

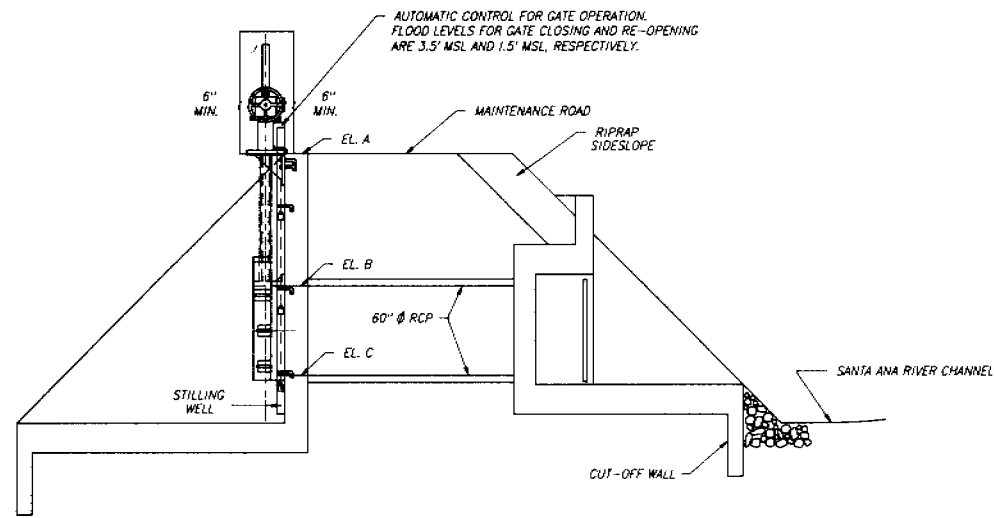
A STUDY RELATED DOCUMENTS

A1 Salt Marsh Restoration Plan from USACOE

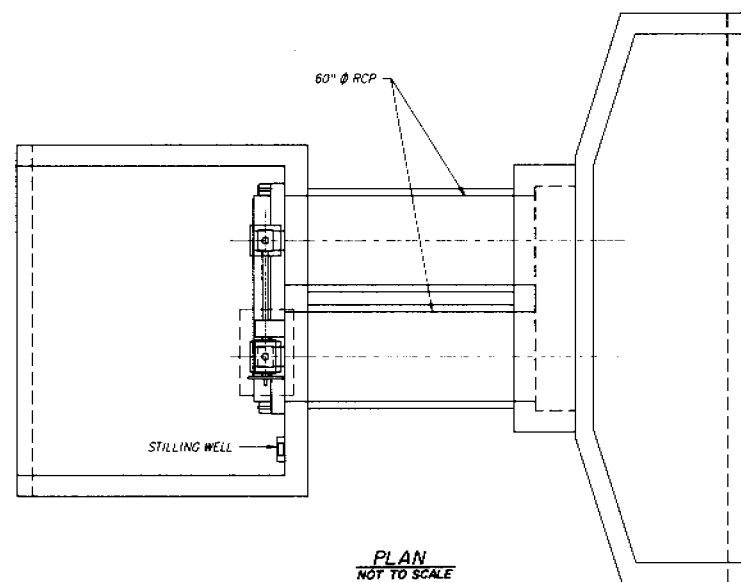
Santa Ana River Tide Gates

- o There are two tide gates installed in the east levee: one at Sta. 17+80 (approximately 100' upstream of the PCH bridge) and the other at Sta. 32+87 (approx. 1300' upstream of the PCH bridge).
- o The purpose of the gates is allow the circulation of natural tidal flows in and out of the marsh restoration area and to prevent increased inflow of the river's storm water into the marsh. (The term "increased" is used because as the river stage rises, some storm flow will enter the marsh until the water surface reaches the elevation that triggers closing of the gates). Please refer to the table below for the design actuating elevations.
- o The natural position of the gates is **open**, assuming natural tidal ebb and flows.
- o The water level in the marsh controls the opening and closing of the gates, not the stage in the river. However, during a rising river stage (open gate), the water surface elevation on the marsh side of the gate will be equal to the river stage, so in a way, a rising river stage can close the gate. Once closed, only the drop in water level on the marsh side could re-open the gate. Please refer to the table below for the design actuating elevations.
- o There are nine outlet pipes at sta. 19+00 (seven, 42" RCPs included in the original plans and two, 48" RCPs built by change order) which are flapgated on the river side constructed to drain the marsh when the tide gates are closed and river storm flow stage subsides sufficiently.

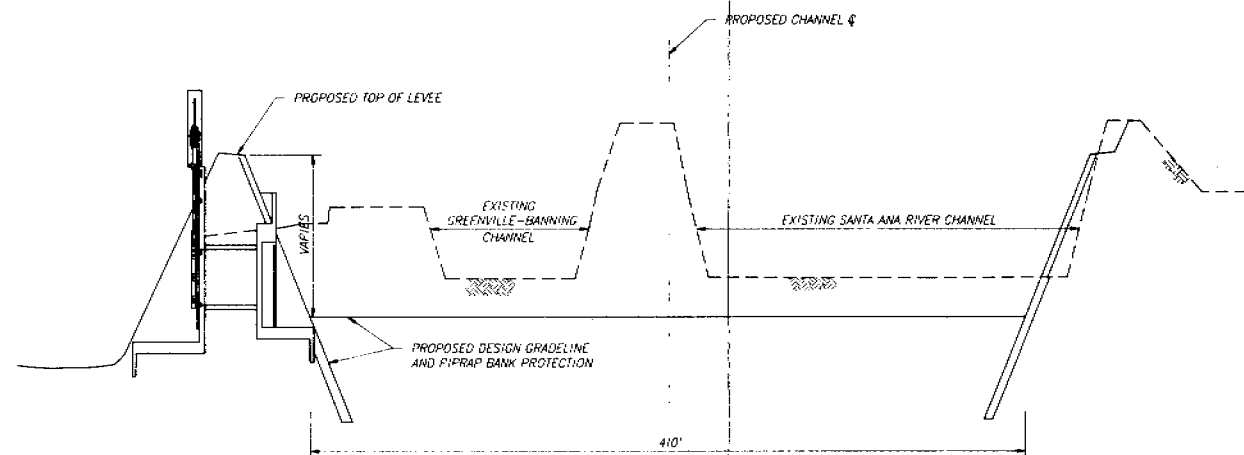
	<u>Gate 1</u>	<u>Gate 2</u>
Station	17+80	32+87
Intake Elevation	-4.0' MSL	-1.0' MSL
Maximum marsh design water level	6.0' MSL	6.0' MSL
Gate remains completely open until marsh water level rises above	3.0' MSL	3.0' MSL
Gate completely closed when marsh water level reaches	3.5' MSL	3.5' MSL
Gates begin to open when marsh water level falls below	3.5' MSL	3.5' MSL
Top of SAR levee Elevation	10.4'	13.6'
Design water surface w/sediment	8'±	9.5'±
Design water surface wo/sed	5.5'±	7.5'±



