = 15.8 PEAK FLOW RATE(CFS) = 43.06
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

PREB100.RES

=====
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 15.8 TC(MIN.) = 12.66
 EFFECTIVE AREA(ACRES) = 13.34 AREA-AVERAGED Fm(INCH/HR)= 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.181
 PEAK FLOW RATE(CFS) = 43.06

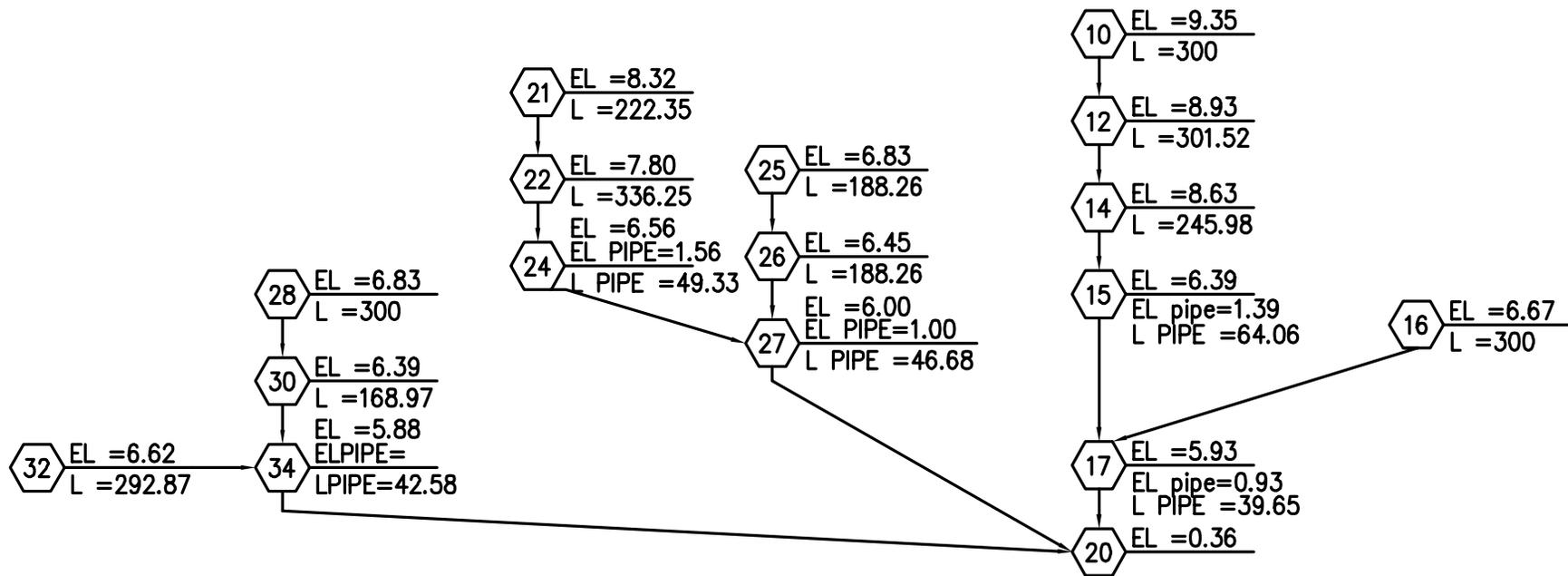
** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	36.59	6.88	5.153	0.40(0.07)	0.18	8.0	64.00
2	39.85	9.61	4.255	0.40(0.07)	0.18	10.6	58.00
3	43.05	12.60	3.643	0.40(0.07)	0.18	13.3	90.00
4	43.06	12.66	3.634	0.40(0.07)	0.18	13.3	92.00
5	42.76	16.38	3.134	0.40(0.08)	0.19	15.5	96.00
6	42.62	16.76	3.094	0.40(0.08)	0.19	15.6	60.00
7	42.49	17.03	3.066	0.40(0.08)	0.19	15.7	50.00
8	42.25	17.25	3.043	0.40(0.08)	0.19	15.8	80.00

=====
 END OF RATIONAL METHOD ANALYSIS

♀

POST-PROJECT CONDITION



AREA A

 RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 Ver. 20.0 Release Date: 06/01/2013 License ID 1271

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
 * POST-PROJECT CONDITION *
 * 100-YR STORM AREA A 10/23/13 SWL *

FILE NAME: POSTA100.DAT
 TIME/DATE OF STUDY: 13:39 10/25/2013

=====

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 = 0.95
 DATA BANK RAINFALL USED
 ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

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

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES: LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	35.0	30.0	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
3	15.0	10.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	10.0	5.0	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 = 0.67 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 10.0 (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 10.00 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) = 300.00
 ELEVATION DATA: UPSTREAM(FEET) = 9.35 DOWNSTREAM(FEET) = 8.93

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 11.079
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.922
 SUBAREA T_c AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	A	0.65	0.40	0.100	52	11.08

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 2.27
 TOTAL AREA(ACRES) = 0.65 PEAK FLOW RATE(CFS) = 2.27

FLOW PROCESS FROM NODE 12.00 TO NODE 14.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.93 DOWNSTREAM ELEVATION(FEET) = 8.63
STREET LENGTH(FEET) = 301.52 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 3.04
STREET FLOW SPLITS OVER STREET-CROWN

FULL DEPTH(FEET) = 0.46 FLOOD WIDTH(FEET) = 15.00
FULL HALF-STREET VELOCITY(FEET/SEC.) = 0.91
SPLIT DEPTH(FEET) = 0.35 SPLIT FLOOD WIDTH(FEET) = 9.73
SPLIT FLOW(CFS) = 0.82 SPLIT VELOCITY(FEET/SEC.) = 0.72

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 15.00
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.91
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.42
STREET FLOW TRAVEL TIME(MIN.) = 5.52 Tc(MIN.) = 16.60

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.111

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.56	0.40	0.100	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.55

EFFECTIVE AREA(ACRES) = 1.21 AREA-AVERAGED Fm(INCH/HR) = 0.04

AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 3.34

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 15.00
FLOW VELOCITY(FEET/SEC.) = 0.91 DEPTH*VELOCITY(FT*FT/SEC.) = 0.42
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 14.00 = 601.52 FEET.

FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.63 DOWNSTREAM ELEVATION(FEET) = 6.39
STREET LENGTH(FEET) = 245.98 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 5.23

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 13.48
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.12
STREET FLOW TRAVEL TIME(MIN.) = 1.57 Tc(MIN.) = 18.17

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.954
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 1.44 0.40 0.100 52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.44 SUBAREA RUNOFF(CFS) = 3.78
 EFFECTIVE AREA(ACRES) = 2.65 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 6.95

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 15.00
 FLOW VELOCITY(FEET/SEC.) = 2.76 DEPTH*VELOCITY(FT*FT/SEC.) = 1.26
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.00 = 847.50 FEET.

 FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 18.17
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.954
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.41 0.40 0.100 52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 1.08
 EFFECTIVE AREA(ACRES) = 3.06 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.1 PEAK FLOW RATE(CFS) = 8.03

 FLOW PROCESS FROM NODE 15.00 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) = 1.39 DOWNSTREAM(FEET) = 0.93
 FLOW LENGTH(FEET) = 62.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.65
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 8.03
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 18.35
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

 FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 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.) = 18.35
 RAINFALL INTENSITY(INCH/HR) = 2.94
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 3.06
 TOTAL STREAM AREA(ACRES) = 3.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.03

 FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00

POSTA100.RES
ELEVATION DATA: UPSTREAM(FEET) = 6.67 DOWNSTREAM(FEET) = 5.93

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.892
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.185
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 1.38 0.40 0.100 52 9.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 5.15
TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 5.15

FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.89
RAINFALL INTENSITY(INCH/HR) = 4.19
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.38
TOTAL STREAM AREA(ACRES) = 1.38
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.15

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.03	18.35	2.937	0.40(0.04)	0.10	3.1	10.00
2	5.15	9.89	4.185	0.40(0.04)	0.10	1.4	16.00

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	11.34	9.89	4.185	0.40(0.04)	0.10	3.0	16.00
2	11.62	18.35	2.937	0.40(0.04)	0.10	4.4	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 11.62 Tc(MIN.) = 18.35
EFFECTIVE AREA(ACRES) = 4.44 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 4.4
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

FLOW PROCESS FROM NODE 17.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 0.93 DOWNSTREAM(FEET) = 0.36
FLOW LENGTH(FEET) = 40.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.87
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.62
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 18.43
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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) = 222.35
 ELEVATION DATA: UPSTREAM(FEET) = 8.32 DOWNSTREAM(FEET) = 7.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.869
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.455
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.72	0.40	0.100	52	8.87

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.86
 TOTAL AREA(ACRES) = 0.72 PEAK FLOW RATE(CFS) = 2.86

 FLOW PROCESS FROM NODE 22.00 TO NODE 24.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 7.80 DOWNSTREAM ELEVATION(FEET) = 6.56
 STREET LENGTH(FEET) = 336.25 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 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) = 5.09
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.48
 HALFSTREET FLOOD WIDTH(FEET) = 16.10
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.83
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.88
 STREET FLOW TRAVEL TIME(MIN.) = 3.06 Tc(MIN.) = 11.93
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.759

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.32	0.40	0.100	52
NATURAL GOOD COVER "GRASS"	A	0.01	0.40	1.000	58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.107
 SUBAREA AREA(ACRES) = 1.33 SUBAREA RUNOFF(CFS) = 4.45
 EFFECTIVE AREA(ACRES) = 2.05 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.1 PEAK FLOW RATE(CFS) = 6.86

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 18.15
 FLOW VELOCITY(FEET/SEC.) = 1.97 DEPTH*VELOCITY(FT*FT/SEC.) = 1.03
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 24.00 = 558.60 FEET.

 FLOW PROCESS FROM NODE 24.00 TO NODE 27.00 IS CODE = 31

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

POSTA100.RES
 ELEVATION DATA: UPSTREAM(FEET) = 1.56 DOWNSTREAM(FEET) = 1.00
 FLOW LENGTH(FEET) = 49.33 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.52
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.86
 PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 12.06
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

 FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 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.) = 12.06
 RAINFALL INTENSITY(INCH/HR) = 3.74
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 2.05
 TOTAL STREAM AREA(ACRES) = 2.05
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.86

 FLOW PROCESS FROM NODE 25.00 TO NODE 26.00 IS CODE = 21

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

 INITIAL SUBAREA FLOW-LENGTH(FEET) = 188.26
 ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.546
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.551
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.38	0.40	0.100	52	8.55

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.54
 TOTAL AREA(ACRES) = 0.38 PEAK FLOW RATE(CFS) = 1.54

 FLOW PROCESS FROM NODE 26.00 TO NODE 27.00 IS CODE = 62

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

 UPSTREAM ELEVATION(FEET) = 6.45 DOWNSTREAM ELEVATION(FEET) = 6.00
 STREET LENGTH(FEET) = 254.74 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 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) = 2.54
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.44
 HALFSTREET FLOOD WIDTH(FEET) = 14.05
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.17
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.51
 STREET FLOW TRAVEL TIME(MIN.) = 3.62 Tc(MIN.) = 12.17
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.717

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.59	0.40	0.100	52
NATURAL GOOD COVER "GRASS"	A	0.01	0.40	1.000	58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.115
 SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 1.98
 EFFECTIVE AREA(ACRES) = 0.98 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.11
 TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 3.24

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 15.58
 FLOW VELOCITY(FEET/SEC.) = 1.24 DEPTH*VELOCITY(FT*FT/SEC.) = 0.58
 LONGEST FLOWPATH FROM NODE 25.00 TO NODE 27.00 = 443.00 FEET.

FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 12.17
 RAINFALL INTENSITY(INCH/HR) = 3.72
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.11
 EFFECTIVE STREAM AREA(ACRES) = 0.98
 TOTAL STREAM AREA(ACRES) = 0.98
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.24

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.86	12.06	3.736	0.40(0.04)	0.10	2.1	21.00
2	3.24	12.17	3.717	0.40(0.04)	0.11	1.0	25.00

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	10.09	12.06	3.736	0.40(0.04)	0.11	3.0	21.00
2	10.06	12.17	3.717	0.40(0.04)	0.11	3.0	25.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 10.09 Tc(MIN.) = 12.06
 EFFECTIVE AREA(ACRES) = 3.02 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.11
 TOTAL AREA(ACRES) = 3.0
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

FLOW PROCESS FROM NODE 27.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1.00 DOWNSTREAM(FEET) = 0.36
 FLOW LENGTH(FEET) = 300.70 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.69
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 10.09
 PIPE TRAVEL TIME(MIN.) = 1.36 Tc(MIN.) = 13.42
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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	10.09	13.42	3.515	0.40(0.04)	0.11	3.0	21.00
2	10.06	13.53	3.498	0.40(0.04)	0.11	3.0	25.00

LONGEST FLOWPATH FROM NODE 20.00 TO NODE 20.00 = 908.63 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	11.34	9.98	4.165	0.40(0.04)	0.10	3.0	16.00
2	11.62	18.43	2.930	0.40(0.04)	0.10	4.4	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	20.24	9.98	4.165	0.40(0.04)	0.10	5.3	16.00
2	21.54	13.42	3.515	0.40(0.04)	0.10	6.6	21.00
3	21.52	13.53	3.498	0.40(0.04)	0.10	6.7	25.00
4	20.03	18.43	2.930	0.40(0.04)	0.10	7.5	10.00

TOTAL AREA(ACRES) = 7.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 21.54 Tc(MIN.) = 13.416
 EFFECTIVE AREA(ACRES) = 6.62 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 7.5
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 28.00 TO NODE 30.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 218.21
 ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.39

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.068
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.399
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.31	0.40	0.100	52	9.07

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.22
 TOTAL AREA(ACRES) = 0.31 PEAK FLOW RATE(CFS) = 1.22

 FLOW PROCESS FROM NODE 30.00 TO NODE 34.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 6.39 DOWNSTREAM ELEVATION(FEET) = 5.88
 STREET LENGTH(FEET) = 168.97 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00

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) = 1.58
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.36
 HALFSTREET FLOOD WIDTH(FEET) = 10.19
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.29
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.47
 STREET FLOW TRAVEL TIME(MIN.) = 2.19 Tc(MIN.) = 11.26
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.886

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.20	0.40	0.100	52
NATURAL GOOD COVER "GRASS"	A	0.01	0.40	1.000	58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.143
 SUBAREA AREA(ACRES) = 0.21 SUBAREA RUNOFF(CFS) = 0.72
 EFFECTIVE AREA(ACRES) = 0.52 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.12
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.80

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 10.77
 FLOW VELOCITY(FEET/SEC.) = 1.33 DEPTH*VELOCITY(FT*FT/SEC.) = 0.50
 LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

 FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 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.) = 11.26
 RAINFALL INTENSITY(INCH/HR) = 3.89
 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.12
 EFFECTIVE STREAM AREA(ACRES) = 0.52
 TOTAL STREAM AREA(ACRES) = 0.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.80

 FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 292.87
 ELEVATION DATA: UPSTREAM(FEET) = 6.62 DOWNSTREAM(FEET) = 5.88

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.751
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.220
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.87	0.40	0.100	52	9.75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 3.27
 TOTAL AREA(ACRES) = 0.87 PEAK FLOW RATE(CFS) = 3.27

 FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.75
 RAINFALL INTENSITY(INCH/HR) = 4.22
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.87
 TOTAL STREAM AREA(ACRES) = 0.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.27

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.80	11.26	3.886	0.40(0.05)	0.12	0.5	28.00
2	3.27	9.75	4.220	0.40(0.04)	0.10	0.9	32.00

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	4.96	9.75	4.220	0.40(0.04)	0.11	1.3	32.00
2	4.81	11.26	3.886	0.40(0.04)	0.11	1.4	28.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 4.96 Tc(MIN.) = 9.75
 EFFECTIVE AREA(ACRES) = 1.32 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.11
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

 FLOW PROCESS FROM NODE 34.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 0.88 DOWNSTREAM(FEET) = 0.36
 FLOW LENGTH(FEET) = 42.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.23
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.96
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 9.86
 LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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	4.96	9.86	4.192	0.40(0.04)	0.11	1.3	32.00
2	4.81	11.37	3.864	0.40(0.04)	0.11	1.4	28.00

LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 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	20.24	9.98	4.165	0.40(0.04)	0.10	5.3	16.00
2	21.54	13.42	3.515	0.40(0.04)	0.10	6.6	21.00
3	21.52	13.53	3.498	0.40(0.04)	0.10	6.7	25.00
4	20.03	18.43	2.930	0.40(0.04)	0.10	7.5	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	25.11	9.86	4.192	0.40(0.04)	0.10	6.5	32.00
2	25.19	9.98	4.165	0.40(0.04)	0.10	6.6	16.00
3	25.58	11.37	3.864	0.40(0.04)	0.10	7.2	28.00
4	25.91	13.42	3.515	0.40(0.04)	0.10	8.0	21.00
5	25.87	13.53	3.498	0.40(0.04)	0.10	8.0	25.00
6	23.66	18.43	2.930	0.40(0.04)	0.10	8.9	10.00
TOTAL AREA(ACRES) =		8.9					

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 25.91 Tc(MIN.) = 13.416
 EFFECTIVE AREA(ACRES) = 8.01 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 8.9
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

=====
 END OF STUDY SUMMARY:

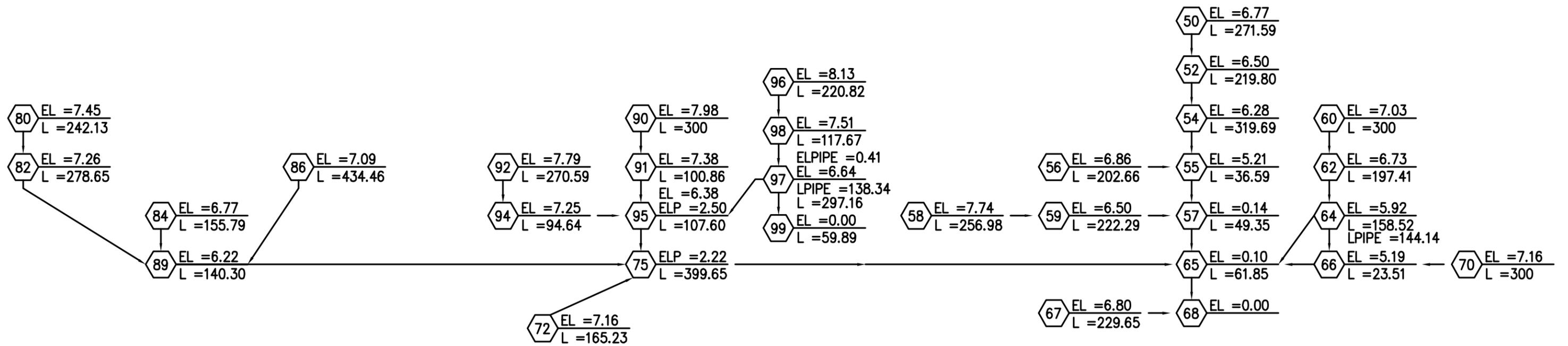
TOTAL AREA(ACRES) = 8.9 TC(MIN.) = 13.42
 EFFECTIVE AREA(ACRES) = 8.01 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.103
 PEAK FLOW RATE(CFS) = 25.91

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	25.11	9.86	4.192	0.40(0.04)	0.10	6.5	32.00
2	25.19	9.98	4.165	0.40(0.04)	0.10	6.6	16.00
3	25.58	11.37	3.864	0.40(0.04)	0.10	7.2	28.00
4	25.91	13.42	3.515	0.40(0.04)	0.10	8.0	21.00
5	25.87	13.53	3.498	0.40(0.04)	0.10	8.0	25.00
6	23.66	18.43	2.930	0.40(0.04)	0.10	8.9	10.00

=====
 END OF RATIONAL METHOD ANALYSIS

♀



AREA B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 Ver. 20.0 Release Date: 06/01/2013 License ID 1271

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
 * POST-PROJECT CONDITION *
 * 100-YR STORM AREA B 10/23/13 SWL *

FILE NAME: POSTB100.DAT
 TIME/DATE OF STUDY: 17:00 10/25/2013

=====

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 = 0.95
 DATA BANK RAINFALL USED
 ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

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

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES: LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	35.0	30.0	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
3	15.0	10.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	10.0	5.0	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 = 0.67 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 10.0 (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 50.00 TO NODE 52.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 217.59
 ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 9.981
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.164
 SUBAREA T_c AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	A	0.56	0.40	0.100	52	9.98

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 2.08
 TOTAL AREA(ACRES) = 0.56 PEAK FLOW RATE(CFS) = 2.08

FLOW PROCESS FROM NODE 52.00 TO NODE 54.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.50 DOWNSTREAM ELEVATION(FEET) = 6.28
STREET LENGTH(FEET) = 219.80 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 = 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) = 3.70
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.53
HALFSTREET FLOOD WIDTH(FEET) = 18.42
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.03
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.54
STREET FLOW TRAVEL TIME(MIN.) = 3.55 Tc(MIN.) = 13.53
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.498

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.04	0.40	0.100	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.04 SUBAREA RUNOFF(CFS) = 3.24
EFFECTIVE AREA(ACRES) = 1.60 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 4.98

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 20.74
FLOW VELOCITY(FEET/SEC.) = 1.11 DEPTH*VELOCITY(FT*FT/SEC.) = 0.64
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 437.39 FEET.

FLOW PROCESS FROM NODE 54.00 TO NODE 55.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.28 DOWNSTREAM ELEVATION(FEET) = 5.21
STREET LENGTH(FEET) = 319.69 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 = 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) = 7.27
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.54
HALFSTREET FLOOD WIDTH(FEET) = 18.95
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.92
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.03
STREET FLOW TRAVEL TIME(MIN.) = 2.77 Tc(MIN.) = 16.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.144

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.64	0.40	0.100	52

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.64 SUBAREA RUNOFF(CFS) = 4.58
EFFECTIVE AREA(ACRES) = 3.24 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 9.05

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 20.69
FLOW VELOCITY(FEET/SEC.) = 2.02 DEPTH*VELOCITY(FT*FT/SEC.) = 1.16
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 757.08 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 55.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.144
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.18 0.40 0.100 52
NATURAL GOOD COVER
"GRASS" A 0.01 0.40 1.000 58
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.147
SUBAREA AREA(ACRES) = 0.19 SUBAREA RUNOFF(CFS) = 0.53
EFFECTIVE AREA(ACRES) = 3.43 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.4 PEAK FLOW RATE(CFS) = 9.58

FLOW PROCESS FROM NODE 55.00 TO NODE 57.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 0.21 DOWNSTREAM(FEET) = 0.14
FLOW LENGTH(FEET) = 49.35 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.20
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.58
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 16.55
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 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.) = 16.55
RAINFALL INTENSITY(INCH/HR) = 3.12
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 3.43
TOTAL STREAM AREA(ACRES) = 3.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.58

FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 256.98
ELEVATION DATA: UPSTREAM(FEET) = 7.74 DOWNSTREAM(FEET) = 6.50

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

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.131
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.683
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL A 0.47 0.40 0.100 52 8.13
 NATURAL GOOD COVER
 "GRASS" A 0.01 0.40 1.000 58 25.01
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.119
 SUBAREA RUNOFF(CFS) = 2.00
 TOTAL AREA(ACRES) = 0.48 PEAK FLOW RATE(CFS) = 2.00

 FLOW PROCESS FROM NODE 59.00 TO NODE 57.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 1.50 DOWNSTREAM(FEET) = 0.14
 FLOW LENGTH(FEET) = 222.29 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.) = 3.76
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.00
 PIPE TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 9.11
 LONGEST FLOWPATH FROM NODE 58.00 TO NODE 57.00 = 479.27 FEET.

 FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 =====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.11
 RAINFALL INTENSITY(INCH/HR) = 4.39
 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.12
 EFFECTIVE STREAM AREA(ACRES) = 0.48
 TOTAL STREAM AREA(ACRES) = 0.48
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.00

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.58	16.55	3.116	0.40(0.04)	0.10	3.4	50.00
2	2.00	9.11	4.386	0.40(0.05)	0.12	0.5	58.00

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	9.45	9.11	4.386	0.40(0.04)	0.11	2.4	58.00
2	10.99	16.55	3.116	0.40(0.04)	0.10	3.9	50.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 10.99 Tc(MIN.) = 16.55
 EFFECTIVE AREA(ACRES) = 3.91 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.9
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

 FLOW PROCESS FROM NODE 57.00 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) = 0.14 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 61.85 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.47
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.99
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 16.97
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

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*****
FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10
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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

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*****
FLOW PROCESS FROM NODE 60.00 TO NODE 62.00 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) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 7.03 DOWNSTREAM(FEET) = 6.73

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.033
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.425
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA      Fp        Ap      SCS  Tc
LAND USE             GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
CONDOMINIUMS        A       0.61    0.40    0.350   52  14.03
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 1.80
TOTAL AREA(ACRES) = 0.61 PEAK FLOW RATE(CFS) = 1.80

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*****
FLOW PROCESS FROM NODE 62.00 TO NODE 64.00 IS CODE = 62
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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

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=====
UPSTREAM ELEVATION(FEET) = 6.73 DOWNSTREAM ELEVATION(FEET) = 5.92
STREET LENGTH(FEET) = 197.41 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 32.00

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DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 27.00
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) = 2.35

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STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 11.35
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.59
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.61
STREET FLOW TRAVEL TIME(MIN.) = 2.07 Tc(MIN.) = 16.10
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.165
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA      Fp        Ap      SCS
LAND USE             GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS        A       0.40    0.40    0.350   52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 0.40 SUBAREA RUNOFF(CFS) = 1.09
EFFECTIVE AREA(ACRES) = 1.01 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.35

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TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 2.75

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.40 HALFSTREET FLOOD WIDTH(FEET) = 12.15
FLOW VELOCITY(FEET/SEC.) = 1.65 DEPTH*VELOCITY(FT*FT/SEC.) = 0.66
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 64.00 = 497.41 FEET.