SIDE VIEW OF GATES
NOT TO SCALE



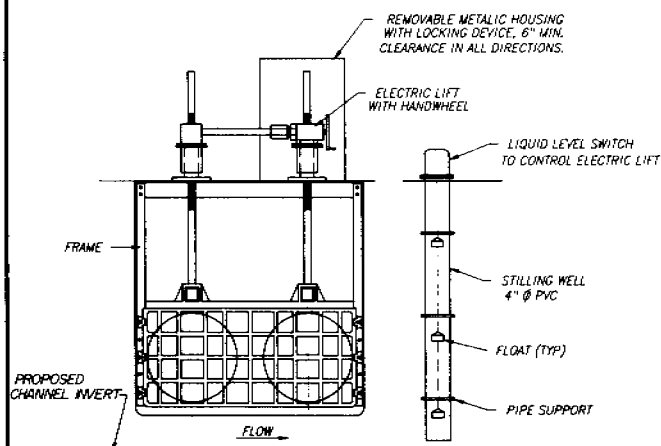
PLAN
NOT TO SCALE



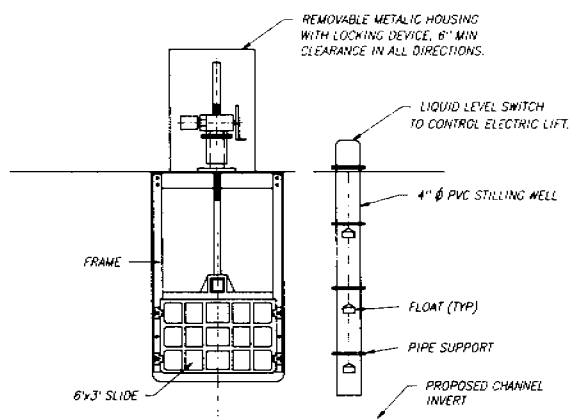
TYPICAL SECTION
NOT TO SCALE

	TIDAL GATES	
	NO. 1	NO. 2
STATION	10+50	29+00
GATE SIZE	60" O	6x3'
NO. OF GATE(S)	1	1
MATERIAL	AUSTENITIC GRAY IRON (NI-RESIST)	
ELEV. A*(MSL)	12.3'	13.9'
ELEV. B (MSL)	1.0'	2.0'
ELEV. C (MSL)	-4.0'	-1.0'

* APPROXIMATE TOP OF LEVEE



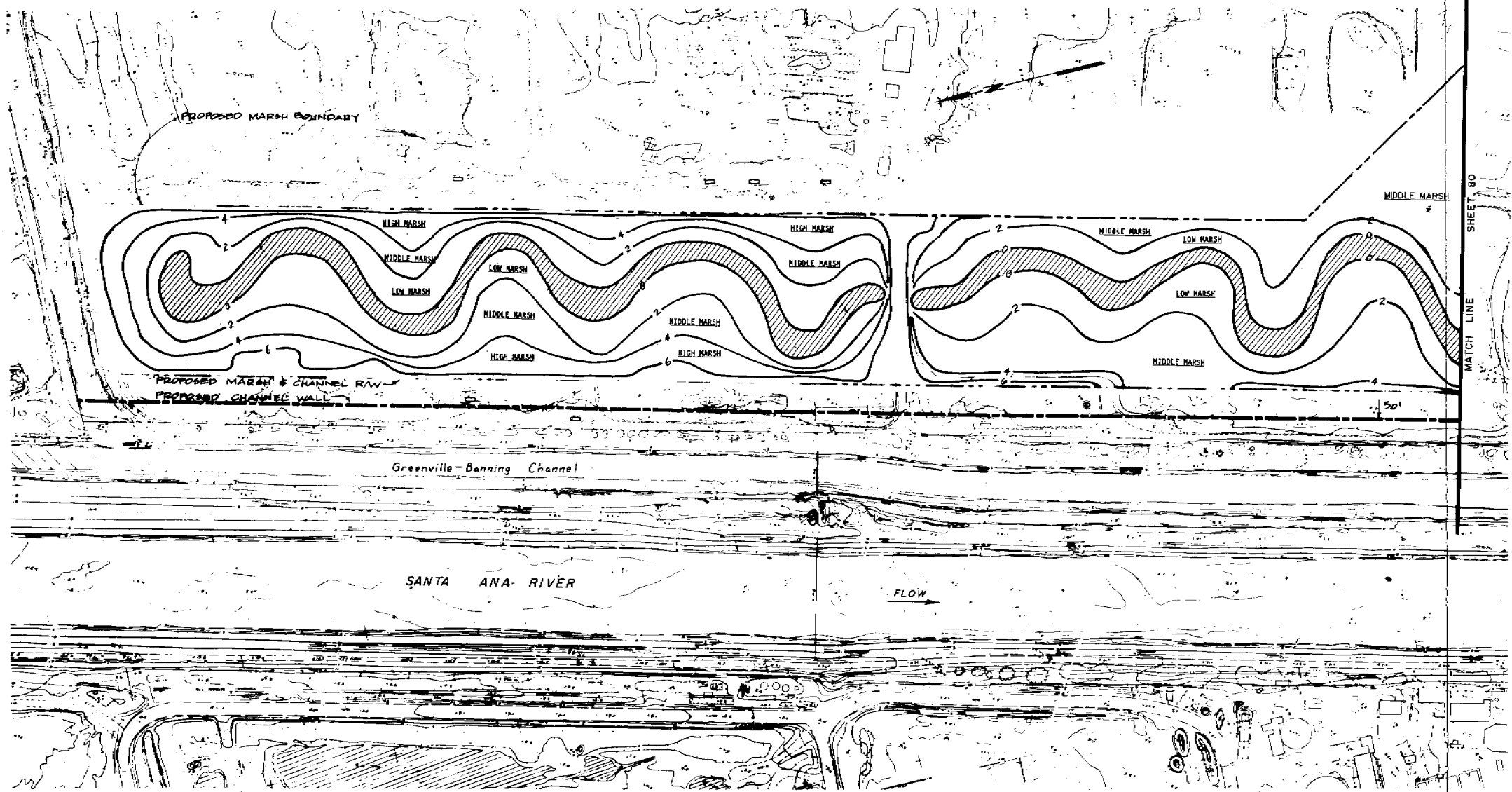
FRONT VIEW OF GATE NO. 1
NOT TO SCALE



FRONT VIEW OF GATE NO. 2
NOT TO SCALE

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
REVISIONS			
U. S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS			
DESIGNED BY:	SANTA ANA RIVER MAINSTEM, CALIFORNIA PHASE II GENERAL DESIGN MEMORANDUM		
DRAWN BY:	LOWER SANTA ANA RIVER CHANNEL		
CHECKED BY:	TIDE GATES		
SUBMITTED BY:	DATE APPROVED:	DISTRICT FILE NO.	SHEET 82 OF 105 SHEETS
CHIEF:	MANAGER:		PLATE 65

ENVIRONMENTAL
ENHANCEMENT
TYPE ENGINEERING

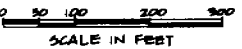


Legend

LOW MARSH (0.5-2 feet MSL)
Plant 4x4 inch plugs of
Pacific cordgrass on 4-foot
centers.

MIDDLE MARSH (2-4 feet MSL)
Plant 6x6 inch plugs of
perennial pickleweed on 8-foot
centers; broadcast seed at 4-6
seeds/square foot.

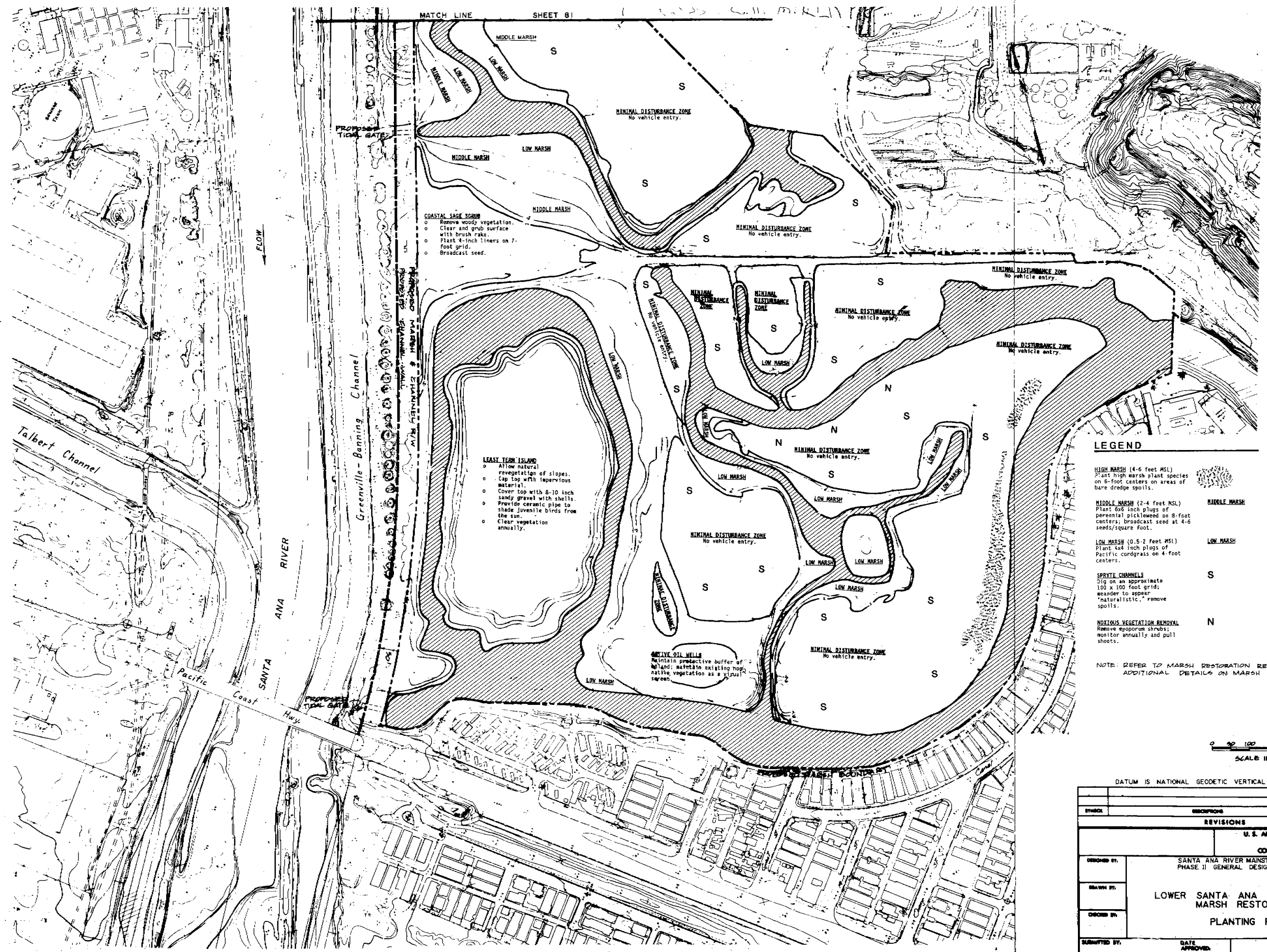
HIGH MARSH (4-6 feet MSL)
Plant high marsh plant species
on 6-foot centers.



DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

REVISIONS	U. S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS	
DESIGNED BY:	SANTA ANA RIVER MARSH, CALIFORNIA PHASE II GENERAL DESIGN MEMORANDUM	
DRAWN BY:	LOWER SANTA ANA RIVER CHANNEL MARSH RESTORATION PLANTING PLAN	
CHECKED BY:	DATE APPROVED:	DISTRICT FILE NO.
SUBMITTED BY:		SHEET 81 OF 105 SHEETS

ENVIRONMENTAL
ENHANCEMENT
THRU ENGINEERING



MATCH LINE SHEET 81

- COASTAL SAGE SCRUB**
- Remove woody vegetation.
 - Clear and grub surface with brush rake.
 - Plant 4-inch liners on 7-foot grid.
 - Broadcast seed.

- LEAST TERN ISLAND**
- Allow natural revegetation of slopes.
 - Cap top with impervious material.
 - Cover top with 8-10 inch sandy gravel with shells.
 - Provide ceramic pipe to shade juvenile birds from the sun.
 - Clear vegetation annually.

- ACTIVE OIL WELLS**
- Maintain protective buffer of 100 feet.
 - Maintain existing non-native vegetation as a visual screen.

LEGEND

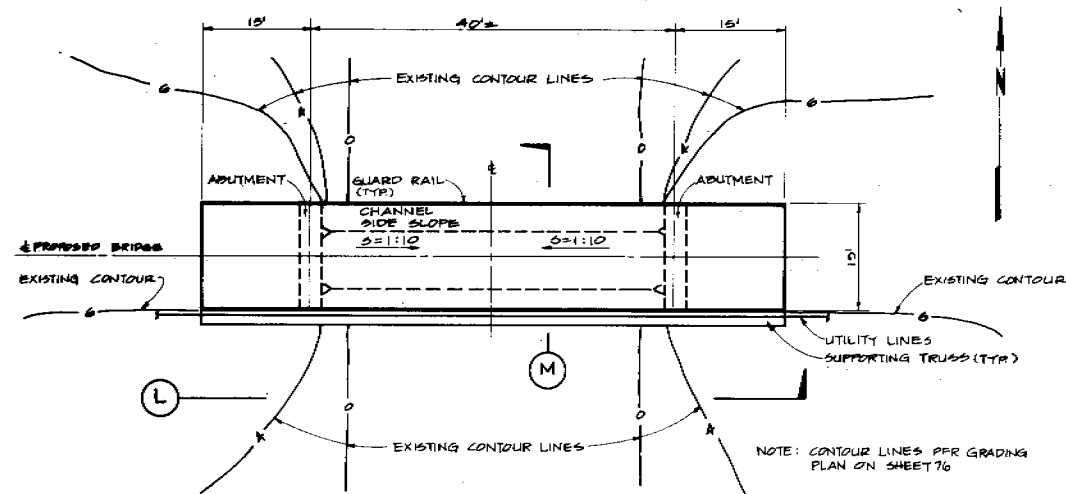
- HIGH MARSH** (4-6 feet MSL)
Plant high marsh plant species on 6-foot centers on areas of bare dredge spoils.
- MIDDLE MARSH** (2-4 feet MSL)
Plant 6x6 inch plugs of perennial pickleweed on 8-foot centers; broadcast seed at 4-6 seeds/square foot.
- LOW MARSH** (0.5-2 feet MSL)
Plant 4x4 inch plugs of Pacific cordgrass on 4-foot centers.
- SPRINKLE CHANNELS**
Dig on an approximate 100 x 100 foot grid; meander to appear "naturalistic," remove spoils.
- NOXIOUS VEGETATION REMOVAL**
Remove sycamore shrubs; monitor annually and pull shoots.
- MINIMAL DISTURBANCE ZONE**
No vehicle entry.

NOTE: REFER TO MARSH RESTORATION REPORT FOR ADDITIONAL DETAILS ON MARSH PLANTING.