FLOW PROCESS FROM NODE 64.00 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) = 0.92 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 144.14 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.00
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.75
PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 16.71
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 16.71
RAINFALL INTENSITY(INCH/HR) = 3.10
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.35
EFFECTIVE STREAM AREA(ACRES) = 1.01
TOTAL STREAM AREA(ACRES) = 1.01
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.75

FLOW PROCESS FROM NODE 64.00 TO NODE 66.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 158.52
ELEVATION DATA: UPSTREAM(FEET) = 5.92 DOWNSTREAM(FEET) = 5.19

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.765
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.203
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 0.24 0.40 0.100 52 6.76
NATURAL GOOD COVER
"GRASS" A 0.09 0.40 1.000 58 20.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.345
SUBAREA RUNOFF(CFS) = 1.50
TOTAL AREA(ACRES) = 0.33 PEAK FLOW RATE(CFS) = 1.50

FLOW PROCESS FROM NODE 70.00 TO NODE 66.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 6.76
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.203
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.41 0.40 0.100 52

NATURAL GOOD COVER
 "GRASS" A 0.01 0.40 1.000 58
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.121
 SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 1.95
 EFFECTIVE AREA(ACRES) = 0.75 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.22
 TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 3.45

 FLOW PROCESS FROM NODE 66.00 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) = 0.19 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 15.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.33
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.45
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 6.82
 LONGEST FLOWPATH FROM NODE 64.00 TO NODE 65.00 = 173.52 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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.) = 6.82
 RAINFALL INTENSITY(INCH/HR) = 5.18
 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.22
 EFFECTIVE STREAM AREA(ACRES) = 0.75
 TOTAL STREAM AREA(ACRES) = 0.75
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.45

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.75	16.71	3.100	0.40(0.14)	0.35	1.0	60.00
2	3.45	6.82	5.178	0.40(0.09)	0.22	0.8	64.00

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	5.36	6.82	5.178	0.40(0.11)	0.27	1.2	64.00
2	4.79	16.71	3.100	0.40(0.12)	0.29	1.8	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 5.36 Tc(MIN.) = 6.82
 EFFECTIVE AREA(ACRES) = 1.16 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.27
 TOTAL AREA(ACRES) = 1.8
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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
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1 5.36 6.82 5.178 0.40(0.11) 0.27 1.2 64.00
2 4.79 16.71 3.100 0.40(0.12) 0.29 1.8 60.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 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 9.45 9.55 4.270 0.40(0.04) 0.11 2.4 58.00
2 10.99 16.97 3.072 0.40(0.04) 0.10 3.9 50.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

** PEAK FLOW RATE TABLE **

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 13.57 6.82 5.178 0.40(0.07) 0.17 2.9 64.00
2 14.66 9.55 4.270 0.40(0.07) 0.17 3.7 58.00
3 15.73 16.71 3.100 0.40(0.07) 0.16 5.6 60.00
4 15.74 16.97 3.072 0.40(0.07) 0.16 5.7 50.00
TOTAL AREA(ACRES) = 5.7

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 15.74 Tc(MIN.) = 16.972
EFFECTIVE AREA(ACRES) = 5.67 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 5.7
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 80.00 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) = 242.13
ELEVATION DATA: UPSTREAM(FEET) = 7.45 DOWNSTREAM(FEET) = 7.26

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.417
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.855
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 0.38 0.40 0.100 52 11.42
NATURAL GOOD COVER
"GRASS" A 0.06 0.40 1.000 58 35.11
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.223
SUBAREA RUNOFF(CFS) = 1.49
TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 1.49

FLOW PROCESS FROM NODE 82.00 TO NODE 89.00 IS CODE = 62

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

>>>>(STREET TABLE SECTION # 2 USED)<<<<

UPSTREAM ELEVATION(FEET) = 7.26 DOWNSTREAM ELEVATION(FEET) = 6.22
STREET LENGTH(FEET) = 278.65 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 = 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) = 1.85
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.37
 HALFSTREET FLOOD WIDTH(FEET) = 10.41
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.45
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.53
 STREET FLOW TRAVEL TIME(MIN.) = 3.20 Tc(MIN.) = 14.61
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.347

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.24	0.40	0.100	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.24 SUBAREA RUNOFF(CFS) = 0.71
 EFFECTIVE AREA(ACRES) = 0.68 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
 TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 2.00

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 10.77
 FLOW VELOCITY(FEET/SEC.) = 1.48 DEPTH*VELOCITY(FT*FT/SEC.) = 0.55
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 520.78 FEET.

 FLOW PROCESS FROM NODE 84.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
 >>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 155.79
 ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.085
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.067
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.25	0.40	0.100	52	7.08
CONDOMINIUMS	A	0.25	0.40	0.350	52	8.39

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
 SUBAREA AREA(ACRES) = 0.50 INITIAL SUBAREA RUNOFF(CFS) = 2.24

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
 MAINLINE Tc(MIN.) = 14.61
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.347
 SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.47
 EFFECTIVE AREA(ACRES) = 1.18 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 3.47

 FLOW PROCESS FROM NODE 86.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
 >>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 434.46
 ELEVATION DATA: UPSTREAM(FEET) = 7.09 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.960
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.754
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.62	0.40	0.100	52	11.96
CONDOMINIUMS	A	0.44	0.40	0.350	52	14.16

NATURAL GOOD COVER

"GRASS" A 0.14 0.40 1.000 58 36.79
 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.297
 SUBAREA AREA(ACRES) = 1.20 INITIAL SUBAREA RUNOFF(CFS) = 3.93

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE T_c :
 MAINLINE T_c (MIN.) = 14.61
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.347
 SUBAREA AREA(ACRES) = 1.20 SUBAREA RUNOFF(CFS) = 3.49
 EFFECTIVE AREA(ACRES) = 2.38 AREA-AVERAGED F_m (INCH/HR) = 0.10
 AREA-AVERAGED F_p (INCH/HR) = 0.40 AREA-AVERAGED A_p = 0.25
 TOTAL AREA(ACRES) = 2.4 PEAK FLOW RATE(CFS) = 6.96

 FLOW PROCESS FROM NODE 89.00 TO NODE 75.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	3.00	DOWNSTREAM(FEET) =	2.22
FLOW LENGTH(FEET) =	140.30	MANNING'S N =	0.013
DEPTH OF FLOW IN	18.0 INCH PIPE IS	13.5 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	4.89		
ESTIMATED PIPE DIAMETER(INCH) =	18.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	6.96		
PIPE TRAVEL TIME(MIN.) =	0.48	T_c (MIN.) =	15.09
LONGEST FLOWPATH FROM NODE	80.00 TO NODE	75.00 =	661.08 FEET.

 FLOW PROCESS FROM NODE 75.00 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) =	2.22	DOWNSTREAM(FEET) =	0.10
FLOW LENGTH(FEET) =	550.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	21.0 INCH PIPE IS	13.3 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	4.34		
ESTIMATED PIPE DIAMETER(INCH) =	21.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	6.96		
PIPE TRAVEL TIME(MIN.) =	2.11	T_c (MIN.) =	17.20
LONGEST FLOWPATH FROM NODE	80.00 TO NODE	65.00 =	1211.08 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 11

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

** MAIN STREAM 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	6.96	17.20	3.048	0.40(0.10)	0.25	2.4	80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.							

** MEMORY BANK # 2 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	13.57	6.82	5.178	0.40(0.07)	0.17	2.9	64.00
2	14.66	9.55	4.270	0.40(0.07)	0.17	3.7	58.00
3	15.73	16.71	3.100	0.40(0.07)	0.16	5.6	60.00
4	15.74	16.97	3.072	0.40(0.07)	0.16	5.7	50.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.							

** 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	18.32	6.82	5.178	0.40(0.08)	0.19	3.8	64.00
2	20.12	9.55	4.270	0.40(0.08)	0.19	5.0	58.00
3	22.61	16.71	3.100	0.40(0.08)	0.19	7.9	60.00
4	22.66	16.97	3.072	0.40(0.08)	0.19	8.0	50.00
5	22.58	17.20	3.048	0.40(0.08)	0.19	8.1	80.00
TOTAL AREA(ACRES) = 8.1							

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 22.66 Tc(MIN.) = 16.972
 EFFECTIVE AREA(ACRES) = 8.02 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.19
 TOTAL AREA(ACRES) = 8.1
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 90.00 TO NODE 91.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
 ELEVATION DATA: UPSTREAM(FEET) = 7.98 DOWNSTREAM(FEET) = 7.38

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.316
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.086
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	2.73	0.40	0.100	52	10.32
NATURAL GOOD COVER "GRASS"	A	0.11	0.40	1.000	58	31.73

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.135
 SUBAREA RUNOFF(CFS) = 10.31
 TOTAL AREA(ACRES) = 2.84 PEAK FLOW RATE(CFS) = 10.31

 FLOW PROCESS FROM NODE 91.00 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) = 3.38 DOWNSTREAM(FEET) = 2.50
 FLOW LENGTH(FEET) = 100.86 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.52
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 10.31
 PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 10.57
 LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 400.86 FEET.

 FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 10.57
 RAINFALL INTENSITY(INCH/HR) = 4.03
 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.13
 EFFECTIVE STREAM AREA(ACRES) = 2.84
 TOTAL STREAM AREA(ACRES) = 2.84
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.31

 FLOW PROCESS FROM NODE 92.00 TO NODE 94.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 270.59

ELEVATION DATA: UPSTREAM(FEET) = 7.79 DOWNSTREAM(FEET) = 7.25

=====

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

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.903

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.182

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)

COMMERCIAL A 1.02 0.40 0.100 52 9.90

NATURAL GOOD COVER

"GRASS" A 0.12 0.40 1.000 58 30.46

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.195

SUBAREA RUNOFF(CFS) = 4.21

TOTAL AREA(ACRES) = 1.14 PEAK FLOW RATE(CFS) = 4.21

FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 62

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

>>>>(STREET TABLE SECTION # 4 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 7.25 DOWNSTREAM ELEVATION(FEET) = 6.38

STREET LENGTH(FEET) = 94.64 CURB HEIGHT(INCHES) = 8.0

STREET HALFWIDTH(FEET) = 10.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 5.00

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) = 4.67

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.35

HALFSTREET FLOOD WIDTH(FEET) = 9.41

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.17

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.75

STREET FLOW TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 10.63

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.016

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL A 0.20 0.40 0.100 52

NATURAL GOOD COVER

"GRASS" A 0.06 0.40 1.000 58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.308

SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.91

EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.22

TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 4.95

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 9.65

FLOW VELOCITY(FEET/SEC.) = 2.21 DEPTH*VELOCITY(FT*FT/SEC.) = 0.78

LONGEST FLOWPATH FROM NODE 92.00 TO NODE 95.00 = 365.23 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 10.63

RAINFALL INTENSITY(INCH/HR) = 4.02

AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.22
 EFFECTIVE STREAM AREA(ACRES) = 1.40
 TOTAL STREAM AREA(ACRES) = 1.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.95

 FLOW PROCESS FROM NODE 96.00 TO NODE 98.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 220.82
 ELEVATION DATA: UPSTREAM(FEET) = 8.13 DOWNSTREAM(FEET) = 7.51

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.527
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.557
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.28	0.40	0.100	52	8.53

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.14
 TOTAL AREA(ACRES) = 0.28 PEAK FLOW RATE(CFS) = 1.14

 FLOW PROCESS FROM NODE 98.00 TO NODE 97.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 2 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 7.51 DOWNSTREAM ELEVATION(FEET) = 6.64
 STREET LENGTH(FEET) = 117.67 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 = 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) = 1.63
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.32
 HALFSTREET FLOOD WIDTH(FEET) = 8.30
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.86
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.60
 STREET FLOW TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 9.58
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.262

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.26	0.40	0.100	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.99
 EFFECTIVE AREA(ACRES) = 0.54 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 2.05

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 9.30
 FLOW VELOCITY(FEET/SEC.) = 1.95 DEPTH*VELOCITY(FT*FT/SEC.) = 0.67
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 97.00 = 338.49 FEET.

 FLOW PROCESS FROM NODE 97.00 TO NODE 95.00 IS CODE = 62

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

=====

UPSTREAM ELEVATION(FEET) = 6.64 DOWNSTREAM ELEVATION(FEET) = 6.38
 STREET LENGTH(FEET) = 297.16 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 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) = 4.84
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.58
 HALFSTREET FLOOD WIDTH(FEET) = 21.08
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.04
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.61
 STREET FLOW TRAVEL TIME(MIN.) = 4.74 Tc(MIN.) = 14.33
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.385

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.23	0.40	0.100	52
NATURAL GOOD COVER "GRASS"	A	0.68	0.40	1.000	58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.420
 SUBAREA AREA(ACRES) = 1.91 SUBAREA RUNOFF(CFS) = 5.53
 EFFECTIVE AREA(ACRES) = 2.45 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.35
 TOTAL AREA(ACRES) = 2.5 PEAK FLOW RATE(CFS) = 7.16

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.65 HALFSTREET FLOOD WIDTH(FEET) = 24.54
 FLOW VELOCITY(FEET/SEC.) = 1.15 DEPTH*VELOCITY(FT*FT/SEC.) = 0.75
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

 FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 14.33
 RAINFALL INTENSITY(INCH/HR) = 3.39
 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.35
 EFFECTIVE STREAM AREA(ACRES) = 2.45
 TOTAL STREAM AREA(ACRES) = 2.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.16

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.31	10.57	4.028	0.40(0.05)	0.13	2.8	90.00
2	4.95	10.63	4.016	0.40(0.09)	0.22	1.4	92.00
3	7.16	14.33	3.385	0.40(0.14)	0.35	2.5	96.00

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	21.57	10.57	4.028	0.40(0.09)	0.22	6.0	90.00

2	21.57	10.63	4.016	0.40(0.09)	0.22	6.1	92.00
3	19.95	14.33	3.385	0.40(0.09)	0.23	6.7	96.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 21.57 Tc(MIN.) = 10.57
 EFFECTIVE AREA(ACRES) = 6.04 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.22
 TOTAL AREA(ACRES) = 6.7
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

 FLOW PROCESS FROM NODE 95.00 TO NODE 75.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 2.50 DOWNSTREAM(FEET) = 2.22
 FLOW LENGTH(FEET) = 107.60 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.94
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 21.57
 PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 10.94
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 75.00 = 743.25 FEET.

 FLOW PROCESS FROM NODE 72.00 TO NODE 75.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 10.94
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.951
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.22	0.40	0.100	52
NATURAL GOOD COVER "GRASS"	A	0.01	0.40	1.000	58

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.139
 SUBAREA AREA(ACRES) = 0.23 SUBAREA RUNOFF(CFS) = 0.81
 EFFECTIVE AREA(ACRES) = 6.27 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
 TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 21.81

 FLOW PROCESS FROM NODE 75.00 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) = 2.22 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.70
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 21.81
 PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 12.54
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 3 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	21.81	12.54	3.653	0.40(0.09)	0.21	6.3	90.00
2	21.81	12.60	3.643	0.40(0.09)	0.22	6.3	92.00
3	20.20	16.33	3.140	0.40(0.09)	0.23	6.9	96.00

LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.32	6.82	5.178	0.40(0.08)	0.19	3.8	64.00
2	20.12	9.55	4.270	0.40(0.08)	0.19	5.0	58.00
3	22.61	16.71	3.100	0.40(0.08)	0.19	7.9	60.00
4	22.66	16.97	3.072	0.40(0.08)	0.19	8.0	50.00
5	22.58	17.20	3.048	0.40(0.08)	0.19	8.1	80.00

LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	35.26	6.82	5.178	0.40(0.08)	0.20	7.2	64.00
2	39.61	9.55	4.270	0.40(0.08)	0.20	9.8	58.00
3	42.98	12.54	3.653	0.40(0.08)	0.20	12.5	90.00
4	42.99	12.60	3.643	0.40(0.08)	0.20	12.5	92.00
5	42.68	16.33	3.140	0.40(0.08)	0.21	14.7	96.00
6	42.54	16.71	3.100	0.40(0.08)	0.21	14.8	60.00
7	42.41	16.97	3.072	0.40(0.08)	0.21	14.9	50.00
8	42.17	17.20	3.048	0.40(0.08)	0.21	15.0	80.00

TOTAL AREA(ACRES) = 15.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 42.99 Tc(MIN.) = 12.600
 EFFECTIVE AREA(ACRES) = 12.55 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 15.0
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

FLOW PROCESS FROM NODE 65.00 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) = 0.10 DOWNSTREAM(FEET) = 0.00
 FLOW LENGTH(FEET) = 23.51 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 26.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.06
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 42.99
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 12.66
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 68.00 = 1316.76 FEET.

FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 12.66
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.634
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.58	0.40	0.100	52
NATURAL GOOD COVER "GRASS"	A	0.04	0.40	1.000	58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.158
 SUBAREA AREA(ACRES) = 0.62 SUBAREA RUNOFF(CFS) = 1.99
 EFFECTIVE AREA(ACRES) = 13.17 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 42.99
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 12.66

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.634
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.15 0.40 0.100 52
 NATURAL GOOD COVER
 "GRASS" A 0.02 0.40 1.000 58
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.206
 SUBAREA AREA(ACRES) = 0.17 SUBAREA RUNOFF(CFS) = 0.54
 EFFECTIVE AREA(ACRES) = 13.34 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 15.8 PEAK FLOW RATE(CFS) = 42.99
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 15.8 TC(MIN.) = 12.66
 EFFECTIVE AREA(ACRES) = 13.34 AREA-AVERAGED Fm(INCH/HR)= 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
 PEAK FLOW RATE(CFS) = 42.99

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	36.52	6.88	5.153	0.40(0.08)	0.20	8.0	64.00
2	39.77	9.61	4.255	0.40(0.08)	0.20	10.6	58.00
3	42.98	12.60	3.643	0.40(0.08)	0.20	13.3	90.00
4	42.99	12.66	3.634	0.40(0.08)	0.20	13.3	92.00
5	42.68	16.39	3.134	0.40(0.08)	0.20	15.5	96.00
6	42.54	16.76	3.094	0.40(0.08)	0.20	15.6	60.00
7	42.41	17.03	3.066	0.40(0.08)	0.20	15.7	50.00
8	42.17	17.26	3.042	0.40(0.08)	0.20	15.8	80.00

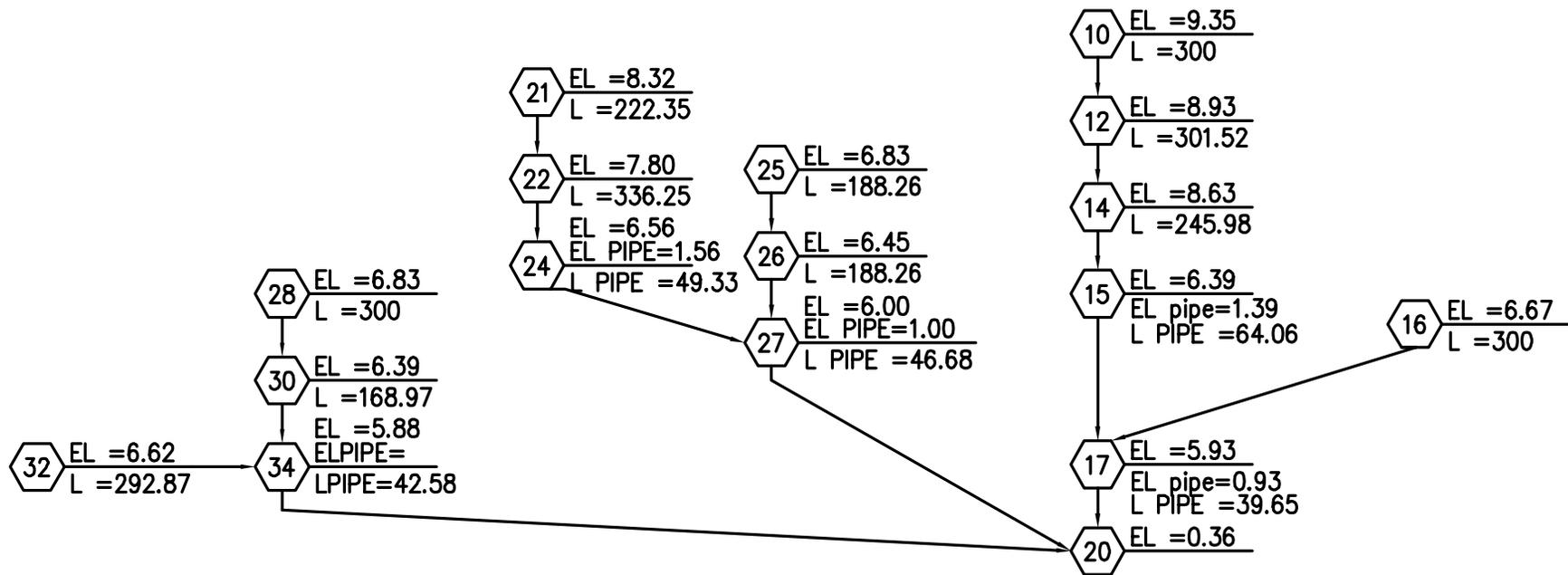
=====
 END OF RATIONAL METHOD ANALYSIS

♀

APPENDIX C

Rational Method Hydrology Analysis 25-Year Storm Event

PRE-PROJECT CONDITION



AREA A

 RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
 (c) Copyright 1983-2013 Advanced Engineering Software (aes)
 Ver. 20.0 Release Date: 06/01/2013 License ID 1271

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
 * PRE-PROJECT CONDITION *
 * 25-YR STORM AREA A 10/23/13 SWL *

FILE NAME: PREA25.DAT
 TIME/DATE OF STUDY: 11:19 10/25/2013

=====

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 = 0.95
 DATA BANK RAINFALL USED
 ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	35.0	30.0	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
3	15.0	10.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	10.0	5.0	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 = 0.67 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 10.0 (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 10.00 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) = 300.00
 ELEVATION DATA: UPSTREAM(FEET) = 9.35 DOWNSTREAM(FEET) = 8.93

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 11.079
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.075
 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.)
COMMERCIAL	A	0.65	0.40	0.100	32	11.08

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 1.78
 TOTAL AREA(ACRES) = 0.65 PEAK FLOW RATE(CFS) = 1.78

FLOW PROCESS FROM NODE 12.00 TO NODE 14.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.93 DOWNSTREAM ELEVATION(FEET) = 8.63
STREET LENGTH(FEET) = 301.52 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 2.38

STREET FLOW SPLITS OVER STREET-CROWN

FULL DEPTH(FEET) = 0.46 FLOOD WIDTH(FEET) = 15.00
FULL HALF-STREET VELOCITY(FEET/SEC.) = 0.91
SPLIT DEPTH(FEET) = 0.21 SPLIT FLOOD WIDTH(FEET) = 2.42
SPLIT FLOW(CFS) = 0.16 SPLIT VELOCITY(FEET/SEC.) = 0.64

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 15.00
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.91
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.42
STREET FLOW TRAVEL TIME(MIN.) = 5.52 Tc(MIN.) = 16.60
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.446

SUBAREA LOSS RATE DATA(AMC II):

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Row 1: COMMERCIAL, A, 0.56, 0.40, 0.100, 32.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.21
EFFECTIVE AREA(ACRES) = 1.21 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.62

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 15.00
FLOW VELOCITY(FEET/SEC.) = 0.91 DEPTH*VELOCITY(FT*FT/SEC.) = 0.42
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 14.00 = 601.52 FEET.

FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.63 DOWNSTREAM ELEVATION(FEET) = 6.39
STREET LENGTH(FEET) = 245.98 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 4.10

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.40
HALFSTREET FLOOD WIDTH(FEET) = 12.15
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.46
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.99
STREET FLOW TRAVEL TIME(MIN.) = 1.67 Tc(MIN.) = 18.26

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.317
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 1.44 0.40 0.100 32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.44 SUBAREA RUNOFF(CFS) = 2.95
 EFFECTIVE AREA(ACRES) = 2.65 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 5.43

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 13.71
 FLOW VELOCITY(FEET/SEC.) = 2.62 DEPTH*VELOCITY(FT*FT/SEC.) = 1.13
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.00 = 847.50 FEET.

 FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 18.26
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.317
 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 0.40 0.100 32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 0.84
 EFFECTIVE AREA(ACRES) = 3.06 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.1 PEAK FLOW RATE(CFS) = 6.27

 FLOW PROCESS FROM NODE 15.00 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) = 1.39 DOWNSTREAM(FEET) = 0.93
 FLOW LENGTH(FEET) = 62.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.42
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.27
 PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 18.45
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

 FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 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.) = 18.45
 RAINFALL INTENSITY(INCH/HR) = 2.30
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 3.06
 TOTAL STREAM AREA(ACRES) = 3.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.27

 FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00

PREA25.RES
ELEVATION DATA: UPSTREAM(FEET) = 6.67 DOWNSTREAM(FEET) = 5.93

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.892
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.278
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 1.38 0.40 0.100 32 9.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.02
TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 4.02

FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.89
RAINFALL INTENSITY(INCH/HR) = 3.28
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.38
TOTAL STREAM AREA(ACRES) = 1.38
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.02

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.27	18.45	2.304	0.40(0.04)	0.10	3.1	10.00
2	4.02	9.89	3.278	0.40(0.04)	0.10	1.4	16.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.83	9.89	3.278	0.40(0.04)	0.10	3.0	16.00
2	9.08	18.45	2.304	0.40(0.04)	0.10	4.4	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 9.08 Tc(MIN.) = 18.45
EFFECTIVE AREA(ACRES) = 4.44 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 4.4
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

FLOW PROCESS FROM NODE 17.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 0.93 DOWNSTREAM(FEET) = 0.36
FLOW LENGTH(FEET) = 40.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.58
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.08
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 18.54
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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) = 222.35
 ELEVATION DATA: UPSTREAM(FEET) = 8.32 DOWNSTREAM(FEET) = 7.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.869
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.487
 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	0.72	0.40	0.100	32	8.87

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.23
 TOTAL AREA(ACRES) = 0.72 PEAK FLOW RATE(CFS) = 2.23

 FLOW PROCESS FROM NODE 22.00 TO NODE 24.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 7.80 DOWNSTREAM ELEVATION(FEET) = 6.56
 STREET LENGTH(FEET) = 336.25 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 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) = 3.96
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.45
 HALFSTREET FLOOD WIDTH(FEET) = 14.52
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.72
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.77
 STREET FLOW TRAVEL TIME(MIN.) = 3.25 Tc(MIN.) = 12.12
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.922

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.33	0.40	0.100	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.33 SUBAREA RUNOFF(CFS) = 3.45
 EFFECTIVE AREA(ACRES) = 2.05 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.1 PEAK FLOW RATE(CFS) = 5.32

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 16.40
 FLOW VELOCITY(FEET/SEC.) = 1.85 DEPTH*VELOCITY(FT*FT/SEC.) = 0.90
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 24.00 = 558.60 FEET.

 FLOW PROCESS FROM NODE 24.00 TO NODE 27.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 1.56 DOWNSTREAM(FEET) = 1.00
 FLOW LENGTH(FEET) = 49.33 MANNING'S N = 0.013

PREA25.RES

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.14
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.32
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 12.25
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 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.) = 12.25
RAINFALL INTENSITY(INCH/HR) = 2.90
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.05
TOTAL STREAM AREA(ACRES) = 2.05
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.32

FLOW PROCESS FROM NODE 25.00 TO NODE 26.00 IS CODE = 21

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

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 188.26
ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.546
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.561
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 0.38 0.40 0.100 32 8.55
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.20
TOTAL AREA(ACRES) = 0.38 PEAK FLOW RATE(CFS) = 1.20

FLOW PROCESS FROM NODE 26.00 TO NODE 27.00 IS CODE = 62

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

=====
UPSTREAM ELEVATION(FEET) = 6.45 DOWNSTREAM ELEVATION(FEET) = 6.00
STREET LENGTH(FEET) = 254.74 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
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) = 1.98
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 12.65
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.10
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.45
STREET FLOW TRAVEL TIME(MIN.) = 3.84 Tc(MIN.) = 12.39
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.886
SUBAREA LOSS RATE DATA(AMC II):

PREA25.RES

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.60	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 1.54
 EFFECTIVE AREA(ACRES) = 0.98 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 2.51

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 13.99
 FLOW VELOCITY(FEET/SEC.) = 1.17 DEPTH*VELOCITY(FT*FT/SEC.) = 0.51
 LONGEST FLOWPATH FROM NODE 25.00 TO NODE 27.00 = 443.00 FEET.

 FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 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.) = 12.39
 RAINFALL INTENSITY(INCH/HR) = 2.89
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.98
 TOTAL STREAM AREA(ACRES) = 0.98
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.51

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.32	12.25	2.904	0.40(0.04)	0.10	2.1	21.00
2	2.51	12.39	2.886	0.40(0.04)	0.10	1.0	25.00

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	7.82	12.25	2.904	0.40(0.04)	0.10	3.0	21.00
2	7.79	12.39	2.886	0.40(0.04)	0.10	3.0	25.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 7.82 Tc(MIN.) = 12.25
 EFFECTIVE AREA(ACRES) = 3.02 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.0
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

 FLOW PROCESS FROM NODE 27.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1.00 DOWNSTREAM(FEET) = 0.36
 FLOW LENGTH(FEET) = 300.70 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.57
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.82
 PIPE TRAVEL TIME(MIN.) = 1.40 Tc(MIN.) = 13.66
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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	7.82	13.66	2.731	0.40(0.04)	0.10	3.0	21.00
2	7.79	13.80	2.716	0.40(0.04)	0.10	3.0	25.00

LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 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	8.83	9.98	3.262	0.40(0.04)	0.10	3.0	16.00
2	9.08	18.54	2.297	0.40(0.04)	0.10	4.4	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	15.67	9.98	3.262	0.40(0.04)	0.10	5.2	16.00
2	16.76	13.66	2.731	0.40(0.04)	0.10	6.6	21.00
3	16.74	13.80	2.716	0.40(0.04)	0.10	6.7	25.00
4	15.66	18.54	2.297	0.40(0.04)	0.10	7.5	10.00

TOTAL AREA(ACRES) = 7.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 16.76 Tc(MIN.) = 13.657
 EFFECTIVE AREA(ACRES) = 6.65 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 7.5
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 28.00 TO NODE 30.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 218.21
 ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.39

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.068
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.444
 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	0.31	0.40	0.100	32	9.07

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.95
 TOTAL AREA(ACRES) = 0.31 PEAK FLOW RATE(CFS) = 0.95

 FLOW PROCESS FROM NODE 30.00 TO NODE 34.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 6.39 DOWNSTREAM ELEVATION(FEET) = 5.88
 STREET LENGTH(FEET) = 168.97 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

PREA25.RES

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) = 1.23
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.34
HALFSTREET FLOOD WIDTH(FEET) = 9.01
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.23
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.42
STREET FLOW TRAVEL TIME(MIN.) = 2.29 Tc(MIN.) = 11.36
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.032

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 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.21 SUBAREA RUNOFF(CFS) = 0.57
EFFECTIVE AREA(ACRES) = 0.52 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.40

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 9.60
FLOW VELOCITY(FEET/SEC.) = 1.26 DEPTH*VELOCITY(FT*FT/SEC.) = 0.44
LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 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.) = 11.36
RAINFALL INTENSITY(INCH/HR) = 3.03
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.52
TOTAL STREAM AREA(ACRES) = 0.52
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.40

FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 292.87
ELEVATION DATA: UPSTREAM(FEET) = 6.62 DOWNSTREAM(FEET) = 5.88

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.751
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.305
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 0.87 0.40 0.100 32 9.75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.56
TOTAL AREA(ACRES) = 0.87 PEAK FLOW RATE(CFS) = 2.56

FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 9.75
 RAINFALL INTENSITY(INCH/HR) = 3.31
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.87
 TOTAL STREAM AREA(ACRES) = 0.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.56

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.40	11.36	3.032	0.40(0.04)	0.10	0.5	28.00
2	2.56	9.75	3.305	0.40(0.04)	0.10	0.9	32.00

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	3.87	9.75	3.305	0.40(0.04)	0.10	1.3	32.00
2	3.74	11.36	3.032	0.40(0.04)	0.10	1.4	28.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.87 Tc(MIN.) = 9.75
 EFFECTIVE AREA(ACRES) = 1.32 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

 FLOW PROCESS FROM NODE 34.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 0.88 DOWNSTREAM(FEET) = 0.36
 FLOW LENGTH(FEET) = 42.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.82
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.87
 PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 9.87
 LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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	3.87	9.87	3.282	0.40(0.04)	0.10	1.3	32.00
2	3.74	11.48	3.014	0.40(0.04)	0.10	1.4	28.00

LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 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	15.67	9.98	3.262	0.40(0.04)	0.10	5.2	16.00
2	16.76	13.66	2.731	0.40(0.04)	0.10	6.6	21.00
3	16.74	13.80	2.716	0.40(0.04)	0.10	6.7	25.00
4	15.66	18.54	2.297	0.40(0.04)	0.10	7.5	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
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                                PREA25.RES
1      19.46   9.87   3.282  0.40( 0.04) 0.10   6.5   32.00
2      19.53   9.98   3.262  0.40( 0.04) 0.10   6.5   16.00
3      19.86  11.48   3.014  0.40( 0.04) 0.10   7.2   28.00
4      20.14  13.66   2.731  0.40( 0.04) 0.10   8.0   21.00
5      20.11  13.80   2.716  0.40( 0.04) 0.10   8.1   25.00
6      18.50  18.54   2.297  0.40( 0.04) 0.10   8.9   10.00
TOTAL AREA(ACRES) =                8.9

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COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      20.14  Tc(MIN.) =    13.657
EFFECTIVE AREA(ACRES) =      8.04  AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =      8.9
LONGEST FLOWPATH FROM NODE    10.00 TO NODE    20.00 =    949.50 FEET.
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END OF STUDY SUMMARY:
TOTAL AREA(ACRES) =      8.9  TC(MIN.) =    13.66
EFFECTIVE AREA(ACRES) =      8.04  AREA-AVERAGED Fm(INCH/HR)=  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.100
PEAK FLOW RATE(CFS) =      20.14

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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      19.46   9.87   3.282  0.40( 0.04) 0.10   6.5   32.00
2      19.53   9.98   3.262  0.40( 0.04) 0.10   6.5   16.00
3      19.86  11.48   3.014  0.40( 0.04) 0.10   7.2   28.00
4      20.14  13.66   2.731  0.40( 0.04) 0.10   8.0   21.00
5      20.11  13.80   2.716  0.40( 0.04) 0.10   8.1   25.00
6      18.50  18.54   2.297  0.40( 0.04) 0.10   8.9   10.00
=====

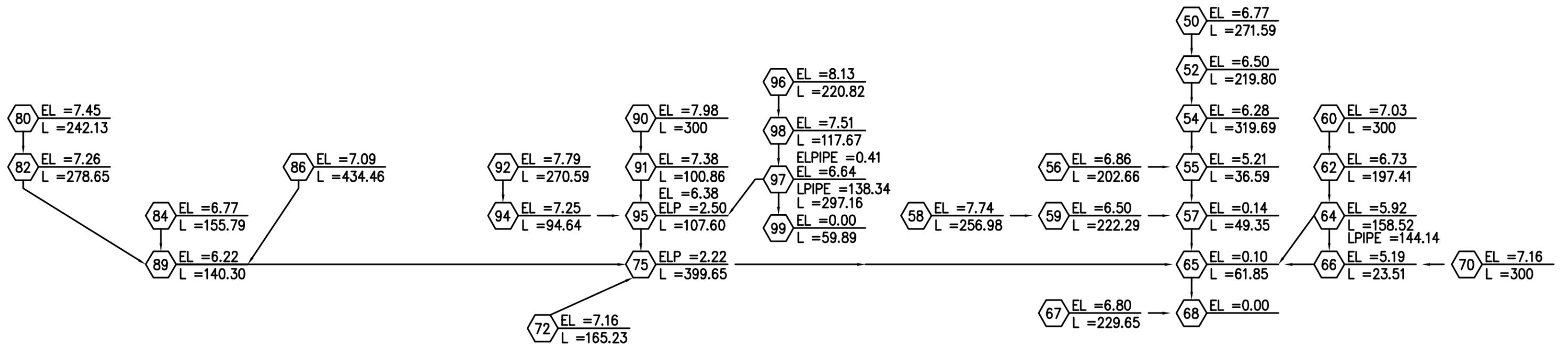
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END OF RATIONAL METHOD ANALYSIS

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AREA B

 RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 Ver. 20.0 Release Date: 06/01/2013 License ID 1271

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
 * PRE-PROJECT CONDITION *
 * 25-YR STORM AREA B 10/23/13 SWL *

FILE NAME: PREB25.DAT
 TIME/DATE OF STUDY: 17:01 10/25/2013

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
 DATA BANK RAINFALL USED
 ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES: LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	35.0	30.0	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
3	15.0	10.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	10.0	5.0	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 = 0.67 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 10.0 (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 50.00 TO NODE 52.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 217.59
 ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 9.981
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.262
 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.)
COMMERCIAL	A	0.56	0.40	0.100	32	9.98

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 1.62
 TOTAL AREA(ACRES) = 0.56 PEAK FLOW RATE(CFS) = 1.62

FLOW PROCESS FROM NODE 52.00 TO NODE 54.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.50 DOWNSTREAM ELEVATION(FEET) = 6.28
STREET LENGTH(FEET) = 219.80 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 = 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) = 2.88
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.49
HALFSTREET FLOOD WIDTH(FEET) = 16.68
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.48
STREET FLOW TRAVEL TIME(MIN.) = 3.78 Tc(MIN.) = 13.76
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.720

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 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.04 SUBAREA RUNOFF(CFS) = 2.51
EFFECTIVE AREA(ACRES) = 1.60 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 3.86

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 18.74
FLOW VELOCITY(FEET/SEC.) = 1.04 DEPTH*VELOCITY(FT*FT/SEC.) = 0.56
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 437.39 FEET.

FLOW PROCESS FROM NODE 54.00 TO NODE 55.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.28 DOWNSTREAM ELEVATION(FEET) = 5.21
STREET LENGTH(FEET) = 319.69 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 = 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) = 5.63
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 17.10
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.81
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.90
STREET FLOW TRAVEL TIME(MIN.) = 2.95 Tc(MIN.) = 16.71
* 25 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
COMMERCIAL A 1.64 0.40 0.100 32

PREB25.RES

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.64 SUBAREA RUNOFF(CFS) = 3.54
EFFECTIVE AREA(ACRES) = 3.24 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 6.99

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 18.68
FLOW VELOCITY(FEET/SEC.) = 1.90 DEPTH*VELOCITY(FT*FT/SEC.) = 1.01
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 757.08 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 55.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.71
* 25 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
COMMERCIAL A 0.19 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.19 SUBAREA RUNOFF(CFS) = 0.41
EFFECTIVE AREA(ACRES) = 3.43 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.4 PEAK FLOW RATE(CFS) = 7.40

FLOW PROCESS FROM NODE 55.00 TO NODE 57.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 0.21 DOWNSTREAM(FEET) = 0.14
FLOW LENGTH(FEET) = 49.35 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.99
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.40
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 16.98
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 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.) = 16.98
RAINFALL INTENSITY(INCH/HR) = 2.41
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 3.43
TOTAL STREAM AREA(ACRES) = 3.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.40

FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 256.98
ELEVATION DATA: UPSTREAM(FEET) = 7.74 DOWNSTREAM(FEET) = 6.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.131
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.663

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 0.48 0.40 0.100 32 8.13
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.57
 TOTAL AREA(ACRES) = 0.48 PEAK FLOW RATE(CFS) = 1.57

 FLOW PROCESS FROM NODE 59.00 TO NODE 57.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1.50 DOWNSTREAM(FEET) = 0.14
 FLOW LENGTH(FEET) = 222.29 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.51
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.57
 PIPE TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 9.18
 LONGEST FLOWPATH FROM NODE 58.00 TO NODE 57.00 = 479.27 FEET.

 FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.18
 RAINFALL INTENSITY(INCH/HR) = 3.42
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.48
 TOTAL STREAM AREA(ACRES) = 0.48
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.57

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.40	16.98	2.414	0.40(0.04)	0.10	3.4	50.00
2	1.57	9.18	3.419	0.40(0.04)	0.10	0.5	58.00

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	7.26	9.18	3.419	0.40(0.04)	0.10	2.3	58.00
2	8.50	16.98	2.414	0.40(0.04)	0.10	3.9	50.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 8.50 Tc(MIN.) = 16.98
 EFFECTIVE AREA(ACRES) = 3.91 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.9
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

 FLOW PROCESS FROM NODE 57.00 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) = 0.14 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 61.85 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.0 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 2.32
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 8.50
 PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 17.43
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 60.00 TO NODE 62.00 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
 ELEVATION DATA: UPSTREAM(FEET) = 7.03 DOWNSTREAM(FEET) = 6.73

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.033
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.690
 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.)
 CONDOMINIUMS A 0.61 0.40 0.350 32 14.03
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
 SUBAREA RUNOFF(CFS) = 1.40
 TOTAL AREA(ACRES) = 0.61 PEAK FLOW RATE(CFS) = 1.40

 FLOW PROCESS FROM NODE 62.00 TO NODE 64.00 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 2 USED)<<<<
 =====
 UPSTREAM ELEVATION(FEET) = 6.73 DOWNSTREAM ELEVATION(FEET) = 5.92
 STREET LENGTH(FEET) = 197.41 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 = 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) = 1.82
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.36
 HALFSTREET FLOOD WIDTH(FEET) = 10.09
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.51
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.54
 STREET FLOW TRAVEL TIME(MIN.) = 2.18 Tc(MIN.) = 16.21
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.479
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 CONDOMINIUMS A 0.40 0.40 0.350 32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
 SUBAREA AREA(ACRES) = 0.40 SUBAREA RUNOFF(CFS) = 0.84
 EFFECTIVE AREA(ACRES) = 1.01 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.35
 TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 2.13

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 10.83

PREB25.RES

FLOW VELOCITY(FEET/SEC.) = 1.56 DEPTH*VELOCITY(FT*FT/SEC.) = 0.59
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 64.00 = 497.41 FEET.

FLOW PROCESS FROM NODE 64.00 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) = 0.92 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 144.14 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.73
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.13
PIPE TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 16.86
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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.) = 16.86
RAINFALL INTENSITY(INCH/HR) = 2.42
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.35
EFFECTIVE STREAM AREA(ACRES) = 1.01
TOTAL STREAM AREA(ACRES) = 1.01
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.13

FLOW PROCESS FROM NODE 64.00 TO NODE 66.00 IS CODE = 21

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

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 158.52
ELEVATION DATA: UPSTREAM(FEET) = 5.92 DOWNSTREAM(FEET) = 5.19

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.765
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.065
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 0.30 0.40 0.100 32 6.76
NATURAL GOOD COVER
"GRASS" A 0.03 0.40 1.000 38 20.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.182
SUBAREA RUNOFF(CFS) = 1.19
TOTAL AREA(ACRES) = 0.33 PEAK FLOW RATE(CFS) = 1.19

FLOW PROCESS FROM NODE 70.00 TO NODE 66.00 IS CODE = 81

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

=====
MAINLINE Tc(MIN.) = 6.76
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.065
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 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 1.52
EFFECTIVE AREA(ACRES) = 0.75 AREA-AVERAGED Fm(INCH/HR) = 0.05

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AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 2.71

FLOW PROCESS FROM NODE 66.00 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) = 0.19 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 15.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.06
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.71
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 6.83
LONGEST FLOWPATH FROM NODE 64.00 TO NODE 65.00 = 173.52 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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.) = 6.83
RAINFALL INTENSITY(INCH/HR) = 4.04
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.14
EFFECTIVE STREAM AREA(ACRES) = 0.75
TOTAL STREAM AREA(ACRES) = 0.75
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.71

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.13	16.86	2.424	0.40(0.14)	0.35	1.0	60.00
2	2.71	6.83	4.044	0.40(0.05)	0.14	0.8	64.00

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	4.18	6.83	4.044	0.40(0.08)	0.21	1.2	64.00
2	3.73	16.86	2.424	0.40(0.10)	0.26	1.8	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 4.18 Tc(MIN.) = 6.83
EFFECTIVE AREA(ACRES) = 1.16 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 1.8
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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	4.18	6.83	4.044	0.40(0.08)	0.21	1.2	64.00
2	3.73	16.86	2.424	0.40(0.10)	0.26	1.8	60.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
--------	---	----	-----------	--------	----	----	-----------

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NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	7.26	9.65	3.324	0.40(0.04)	0.10	2.3 58.00
2	8.50	17.43	2.379	0.40(0.04)	0.10	3.9 50.00

LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	10.44	6.83	4.044	0.40(0.06)	0.15	2.8	64.00
2	11.31	9.65	3.324	0.40(0.06)	0.15	3.7	58.00
3	12.14	16.86	2.424	0.40(0.06)	0.15	5.6	60.00
4	12.16	17.43	2.379	0.40(0.06)	0.15	5.7	50.00

TOTAL AREA(ACRES) = 5.7

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 12.16 Tc(MIN.) = 17.427
 EFFECTIVE AREA(ACRES) = 5.67 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.15
 TOTAL AREA(ACRES) = 5.7
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 80.00 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) = 242.13
 ELEVATION DATA: UPSTREAM(FEET) = 7.45 DOWNSTREAM(FEET) = 7.26

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.417
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.023
 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	0.44	0.40	0.100	32	11.42

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.18
 TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 1.18

 FLOW PROCESS FROM NODE 82.00 TO NODE 89.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 2 USED)<<<<<
 =====

UPSTREAM ELEVATION(FEET) = 7.26 DOWNSTREAM ELEVATION(FEET) = 6.22
 STREET LENGTH(FEET) = 278.65 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 = 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) = 1.46
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.34
 HALFSTREET FLOOD WIDTH(FEET) = 9.30
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.38
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.48

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STREET FLOW TRAVEL TIME(MIN.) = 3.35 Tc(MIN.) = 14.77
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.613

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.24 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.24 SUBAREA RUNOFF(CFS) = 0.56
EFFECTIVE AREA(ACRES) = 0.68 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 1.57

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 9.67
FLOW VELOCITY(FEET/SEC.) = 1.40 DEPTH*VELOCITY(FT*FT/SEC.) = 0.49
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 520.78 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 155.79
ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.085
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.960
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 0.25 0.40 0.100 32 7.08
CONDOMINIUMS A 0.25 0.40 0.350 32 8.39
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 0.50 INITIAL SUBAREA RUNOFF(CFS) = 1.74

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN.) = 14.77
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.613
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.14
EFFECTIVE AREA(ACRES) = 1.18 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.71

FLOW PROCESS FROM NODE 86.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 434.46
ELEVATION DATA: UPSTREAM(FEET) = 7.09 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.960
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.944
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 0.62 0.40 0.100 32 11.96
CONDOMINIUMS A 0.44 0.40 0.350 32 14.16
NATURAL GOOD COVER
"GRASS" A 0.14 0.40 1.000 38 36.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.297
SUBAREA AREA(ACRES) = 1.20 INITIAL SUBAREA RUNOFF(CFS) = 3.05

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN.) = 14.77
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.613

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SUBAREA AREA(ACRES) = 1.20 SUBAREA RUNOFF(CFS) = 2.69
 EFFECTIVE AREA(ACRES) = 2.38 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.23
 TOTAL AREA(ACRES) = 2.4 PEAK FLOW RATE(CFS) = 5.40

 FLOW PROCESS FROM NODE 89.00 TO NODE 75.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 3.00 DOWNSTREAM(FEET) = 2.22
 FLOW LENGTH(FEET) = 140.30 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.68
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.40
 PIPE TRAVEL TIME(MIN.) = 0.50 Tc(MIN.) = 15.27
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 75.00 = 661.08 FEET.

 FLOW PROCESS FROM NODE 75.00 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) = 2.22 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.04
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.40
 PIPE TRAVEL TIME(MIN.) = 2.27 Tc(MIN.) = 17.54
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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	5.40	17.54	2.371	0.40(0.09)	0.23	2.4	80.00

LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 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	10.44	6.83	4.044	0.40(0.06)	0.15	2.8	64.00
2	11.31	9.65	3.324	0.40(0.06)	0.15	3.7	58.00
3	12.14	16.86	2.424	0.40(0.06)	0.15	5.6	60.00
4	12.16	17.43	2.379	0.40(0.06)	0.15	5.7	50.00

LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	14.08	6.83	4.044	0.40(0.07)	0.17	3.7	64.00
2	15.53	9.65	3.324	0.40(0.07)	0.17	5.0	58.00
3	17.46	16.86	2.424	0.40(0.07)	0.17	7.8	60.00
4	17.55	17.43	2.379	0.40(0.07)	0.17	8.0	50.00
5	17.52	17.54	2.371	0.40(0.07)	0.17	8.1	80.00

TOTAL AREA(ACRES) = 8.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 17.55 Tc(MIN.) = 17.427
 EFFECTIVE AREA(ACRES) = 8.03 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.17
 TOTAL AREA(ACRES) = 8.1
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

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 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 90.00 TO NODE 91.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
 ELEVATION DATA: UPSTREAM(FEET) = 7.98 DOWNSTREAM(FEET) = 7.38

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 10.316
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.201
 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.)
COMMERCIAL	A	2.77	0.40	0.100	32	10.32
NATURAL GOOD COVER "GRASS"	A	0.07	0.40	1.000	38	31.73

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.122
 SUBAREA RUNOFF(CFS) = 8.06
 TOTAL AREA(ACRES) = 2.84 PEAK FLOW RATE(CFS) = 8.06

 FLOW PROCESS FROM NODE 91.00 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) = 3.38 DOWNSTREAM(FEET) = 2.50
 FLOW LENGTH(FEET) = 100.86 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.06
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 8.06
 PIPE TRAVEL TIME(MIN.) = 0.28 T_c (MIN.) = 10.59
 LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 400.86 FEET.

 FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 10.59
 RAINFALL INTENSITY(INCH/HR) = 3.15
 AREA-AVERAGED F_m (INCH/HR) = 0.05
 AREA-AVERAGED F_p (INCH/HR) = 0.40
 AREA-AVERAGED A_p = 0.12
 EFFECTIVE STREAM AREA(ACRES) = 2.84
 TOTAL STREAM AREA(ACRES) = 2.84
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.06

 FLOW PROCESS FROM NODE 92.00 TO NODE 94.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 270.59
 ELEVATION DATA: UPSTREAM(FEET) = 7.79 DOWNSTREAM(FEET) = 7.25

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 9.903
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.276
 SUBAREA T_c AND LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	1.02	0.40	0.100	32	9.90
NATURAL GOOD COVER "GRASS"	A	0.12	0.40	1.000	38	30.46

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.195
SUBAREA RUNOFF(CFS) = 3.28
TOTAL AREA(ACRES) = 1.14 PEAK FLOW RATE(CFS) = 3.28

FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 4 USED)<<<<<
=====

UPSTREAM ELEVATION(FEET) = 7.25 DOWNSTREAM ELEVATION(FEET) = 6.38
STREET LENGTH(FEET) = 94.64 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 10.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 5.00
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) = 3.64
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.32
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.67
STREET FLOW TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 10.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.141

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 0.40 0.100 32
NATURAL GOOD COVER
"GRASS" A 0.05 0.40 1.000 38
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.273
SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.71
EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 3.85

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 8.55
FLOW VELOCITY(FEET/SEC.) = 2.09 DEPTH*VELOCITY(FT*FT/SEC.) = 0.69
LONGEST FLOWPATH FROM NODE 92.00 TO NODE 95.00 = 365.23 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.67
RAINFALL INTENSITY(INCH/HR) = 3.14
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.21
EFFECTIVE STREAM AREA(ACRES) = 1.40
TOTAL STREAM AREA(ACRES) = 1.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.85

FLOW PROCESS FROM NODE 96.00 TO NODE 98.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 220.82
 ELEVATION DATA: UPSTREAM(FEET) = 8.13 DOWNSTREAM(FEET) = 7.51

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.527
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.566
 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 0.28 0.40 0.100 32 8.53
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.89
 TOTAL AREA(ACRES) = 0.28 PEAK FLOW RATE(CFS) = 0.89

 FLOW PROCESS FROM NODE 98.00 TO NODE 97.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 7.51 DOWNSTREAM ELEVATION(FEET) = 6.64
 STREET LENGTH(FEET) = 117.67 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 = 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) = 1.27
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.30
 HALFSTREET FLOOD WIDTH(FEET) = 7.29
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.76
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.54
 STREET FLOW TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 9.64
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.327
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.26 0.40 0.100 32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.77
 EFFECTIVE AREA(ACRES) = 0.54 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.60

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 8.24
 FLOW VELOCITY(FEET/SEC.) = 1.84 DEPTH*VELOCITY(FT*FT/SEC.) = 0.59
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 97.00 = 338.49 FEET.

 FLOW PROCESS FROM NODE 97.00 TO NODE 95.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 6.64 DOWNSTREAM ELEVATION(FEET) = 6.38
 STREET LENGTH(FEET) = 297.16 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
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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) = 3.73
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.54
HALFSTREET FLOOD WIDTH(FEET) = 18.97
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.98
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.53
STREET FLOW TRAVEL TIME(MIN.) = 5.04 Tc(MIN.) = 14.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.623

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.25 0.40 0.100 32
NATURAL GOOD COVER
"GRASS" A 0.66 0.40 1.000 38
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.411
SUBAREA AREA(ACRES) = 1.91 SUBAREA RUNOFF(CFS) = 4.23
EFFECTIVE AREA(ACRES) = 2.45 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 2.5 PEAK FLOW RATE(CFS) = 5.48

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 22.14
FLOW VELOCITY(FEET/SEC.) = 1.08 DEPTH*VELOCITY(FT*FT/SEC.) = 0.65
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 14.67
RAINFALL INTENSITY(INCH/HR) = 2.62
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.34
EFFECTIVE STREAM AREA(ACRES) = 2.45
TOTAL STREAM AREA(ACRES) = 2.45
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.48

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.06	10.59	3.154	0.40(0.05)	0.12	2.8	90.00
2	3.85	10.67	3.141	0.40(0.08)	0.21	1.4	92.00
3	5.48	14.67	2.623	0.40(0.14)	0.34	2.5	96.00

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	16.70	10.59	3.154	0.40(0.08)	0.21	6.0	90.00
2	16.69	10.67	3.141	0.40(0.08)	0.21	6.0	92.00
3	15.36	14.67	2.623	0.40(0.09)	0.22	6.7	96.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 16.70 Tc(MIN.) = 10.59
EFFECTIVE AREA(ACRES) = 6.00 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 6.7

LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 75.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 2.50 DOWNSTREAM(FEET) = 2.22
FLOW LENGTH(FEET) = 107.60 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.64
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.70
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 10.98
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 75.00 = 743.25 FEET.

FLOW PROCESS FROM NODE 72.00 TO NODE 75.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.98
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.090
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.23 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.23 SUBAREA RUNOFF(CFS) = 0.63
EFFECTIVE AREA(ACRES) = 6.23 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 16.87

FLOW PROCESS FROM NODE 75.00 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) = 2.22 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.33
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.87
PIPE TRAVEL TIME(MIN.) = 1.72 Tc(MIN.) = 12.70
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

Table with 9 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-3 and summary row.

** MEMORY BANK # 3 CONFLUENCE DATA **

Table with 9 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-5 and summary row.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	27.08	6.83	4.044	0.40(0.07)	0.18	7.1	64.00
2	30.57	9.65	3.324	0.40(0.07)	0.18	9.7	58.00
3	33.21	12.70	2.846	0.40(0.07)	0.19	12.4	90.00
4	33.23	12.77	2.837	0.40(0.07)	0.19	12.5	92.00
5	32.99	16.82	2.428	0.40(0.08)	0.19	14.7	96.00
6	32.98	16.86	2.424	0.40(0.08)	0.19	14.8	60.00
7	32.77	17.43	2.379	0.40(0.08)	0.19	15.0	50.00
8	32.68	17.54	2.371	0.40(0.08)	0.19	15.0	80.00
TOTAL AREA(ACRES) =			15.0				

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 33.23 Tc(MIN.) = 12.774
 EFFECTIVE AREA(ACRES) = 12.47 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
 TOTAL AREA(ACRES) = 15.0
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

 FLOW PROCESS FROM NODE 65.00 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) = 0.10 DOWNSTREAM(FEET) = 0.00
 FLOW LENGTH(FEET) = 23.51 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.45
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 33.23
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 12.83
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 68.00 = 1316.76 FEET.

 FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 12.83
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.829
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.62 0.40 0.100 32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.62 SUBAREA RUNOFF(CFS) = 1.56
 EFFECTIVE AREA(ACRES) = 13.09 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
 TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 33.23
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 12.83
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.829
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.17 0.40 0.100 32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.17 SUBAREA RUNOFF(CFS) = 0.43
 EFFECTIVE AREA(ACRES) = 13.26 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
 TOTAL AREA(ACRES) = 15.8 PEAK FLOW RATE(CFS) = 33.23
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

PREB25.RES

=====
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 15.8 TC(MIN.) = 12.83
 EFFECTIVE AREA(ACRES) = 13.26 AREA-AVERAGED Fm(INCH/HR)= 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.181
 PEAK FLOW RATE(CFS) = 33.23

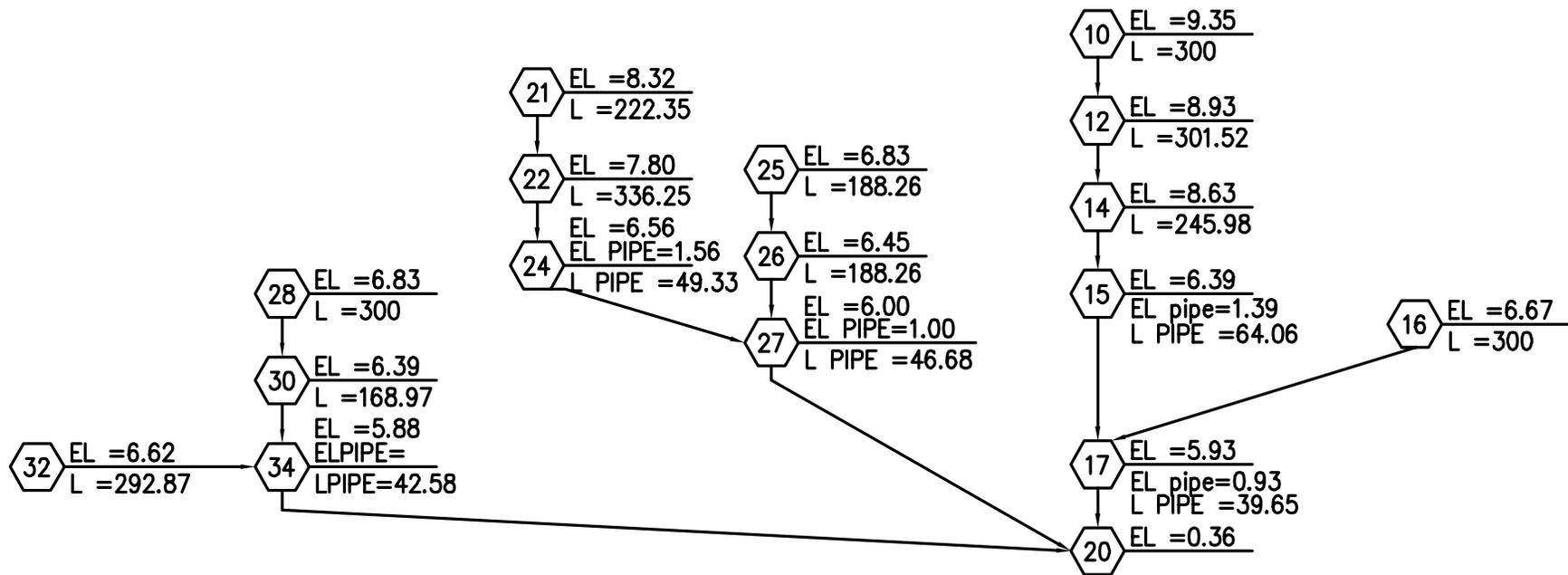
** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	28.02	6.89	4.024	0.40(0.07)	0.18	7.9	64.00
2	30.62	9.72	3.312	0.40(0.07)	0.18	10.5	58.00
3	33.21	12.76	2.839	0.40(0.07)	0.18	13.2	90.00
4	33.23	12.83	2.829	0.40(0.07)	0.18	13.3	92.00
5	32.99	16.88	2.423	0.40(0.08)	0.19	15.5	96.00
6	32.98	16.92	2.419	0.40(0.08)	0.19	15.6	60.00
7	32.77	17.49	2.375	0.40(0.08)	0.19	15.7	50.00
8	32.68	17.60	2.366	0.40(0.08)	0.19	15.8	80.00

=====
 END OF RATIONAL METHOD ANALYSIS

♀

POST-PROJECT CONDITION



AREA A

 RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 Ver. 20.0 Release Date: 06/01/2013 License ID 1271

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
 * POST-PROJECT CONDITION *
 * 25-YR STORM AREA A 10/23/13 SWL *

FILE NAME: POSTA25.DAT
 TIME/DATE OF STUDY: 13:40 10/25/2013

=====

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 = 0.95
 DATA BANK RAINFALL USED
 ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES: LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	35.0	30.0	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
3	15.0	10.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	10.0	5.0	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 = 0.67 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 10.0 (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 10.00 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) = 300.00
 ELEVATION DATA: UPSTREAM(FEET) = 9.35 DOWNSTREAM(FEET) = 8.93

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 11.079
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.075
 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.)
COMMERCIAL	A	0.65	0.40	0.100	32	11.08

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 1.78
 TOTAL AREA(ACRES) = 0.65 PEAK FLOW RATE(CFS) = 1.78

FLOW PROCESS FROM NODE 12.00 TO NODE 14.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.93 DOWNSTREAM ELEVATION(FEET) = 8.63
STREET LENGTH(FEET) = 301.52 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 2.38

STREET FLOW SPLITS OVER STREET-CROWN

FULL DEPTH(FEET) = 0.46 FLOOD WIDTH(FEET) = 15.00
FULL HALF-STREET VELOCITY(FEET/SEC.) = 0.91
SPLIT DEPTH(FEET) = 0.21 SPLIT FLOOD WIDTH(FEET) = 2.42
SPLIT FLOW(CFS) = 0.16 SPLIT VELOCITY(FEET/SEC.) = 0.64

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 15.00
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.91
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.42
STREET FLOW TRAVEL TIME(MIN.) = 5.52 Tc(MIN.) = 16.60
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.446

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.56	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.21

EFFECTIVE AREA(ACRES) = 1.21 AREA-AVERAGED Fm(INCH/HR) = 0.04

AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.62

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 15.00
FLOW VELOCITY(FEET/SEC.) = 0.91 DEPTH*VELOCITY(FT*FT/SEC.) = 0.42
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 14.00 = 601.52 FEET.

FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.63 DOWNSTREAM ELEVATION(FEET) = 6.39
STREET LENGTH(FEET) = 245.98 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 4.10

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.40
HALFSTREET FLOOD WIDTH(FEET) = 12.15
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.46
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.99
STREET FLOW TRAVEL TIME(MIN.) = 1.67 Tc(MIN.) = 18.26

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* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.317
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 1.44 0.40 0.100 32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.44 SUBAREA RUNOFF(CFS) = 2.95
 EFFECTIVE AREA(ACRES) = 2.65 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 5.43

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 13.71
 FLOW VELOCITY(FEET/SEC.) = 2.62 DEPTH*VELOCITY(FT*FT/SEC.) = 1.13
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.00 = 847.50 FEET.

 FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 18.26
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.317
 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 0.40 0.100 32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 0.84
 EFFECTIVE AREA(ACRES) = 3.06 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.1 PEAK FLOW RATE(CFS) = 6.27

 FLOW PROCESS FROM NODE 15.00 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) = 1.39 DOWNSTREAM(FEET) = 0.93
 FLOW LENGTH(FEET) = 62.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.42
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.27
 PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 18.45
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

 FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 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.) = 18.45
 RAINFALL INTENSITY(INCH/HR) = 2.30
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 3.06
 TOTAL STREAM AREA(ACRES) = 3.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.27

 FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00

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ELEVATION DATA: UPSTREAM(FEET) = 6.67 DOWNSTREAM(FEET) = 5.93

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.892
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.278
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 1.38 0.40 0.100 32 9.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.02
TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 4.02

FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.89
RAINFALL INTENSITY(INCH/HR) = 3.28
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.38
TOTAL STREAM AREA(ACRES) = 1.38
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.02

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.27	18.45	2.304	0.40(0.04)	0.10	3.1	10.00
2	4.02	9.89	3.278	0.40(0.04)	0.10	1.4	16.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.83	9.89	3.278	0.40(0.04)	0.10	3.0	16.00
2	9.08	18.45	2.304	0.40(0.04)	0.10	4.4	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 9.08 Tc(MIN.) = 18.45
EFFECTIVE AREA(ACRES) = 4.44 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 4.4
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

FLOW PROCESS FROM NODE 17.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 0.93 DOWNSTREAM(FEET) = 0.36
FLOW LENGTH(FEET) = 40.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.58
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.08
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 18.54
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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) = 222.35
 ELEVATION DATA: UPSTREAM(FEET) = 8.32 DOWNSTREAM(FEET) = 7.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.869
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.487
 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	0.72	0.40	0.100	32	8.87

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.23
 TOTAL AREA(ACRES) = 0.72 PEAK FLOW RATE(CFS) = 2.23

 FLOW PROCESS FROM NODE 22.00 TO NODE 24.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 7.80 DOWNSTREAM ELEVATION(FEET) = 6.56
 STREET LENGTH(FEET) = 336.25 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 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) = 3.96
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.45
 HALFSTREET FLOOD WIDTH(FEET) = 14.52
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.72
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.77
 STREET FLOW TRAVEL TIME(MIN.) = 3.25 Tc(MIN.) = 12.12
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.922

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	0.40	0.100	32
NATURAL GOOD COVER "GRASS"	A	0.01	0.40	1.000	38

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.107
 SUBAREA AREA(ACRES) = 1.33 SUBAREA RUNOFF(CFS) = 3.45
 EFFECTIVE AREA(ACRES) = 2.05 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.1 PEAK FLOW RATE(CFS) = 5.31

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 16.40
 FLOW VELOCITY(FEET/SEC.) = 1.85 DEPTH*VELOCITY(FT*FT/SEC.) = 0.90
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 24.00 = 558.60 FEET.

 FLOW PROCESS FROM NODE 24.00 TO NODE 27.00 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) = 1.56 DOWNSTREAM(FEET) = 1.00
 FLOW LENGTH(FEET) = 49.33 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.13
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.31
 PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 12.25
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

 FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 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.) = 12.25
 RAINFALL INTENSITY(INCH/HR) = 2.90
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 2.05
 TOTAL STREAM AREA(ACRES) = 2.05
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.31

 FLOW PROCESS FROM NODE 25.00 TO NODE 26.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 188.26
 ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.546
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.561
 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.)
COMMERCIAL	A	0.38	0.40	0.100	32	8.55

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.20
 TOTAL AREA(ACRES) = 0.38 PEAK FLOW RATE(CFS) = 1.20

 FLOW PROCESS FROM NODE 26.00 TO NODE 27.00 IS CODE = 62

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

=====

UPSTREAM ELEVATION(FEET) = 6.45 DOWNSTREAM ELEVATION(FEET) = 6.00
 STREET LENGTH(FEET) = 254.74 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 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) = 1.97
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.41
 HALFSTREET FLOOD WIDTH(FEET) = 12.65
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.10
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.45
 STREET FLOW TRAVEL TIME(MIN.) = 3.85 Tc(MIN.) = 12.39

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.886
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.59 0.40 0.100 32
 NATURAL GOOD COVER
 "GRASS" A 0.01 0.40 1.000 38
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.115
 SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 1.53
 EFFECTIVE AREA(ACRES) = 0.98 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.11
 TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 2.51

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 13.99
 FLOW VELOCITY(FEET/SEC.) = 1.17 DEPTH*VELOCITY(FT*FT/SEC.) = 0.51
 LONGEST FLOWPATH FROM NODE 25.00 TO NODE 27.00 = 443.00 FEET.

 FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 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.) = 12.39
 RAINFALL INTENSITY(INCH/HR) = 2.89
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.11
 EFFECTIVE STREAM AREA(ACRES) = 0.98
 TOTAL STREAM AREA(ACRES) = 0.98
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.51

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.31	12.25	2.904	0.40(0.04)	0.10	2.1	21.00
2	2.51	12.39	2.886	0.40(0.04)	0.11	1.0	25.00

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	7.81	12.25	2.904	0.40(0.04)	0.11	3.0	21.00
2	7.79	12.39	2.886	0.40(0.04)	0.11	3.0	25.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 7.81 Tc(MIN.) = 12.25
 EFFECTIVE AREA(ACRES) = 3.02 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.11
 TOTAL AREA(ACRES) = 3.0
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

 FLOW PROCESS FROM NODE 27.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1.00 DOWNSTREAM(FEET) = 0.36
 FLOW LENGTH(FEET) = 300.70 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.57
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.81
 PIPE TRAVEL TIME(MIN.) = 1.40 Tc(MIN.) = 13.66
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 FEET.

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 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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	7.81	13.66	2.731	0.40(0.04)	0.11	3.0	21.00
2	7.79	13.80	2.716	0.40(0.04)	0.11	3.0	25.00

LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 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	8.83	9.98	3.262	0.40(0.04)	0.10	3.0	16.00
2	9.08	18.54	2.297	0.40(0.04)	0.10	4.4	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	15.66	9.98	3.262	0.40(0.04)	0.10	5.2	16.00
2	16.75	13.66	2.731	0.40(0.04)	0.10	6.6	21.00
3	16.73	13.80	2.716	0.40(0.04)	0.10	6.7	25.00
4	15.65	18.54	2.297	0.40(0.04)	0.10	7.5	10.00

TOTAL AREA(ACRES) = 7.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 16.75 Tc(MIN.) = 13.658
 EFFECTIVE AREA(ACRES) = 6.65 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 7.5
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 28.00 TO NODE 30.00 IS CODE = 21

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 218.21
 ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.39

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.068
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.444
 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	0.31	0.40	0.100	32	9.07

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.95
 TOTAL AREA(ACRES) = 0.31 PEAK FLOW RATE(CFS) = 0.95

 FLOW PROCESS FROM NODE 30.00 TO NODE 34.00 IS CODE = 62

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

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

UPSTREAM ELEVATION(FEET) = 6.39 DOWNSTREAM ELEVATION(FEET) = 5.88
 STREET LENGTH(FEET) = 168.97 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

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DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
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) = 1.23
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.34
HALFSTREET FLOOD WIDTH(FEET) = 9.01
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.23
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.42
STREET FLOW TRAVEL TIME(MIN.) = 2.29 Tc(MIN.) = 11.36
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.031

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.20 0.40 0.100 32
NATURAL GOOD COVER
"GRASS" A 0.01 0.40 1.000 38
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.143
SUBAREA AREA(ACRES) = 0.21 SUBAREA RUNOFF(CFS) = 0.56
EFFECTIVE AREA(ACRES) = 0.52 AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.12
TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.40

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 9.60
FLOW VELOCITY(FEET/SEC.) = 1.26 DEPTH*VELOCITY(FT*FT/SEC.) = 0.44
LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 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.) = 11.36
RAINFALL INTENSITY(INCH/HR) = 3.03
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.12
EFFECTIVE STREAM AREA(ACRES) = 0.52
TOTAL STREAM AREA(ACRES) = 0.52
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.40

FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 21

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

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 292.87
ELEVATION DATA: UPSTREAM(FEET) = 6.62 DOWNSTREAM(FEET) = 5.88

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.751
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.305
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 0.87 0.40 0.100 32 9.75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.56
TOTAL AREA(ACRES) = 0.87 PEAK FLOW RATE(CFS) = 2.56

FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.75
 RAINFALL INTENSITY(INCH/HR) = 3.31
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.87
 TOTAL STREAM AREA(ACRES) = 0.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.56

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.40	11.36	3.031	0.40(0.05)	0.12	0.5	28.00
2	2.56	9.75	3.305	0.40(0.04)	0.10	0.9	32.00

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	3.87	9.75	3.305	0.40(0.04)	0.11	1.3	32.00
2	3.74	11.36	3.031	0.40(0.04)	0.11	1.4	28.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 3.87 Tc(MIN.) = 9.75
 EFFECTIVE AREA(ACRES) = 1.32 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.11
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

FLOW PROCESS FROM NODE 34.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 0.88 DOWNSTREAM(FEET) = 0.36
 FLOW LENGTH(FEET) = 42.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.83
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.87
 PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 9.87
 LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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	3.87	9.87	3.282	0.40(0.04)	0.11	1.3	32.00
2	3.74	11.48	3.013	0.40(0.04)	0.11	1.4	28.00

LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 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	15.66	9.98	3.262	0.40(0.04)	0.10	5.2	16.00
2	16.75	13.66	2.731	0.40(0.04)	0.10	6.6	21.00
3	16.73	13.80	2.716	0.40(0.04)	0.10	6.7	25.00

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4 15.65 18.54 2.297 0.40(0.04) 0.10 7.5 10.00
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	19.46	9.87	3.282	0.40(0.04)	0.10	6.5	32.00
2	19.52	9.98	3.262	0.40(0.04)	0.10	6.5	16.00
3	19.85	11.48	3.013	0.40(0.04)	0.10	7.2	28.00
4	20.13	13.66	2.731	0.40(0.04)	0.10	8.0	21.00
5	20.09	13.80	2.716	0.40(0.04)	0.10	8.1	25.00
6	18.49	18.54	2.297	0.40(0.04)	0.10	8.9	10.00
TOTAL AREA(ACRES) =			8.9				

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 20.13 Tc(MIN.) = 13.658
 EFFECTIVE AREA(ACRES) = 8.04 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 8.9
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

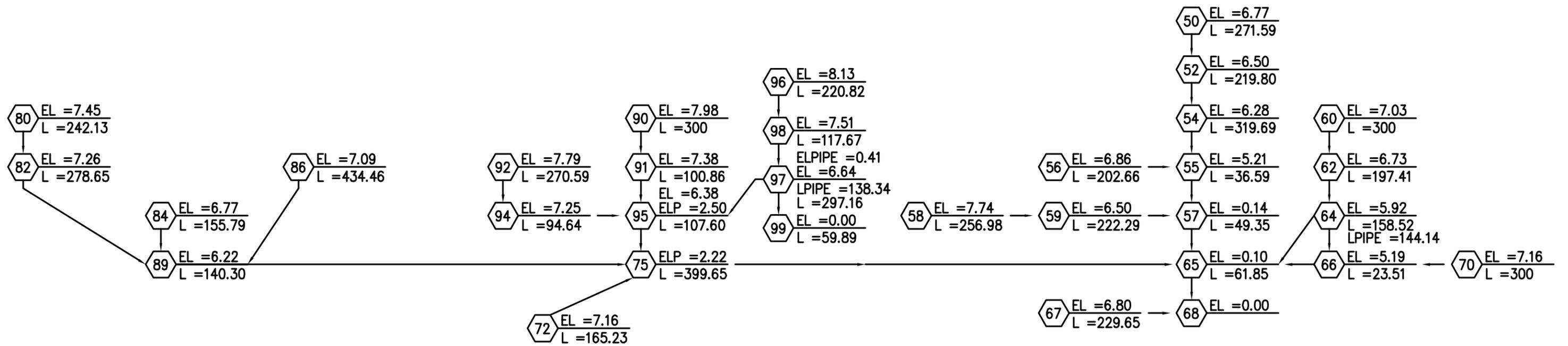
=====
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 8.9 TC(MIN.) = 13.66
 EFFECTIVE AREA(ACRES) = 8.04 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.103
 PEAK FLOW RATE(CFS) = 20.13

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	19.46	9.87	3.282	0.40(0.04)	0.10	6.5	32.00
2	19.52	9.98	3.262	0.40(0.04)	0.10	6.5	16.00
3	19.85	11.48	3.013	0.40(0.04)	0.10	7.2	28.00
4	20.13	13.66	2.731	0.40(0.04)	0.10	8.0	21.00
5	20.09	13.80	2.716	0.40(0.04)	0.10	8.1	25.00
6	18.49	18.54	2.297	0.40(0.04)	0.10	8.9	10.00

=====
 END OF RATIONAL METHOD ANALYSIS

♀



AREA B

 RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
 * POST-PROJECT CONDITION *
 * 25-YR STORM AREA B 10/23/13 SWL *

FILE NAME: POSTB25.DAT
 TIME/DATE OF STUDY: 17:00 10/25/2013

=====

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 = 0.95
 DATA BANK RAINFALL USED
 ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL:			CURB HEIGHT (FT)	GUTTER-GEOMETRIES:			MANNING FACTOR (n)
			IN-SIDE	/	OUT-/PARK-WAY		WIDTH (FT)	LIP (FT)	HIKE (FT)	
1	35.0	30.0	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
3	15.0	10.0	0.020	/	0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	10.0	5.0	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 = 0.67 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 10.0 (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 50.00 TO NODE 52.00 IS CODE = 21
 =====

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 217.59
 ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 9.981
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.262
 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.)
COMMERCIAL	A	0.56	0.40	0.100	32	9.98

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 1.62
 TOTAL AREA(ACRES) = 0.56 PEAK FLOW RATE(CFS) = 1.62

FLOW PROCESS FROM NODE 52.00 TO NODE 54.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.50 DOWNSTREAM ELEVATION(FEET) = 6.28
STREET LENGTH(FEET) = 219.80 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 = 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) = 2.88
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.49
HALFSTREET FLOOD WIDTH(FEET) = 16.68
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.48
STREET FLOW TRAVEL TIME(MIN.) = 3.78 Tc(MIN.) = 13.76
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.720

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.04	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.04 SUBAREA RUNOFF(CFS) = 2.51
EFFECTIVE AREA(ACRES) = 1.60 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 3.86

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 18.74
FLOW VELOCITY(FEET/SEC.) = 1.04 DEPTH*VELOCITY(FT*FT/SEC.) = 0.56
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 437.39 FEET.