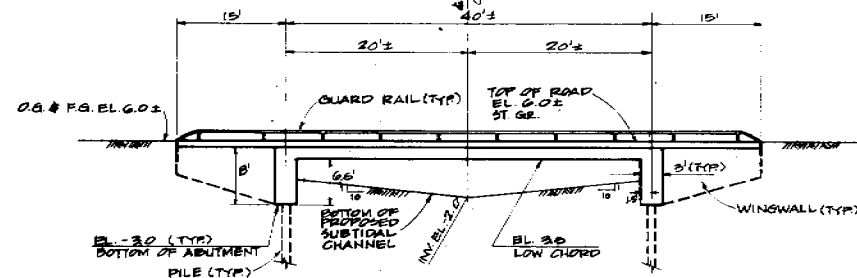


DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

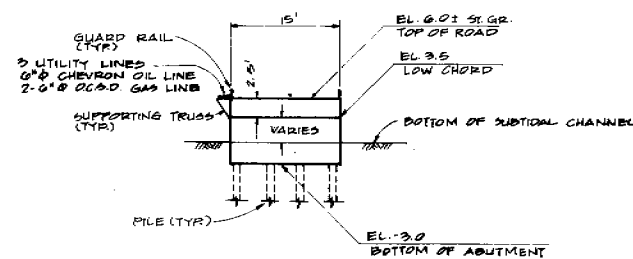
SYMBOL	DESCRIPTION	DATE	APPROVAL
REVISIONS			
U. S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS			
DESIGNED BY:	SANTA ANA RIVER MAINSTEM, CALIFORNIA PHASE II GENERAL DESIGN MEMORANDUM		
DRAWN BY:	LOWER SANTA ANA RIVER CHANNEL MARSH RESTORATION PLANTING PLAN		
CHECKED BY:			
SUBMITTED BY:	DATE APPROVED:	SHEET 80 OF 105 SHEETS	
DISTRICT FILE NO.		PLATE 83	



PLAN

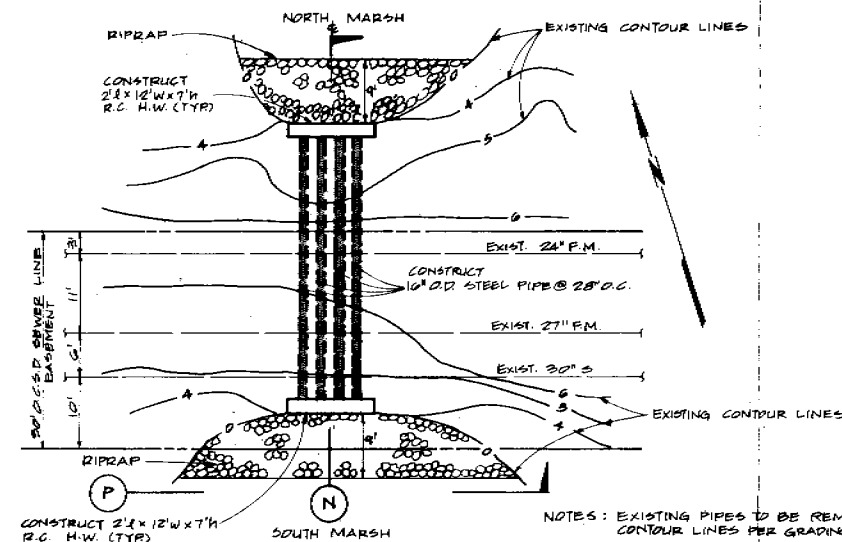


SECTION L

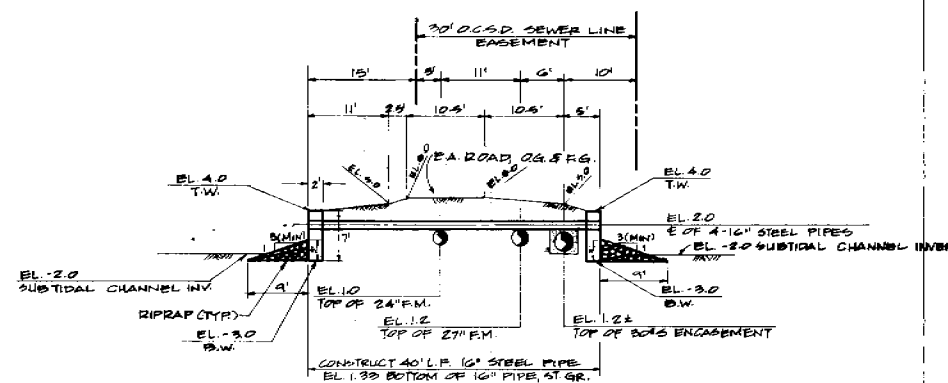


SECTION M

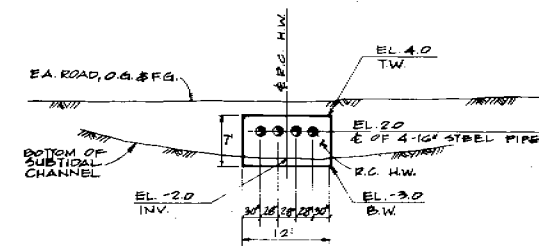
CHEVRON OIL LINE ACCESS RD CROSSING



PLAN



SECTION N



SECTION P

STEEL PIPES CONNECTING NORTH & SOUTH MARSHES

ENVIRONMENTAL
ENHANCEMENT
THRU ENGINEERING

DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929			
SYMBOL	DESCRIPTIONS	DATE	APPROVAL
REVISIONS			
U. S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS			
DESIGNED BY: J.T.Y./L.Y.L.			
DRAWN BY: E.C.			
CHECKED BY: L.Y.L.			
SUBMITTED BY:			
DATE APPROVED:		DISTRICT FILE NO.	
SHEET 79 OF 105 SHEETS		PLATE 82	



VALUE ENGINEERING PAYS

GENERAL NOTES

1. CONTRACTOR TO VERIFY THE ELEVATION OF CHEVRON OIL LINE PRIOR TO EXCAVATION.
2. CONTRACTOR TO CONTACT SOUTHERN CALIFORNIA EDISON COMPANY FOR POWER POLE REMOVAL.
3. CONTRACTOR TO VERIFY THE LOCATION AND ELEVATION OF THE CITY OF NEWPORT BEACH OIL LINE PRIOR TO EXCAVATION.
4. CONTRACTOR TO OBTAIN APPLICABLE REGULATIONS AND PERMITS PRIOR TO ABANDON AND/OR RELOCATION OF OIL WELLS.
5. CONTRACTOR TO MODIFY THE OIL WELLS PER PROPOSED FINISHED ELEVATIONS ON SHEETS 75 AND 76.
6. CONTRACTOR TO CONTACT WEST NEWPORT OIL COMPANY FOR OIL WELL RELOCATION.
7. CONTACT PERSONS:

UTILITY	TELEPHONE	PERSON
WEST NEWPORT OIL COMPANY	(714) 650-4000	LEONARD W. ANDERSON
WEST NEWPORT OIL COMPANY FIELD OFFICE	(714) 651-1100	JAY R. STARR
ORANGE COUNTY SANITATION DISTRICT	(714) 962-2411 (714) 840-2910	RUSSELL WOLD
SOUTHERN CALIFORNIA EDISON	(714) 895-0205	R. JOHN MCMANN
CHEVRON OIL PIPELINE	(213) 694-7669 (213) 694-2815	JOE KENZALAS MARGO BART
CITY OF NEWPORT BEACH	(714) 644-3011	JOSEPH T. DEVLIN

LEGEND

- ① OIL WELL NUMBER, BANNING-GR.
- ⊘ ABANDONED OIL WELL
- OIL WELL TO BE ABANDONED AND REPLACED
- OIL WELL TO BE PROTECTED IN PLACE
- OIL WELL TO BE ABANDONED
- POWER POLE TO BE PROTECTED IN PLACE
- x POWER POLE TO BE ABANDONED
- ACCESS ROAD TO BE ABANDONED
- ACCESS ROAD TO BE MAINTAINED
- FM FORCED MAIN
- S SEWER LINE
- MN MANHOLE

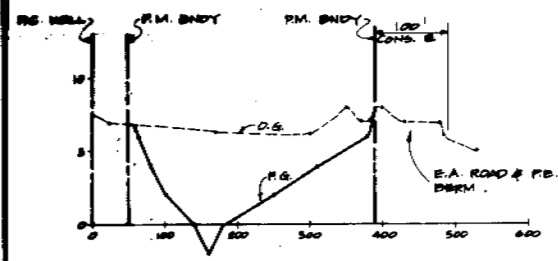


DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

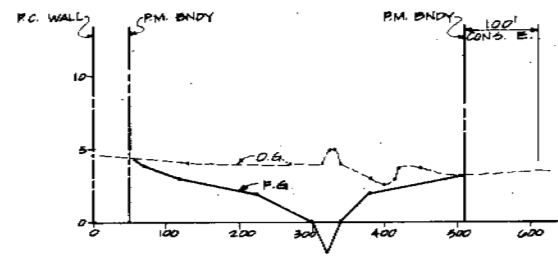
REVISIONS		U. S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS	
NO.	DESCRIPTION	DATE	APPROVED
DESIGNED BY: JTY/L.Y.L.		SANTA ANA RIVER MAINSTEM, CALIFORNIA PHASE II GENERAL DESIGN MEMORANDUM	
DRAWN BY: E.C.		LOWER SANTA ANA RIVER CHANNEL MARSH RESTORATION	
CHECKED BY: L.Y.L.		OIL WELL, UTILITY AND ACCESS RD	
SUBMITTED BY:		DATE APPROVED:	SHEET NO. 77 OF 105 SHEETS
		DISTRICT FILE NO.	PLATE 80

SAFETY PAYS

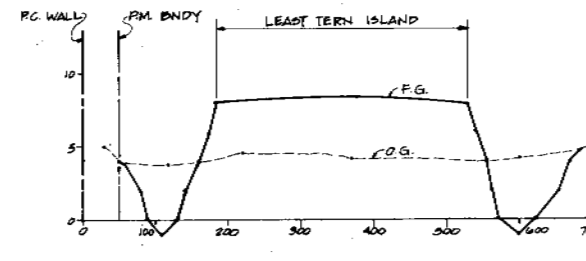
VALUE ENGINEERING PAYS



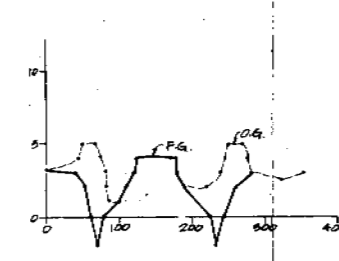
SECTION A



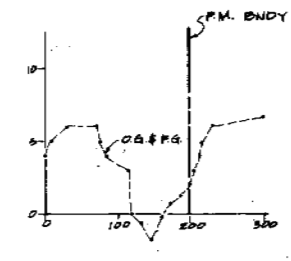
SECTION C



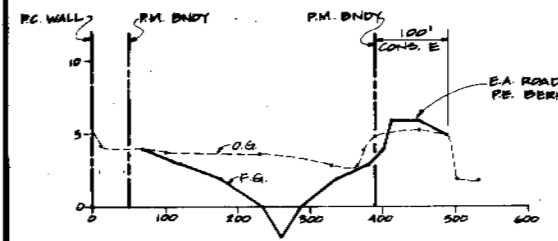
SECTION E



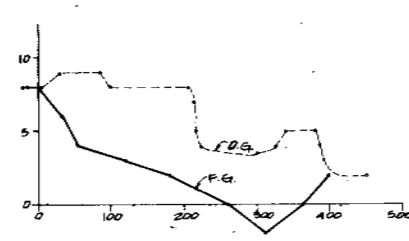
SECTION G



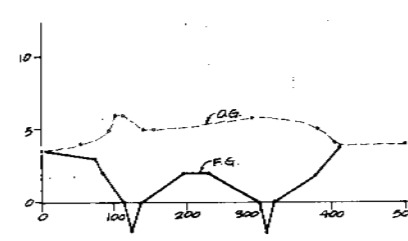
SECTION I (STA. 5)