FLOW PROCESS FROM NODE 54.00 TO NODE 55.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.28 DOWNSTREAM ELEVATION(FEET) = 5.21
STREET LENGTH(FEET) = 319.69 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 = 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) = 5.63
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 17.10
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.81
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.90
STREET FLOW TRAVEL TIME(MIN.) = 2.95 Tc(MIN.) = 16.71
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.64	0.40	0.100	32

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.64 SUBAREA RUNOFF(CFS) = 3.54
EFFECTIVE AREA(ACRES) = 3.24 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 6.99

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 18.68
FLOW VELOCITY(FEET/SEC.) = 1.90 DEPTH*VELOCITY(FT*FT/SEC.) = 1.01
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 757.08 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 55.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.71
* 25 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
COMMERCIAL A 0.18 0.40 0.100 32
NATURAL GOOD COVER
"GRASS" A 0.01 0.40 1.000 38
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.147
SUBAREA AREA(ACRES) = 0.19 SUBAREA RUNOFF(CFS) = 0.41
EFFECTIVE AREA(ACRES) = 3.43 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.4 PEAK FLOW RATE(CFS) = 7.40

FLOW PROCESS FROM NODE 55.00 TO NODE 57.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 0.21 DOWNSTREAM(FEET) = 0.14
FLOW LENGTH(FEET) = 49.35 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.99
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.40
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 16.98
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 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.) = 16.98
RAINFALL INTENSITY(INCH/HR) = 2.41
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 3.43
TOTAL STREAM AREA(ACRES) = 3.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.40

FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 256.98
ELEVATION DATA: UPSTREAM(FEET) = 7.74 DOWNSTREAM(FEET) = 6.50

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

POSTB25.RES

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.131
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.663
 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 0.47 0.40 0.100 32 8.13
 NATURAL GOOD COVER
 "GRASS" A 0.01 0.40 1.000 38 25.01
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.119
 SUBAREA RUNOFF(CFS) = 1.56
 TOTAL AREA(ACRES) = 0.48 PEAK FLOW RATE(CFS) = 1.56

 FLOW PROCESS FROM NODE 59.00 TO NODE 57.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 1.50 DOWNSTREAM(FEET) = 0.14
 FLOW LENGTH(FEET) = 222.29 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.51
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.56
 PIPE TRAVEL TIME(MIN.) = 1.06 Tc(MIN.) = 9.19
 LONGEST FLOWPATH FROM NODE 58.00 TO NODE 57.00 = 479.27 FEET.

 FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 =====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.19
 RAINFALL INTENSITY(INCH/HR) = 3.42
 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.12
 EFFECTIVE STREAM AREA(ACRES) = 0.48
 TOTAL STREAM AREA(ACRES) = 0.48
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.56

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.40	16.98	2.414	0.40(0.04)	0.10	3.4	50.00
2	1.56	9.19	3.419	0.40(0.05)	0.12	0.5	58.00

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	7.26	9.19	3.419	0.40(0.04)	0.11	2.3	58.00
2	8.49	16.98	2.414	0.40(0.04)	0.10	3.9	50.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 8.49 Tc(MIN.) = 16.98
 EFFECTIVE AREA(ACRES) = 3.91 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.9
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

 FLOW PROCESS FROM NODE 57.00 TO NODE 65.00 IS CODE = 31

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

POSTB25.RES

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=====
ELEVATION DATA: UPSTREAM( FEET ) = 0.14 DOWNSTREAM( FEET ) = 0.10
FLOW LENGTH( FEET ) = 61.85 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.0 INCHES
PIPE-FLOW VELOCITY( FEET/SEC. ) = 2.32
ESTIMATED PIPE DIAMETER( INCH ) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS ) = 8.49
PIPE TRAVEL TIME( MIN. ) = 0.44 Tc( MIN. ) = 17.43
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

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*****
FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10
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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

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*****
FLOW PROCESS FROM NODE 60.00 TO NODE 62.00 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 ) = 300.00
ELEVATION DATA: UPSTREAM( FEET ) = 7.03 DOWNSTREAM( FEET ) = 6.73

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```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc( MIN. ) = 14.033
* 25 YEAR RAINFALL INTENSITY( INCH/HR ) = 2.690
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.)
CONDOMINIUMS      A       0.61    0.40    0.350   32   14.03
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR ) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF( CFS ) = 1.40
TOTAL AREA( ACRES ) = 0.61 PEAK FLOW RATE( CFS ) = 1.40

```

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*****
FLOW PROCESS FROM NODE 62.00 TO NODE 64.00 IS CODE = 62
-----

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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

```

=====
UPSTREAM ELEVATION( FEET ) = 6.73 DOWNSTREAM ELEVATION( FEET ) = 5.92
STREET LENGTH( FEET ) = 197.41 CURB HEIGHT( INCHES ) = 8.0
STREET HALFWIDTH( FEET ) = 32.00

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.82

```

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH( FEET ) = 0.36
HALFSTREET FLOOD WIDTH( FEET ) = 10.09
AVERAGE FLOW VELOCITY( FEET/SEC. ) = 1.51
PRODUCT OF DEPTH&VELOCITY( FT*FT/SEC. ) = 0.54
STREET FLOW TRAVEL TIME( MIN. ) = 2.18 Tc( MIN. ) = 16.21
* 25 YEAR RAINFALL INTENSITY( INCH/HR ) = 2.479
SUBAREA LOSS RATE DATA( AMC II ):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS      A       0.40    0.40    0.350   32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR ) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA( ACRES ) = 0.40 SUBAREA RUNOFF( CFS ) = 0.84
EFFECTIVE AREA( ACRES ) = 1.01 AREA-AVERAGED Fm( INCH/HR ) = 0.14
AREA-AVERAGED Fp( INCH/HR ) = 0.40 AREA-AVERAGED Ap = 0.35

```

TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 2.13

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 10.83
 FLOW VELOCITY(FEET/SEC.) = 1.56 DEPTH*VELOCITY(FT*FT/SEC.) = 0.59
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 64.00 = 497.41 FEET.

 FLOW PROCESS FROM NODE 64.00 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) = 0.92 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 144.14 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.73
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.13
 PIPE TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 16.86
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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.) = 16.86
 RAINFALL INTENSITY(INCH/HR) = 2.42
 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.35
 EFFECTIVE STREAM AREA(ACRES) = 1.01
 TOTAL STREAM AREA(ACRES) = 1.01
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.13

 FLOW PROCESS FROM NODE 64.00 TO NODE 66.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 158.52
 ELEVATION DATA: UPSTREAM(FEET) = 5.92 DOWNSTREAM(FEET) = 5.19

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.765
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.065
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.24	0.40	0.100	32	6.76
NATURAL GOOD COVER "GRASS"	A	0.09	0.40	1.000	38	20.81

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.345
 SUBAREA RUNOFF(CFS) = 1.17
 TOTAL AREA(ACRES) = 0.33 PEAK FLOW RATE(CFS) = 1.17

 FLOW PROCESS FROM NODE 70.00 TO NODE 66.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 6.76
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.065
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.41	0.40	0.100	32

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NATURAL GOOD COVER
 "GRASS" A 0.01 0.40 1.000 38
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.121
 SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 1.52
 EFFECTIVE AREA(ACRES) = 0.75 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.22
 TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 2.68

 FLOW PROCESS FROM NODE 66.00 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) = 0.19 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 15.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.06
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.68
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 6.83
 LONGEST FLOWPATH FROM NODE 64.00 TO NODE 65.00 = 173.52 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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.) = 6.83
 RAINFALL INTENSITY(INCH/HR) = 4.04
 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.22
 EFFECTIVE STREAM AREA(ACRES) = 0.75
 TOTAL STREAM AREA(ACRES) = 0.75
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.68

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.13	16.86	2.424	0.40(0.14)	0.35	1.0	60.00
2	2.68	6.83	4.044	0.40(0.09)	0.22	0.8	64.00

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	4.16	6.83	4.044	0.40(0.11)	0.27	1.2	64.00
2	3.71	16.86	2.424	0.40(0.12)	0.29	1.8	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 4.16 Tc(MIN.) = 6.83
 EFFECTIVE AREA(ACRES) = 1.16 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.27
 TOTAL AREA(ACRES) = 1.8
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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
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POSTB25.RES

1	4.16	6.83	4.044	0.40(0.11)	0.27	1.2	64.00
2	3.71	16.86	2.424	0.40(0.12)	0.29	1.8	60.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 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	7.26	9.66	3.323	0.40(0.04)	0.11	2.3	58.00
2	8.49	17.43	2.379	0.40(0.04)	0.10	3.9	50.00

LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.41	6.83	4.044	0.40(0.07)	0.17	2.8	64.00
2	11.29	9.66	3.323	0.40(0.07)	0.17	3.7	58.00
3	12.11	16.86	2.424	0.40(0.07)	0.16	5.6	60.00
4	12.13	17.43	2.379	0.40(0.07)	0.16	5.7	50.00

TOTAL AREA(ACRES) = 5.7

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 12.13 Tc(MIN.) = 17.427
 EFFECTIVE AREA(ACRES) = 5.67 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.16
 TOTAL AREA(ACRES) = 5.7
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

=====

FLOW PROCESS FROM NODE 80.00 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) = 242.13
 ELEVATION DATA: UPSTREAM(FEET) = 7.45 DOWNSTREAM(FEET) = 7.26

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.417
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.023
 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	0.38	0.40	0.100	32	11.42
NATURAL GOOD COVER "GRASS"	A	0.06	0.40	1.000	38	35.11

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.223
 SUBAREA RUNOFF(CFS) = 1.16
 TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 1.16

FLOW PROCESS FROM NODE 82.00 TO NODE 89.00 IS CODE = 62

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

>>>>(STREET TABLE SECTION # 2 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 7.26 DOWNSTREAM ELEVATION(FEET) = 6.22
 STREET LENGTH(FEET) = 278.65 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 = 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) = 1.44
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.34
 HALFSTREET FLOOD WIDTH(FEET) = 9.25
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.38
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.47
 STREET FLOW TRAVEL TIME(MIN.) = 3.37 Tc(MIN.) = 14.79
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.611

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.24	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.24 SUBAREA RUNOFF(CFS) = 0.56
 EFFECTIVE AREA(ACRES) = 0.68 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
 TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 1.55

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 9.61
 FLOW VELOCITY(FEET/SEC.) = 1.40 DEPTH*VELOCITY(FT*FT/SEC.) = 0.49
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 520.78 FEET.

 FLOW PROCESS FROM NODE 84.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
 >>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 155.79
 ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.085
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.960
 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	0.25	0.40	0.100	32	7.08
CONDOMINIUMS	A	0.25	0.40	0.350	32	8.39

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
 SUBAREA AREA(ACRES) = 0.50 INITIAL SUBAREA RUNOFF(CFS) = 1.74

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
 MAINLINE Tc(MIN.) = 14.79
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.611
 SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.13
 EFFECTIVE AREA(ACRES) = 1.18 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.69

 FLOW PROCESS FROM NODE 86.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
 >>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 434.46
 ELEVATION DATA: UPSTREAM(FEET) = 7.09 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.960
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.944
 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	0.62	0.40	0.100	32	11.96
CONDOMINIUMS	A	0.44	0.40	0.350	32	14.16

NATURAL GOOD COVER

"GRASS" A 0.14 0.40 1.000 38 36.79
 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.297
 SUBAREA AREA(ACRES) = 1.20 INITIAL SUBAREA RUNOFF(CFS) = 3.05

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE T_c :
 MAINLINE T_c (MIN.) = 14.79
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.611
 SUBAREA AREA(ACRES) = 1.20 SUBAREA RUNOFF(CFS) = 2.69
 EFFECTIVE AREA(ACRES) = 2.38 AREA-AVERAGED F_m (INCH/HR) = 0.10
 AREA-AVERAGED F_p (INCH/HR) = 0.40 AREA-AVERAGED A_p = 0.25
 TOTAL AREA(ACRES) = 2.4 PEAK FLOW RATE(CFS) = 5.38

 FLOW PROCESS FROM NODE 89.00 TO NODE 75.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	3.00	DOWNSTREAM(FEET) =	2.22
FLOW LENGTH(FEET) =	140.30	MANNING'S N =	0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS	11.2 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	4.68		
ESTIMATED PIPE DIAMETER(INCH) =	18.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	5.38		
PIPE TRAVEL TIME(MIN.) =	0.50	T_c (MIN.) =	15.28
LONGEST FLOWPATH FROM NODE	80.00 TO NODE	75.00 =	661.08 FEET.

 FLOW PROCESS FROM NODE 75.00 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) =	2.22	DOWNSTREAM(FEET) =	0.10
FLOW LENGTH(FEET) =	550.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS	12.7 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	4.04		
ESTIMATED PIPE DIAMETER(INCH) =	18.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	5.38		
PIPE TRAVEL TIME(MIN.) =	2.27	T_c (MIN.) =	17.56
LONGEST FLOWPATH FROM NODE	80.00 TO NODE	65.00 =	1211.08 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 11

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

** MAIN STREAM 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	5.38	17.56	2.370	0.40(0.10)	0.25	2.4	80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.							

** MEMORY BANK # 2 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	10.41	6.83	4.044	0.40(0.07)	0.17	2.8	64.00
2	11.29	9.66	3.323	0.40(0.07)	0.17	3.7	58.00
3	12.11	16.86	2.424	0.40(0.07)	0.16	5.6	60.00
4	12.13	17.43	2.379	0.40(0.07)	0.16	5.7	50.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.							

** 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	14.05	6.83	4.044	0.40(0.08)	0.19	3.7	64.00
2	15.49	9.66	3.323	0.40(0.08)	0.19	5.0	58.00
3	17.41	16.86	2.424	0.40(0.08)	0.19	7.8	60.00
4	17.50	17.43	2.379	0.40(0.08)	0.19	8.0	50.00
5	17.46	17.56	2.370	0.40(0.08)	0.19	8.1	80.00
TOTAL AREA(ACRES) = 8.1							

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COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 17.50 Tc(MIN.) = 17.427
 EFFECTIVE AREA(ACRES) = 8.03 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.19
 TOTAL AREA(ACRES) = 8.1
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 90.00 TO NODE 91.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
 ELEVATION DATA: UPSTREAM(FEET) = 7.98 DOWNSTREAM(FEET) = 7.38

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.316
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.201
 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	2.73	0.40	0.100	32	10.32
NATURAL GOOD COVER "GRASS"	A	0.11	0.40	1.000	38	31.73

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.135
 SUBAREA RUNOFF(CFS) = 8.05
 TOTAL AREA(ACRES) = 2.84 PEAK FLOW RATE(CFS) = 8.05

 FLOW PROCESS FROM NODE 91.00 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) = 3.38 DOWNSTREAM(FEET) = 2.50
 FLOW LENGTH(FEET) = 100.86 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.06
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 8.05
 PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 10.59
 LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 400.86 FEET.

 FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 10.59
 RAINFALL INTENSITY(INCH/HR) = 3.15
 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.13
 EFFECTIVE STREAM AREA(ACRES) = 2.84
 TOTAL STREAM AREA(ACRES) = 2.84
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.05

 FLOW PROCESS FROM NODE 92.00 TO NODE 94.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 270.59

ELEVATION DATA: UPSTREAM(FEET) = 7.79 DOWNSTREAM(FEET) = 7.25

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

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.903

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.276

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 1.02 0.40 0.100 32 9.90

NATURAL GOOD COVER

"GRASS" A 0.12 0.40 1.000 38 30.46

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.195

SUBAREA RUNOFF(CFS) = 3.28

TOTAL AREA(ACRES) = 1.14 PEAK FLOW RATE(CFS) = 3.28

FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 62

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

>>>>(STREET TABLE SECTION # 4 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 7.25 DOWNSTREAM ELEVATION(FEET) = 6.38

STREET LENGTH(FEET) = 94.64 CURB HEIGHT(INCHES) = 8.0

STREET HALFWIDTH(FEET) = 10.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 5.00

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) = 3.63

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.32

HALFSTREET FLOOD WIDTH(FEET) = 8.32

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.06

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.67

STREET FLOW TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 10.67

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.141

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL A 0.20 0.40 0.100 32

NATURAL GOOD COVER

"GRASS" A 0.06 0.40 1.000 38

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.308

SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.71

EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.22

TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 3.85

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 8.55

FLOW VELOCITY(FEET/SEC.) = 2.09 DEPTH*VELOCITY(FT*FT/SEC.) = 0.69

LONGEST FLOWPATH FROM NODE 92.00 TO NODE 95.00 = 365.23 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 10.67

RAINFALL INTENSITY(INCH/HR) = 3.14

AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.22
 EFFECTIVE STREAM AREA(ACRES) = 1.40
 TOTAL STREAM AREA(ACRES) = 1.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.85

 FLOW PROCESS FROM NODE 96.00 TO NODE 98.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 220.82
 ELEVATION DATA: UPSTREAM(FEET) = 8.13 DOWNSTREAM(FEET) = 7.51

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.527
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.566
 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	0.28	0.40	0.100	32	8.53

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.89
 TOTAL AREA(ACRES) = 0.28 PEAK FLOW RATE(CFS) = 0.89

 FLOW PROCESS FROM NODE 98.00 TO NODE 97.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 2 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 7.51 DOWNSTREAM ELEVATION(FEET) = 6.64
 STREET LENGTH(FEET) = 117.67 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 = 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) = 1.27
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.30
 HALFSTREET FLOOD WIDTH(FEET) = 7.29
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.76
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.54
 STREET FLOW TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 9.64
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.327

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.26	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.77
 EFFECTIVE AREA(ACRES) = 0.54 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.60

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 8.24
 FLOW VELOCITY(FEET/SEC.) = 1.84 DEPTH*VELOCITY(FT*FT/SEC.) = 0.59
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 97.00 = 338.49 FEET.

 FLOW PROCESS FROM NODE 97.00 TO NODE 95.00 IS CODE = 62

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

=====

UPSTREAM ELEVATION(FEET) = 6.64 DOWNSTREAM ELEVATION(FEET) = 6.38
STREET LENGTH(FEET) = 297.16 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
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) = 3.72
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.54
HALFSTREET FLOOD WIDTH(FEET) = 18.97
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.98
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.53
STREET FLOW TRAVEL TIME(MIN.) = 5.04 Tc(MIN.) = 14.68
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.622

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.23	0.40	0.100	32
NATURAL GOOD COVER "GRASS"	A	0.68	0.40	1.000	38

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.420
SUBAREA AREA(ACRES) = 1.91 SUBAREA RUNOFF(CFS) = 4.22
EFFECTIVE AREA(ACRES) = 2.45 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 2.5 PEAK FLOW RATE(CFS) = 5.47

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 22.08
FLOW VELOCITY(FEET/SEC.) = 1.08 DEPTH*VELOCITY(FT*FT/SEC.) = 0.65
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 14.68
RAINFALL INTENSITY(INCH/HR) = 2.62
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.35
EFFECTIVE STREAM AREA(ACRES) = 2.45
TOTAL STREAM AREA(ACRES) = 2.45
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.47

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.05	10.59	3.154	0.40(0.05)	0.13	2.8	90.00
2	3.85	10.67	3.141	0.40(0.09)	0.22	1.4	92.00
3	5.47	14.68	2.622	0.40(0.14)	0.35	2.5	96.00

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	16.68	10.59	3.154	0.40(0.09)	0.22	6.0	90.00

2	16.67	10.67	3.141	0.40(0.09)	0.22	6.0	92.00
3	15.33	14.68	2.622	0.40(0.09)	0.23	6.7	96.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 16.68 Tc(MIN.) = 10.59
 EFFECTIVE AREA(ACRES) = 6.00 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.22
 TOTAL AREA(ACRES) = 6.7
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

 FLOW PROCESS FROM NODE 95.00 TO NODE 75.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 2.50 DOWNSTREAM(FEET) = 2.22
 FLOW LENGTH(FEET) = 107.60 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.63
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 16.68
 PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 10.98
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 75.00 = 743.25 FEET.

 FLOW PROCESS FROM NODE 72.00 TO NODE 75.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 10.98
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.090
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.22	0.40	0.100	32
NATURAL GOOD COVER "GRASS"	A	0.01	0.40	1.000	38

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.139
 SUBAREA AREA(ACRES) = 0.23 SUBAREA RUNOFF(CFS) = 0.63
 EFFECTIVE AREA(ACRES) = 6.23 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
 TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 16.84

 FLOW PROCESS FROM NODE 75.00 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) = 2.22 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.33
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 16.84
 PIPE TRAVEL TIME(MIN.) = 1.72 Tc(MIN.) = 12.70
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 3 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	16.84	12.70	2.846	0.40(0.09)	0.21	6.2	90.00
2	16.84	12.78	2.837	0.40(0.09)	0.21	6.3	92.00
3	15.51	16.82	2.427	0.40(0.09)	0.23	6.9	96.00

LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	14.05	6.83	4.044	0.40(0.08)	0.19	3.7	64.00
2	15.49	9.66	3.323	0.40(0.08)	0.19	5.0	58.00
3	17.41	16.86	2.424	0.40(0.08)	0.19	7.8	60.00
4	17.50	17.43	2.379	0.40(0.08)	0.19	8.0	50.00
5	17.46	17.56	2.370	0.40(0.08)	0.19	8.1	80.00

LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	27.03	6.83	4.044	0.40(0.08)	0.20	7.1	64.00
2	30.51	9.66	3.323	0.40(0.08)	0.20	9.7	58.00
3	33.14	12.70	2.846	0.40(0.08)	0.20	12.4	90.00
4	33.16	12.78	2.837	0.40(0.08)	0.20	12.5	92.00
5	32.91	16.82	2.427	0.40(0.08)	0.21	14.7	96.00
6	32.90	16.86	2.424	0.40(0.08)	0.21	14.8	60.00
7	32.69	17.43	2.379	0.40(0.08)	0.21	15.0	50.00
8	32.59	17.56	2.370	0.40(0.08)	0.21	15.0	80.00

TOTAL AREA(ACRES) = 15.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 33.16 Tc(MIN.) = 12.775
 EFFECTIVE AREA(ACRES) = 12.47 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 15.0
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

FLOW PROCESS FROM NODE 65.00 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) = 0.10 DOWNSTREAM(FEET) = 0.00
 FLOW LENGTH(FEET) = 23.51 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.45
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 33.16
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 12.84
 LONGEST FLOWPATH FROM NODE 96.00 TO NODE 68.00 = 1316.76 FEET.

FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 12.84
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.829
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.58	0.40	0.100	32
NATURAL GOOD COVER "GRASS"	A	0.04	0.40	1.000	38

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.158
 SUBAREA AREA(ACRES) = 0.62 SUBAREA RUNOFF(CFS) = 1.54
 EFFECTIVE AREA(ACRES) = 13.09 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 33.16
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 12.84

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* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.829
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.15 0.40 0.100 32
 NATURAL GOOD COVER
 "GRASS" A 0.02 0.40 1.000 38
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.206
 SUBAREA AREA(ACRES) = 0.17 SUBAREA RUNOFF(CFS) = 0.42
 EFFECTIVE AREA(ACRES) = 13.26 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 15.8 PEAK FLOW RATE(CFS) = 33.16
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 15.8 TC(MIN.) = 12.84
 EFFECTIVE AREA(ACRES) = 13.26 AREA-AVERAGED Fm(INCH/HR)= 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
 PEAK FLOW RATE(CFS) = 33.16

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	27.95	6.89	4.024	0.40(0.08)	0.20	7.9	64.00
2	30.54	9.72	3.312	0.40(0.08)	0.20	10.5	58.00
3	33.14	12.76	2.839	0.40(0.08)	0.20	13.2	90.00
4	33.16	12.84	2.829	0.40(0.08)	0.20	13.3	92.00
5	32.91	16.89	2.422	0.40(0.08)	0.21	15.5	96.00
6	32.90	16.92	2.419	0.40(0.08)	0.21	15.6	60.00
7	32.69	17.49	2.375	0.40(0.08)	0.20	15.7	50.00
8	32.59	17.62	2.365	0.40(0.08)	0.20	15.8	80.00

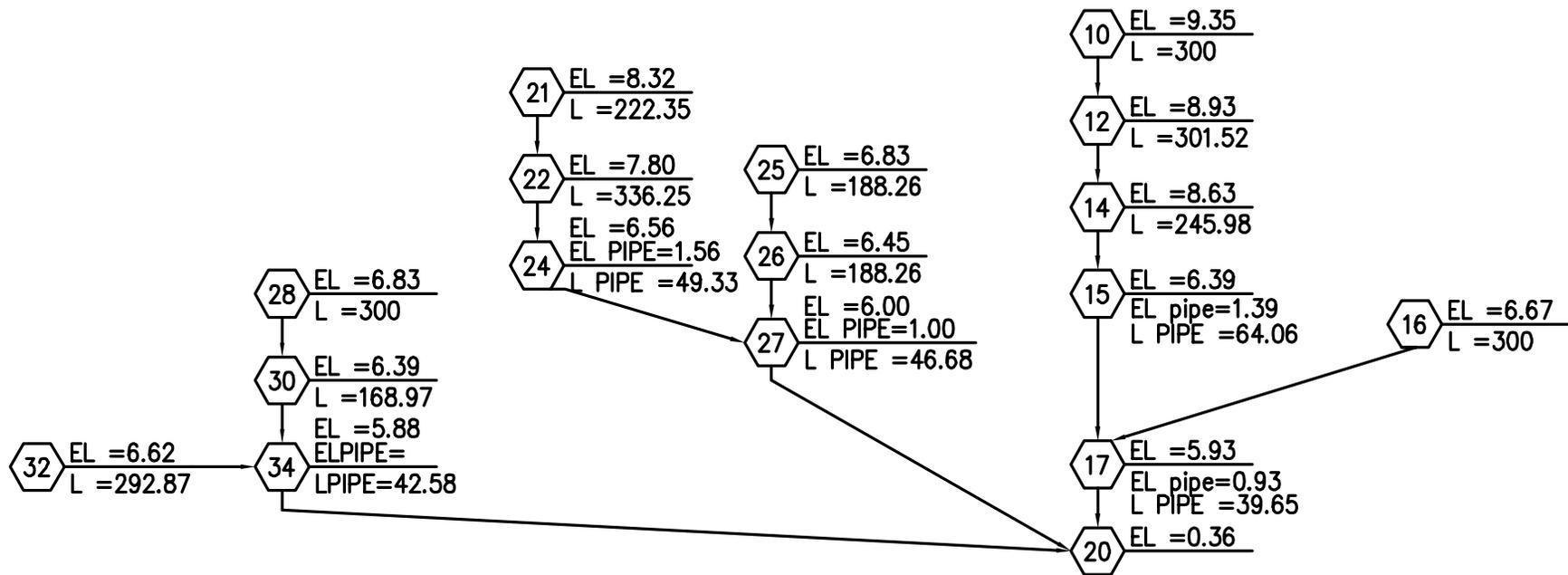
=====
 END OF RATIONAL METHOD ANALYSIS

♀

APPENDIX D

Rational Method Hydrology Analysis 10-Year Storm Event

PRE-PROJECT CONDITION



AREA A

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2013 Advanced Engineering Software (aes)
Ver. 20.0 Release Date: 06/01/2013 License ID 1271

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
* PRE-PROJECT CONDITION *
* 10-YR STORM AREA A 10/23/13 SWL *

FILE NAME: PREA10.DAT
TIME/DATE OF STUDY: 11:19 10/25/2013

=====

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 = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

Table with 9 columns: 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). Rows 1-4.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.67 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 10.0 (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 10.00 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) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 9.35 DOWNSTREAM(FEET) = 8.93

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.079
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.573
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ LAND USE SCS SOIL GROUP (ACRES) AREA Fp (INCH/HR) Ap (DECIMAL) SCS CN Tc (MIN.)
COMMERCIAL A 0.65 0.40 0.100 32 11.08
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.48
TOTAL AREA(ACRES) = 0.65 PEAK FLOW RATE(CFS) = 1.48

FLOW PROCESS FROM NODE 12.00 TO NODE 14.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.93 DOWNSTREAM ELEVATION(FEET) = 8.63
STREET LENGTH(FEET) = 301.52 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 1.99
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 14.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.88
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.39
STREET FLOW TRAVEL TIME(MIN.) = 5.68 Tc(MIN.) = 16.76
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.030

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.56 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.00
EFFECTIVE AREA(ACRES) = 1.21 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.17

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 14.88
FLOW VELOCITY(FEET/SEC.) = 0.90 DEPTH*VELOCITY(FT*FT/SEC.) = 0.41
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 14.00 = 601.52 FEET.

FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.63 DOWNSTREAM ELEVATION(FEET) = 6.39
STREET LENGTH(FEET) = 245.98 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 3.38
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.38
HALFSTREET FLOOD WIDTH(FEET) = 11.21
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.34
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.89
STREET FLOW TRAVEL TIME(MIN.) = 1.75 Tc(MIN.) = 18.51
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.917

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.44 0.40 0.100 32

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.44 SUBAREA RUNOFF(CFS) = 2.43
EFFECTIVE AREA(ACRES) = 2.65 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 4.48

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 12.62
FLOW VELOCITY(FEET/SEC.) = 2.51 DEPTH*VELOCITY(FT*FT/SEC.) = 1.03
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.00 = 847.50 FEET.

FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.51
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.917
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.41 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 0.69
EFFECTIVE AREA(ACRES) = 3.06 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.1 PEAK FLOW RATE(CFS) = 5.17

FLOW PROCESS FROM NODE 15.00 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) = 1.39 DOWNSTREAM(FEET) = 0.93
FLOW LENGTH(FEET) = 62.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.19
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.17
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 18.71
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 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.) = 18.71
RAINFALL INTENSITY(INCH/HR) = 1.91
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 3.06
TOTAL STREAM AREA(ACRES) = 3.06
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.17

FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 6.67 DOWNSTREAM(FEET) = 5.93

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.892

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.746
 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 1.38 0.40 0.100 32 9.89
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 3.36
 TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 3.36

 FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.89
 RAINFALL INTENSITY(INCH/HR) = 2.75
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.38
 TOTAL STREAM AREA(ACRES) = 1.38
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.36

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.17	18.71	1.906	0.40(0.04)	0.10	3.1	10.00
2	3.36	9.89	2.746	0.40(0.04)	0.10	1.4	16.00

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	7.32	9.89	2.746	0.40(0.04)	0.10	3.0	16.00
2	7.49	18.71	1.906	0.40(0.04)	0.10	4.4	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 7.49 Tc(MIN.) = 18.71
 EFFECTIVE AREA(ACRES) = 4.44 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 4.4
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

 FLOW PROCESS FROM NODE 17.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 0.93 DOWNSTREAM(FEET) = 0.36
 FLOW LENGTH(FEET) = 40.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.26
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.49
 PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 18.80
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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) = 222.35
ELEVATION DATA: UPSTREAM(FEET) = 8.32 DOWNSTREAM(FEET) = 7.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.869
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.923
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 0.72 0.40 0.100 32 8.87
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.87
TOTAL AREA(ACRES) = 0.72 PEAK FLOW RATE(CFS) = 1.87

FLOW PROCESS FROM NODE 22.00 TO NODE 24.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 7.80 DOWNSTREAM ELEVATION(FEET) = 6.56
STREET LENGTH(FEET) = 336.25 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
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) = 3.30
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 13.47
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.65
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.70
STREET FLOW TRAVEL TIME(MIN.) = 3.40 Tc(MIN.) = 12.27
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.427
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.33 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.33 SUBAREA RUNOFF(CFS) = 2.86
EFFECTIVE AREA(ACRES) = 2.05 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.1 PEAK FLOW RATE(CFS) = 4.40

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 15.17
FLOW VELOCITY(FEET/SEC.) = 1.77 DEPTH*VELOCITY(FT*FT/SEC.) = 0.82
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 24.00 = 558.60 FEET.

FLOW PROCESS FROM NODE 24.00 TO NODE 27.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 1.56 DOWNSTREAM(FEET) = 1.00
FLOW LENGTH(FEET) = 49.33 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.) = 5.84

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.40
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 12.41
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 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.) = 12.41
RAINFALL INTENSITY(INCH/HR) = 2.41
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.05
TOTAL STREAM AREA(ACRES) = 2.05
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.40

FLOW PROCESS FROM NODE 25.00 TO NODE 26.00 IS CODE = 21

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

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 188.26
ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.546
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.986
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 0.38 0.40 0.100 32 8.55
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.01
TOTAL AREA(ACRES) = 0.38 PEAK FLOW RATE(CFS) = 1.01

FLOW PROCESS FROM NODE 26.00 TO NODE 27.00 IS CODE = 62

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

=====
UPSTREAM ELEVATION(FEET) = 6.45 DOWNSTREAM ELEVATION(FEET) = 6.00
STREET LENGTH(FEET) = 254.74 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
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) = 1.65
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 11.71
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.05
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.41
STREET FLOW TRAVEL TIME(MIN.) = 4.03 Tc(MIN.) = 12.57
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.393

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.60 0.40 0.100 32

PreA10.RES

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 1.27
EFFECTIVE AREA(ACRES) = 0.98 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 2.08

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 12.94
FLOW VELOCITY(FEET/SEC.) = 1.11 DEPTH*VELOCITY(FT*FT/SEC.) = 0.46
LONGEST FLOWPATH FROM NODE 25.00 TO NODE 27.00 = 443.00 FEET.

FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 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.) = 12.57
RAINFALL INTENSITY(INCH/HR) = 2.39
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.98
TOTAL STREAM AREA(ACRES) = 0.98
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.08

** CONFLUENCE DATA **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1 and 2.

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

** PEAK FLOW RATE TABLE **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1 and 2.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 6.47 Tc(MIN.) = 12.41
EFFECTIVE AREA(ACRES) = 3.02 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.0
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

FLOW PROCESS FROM NODE 27.00 TO NODE 20.00 IS CODE = 31

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

=====
ELEVATION DATA: UPSTREAM(FEET) = 1.00 DOWNSTREAM(FEET) = 0.36
FLOW LENGTH(FEET) = 300.70 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.36
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.47
PIPE TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 13.90
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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	6.47	13.90	2.259	0.40(0.04)	0.10	3.0	21.00
2	6.45	14.07	2.244	0.40(0.04)	0.10	3.0	25.00

LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 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	7.32	9.98	2.731	0.40(0.04)	0.10	3.0	16.00
2	7.49	18.80	1.900	0.40(0.04)	0.10	4.4	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	12.96	9.98	2.731	0.40(0.04)	0.10	5.2	16.00
2	13.87	13.90	2.259	0.40(0.04)	0.10	6.7	21.00
3	13.85	14.07	2.244	0.40(0.04)	0.10	6.7	25.00
4	12.93	18.80	1.900	0.40(0.04)	0.10	7.5	10.00

TOTAL AREA(ACRES) = 7.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 13.87 Tc(MIN.) = 13.903
 EFFECTIVE AREA(ACRES) = 6.66 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 7.5
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 28.00 TO NODE 30.00 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 218.21
 ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.39

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.068
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.886
 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	0.31	0.40	0.100	32	9.07

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.79
 TOTAL AREA(ACRES) = 0.31 PEAK FLOW RATE(CFS) = 0.79

 FLOW PROCESS FROM NODE 30.00 TO NODE 34.00 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<
 =====
 UPSTREAM ELEVATION(FEET) = 6.39 DOWNSTREAM ELEVATION(FEET) = 5.88
 STREET LENGTH(FEET) = 168.97 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 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) = 1.03
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.25
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.18
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.38
STREET FLOW TRAVEL TIME(MIN.) = 2.38 Tc(MIN.) = 11.45
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.525

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 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.21 SUBAREA RUNOFF(CFS) = 0.47
EFFECTIVE AREA(ACRES) = 0.52 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.16

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 8.78
FLOW VELOCITY(FEET/SEC.) = 1.21 DEPTH*VELOCITY(FT*FT/SEC.) = 0.40
LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 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.) = 11.45
RAINFALL INTENSITY(INCH/HR) = 2.53
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.52
TOTAL STREAM AREA(ACRES) = 0.52
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.16

FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 21

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

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 292.87
ELEVATION DATA: UPSTREAM(FEET) = 6.62 DOWNSTREAM(FEET) = 5.88

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.751
* 10 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.)
COMMERCIAL A 0.87 0.40 0.100 32 9.75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.14
TOTAL AREA(ACRES) = 0.87 PEAK FLOW RATE(CFS) = 2.14

FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 1

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

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.75
RAINFALL INTENSITY(INCH/HR) = 2.77

AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.87
TOTAL STREAM AREA(ACRES) = 0.87
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.14

** CONFLUENCE DATA **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1 and 2.

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

** PEAK FLOW RATE TABLE **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1 and 2.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 3.22 Tc(MIN.) = 9.75
EFFECTIVE AREA(ACRES) = 1.31 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

FLOW PROCESS FROM NODE 34.00 TO NODE 20.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 0.88 DOWNSTREAM(FEET) = 0.36
FLOW LENGTH(FEET) = 42.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.54
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.22
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 9.88
LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1 and 2.

** MEMORY BANK # 2 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, 3, 4.

** 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, 2, 3.

```

                                PreA10.RES
4      16.66  13.90  2.259  0.40( 0.04) 0.10      8.0   21.00
5      16.62  14.07  2.244  0.40( 0.04) 0.10      8.1   25.00
6      15.27  18.80  1.900  0.40( 0.04) 0.10      8.9   10.00
TOTAL AREA(ACRES) =                8.9

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```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      16.66  Tc(MIN.) =   13.903
EFFECTIVE AREA(ACRES) =      8.05  AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =      8.9
LONGEST FLOWPATH FROM NODE      10.00 TO NODE      20.00 =   949.50 FEET.
=====

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END OF STUDY SUMMARY:
TOTAL AREA(ACRES) =      8.9  TC(MIN.) =   13.90
EFFECTIVE AREA(ACRES) =      8.05  AREA-AVERAGED Fm(INCH/HR)=  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.100
PEAK FLOW RATE(CFS) =      16.66

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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          16.12   9.88   2.748  0.40( 0.04) 0.10     6.4   32.00
2          16.18   9.98   2.731  0.40( 0.04) 0.10     6.5   16.00
3          16.44  11.58   2.509  0.40( 0.04) 0.10     7.2   28.00
4          16.66  13.90   2.259  0.40( 0.04) 0.10     8.0   21.00
5          16.62  14.07   2.244  0.40( 0.04) 0.10     8.1   25.00
6          15.27  18.80   1.900  0.40( 0.04) 0.10     8.9   10.00
=====

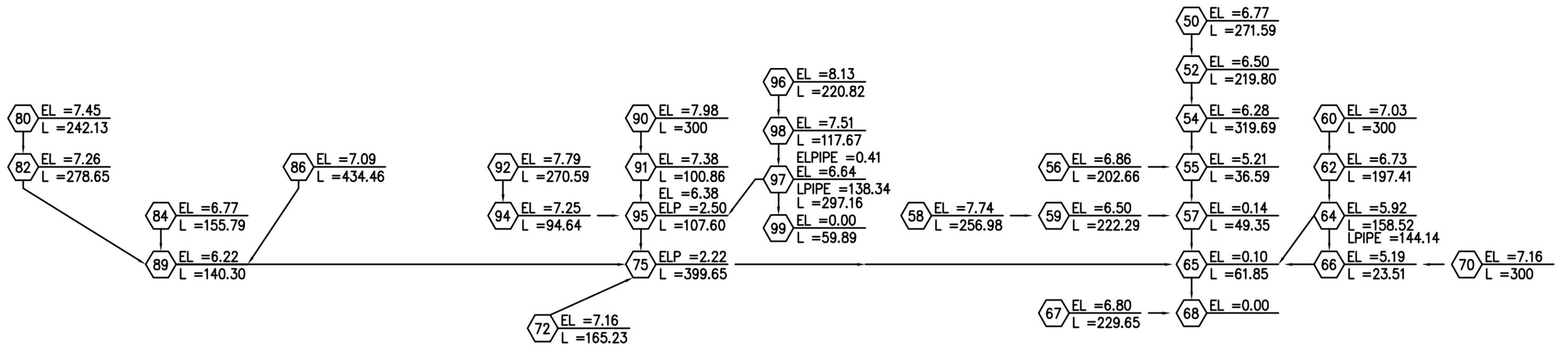
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END OF RATIONAL METHOD ANALYSIS

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♀



AREA B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 20.0 Release Date: 06/01/2013 License ID 1271

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
* PRE-PROJECT CONDITION *
* 10-YR STORM AREA B 10/23/13 SWL *

FILE NAME: PREB10.DAT
TIME/DATE OF STUDY: 16:56 10/25/2013

=====
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 = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

Table with 10 columns: 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). Rows 1-4 show street section data.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.67 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 10.0 (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 50.00 TO NODE 52.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 217.59
ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.981
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.732
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ LAND USE SCS SOIL GROUP (ACRES) AREA Fp (INCH/HR) Ap (DECIMAL) SCS CN Tc (MIN.)
COMMERCIAL A 0.56 0.40 0.100 32 9.98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.36
TOTAL AREA(ACRES) = 0.56 PEAK FLOW RATE(CFS) = 1.36

FLOW PROCESS FROM NODE 52.00 TO NODE 54.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.50 DOWNSTREAM ELEVATION(FEET) = 6.28
STREET LENGTH(FEET) = 219.80 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 = 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) = 2.40
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 15.47
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.93
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.43
STREET FLOW TRAVEL TIME(MIN.) = 3.95 Tc(MIN.) = 13.93
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.257

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 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.04 SUBAREA RUNOFF(CFS) = 2.08
EFFECTIVE AREA(ACRES) = 1.60 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 3.19

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 17.37
FLOW VELOCITY(FEET/SEC.) = 1.00 DEPTH*VELOCITY(FT*FT/SEC.) = 0.50
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 437.39 FEET.

FLOW PROCESS FROM NODE 54.00 TO NODE 55.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.28 DOWNSTREAM ELEVATION(FEET) = 5.21
STREET LENGTH(FEET) = 319.69 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 = 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) = 4.65
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 15.84
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.72
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.82
STREET FLOW TRAVEL TIME(MIN.) = 3.09 Tc(MIN.) = 17.02
* 10 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 1.64 0.40 0.100 32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.64 SUBAREA RUNOFF(CFS) = 2.91
EFFECTIVE AREA(ACRES) = 3.24 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 5.75

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 17.26
FLOW VELOCITY(FEET/SEC.) = 1.81 DEPTH*VELOCITY(FT*FT/SEC.) = 0.91
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 757.08 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 55.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.02
* 10 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 0.19 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.19 SUBAREA RUNOFF(CFS) = 0.34
EFFECTIVE AREA(ACRES) = 3.43 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.4 PEAK FLOW RATE(CFS) = 6.09

FLOW PROCESS FROM NODE 55.00 TO NODE 57.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 0.21 DOWNSTREAM(FEET) = 0.14
FLOW LENGTH(FEET) = 49.35 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.89
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.09
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 17.30
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 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.) = 17.30
RAINFALL INTENSITY(INCH/HR) = 1.99
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 3.43
TOTAL STREAM AREA(ACRES) = 3.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.09

FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 256.98
ELEVATION DATA: UPSTREAM(FEET) = 7.74 DOWNSTREAM(FEET) = 6.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.131
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.072

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 0.48 0.40 0.100 32 8.13
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.31
 TOTAL AREA(ACRES) = 0.48 PEAK FLOW RATE(CFS) = 1.31

 FLOW PROCESS FROM NODE 59.00 TO NODE 57.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1.50 DOWNSTREAM(FEET) = 0.14
 FLOW LENGTH(FEET) = 222.29 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.34
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.31
 PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 9.24
 LONGEST FLOWPATH FROM NODE 58.00 TO NODE 57.00 = 479.27 FEET.

 FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.24
 RAINFALL INTENSITY(INCH/HR) = 2.86
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.48
 TOTAL STREAM AREA(ACRES) = 0.48
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.31

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.09	17.30	1.993	0.40(0.04)	0.10	3.4	50.00
2	1.31	9.24	2.855	0.40(0.04)	0.10	0.5	58.00

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	6.00	9.24	2.855	0.40(0.04)	0.10	2.3	58.00
2	7.00	17.30	1.993	0.40(0.04)	0.10	3.9	50.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 7.00 Tc(MIN.) = 17.30
 EFFECTIVE AREA(ACRES) = 3.91 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.9
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

 FLOW PROCESS FROM NODE 57.00 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) = 0.14 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 61.85 MANNING'S N = 0.013
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 2.19
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.00
PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 17.77
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 60.00 TO NODE 62.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 7.03 DOWNSTREAM(FEET) = 6.73

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.033
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.247
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.)
CONDOMINIUMS A 0.61 0.40 0.350 32 14.03
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 1.16
TOTAL AREA(ACRES) = 0.61 PEAK FLOW RATE(CFS) = 1.16

FLOW PROCESS FROM NODE 62.00 TO NODE 64.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 6.73 DOWNSTREAM ELEVATION(FEET) = 5.92
STREET LENGTH(FEET) = 197.41 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 = 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) = 1.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.34
HALFSTREET FLOOD WIDTH(FEET) = 9.25
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.44
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.49
STREET FLOW TRAVEL TIME(MIN.) = 2.29 Tc(MIN.) = 16.32
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.061
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS A 0.40 0.40 0.350 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 0.40 SUBAREA RUNOFF(CFS) = 0.69
EFFECTIVE AREA(ACRES) = 1.01 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 1.75

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 9.93

FLOW VELOCITY(FEET/SEC.) = 1.49 DEPTH*VELOCITY(FT*FT/SEC.) = 0.53
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 64.00 = 497.41 FEET.

FLOW PROCESS FROM NODE 64.00 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) =	0.92	DOWNSTREAM(FEET) =	0.10
FLOW LENGTH(FEET) =	144.14	MANNING'S N =	0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000			
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.8 INCHES			
PIPE-FLOW VELOCITY(FEET/SEC.) =	3.53		
ESTIMATED PIPE DIAMETER(INCH) =	18.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	1.75		
PIPE TRAVEL TIME(MIN.) =	0.68	Tc(MIN.) =	17.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 =	641.55 FEET.		

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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.) =	17.00
RAINFALL INTENSITY(INCH/HR) =	2.01
AREA-AVERAGED Fm(INCH/HR) =	0.14
AREA-AVERAGED Fp(INCH/HR) =	0.40
AREA-AVERAGED Ap =	0.35
EFFECTIVE STREAM AREA(ACRES) =	1.01
TOTAL STREAM AREA(ACRES) =	1.01
PEAK FLOW RATE(CFS) AT CONFLUENCE =	1.75

FLOW PROCESS FROM NODE 64.00 TO NODE 66.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) =	158.52		
ELEVATION DATA: UPSTREAM(FEET) =	5.92	DOWNSTREAM(FEET) =	5.19

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.765
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.414
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	0.30	0.40	0.100	32	6.76
NATURAL GOOD COVER "GRASS"	A	0.03	0.40	1.000	38	20.81

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.182
SUBAREA RUNOFF(CFS) = 0.99
TOTAL AREA(ACRES) = 0.33 PEAK FLOW RATE(CFS) = 0.99

FLOW PROCESS FROM NODE 70.00 TO NODE 66.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) =	6.76				
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.414					
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.42	0.40	0.100	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =		0.40			
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =		0.100			
SUBAREA AREA(ACRES) =	0.42	SUBAREA RUNOFF(CFS) =	1.28		
EFFECTIVE AREA(ACRES) =	0.75	AREA-AVERAGED Fm(INCH/HR) =	0.05		

AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 2.27

FLOW PROCESS FROM NODE 66.00 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) = 0.19 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 15.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.87
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.27
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 6.83
LONGEST FLOWPATH FROM NODE 64.00 TO NODE 65.00 = 173.52 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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.) = 6.83
RAINFALL INTENSITY(INCH/HR) = 3.40
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.14
EFFECTIVE STREAM AREA(ACRES) = 0.75
TOTAL STREAM AREA(ACRES) = 0.75
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.27

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.75	17.00	2.013	0.40(0.14)	0.35	1.0	60.00
2	2.27	6.83	3.395	0.40(0.05)	0.14	0.8	64.00

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	3.49	6.83	3.395	0.40(0.08)	0.21	1.2	64.00
2	3.08	17.00	2.013	0.40(0.10)	0.26	1.8	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 3.49 Tc(MIN.) = 6.83
EFFECTIVE AREA(ACRES) = 1.16 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 1.8
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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	3.49	6.83	3.395	0.40(0.08)	0.21	1.2	64.00
2	3.08	17.00	2.013	0.40(0.10)	0.26	1.8	60.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 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	6.00	9.72	2.773	0.40(0.04)	0.10	2.3 58.00
2	7.00	17.77	1.963	0.40(0.04)	0.10	3.9 50.00

LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	8.66	6.83	3.395	0.40(0.06)	0.15	2.8	64.00
2	9.37	9.72	2.773	0.40(0.06)	0.15	3.6	58.00
3	9.98	17.00	2.013	0.40(0.06)	0.15	5.5	60.00
4	9.99	17.77	1.963	0.40(0.06)	0.15	5.7	50.00

TOTAL AREA(ACRES) = 5.7

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.99 Tc(MIN.) = 17.774
EFFECTIVE AREA(ACRES) = 5.67 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 5.7
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 80.00 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) = 242.13
ELEVATION DATA: UPSTREAM(FEET) = 7.45 DOWNSTREAM(FEET) = 7.26

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.417
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.529
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 0.44 0.40 0.100 32 11.42
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.99
TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 0.99

FLOW PROCESS FROM NODE 82.00 TO NODE 89.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<
=====

UPSTREAM ELEVATION(FEET) = 7.26 DOWNSTREAM ELEVATION(FEET) = 6.22
STREET LENGTH(FEET) = 278.65 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 = 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) = 1.22
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 8.51
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.33
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.44

STREET FLOW TRAVEL TIME(MIN.) = 3.49 Tc(MIN.) = 14.90
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.171

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.24 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.24 SUBAREA RUNOFF(CFS) = 0.46
EFFECTIVE AREA(ACRES) = 0.68 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 1.30

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 8.82
FLOW VELOCITY(FEET/SEC.) = 1.35 DEPTH*VELOCITY(FT*FT/SEC.) = 0.45
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 520.78 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 155.79
ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.085
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.325
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 0.25 0.40 0.100 32 7.08
CONDOMINIUMS A 0.25 0.40 0.350 32 8.39
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 0.50 INITIAL SUBAREA RUNOFF(CFS) = 1.46

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN.) = 14.90
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.171
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 0.94
EFFECTIVE AREA(ACRES) = 1.18 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.24

FLOW PROCESS FROM NODE 86.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 434.46
ELEVATION DATA: UPSTREAM(FEET) = 7.09 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.960
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.463
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 0.62 0.40 0.100 32 11.96
CONDOMINIUMS A 0.44 0.40 0.350 32 14.16
NATURAL GOOD COVER
"GRASS" A 0.14 0.40 1.000 38 36.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.297
SUBAREA AREA(ACRES) = 1.20 INITIAL SUBAREA RUNOFF(CFS) = 2.53

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN.) = 14.90
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.171

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SUBAREA AREA(ACRES) = 1.20 SUBAREA RUNOFF(CFS) = 2.22
EFFECTIVE AREA(ACRES) = 2.38 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.23
TOTAL AREA(ACRES) = 2.4 PEAK FLOW RATE(CFS) = 4.46

FLOW PROCESS FROM NODE 89.00 TO NODE 75.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3.00 DOWNSTREAM(FEET) = 2.22
FLOW LENGTH(FEET) = 140.30 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.48
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.46
PIPE TRAVEL TIME(MIN.) = 0.52 Tc(MIN.) = 15.43
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 75.00 = 661.08 FEET.

FLOW PROCESS FROM NODE 75.00 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) = 2.22 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.90
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.46
PIPE TRAVEL TIME(MIN.) = 2.35 Tc(MIN.) = 17.78
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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 4.46 17.78 1.962 0.40(0.09) 0.23 2.4 80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 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 8.66 6.83 3.395 0.40(0.06) 0.15 2.8 64.00
2 9.37 9.72 2.773 0.40(0.06) 0.15 3.6 58.00
3 9.98 17.00 2.013 0.40(0.06) 0.15 5.5 60.00
4 9.99 17.77 1.963 0.40(0.06) 0.15 5.7 50.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

** PEAK FLOW RATE TABLE **

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 11.68 6.83 3.395 0.40(0.07) 0.17 3.7 64.00
2 12.86 9.72 2.773 0.40(0.07) 0.17 4.9 58.00
3 14.35 17.00 2.013 0.40(0.07) 0.17 7.8 60.00
4 14.45 17.77 1.963 0.40(0.07) 0.17 8.0 50.00
5 14.45 17.78 1.962 0.40(0.07) 0.17 8.1 80.00
TOTAL AREA(ACRES) = 8.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 14.45 Tc(MIN.) = 17.774
EFFECTIVE AREA(ACRES) = 8.05 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 8.1
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 90.00 TO NODE 91.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 7.98 DOWNSTREAM(FEET) = 7.38

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.316
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
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 2.77 0.40 0.100 32 10.32
NATURAL GOOD COVER
"GRASS" A 0.07 0.40 1.000 38 31.73
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.122
SUBAREA RUNOFF(CFS) = 6.73
TOTAL AREA(ACRES) = 2.84 PEAK FLOW RATE(CFS) = 6.73

FLOW PROCESS FROM NODE 91.00 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) = 3.38 DOWNSTREAM(FEET) = 2.50
FLOW LENGTH(FEET) = 100.86 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.86
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.73
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 10.60
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 400.86 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 10.60
RAINFALL INTENSITY(INCH/HR) = 2.64
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.12
EFFECTIVE STREAM AREA(ACRES) = 2.84
TOTAL STREAM AREA(ACRES) = 2.84
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.73

FLOW PROCESS FROM NODE 92.00 TO NODE 94.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 270.59
ELEVATION DATA: UPSTREAM(FEET) = 7.79 DOWNSTREAM(FEET) = 7.25

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.903
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.744

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	1.02	0.40	0.100	32	9.90
NATURAL GOOD COVER "GRASS"	A	0.12	0.40	1.000	38	30.46

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.195
SUBAREA RUNOFF(CFS) = 2.74
TOTAL AREA(ACRES) = 1.14 PEAK FLOW RATE(CFS) = 2.74

FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 4 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 7.25 DOWNSTREAM ELEVATION(FEET) = 6.38
STREET LENGTH(FEET) = 94.64 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 10.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 5.00
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) = 3.03
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 7.54
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.00
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.62
STREET FLOW TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 10.69
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.626

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	0.40	0.100	32
NATURAL GOOD COVER "GRASS"	A	0.05	0.40	1.000	38

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.273
SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.59
EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 3.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 7.77
FLOW VELOCITY(FEET/SEC.) = 2.02 DEPTH*VELOCITY(FT*FT/SEC.) = 0.63
LONGEST FLOWPATH FROM NODE 92.00 TO NODE 95.00 = 365.23 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.69
RAINFALL INTENSITY(INCH/HR) = 2.63
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.21
EFFECTIVE STREAM AREA(ACRES) = 1.40
TOTAL STREAM AREA(ACRES) = 1.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.20

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FLOW PROCESS FROM NODE      96.00 TO NODE      98.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 220.82
ELEVATION DATA: UPSTREAM(FEET) = 8.13 DOWNSTREAM(FEET) = 7.51

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.527
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.990
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      0.28     0.40       0.100     32   8.53
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.74
TOTAL AREA(ACRES) = 0.28 PEAK FLOW RATE(CFS) = 0.74

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FLOW PROCESS FROM NODE      98.00 TO NODE      97.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<
-----
UPSTREAM ELEVATION(FEET) = 7.51 DOWNSTREAM ELEVATION(FEET) = 6.64
STREET LENGTH(FEET) = 117.67 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 = 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) = 1.06
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.29
HALFSTREET FLOOD WIDTH(FEET) = 6.56
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.72
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.50
STREET FLOW TRAVEL TIME(MIN.) = 1.14 Tc(MIN.) = 9.67
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.782
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     0.40       0.100     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.64
EFFECTIVE AREA(ACRES) = 0.54 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.33

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 7.45
FLOW VELOCITY(FEET/SEC.) = 1.79 DEPTH*VELOCITY(FT*FT/SEC.) = 0.55
LONGEST FLOWPATH FROM NODE      96.00 TO NODE      97.00 = 338.49 FEET.

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*****
FLOW PROCESS FROM NODE      97.00 TO NODE      95.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
-----
UPSTREAM ELEVATION(FEET) = 6.64 DOWNSTREAM ELEVATION(FEET) = 6.38
STREET LENGTH(FEET) = 297.16 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 35.00

```

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
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) = 3.07
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.51
HALFSTREET FLOOD WIDTH(FEET) = 17.57
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.94
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.48
STREET FLOW TRAVEL TIME(MIN.) = 5.28 Tc(MIN.) = 14.95
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.167

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.25 0.40 0.100 32
NATURAL GOOD COVER
"GRASS" A 0.66 0.40 1.000 38
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.411
SUBAREA AREA(ACRES) = 1.91 SUBAREA RUNOFF(CFS) = 3.44
EFFECTIVE AREA(ACRES) = 2.45 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 2.5 PEAK FLOW RATE(CFS) = 4.48

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 20.44
FLOW VELOCITY(FEET/SEC.) = 1.02 DEPTH*VELOCITY(FT*FT/SEC.) = 0.58
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 14.95
RAINFALL INTENSITY(INCH/HR) = 2.17
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.34
EFFECTIVE STREAM AREA(ACRES) = 2.45
TOTAL STREAM AREA(ACRES) = 2.45
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.48

** 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 1-3.

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

** PEAK FLOW RATE TABLE **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-3.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 13.83 Tc(MIN.) = 10.60
EFFECTIVE AREA(ACRES) = 5.97 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21

TOTAL AREA(ACRES) = 6.7
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 75.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 2.50 DOWNSTREAM(FEET) = 2.22
FLOW LENGTH(FEET) = 107.60 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.38
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.83
PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 11.01
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 75.00 = 743.25 FEET.

FLOW PROCESS FROM NODE 72.00 TO NODE 75.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 11.01
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.582
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.23 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.23 SUBAREA RUNOFF(CFS) = 0.53
EFFECTIVE AREA(ACRES) = 6.20 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 13.95

FLOW PROCESS FROM NODE 75.00 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) = 2.22 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.16
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.95
PIPE TRAVEL TIME(MIN.) = 1.78 Tc(MIN.) = 12.79
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 3 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	13.95	12.79	2.370	0.40(0.08)	0.20	6.2	90.00
2	13.94	12.88	2.361	0.40(0.08)	0.20	6.2	92.00
3	12.75	17.22	1.999	0.40(0.09)	0.22	6.9	96.00

LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.68	6.83	3.395	0.40(0.07)	0.17	3.7	64.00
2	12.86	9.72	2.773	0.40(0.07)	0.17	4.9	58.00
3	14.35	17.00	2.013	0.40(0.07)	0.17	7.8	60.00
4	14.45	17.77	1.963	0.40(0.07)	0.17	8.0	50.00
5	14.45	17.78	1.962	0.40(0.07)	0.17	8.1	80.00

LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	22.46	6.83	3.395	0.40(0.07)	0.18	7.0	64.00
2	25.33	9.72	2.773	0.40(0.07)	0.18	9.7	58.00
3	27.44	12.79	2.370	0.40(0.07)	0.19	12.3	90.00
4	27.45	12.88	2.361	0.40(0.07)	0.19	12.4	92.00
5	27.16	17.00	2.013	0.40(0.08)	0.19	14.7	60.00
6	27.13	17.22	1.999	0.40(0.08)	0.19	14.8	96.00
7	26.95	17.77	1.963	0.40(0.08)	0.19	15.0	50.00
8	26.95	17.78	1.962	0.40(0.08)	0.19	15.0	80.00
TOTAL AREA(ACRES) =		15.0					

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 27.45 Tc(MIN.) = 12.877
EFFECTIVE AREA(ACRES) = 12.40 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 15.0
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

FLOW PROCESS FROM NODE 65.00 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) = 0.10 DOWNSTREAM(FEET) = 0.00
FLOW LENGTH(FEET) = 23.51 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.31
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.45
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 12.94
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 68.00 = 1316.76 FEET.

FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.94
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.354
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.62 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.62 SUBAREA RUNOFF(CFS) = 1.29
EFFECTIVE AREA(ACRES) = 13.02 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 27.45
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.94
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.354
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.17 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.17 SUBAREA RUNOFF(CFS) = 0.35
EFFECTIVE AREA(ACRES) = 13.19 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 15.8 PEAK FLOW RATE(CFS) = 27.45

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 15.8 TC(MIN.) = 12.94
 EFFECTIVE AREA(ACRES) = 13.19 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.181
 PEAK FLOW RATE(CFS) = 27.45

** PEAK FLOW RATE TABLE **

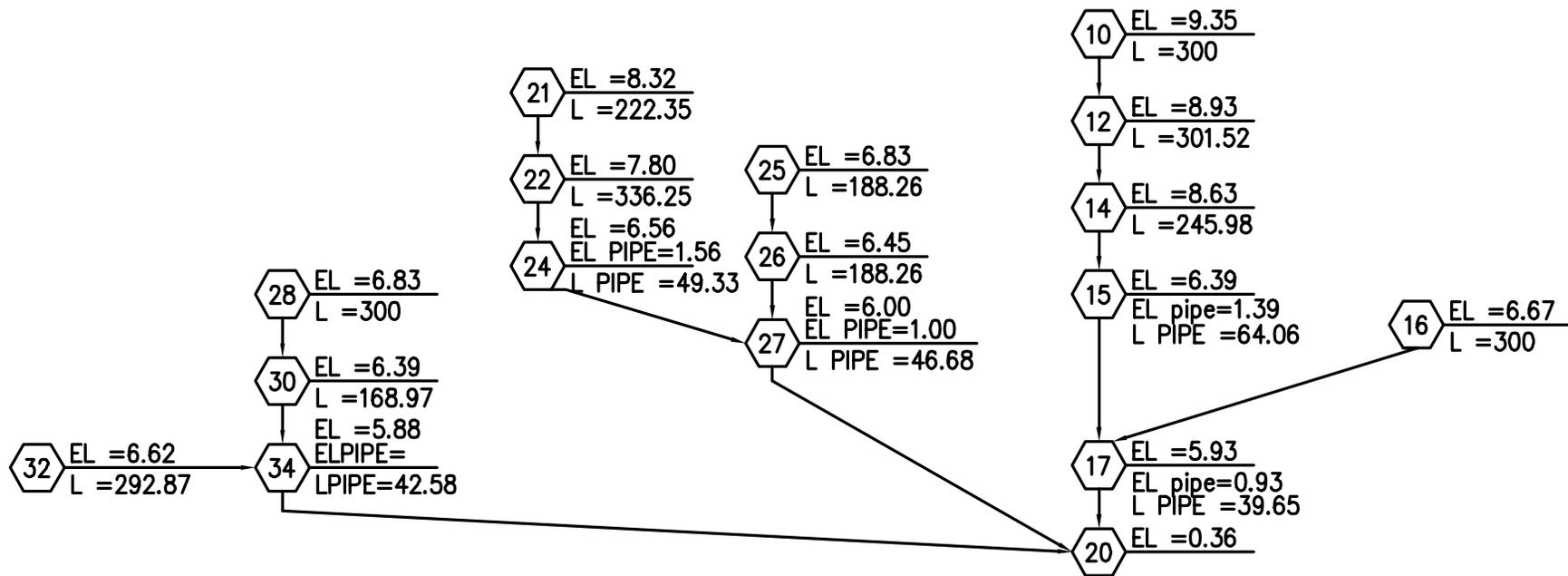
STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	23.19	6.90	3.377	0.40(0.07)	0.17	7.8	64.00
2	25.33	9.79	2.763	0.40(0.07)	0.18	10.4	58.00
3	27.44	12.85	2.364	0.40(0.07)	0.18	13.1	90.00
4	27.45	12.94	2.354	0.40(0.07)	0.18	13.2	92.00
5	27.16	17.06	2.009	0.40(0.08)	0.19	15.5	60.00
6	27.13	17.28	1.994	0.40(0.08)	0.19	15.6	96.00
7	26.95	17.84	1.959	0.40(0.08)	0.19	15.8	50.00
8	26.95	17.84	1.958	0.40(0.08)	0.19	15.8	80.00

=====

END OF RATIONAL METHOD ANALYSIS

♀

POST-PROJECT CONDITION



AREA A

 RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
 * POST-PROJECT CONDITION *
 * 10-YR STORM AREA A 10/23/13 SWL *

FILE NAME: POSTA10.DAT
 TIME/DATE OF STUDY: 11:22 10/25/2013

=====

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 = 0.95
 DATA BANK RAINFALL USED
 ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES: LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	35.0	30.0	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
3	15.0	10.0	0.020/0.020/0.020	0.67	2.00	0.0312	0.167	0.0150
4	10.0	5.0	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 = 0.67 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 10.0 (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 10.00 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) = 300.00
 ELEVATION DATA: UPSTREAM(FEET) = 9.35 DOWNSTREAM(FEET) = 8.93

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 11.079
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.573
 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.)
COMMERCIAL	A	0.65	0.40	0.100	32	11.08

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 1.48
 TOTAL AREA(ACRES) = 0.65 PEAK FLOW RATE(CFS) = 1.48

FLOW PROCESS FROM NODE 12.00 TO NODE 14.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.93 DOWNSTREAM ELEVATION(FEET) = 8.63
STREET LENGTH(FEET) = 301.52 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 1.99
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 14.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.88
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.39
STREET FLOW TRAVEL TIME(MIN.) = 5.68 Tc(MIN.) = 16.76
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.030

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.56	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 1.00
EFFECTIVE AREA(ACRES) = 1.21 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.17

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 14.88
FLOW VELOCITY(FEET/SEC.) = 0.90 DEPTH*VELOCITY(FT*FT/SEC.) = 0.41
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 14.00 = 601.52 FEET.

FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 8.63 DOWNSTREAM ELEVATION(FEET) = 6.39
STREET LENGTH(FEET) = 245.98 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 3.38
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.38
HALFSTREET FLOOD WIDTH(FEET) = 11.21
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.34
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.89
STREET FLOW TRAVEL TIME(MIN.) = 1.75 Tc(MIN.) = 18.51
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.917

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.44	0.40	0.100	32

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.44 SUBAREA RUNOFF(CFS) = 2.43
EFFECTIVE AREA(ACRES) = 2.65 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 4.48

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 12.62
FLOW VELOCITY(FEET/SEC.) = 2.51 DEPTH*VELOCITY(FT*FT/SEC.) = 1.03
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.00 = 847.50 FEET.

FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.51
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.917
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.41 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 0.69
EFFECTIVE AREA(ACRES) = 3.06 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.1 PEAK FLOW RATE(CFS) = 5.17

FLOW PROCESS FROM NODE 15.00 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) = 1.39 DOWNSTREAM(FEET) = 0.93
FLOW LENGTH(FEET) = 62.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.19
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.17
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 18.71
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 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.) = 18.71
RAINFALL INTENSITY(INCH/HR) = 1.91
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 3.06
TOTAL STREAM AREA(ACRES) = 3.06
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.17

FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 6.67 DOWNSTREAM(FEET) = 5.93

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.892

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.746
 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 1.38 0.40 0.100 32 9.89
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 3.36
 TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 3.36

 FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.89
 RAINFALL INTENSITY(INCH/HR) = 2.75
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.38
 TOTAL STREAM AREA(ACRES) = 1.38
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.36

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.17	18.71	1.906	0.40(0.04)	0.10	3.1	10.00
2	3.36	9.89	2.746	0.40(0.04)	0.10	1.4	16.00

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	7.32	9.89	2.746	0.40(0.04)	0.10	3.0	16.00
2	7.49	18.71	1.906	0.40(0.04)	0.10	4.4	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 7.49 Tc(MIN.) = 18.71
 EFFECTIVE AREA(ACRES) = 4.44 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 4.4
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 909.50 FEET.

 FLOW PROCESS FROM NODE 17.00 TO NODE 20.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 0.93 DOWNSTREAM(FEET) = 0.36
 FLOW LENGTH(FEET) = 40.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.26
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.49
 PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 18.80
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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) = 222.35
 ELEVATION DATA: UPSTREAM(FEET) = 8.32 DOWNSTREAM(FEET) = 7.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.869
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.923
 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	0.72	0.40	0.100	32	8.87

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.87
 TOTAL AREA(ACRES) = 0.72 PEAK FLOW RATE(CFS) = 1.87

 FLOW PROCESS FROM NODE 22.00 TO NODE 24.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 7.80 DOWNSTREAM ELEVATION(FEET) = 6.56
 STREET LENGTH(FEET) = 336.25 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 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) = 3.30
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.43
 HALFSTREET FLOOD WIDTH(FEET) = 13.47
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.65
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.70
 STREET FLOW TRAVEL TIME(MIN.) = 3.40 Tc(MIN.) = 12.27
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.427
 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	0.40	0.100	32
NATURAL GOOD COVER "GRASS"	A	0.01	0.40	1.000	38

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.107
 SUBAREA AREA(ACRES) = 1.33 SUBAREA RUNOFF(CFS) = 2.85
 EFFECTIVE AREA(ACRES) = 2.05 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.1 PEAK FLOW RATE(CFS) = 4.40

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 15.17
 FLOW VELOCITY(FEET/SEC.) = 1.77 DEPTH*VELOCITY(FT*FT/SEC.) = 0.82
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 24.00 = 558.60 FEET.

 FLOW PROCESS FROM NODE 24.00 TO NODE 27.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 1.56 DOWNSTREAM(FEET) = 1.00
 FLOW LENGTH(FEET) = 49.33 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

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DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.85
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.40
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 12.41
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 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.) = 12.41
RAINFALL INTENSITY(INCH/HR) = 2.41
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.05
TOTAL STREAM AREA(ACRES) = 2.05
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.40

FLOW PROCESS FROM NODE 25.00 TO NODE 26.00 IS CODE = 21

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

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 188.26
ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.546
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.986
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 0.38 0.40 0.100 32 8.55
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.01
TOTAL AREA(ACRES) = 0.38 PEAK FLOW RATE(CFS) = 1.01

FLOW PROCESS FROM NODE 26.00 TO NODE 27.00 IS CODE = 62

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

=====
UPSTREAM ELEVATION(FEET) = 6.45 DOWNSTREAM ELEVATION(FEET) = 6.00
STREET LENGTH(FEET) = 254.74 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
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) = 1.64
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 11.65
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.42
STREET FLOW TRAVEL TIME(MIN.) = 3.99 Tc(MIN.) = 12.54
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.397

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	0.59	0.40	0.100	32
NATURAL GOOD COVER "GRASS"	A	0.01	0.40	1.000	38

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.115
 SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 1.27
 EFFECTIVE AREA(ACRES) = 0.98 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.11
 TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 2.08

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 12.94
 FLOW VELOCITY(FEET/SEC.) = 1.11 DEPTH*VELOCITY(FT*FT/SEC.) = 0.46
 LONGEST FLOWPATH FROM NODE 25.00 TO NODE 27.00 = 443.00 FEET.

 FLOW PROCESS FROM NODE 27.00 TO NODE 27.00 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.) = 12.54
 RAINFALL INTENSITY(INCH/HR) = 2.40
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.11
 EFFECTIVE STREAM AREA(ACRES) = 0.98
 TOTAL STREAM AREA(ACRES) = 0.98
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.08

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.40	12.41	2.411	0.40(0.04)	0.10	2.1	21.00
2	2.08	12.54	2.397	0.40(0.04)	0.11	1.0	25.00

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	6.47	12.41	2.411	0.40(0.04)	0.11	3.0	21.00
2	6.45	12.54	2.397	0.40(0.04)	0.11	3.0	25.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 6.47 Tc(MIN.) = 12.41
 EFFECTIVE AREA(ACRES) = 3.02 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.11
 TOTAL AREA(ACRES) = 3.0
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 27.00 = 607.93 FEET.

 FLOW PROCESS FROM NODE 27.00 TO NODE 20.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 1.00 DOWNSTREAM(FEET) = 0.36
 FLOW LENGTH(FEET) = 300.70 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.36
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.47
 PIPE TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 13.90
 LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11

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>>>>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	6.47	13.90	2.259	0.40(0.04)	0.11	3.0	21.00
2	6.45	14.03	2.247	0.40(0.04)	0.11	3.0	25.00

LONGEST FLOWPATH FROM NODE 21.00 TO NODE 20.00 = 908.63 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	7.32	9.98	2.731	0.40(0.04)	0.10	3.0	16.00
2	7.49	18.80	1.900	0.40(0.04)	0.10	4.4	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	12.96	9.98	2.731	0.40(0.04)	0.10	5.2	16.00
2	13.86	13.90	2.259	0.40(0.04)	0.10	6.7	21.00
3	13.85	14.03	2.247	0.40(0.04)	0.10	6.7	25.00
4	12.92	18.80	1.900	0.40(0.04)	0.10	7.5	10.00

TOTAL AREA(ACRES) = 7.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 13.86 Tc(MIN.) = 13.905
 EFFECTIVE AREA(ACRES) = 6.66 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 7.5
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 28.00 TO NODE 30.00 IS CODE = 21

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 218.21
 ELEVATION DATA: UPSTREAM(FEET) = 6.83 DOWNSTREAM(FEET) = 6.39

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.068
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.886
 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 0.31 0.40 0.100 32 9.07
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.79
 TOTAL AREA(ACRES) = 0.31 PEAK FLOW RATE(CFS) = 0.79

 FLOW PROCESS FROM NODE 30.00 TO NODE 34.00 IS CODE = 62

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

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

UPSTREAM ELEVATION(FEET) = 6.39 DOWNSTREAM ELEVATION(FEET) = 5.88
 STREET LENGTH(FEET) = 168.97 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 35.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
 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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.03
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.32
 HALFSTREET FLOOD WIDTH(FEET) = 8.25
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.18
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.38
 STREET FLOW TRAVEL TIME(MIN.) = 2.39 Tc(MIN.) = 11.45
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.525

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL A 0.20 0.40 0.100 32
 NATURAL GOOD COVER
 "GRASS" A 0.01 0.40 1.000 38
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.143
 SUBAREA AREA(ACRES) = 0.21 SUBAREA RUNOFF(CFS) = 0.47
 EFFECTIVE AREA(ACRES) = 0.52 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.12
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.16

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 8.78
 FLOW VELOCITY(FEET/SEC.) = 1.21 DEPTH*VELOCITY(FT*FT/SEC.) = 0.40
 LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.

 FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 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.) = 11.45
 RAINFALL INTENSITY(INCH/HR) = 2.52
 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.12
 EFFECTIVE STREAM AREA(ACRES) = 0.52
 TOTAL STREAM AREA(ACRES) = 0.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.16

 FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 292.87
 ELEVATION DATA: UPSTREAM(FEET) = 6.62 DOWNSTREAM(FEET) = 5.88

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.751
 * 10 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.)
 COMMERCIAL A 0.87 0.40 0.100 32 9.75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.14
 TOTAL AREA(ACRES) = 0.87 PEAK FLOW RATE(CFS) = 2.14

 FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

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=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.75
RAINFALL INTENSITY(INCH/HR) = 2.77
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.87
TOTAL STREAM AREA(ACRES) = 0.87
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.14
    
```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.16	11.45	2.525	0.40(0.05)	0.12	0.5	28.00
2	2.14	9.75	2.769	0.40(0.04)	0.10	0.9	32.00

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	3.22	9.75	2.769	0.40(0.04)	0.11	1.3	32.00
2	3.11	11.45	2.525	0.40(0.04)	0.11	1.4	28.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 3.22 Tc(MIN.) = 9.75
EFFECTIVE AREA(ACRES) = 1.31 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.11
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 28.00 TO NODE 34.00 = 387.18 FEET.
    
```

FLOW PROCESS FROM NODE 34.00 TO NODE 20.00 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) = 0.88 DOWNSTREAM(FEET) = 0.36
FLOW LENGTH(FEET) = 42.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.55
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.22
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 9.88
LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 FEET.
    
```

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 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	3.22	9.88	2.748	0.40(0.04)	0.11	1.3	32.00
2	3.11	11.58	2.509	0.40(0.04)	0.11	1.4	28.00

LONGEST FLOWPATH FROM NODE 28.00 TO NODE 20.00 = 429.18 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	12.96	9.98	2.731	0.40(0.04)	0.10	5.2	16.00
2	13.86	13.90	2.259	0.40(0.04)	0.10	6.7	21.00
3	13.85	14.03	2.247	0.40(0.04)	0.10	6.7	25.00
4	12.92	18.80	1.900	0.40(0.04)	0.10	7.5	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

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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	16.12	9.88	2.748	0.40(0.04)	0.10	6.4	32.00
2	16.17	9.98	2.731	0.40(0.04)	0.10	6.5	16.00
3	16.43	11.58	2.509	0.40(0.04)	0.10	7.2	28.00
4	16.66	13.90	2.259	0.40(0.04)	0.10	8.0	21.00
5	16.62	14.03	2.247	0.40(0.04)	0.10	8.1	25.00
6	15.26	18.80	1.900	0.40(0.04)	0.10	8.9	10.00
TOTAL AREA(ACRES) =			8.9				

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 16.66 Tc(MIN.) = 13.905
 EFFECTIVE AREA(ACRES) = 8.05 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 8.9
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 949.50 FEET.

END OF STUDY SUMMARY:

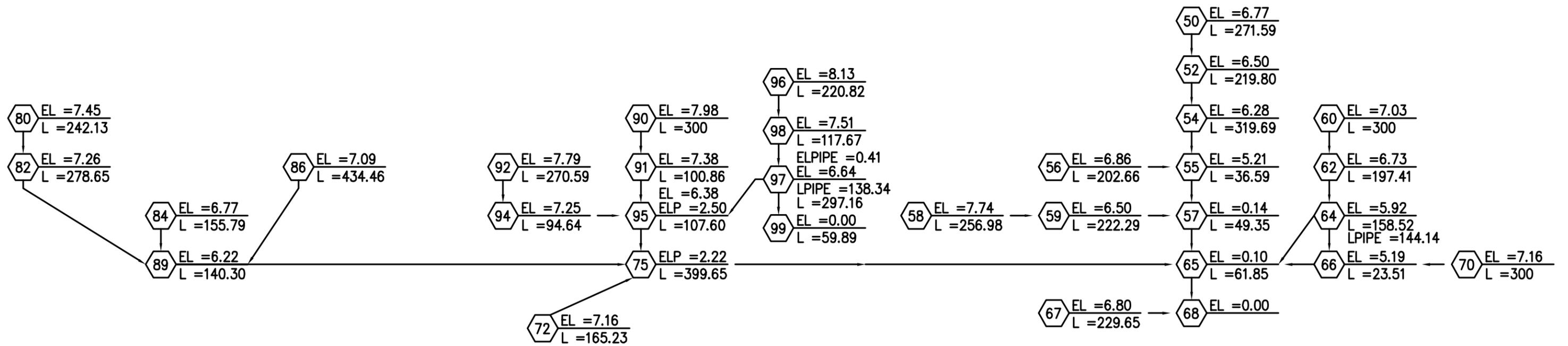
TOTAL AREA(ACRES) = 8.9 TC(MIN.) = 13.90
 EFFECTIVE AREA(ACRES) = 8.05 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.103
 PEAK FLOW RATE(CFS) = 16.66

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	16.12	9.88	2.748	0.40(0.04)	0.10	6.4	32.00
2	16.17	9.98	2.731	0.40(0.04)	0.10	6.5	16.00
3	16.43	11.58	2.509	0.40(0.04)	0.10	7.2	28.00
4	16.66	13.90	2.259	0.40(0.04)	0.10	8.0	21.00
5	16.62	14.03	2.247	0.40(0.04)	0.10	8.1	25.00
6	15.26	18.80	1.900	0.40(0.04)	0.10	8.9	10.00

END OF RATIONAL METHOD ANALYSIS

♀



AREA B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 20.0 Release Date: 06/01/2013 License ID 1271

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* 373.01.0600 CITY OF NEWPORT BEACH NEWPORT BLVD & 32ND *
* PRE-PROJECT CONDITION *
* 10-YR STORM AREA B 10/23/13 SWL *

FILE NAME: PREB10.DAT
TIME/DATE OF STUDY: 16:56 10/25/2013

=====

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 = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

Table with 9 columns: 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). Rows 1-4.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.67 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 10.0 (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 50.00 TO NODE 52.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 217.59
ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.981
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.732
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 0.56 0.40 0.100 32 9.98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.36
TOTAL AREA(ACRES) = 0.56 PEAK FLOW RATE(CFS) = 1.36

FLOW PROCESS FROM NODE 52.00 TO NODE 54.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.50 DOWNSTREAM ELEVATION(FEET) = 6.28
STREET LENGTH(FEET) = 219.80 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 = 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) = 2.40
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 15.47
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.93
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.43
STREET FLOW TRAVEL TIME(MIN.) = 3.95 Tc(MIN.) = 13.93
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.257

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 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.04 SUBAREA RUNOFF(CFS) = 2.08
EFFECTIVE AREA(ACRES) = 1.60 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 3.19

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 17.37
FLOW VELOCITY(FEET/SEC.) = 1.00 DEPTH*VELOCITY(FT*FT/SEC.) = 0.50
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 437.39 FEET.

FLOW PROCESS FROM NODE 54.00 TO NODE 55.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 6.28 DOWNSTREAM ELEVATION(FEET) = 5.21
STREET LENGTH(FEET) = 319.69 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 = 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) = 4.65
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 15.84
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.72
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.82
STREET FLOW TRAVEL TIME(MIN.) = 3.09 Tc(MIN.) = 17.02
* 10 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 1.64 0.40 0.100 32

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.64 SUBAREA RUNOFF(CFS) = 2.91
EFFECTIVE AREA(ACRES) = 3.24 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 5.75

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 17.26
FLOW VELOCITY(FEET/SEC.) = 1.81 DEPTH*VELOCITY(FT*FT/SEC.) = 0.91
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 757.08 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 55.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.02
* 10 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 0.19 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.19 SUBAREA RUNOFF(CFS) = 0.34
EFFECTIVE AREA(ACRES) = 3.43 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.4 PEAK FLOW RATE(CFS) = 6.09

FLOW PROCESS FROM NODE 55.00 TO NODE 57.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 0.21 DOWNSTREAM(FEET) = 0.14
FLOW LENGTH(FEET) = 49.35 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.89
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.09
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 17.30
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 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.) = 17.30
RAINFALL INTENSITY(INCH/HR) = 1.99
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 3.43
TOTAL STREAM AREA(ACRES) = 3.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.09

FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 256.98
ELEVATION DATA: UPSTREAM(FEET) = 7.74 DOWNSTREAM(FEET) = 6.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.131
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.072

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 0.48 0.40 0.100 32 8.13
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.31
 TOTAL AREA(ACRES) = 0.48 PEAK FLOW RATE(CFS) = 1.31

 FLOW PROCESS FROM NODE 59.00 TO NODE 57.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1.50 DOWNSTREAM(FEET) = 0.14
 FLOW LENGTH(FEET) = 222.29 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.34
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.31
 PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 9.24
 LONGEST FLOWPATH FROM NODE 58.00 TO NODE 57.00 = 479.27 FEET.

 FLOW PROCESS FROM NODE 57.00 TO NODE 57.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.24
 RAINFALL INTENSITY(INCH/HR) = 2.86
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.48
 TOTAL STREAM AREA(ACRES) = 0.48
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.31

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.09	17.30	1.993	0.40(0.04)	0.10	3.4	50.00
2	1.31	9.24	2.855	0.40(0.04)	0.10	0.5	58.00

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	6.00	9.24	2.855	0.40(0.04)	0.10	2.3	58.00
2	7.00	17.30	1.993	0.40(0.04)	0.10	3.9	50.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 7.00 Tc(MIN.) = 17.30
 EFFECTIVE AREA(ACRES) = 3.91 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.9
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 806.43 FEET.

 FLOW PROCESS FROM NODE 57.00 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) = 0.14 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 61.85 MANNING'S N = 0.013
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 2.19
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.00
PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 17.77
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 60.00 TO NODE 62.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 7.03 DOWNSTREAM(FEET) = 6.73

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.033
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.247
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.)
CONDOMINIUMS A 0.61 0.40 0.350 32 14.03
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 1.16
TOTAL AREA(ACRES) = 0.61 PEAK FLOW RATE(CFS) = 1.16

FLOW PROCESS FROM NODE 62.00 TO NODE 64.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 6.73 DOWNSTREAM ELEVATION(FEET) = 5.92
STREET LENGTH(FEET) = 197.41 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 = 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) = 1.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.34
HALFSTREET FLOOD WIDTH(FEET) = 9.25
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.44
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.49
STREET FLOW TRAVEL TIME(MIN.) = 2.29 Tc(MIN.) = 16.32
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.061
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS A 0.40 0.40 0.350 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 0.40 SUBAREA RUNOFF(CFS) = 0.69
EFFECTIVE AREA(ACRES) = 1.01 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 1.75

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 9.93

FLOW VELOCITY(FEET/SEC.) = 1.49 DEPTH*VELOCITY(FT*FT/SEC.) = 0.53
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 64.00 = 497.41 FEET.

FLOW PROCESS FROM NODE 64.00 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) = 0.92 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 144.14 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.53
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.75
PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 17.00
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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.) = 17.00
RAINFALL INTENSITY(INCH/HR) = 2.01
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.35
EFFECTIVE STREAM AREA(ACRES) = 1.01
TOTAL STREAM AREA(ACRES) = 1.01
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.75

FLOW PROCESS FROM NODE 64.00 TO NODE 66.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 158.52
ELEVATION DATA: UPSTREAM(FEET) = 5.92 DOWNSTREAM(FEET) = 5.19

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.765
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.414
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	0.30	0.40	0.100	32	6.76
NATURAL GOOD COVER "GRASS"	A	0.03	0.40	1.000	38	20.81

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.182
SUBAREA RUNOFF(CFS) = 0.99
TOTAL AREA(ACRES) = 0.33 PEAK FLOW RATE(CFS) = 0.99

FLOW PROCESS FROM NODE 70.00 TO NODE 66.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 6.76
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.414
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.42	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 1.28
EFFECTIVE AREA(ACRES) = 0.75 AREA-AVERAGED Fm(INCH/HR) = 0.05

AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 2.27

FLOW PROCESS FROM NODE 66.00 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) = 0.19 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 15.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.87
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.27
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 6.83
LONGEST FLOWPATH FROM NODE 64.00 TO NODE 65.00 = 173.52 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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.) = 6.83
RAINFALL INTENSITY(INCH/HR) = 3.40
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.14
EFFECTIVE STREAM AREA(ACRES) = 0.75
TOTAL STREAM AREA(ACRES) = 0.75
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.27

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.75	17.00	2.013	0.40(0.14)	0.35	1.0	60.00
2	2.27	6.83	3.395	0.40(0.05)	0.14	0.8	64.00

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	3.49	6.83	3.395	0.40(0.08)	0.21	1.2	64.00
2	3.08	17.00	2.013	0.40(0.10)	0.26	1.8	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 3.49 Tc(MIN.) = 6.83
EFFECTIVE AREA(ACRES) = 1.16 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 1.8
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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	3.49	6.83	3.395	0.40(0.08)	0.21	1.2	64.00
2	3.08	17.00	2.013	0.40(0.10)	0.26	1.8	60.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 65.00 = 641.55 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
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NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	6.00	9.72	2.773	0.40(0.04)	0.10	2.3 58.00
2	7.00	17.77	1.963	0.40(0.04)	0.10	3.9 50.00

LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	8.66	6.83	3.395	0.40(0.06)	0.15	2.8	64.00
2	9.37	9.72	2.773	0.40(0.06)	0.15	3.6	58.00
3	9.98	17.00	2.013	0.40(0.06)	0.15	5.5	60.00
4	9.99	17.77	1.963	0.40(0.06)	0.15	5.7	50.00

TOTAL AREA(ACRES) = 5.7

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.99 Tc(MIN.) = 17.774
EFFECTIVE AREA(ACRES) = 5.67 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 5.7
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 80.00 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) = 242.13
ELEVATION DATA: UPSTREAM(FEET) = 7.45 DOWNSTREAM(FEET) = 7.26

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.417
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.529
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 0.44 0.40 0.100 32 11.42
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.99
TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 0.99

FLOW PROCESS FROM NODE 82.00 TO NODE 89.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<
=====

UPSTREAM ELEVATION(FEET) = 7.26 DOWNSTREAM ELEVATION(FEET) = 6.22
STREET LENGTH(FEET) = 278.65 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 = 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) = 1.22
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 8.51
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.33
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.44

STREET FLOW TRAVEL TIME(MIN.) = 3.49 Tc(MIN.) = 14.90
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.171

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.24 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.24 SUBAREA RUNOFF(CFS) = 0.46
EFFECTIVE AREA(ACRES) = 0.68 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 1.30

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 8.82
FLOW VELOCITY(FEET/SEC.) = 1.35 DEPTH*VELOCITY(FT*FT/SEC.) = 0.45
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 520.78 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 155.79
ELEVATION DATA: UPSTREAM(FEET) = 6.77 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.085
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.325
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 0.25 0.40 0.100 32 7.08
CONDOMINIUMS A 0.25 0.40 0.350 32 8.39
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 0.50 INITIAL SUBAREA RUNOFF(CFS) = 1.46

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN.) = 14.90
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.171
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 0.94
EFFECTIVE AREA(ACRES) = 1.18 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.24

FLOW PROCESS FROM NODE 86.00 TO NODE 89.00 IS CODE = 82

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 434.46
ELEVATION DATA: UPSTREAM(FEET) = 7.09 DOWNSTREAM(FEET) = 6.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.960
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.463
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 0.62 0.40 0.100 32 11.96
CONDOMINIUMS A 0.44 0.40 0.350 32 14.16
NATURAL GOOD COVER
"GRASS" A 0.14 0.40 1.000 38 36.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.297
SUBAREA AREA(ACRES) = 1.20 INITIAL SUBAREA RUNOFF(CFS) = 2.53

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN.) = 14.90
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.171

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SUBAREA AREA(ACRES) = 1.20 SUBAREA RUNOFF(CFS) = 2.22
 EFFECTIVE AREA(ACRES) = 2.38 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.23
 TOTAL AREA(ACRES) = 2.4 PEAK FLOW RATE(CFS) = 4.46

 FLOW PROCESS FROM NODE 89.00 TO NODE 75.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 3.00 DOWNSTREAM(FEET) = 2.22
 FLOW LENGTH(FEET) = 140.30 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.48
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.46
 PIPE TRAVEL TIME(MIN.) = 0.52 Tc(MIN.) = 15.43
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 75.00 = 661.08 FEET.

 FLOW PROCESS FROM NODE 75.00 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) = 2.22 DOWNSTREAM(FEET) = 0.10
 FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.90
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.46
 PIPE TRAVEL TIME(MIN.) = 2.35 Tc(MIN.) = 17.78
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

 FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 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	4.46	17.78	1.962	0.40(0.09)	0.23	2.4	80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 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	8.66	6.83	3.395	0.40(0.06)	0.15	2.8	64.00
2	9.37	9.72	2.773	0.40(0.06)	0.15	3.6	58.00
3	9.98	17.00	2.013	0.40(0.06)	0.15	5.5	60.00
4	9.99	17.77	1.963	0.40(0.06)	0.15	5.7	50.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 65.00 = 868.28 FEET.							

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.68	6.83	3.395	0.40(0.07)	0.17	3.7	64.00
2	12.86	9.72	2.773	0.40(0.07)	0.17	4.9	58.00
3	14.35	17.00	2.013	0.40(0.07)	0.17	7.8	60.00
4	14.45	17.77	1.963	0.40(0.07)	0.17	8.0	50.00
5	14.45	17.78	1.962	0.40(0.07)	0.17	8.1	80.00
TOTAL AREA(ACRES) = 8.1							

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 14.45 Tc(MIN.) = 17.774
 EFFECTIVE AREA(ACRES) = 8.05 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.17
 TOTAL AREA(ACRES) = 8.1
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 90.00 TO NODE 91.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 7.98 DOWNSTREAM(FEET) = 7.38

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.316
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
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 2.77 0.40 0.100 32 10.32
NATURAL GOOD COVER
"GRASS" A 0.07 0.40 1.000 38 31.73
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.122
SUBAREA RUNOFF(CFS) = 6.73
TOTAL AREA(ACRES) = 2.84 PEAK FLOW RATE(CFS) = 6.73

FLOW PROCESS FROM NODE 91.00 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) = 3.38 DOWNSTREAM(FEET) = 2.50
FLOW LENGTH(FEET) = 100.86 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.86
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.73
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 10.60
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 400.86 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 10.60
RAINFALL INTENSITY(INCH/HR) = 2.64
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.12
EFFECTIVE STREAM AREA(ACRES) = 2.84
TOTAL STREAM AREA(ACRES) = 2.84
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.73

FLOW PROCESS FROM NODE 92.00 TO NODE 94.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 270.59
ELEVATION DATA: UPSTREAM(FEET) = 7.79 DOWNSTREAM(FEET) = 7.25

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.903
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.744

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	1.02	0.40	0.100	32	9.90
NATURAL GOOD COVER "GRASS"	A	0.12	0.40	1.000	38	30.46

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.195
SUBAREA RUNOFF(CFS) = 2.74
TOTAL AREA(ACRES) = 1.14 PEAK FLOW RATE(CFS) = 2.74

FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 4 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 7.25 DOWNSTREAM ELEVATION(FEET) = 6.38
STREET LENGTH(FEET) = 94.64 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 10.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 5.00
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) = 3.03
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 7.54
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.00
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.62
STREET FLOW TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 10.69
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.626

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	0.40	0.100	32
NATURAL GOOD COVER "GRASS"	A	0.05	0.40	1.000	38

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.273
SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.59
EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 3.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 7.77
FLOW VELOCITY(FEET/SEC.) = 2.02 DEPTH*VELOCITY(FT*FT/SEC.) = 0.63
LONGEST FLOWPATH FROM NODE 92.00 TO NODE 95.00 = 365.23 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.69
RAINFALL INTENSITY(INCH/HR) = 2.63
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.21
EFFECTIVE STREAM AREA(ACRES) = 1.40
TOTAL STREAM AREA(ACRES) = 1.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.20

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PreB10.RES
FLOW PROCESS FROM NODE      96.00 TO NODE      98.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 220.82
ELEVATION DATA: UPSTREAM(FEET) = 8.13 DOWNSTREAM(FEET) = 7.51

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.527
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.990
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      0.28     0.40       0.100     32     8.53
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.74
TOTAL AREA(ACRES) = 0.28 PEAK FLOW RATE(CFS) = 0.74

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FLOW PROCESS FROM NODE      98.00 TO NODE      97.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<
-----
UPSTREAM ELEVATION(FEET) = 7.51 DOWNSTREAM ELEVATION(FEET) = 6.64
STREET LENGTH(FEET) = 117.67 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 = 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) = 1.06
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.29
HALFSTREET FLOOD WIDTH(FEET) = 6.56
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.72
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.50
STREET FLOW TRAVEL TIME(MIN.) = 1.14 Tc(MIN.) = 9.67
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.782
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     0.40       0.100     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.26 SUBAREA RUNOFF(CFS) = 0.64
EFFECTIVE AREA(ACRES) = 0.54 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.33

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 7.45
FLOW VELOCITY(FEET/SEC.) = 1.79 DEPTH*VELOCITY(FT*FT/SEC.) = 0.55
LONGEST FLOWPATH FROM NODE      96.00 TO NODE      97.00 = 338.49 FEET.

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FLOW PROCESS FROM NODE      97.00 TO NODE      95.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
-----
UPSTREAM ELEVATION(FEET) = 6.64 DOWNSTREAM ELEVATION(FEET) = 6.38
STREET LENGTH(FEET) = 297.16 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 35.00

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DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 30.00
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) = 3.07
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.51
HALFSTREET FLOOD WIDTH(FEET) = 17.57
AVERAGE FLOW VELOCITY(FEET/SEC.) = 0.94
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.48
STREET FLOW TRAVEL TIME(MIN.) = 5.28 Tc(MIN.) = 14.95
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.167

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.25 0.40 0.100 32
NATURAL GOOD COVER
"GRASS" A 0.66 0.40 1.000 38
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.411
SUBAREA AREA(ACRES) = 1.91 SUBAREA RUNOFF(CFS) = 3.44
EFFECTIVE AREA(ACRES) = 2.45 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 2.5 PEAK FLOW RATE(CFS) = 4.48

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 20.44
FLOW VELOCITY(FEET/SEC.) = 1.02 DEPTH*VELOCITY(FT*FT/SEC.) = 0.58
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 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.) = 14.95
RAINFALL INTENSITY(INCH/HR) = 2.17
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.34
EFFECTIVE STREAM AREA(ACRES) = 2.45
TOTAL STREAM AREA(ACRES) = 2.45
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.48

** 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 1-3.

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

** PEAK FLOW RATE TABLE **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-3.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 13.83 Tc(MIN.) = 10.60
EFFECTIVE AREA(ACRES) = 5.97 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.21

TOTAL AREA(ACRES) = 6.7
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 95.00 = 635.65 FEET.

FLOW PROCESS FROM NODE 95.00 TO NODE 75.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
ELEVATION DATA: UPSTREAM(FEET) = 2.50 DOWNSTREAM(FEET) = 2.22
FLOW LENGTH(FEET) = 107.60 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.38
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.83
PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 11.01
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 75.00 = 743.25 FEET.

FLOW PROCESS FROM NODE 72.00 TO NODE 75.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
MAINLINE Tc(MIN.) = 11.01
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.582
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.23 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.23 SUBAREA RUNOFF(CFS) = 0.53
EFFECTIVE AREA(ACRES) = 6.20 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 13.95

FLOW PROCESS FROM NODE 75.00 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) = 2.22 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.16
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.95
PIPE TRAVEL TIME(MIN.) = 1.78 Tc(MIN.) = 12.79
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<

** MAIN STREAM 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 1-3 and summary row.

** MEMORY BANK # 3 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 1-5.

LONGEST FLOWPATH FROM NODE 80.00 TO NODE 65.00 = 1211.08 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	22.46	6.83	3.395	0.40(0.07)	0.18	7.0	64.00
2	25.33	9.72	2.773	0.40(0.07)	0.18	9.7	58.00
3	27.44	12.79	2.370	0.40(0.07)	0.19	12.3	90.00
4	27.45	12.88	2.361	0.40(0.07)	0.19	12.4	92.00
5	27.16	17.00	2.013	0.40(0.08)	0.19	14.7	60.00
6	27.13	17.22	1.999	0.40(0.08)	0.19	14.8	96.00
7	26.95	17.77	1.963	0.40(0.08)	0.19	15.0	50.00
8	26.95	17.78	1.962	0.40(0.08)	0.19	15.0	80.00
TOTAL AREA(ACRES) =		15.0					

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 27.45 Tc(MIN.) = 12.877
EFFECTIVE AREA(ACRES) = 12.40 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 15.0
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 65.00 = 1293.25 FEET.

FLOW PROCESS FROM NODE 65.00 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) = 0.10 DOWNSTREAM(FEET) = 0.00
FLOW LENGTH(FEET) = 23.51 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.31
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.45
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 12.94
LONGEST FLOWPATH FROM NODE 96.00 TO NODE 68.00 = 1316.76 FEET.

FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.94
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.354
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.62 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.62 SUBAREA RUNOFF(CFS) = 1.29
EFFECTIVE AREA(ACRES) = 13.02 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 27.45
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.94
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.354
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.17 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.17 SUBAREA RUNOFF(CFS) = 0.35
EFFECTIVE AREA(ACRES) = 13.19 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 15.8 PEAK FLOW RATE(CFS) = 27.45

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 15.8 TC(MIN.) = 12.94
 EFFECTIVE AREA(ACRES) = 13.19 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.181
 PEAK FLOW RATE(CFS) = 27.45

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	23.19	6.90	3.377	0.40(0.07)	0.17	7.8	64.00
2	25.33	9.79	2.763	0.40(0.07)	0.18	10.4	58.00
3	27.44	12.85	2.364	0.40(0.07)	0.18	13.1	90.00
4	27.45	12.94	2.354	0.40(0.07)	0.18	13.2	92.00
5	27.16	17.06	2.009	0.40(0.08)	0.19	15.5	60.00
6	27.13	17.28	1.994	0.40(0.08)	0.19	15.6	96.00
7	26.95	17.84	1.959	0.40(0.08)	0.19	15.8	50.00
8	26.95	17.84	1.958	0.40(0.08)	0.19	15.8	80.00

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END OF RATIONAL METHOD ANALYSIS

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