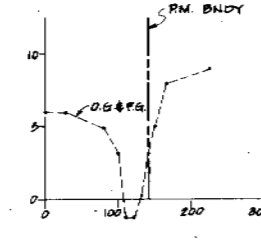
SECTION B



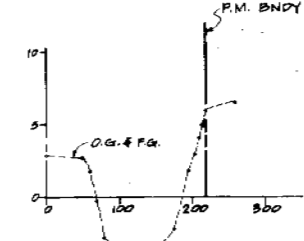
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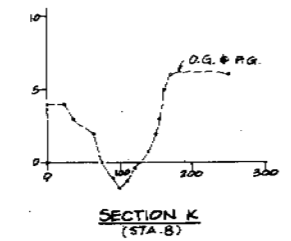
SECTION F



SECTION H (STA. 1)

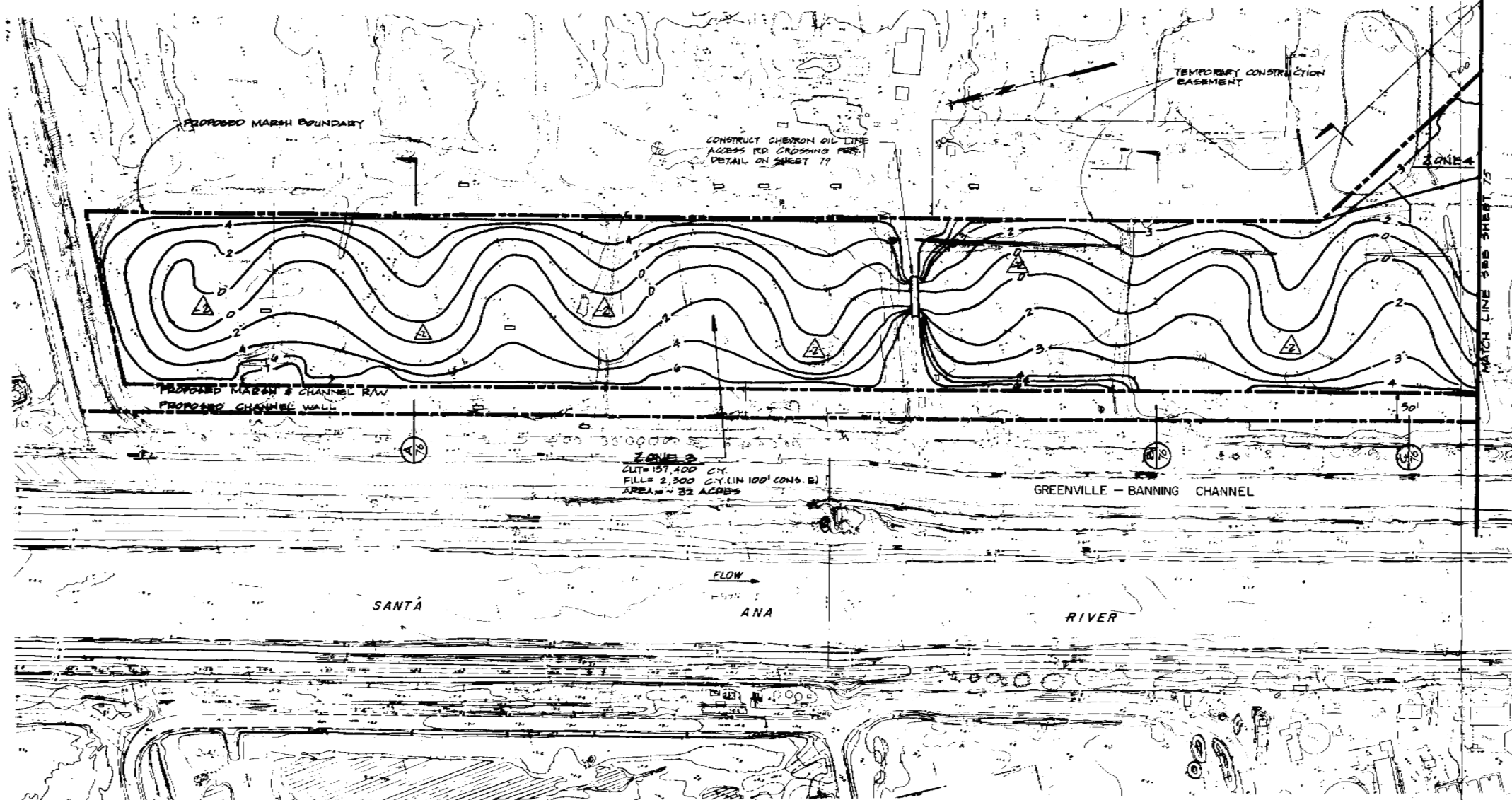


SECTION J (STA. 4)



SECTION K (STA. 8)

SECTION A THRU K
SCALE: HORIZ. 1"=100'
VERT. 1"=5'



- ABBREVIATIONS**
- O.G. ORIGINAL GRADE
 - F.G. FINISHED GRADE
 - P.M. BNDY PROPOSED MARSH BOUNDARY
 - P.C. WALL PROPOSED CHANNEL WALL
 - P.E. BERM PROPOSED EARTH BERM
 - E.A. ROAD EXISTING ACCESS ROAD
 - S.R.C. SURFACE RUNOFF CONTROL
 - COND. E CONSTRUCTION EASEMENT
 - R.C. HW. REINFORCED CONCRETE HEADWALL
 - T.W. TOP OF WALL
 - B.W. BOTTOM OF WALL
 - ST. GR. STRAIGHT GRADE
 - H.P. HIGH POINT
 - F.M. FORGED MAN
 - S. SEWER LINE
 - M.H. MANHOLE
 - △ MINIMUM DEPTH

TOTAL (ZONE 1 THRU 4)
CUT = 262,800 C.Y.
FILL = 89,800 C.Y. (15,200 C.Y. FOR PE BERM IN COND. E.)
AREA = 472 ACRES

0 50 100 200 300
SCALE IN FEET

DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

SYMBOL	DESCRIPTION	DATE	APPROVAL
REVISIONS U. S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS SANTA ANA RIVER MAINSTEM, CALIFORNIA PHASE II GENERAL DESIGN MEMORANDUM LOWER SANTA ANA RIVER CHANNEL MARSH RESTORATION PROPOSED GRADING PLAN			
DESIGNED BY: J.T.Y./L.Y.L.			
DRAWN BY: S.C.			
CHECKED BY: L.Y.L.			
SUBMITTED BY:	DATE APPROVED:	SHEET 76 OF 105 SHEETS	
		DISTRICT FILE NO.	

SAFETY PAYS

VALUE ENGINEERING PAYS

ENVIRONMENTAL
ENHANCEMENT
THRU ENGINEERING



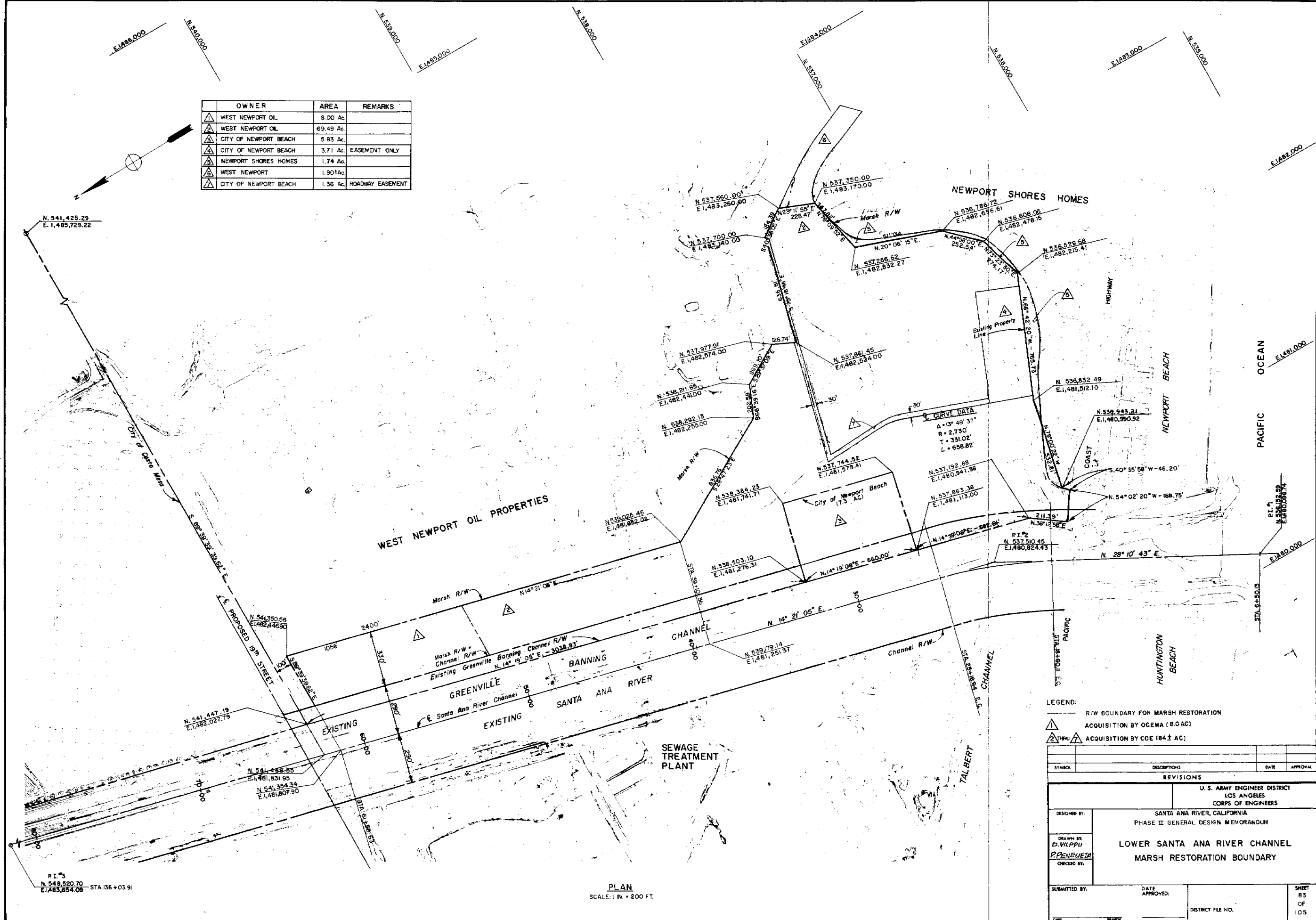
SAFETY PAYS

DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929			
PROJECT	DESCRIPTION	DATE	APPROVED
REVISIONS			
U. S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS			
DESIGNED BY: J.T.Y./L.Y.L.	SANTA ANA RIVER MAINSTEM, CALIFORNIA PHASE II GENERAL DESIGN MEMORANDUM		
DRAWN BY: B.C.	LOWER SANTA ANA RIVER CHANNEL MARSH RESTORATION		
CHECKED BY: L.Y.L.	PROPOSED GRADING PLAN		
QUANTITY BY:	DATE APPROVED:	DESIGNED BY:	SHEET 75 OF 105 SHEETS

VALUE ENGINEERING PAYS

OWNER	AREA	REMARKS
WEST NEWPORT OIL	8.00 Ac	
WEST NEWPORT OIL	69.49 Ac	
CITY OF NEWPORT BEACH	5.83 Ac	
CITY OF NEWPORT BEACH	3.71 Ac	EASEMENT ONLY
NEWPORT SHORES HOMES	1.74 Ac	
WEST NEWPORT	1.90±Ac	
CITY OF NEWPORT BEACH	1.36 Ac	ROADWAY EASEMENT

ENVIRONMENTAL
ENHANCEMENT
THRU ENGINEERING



PLAN
SCALE: 1 IN. = 200 FT.

SAFETY PAYS

LEGEND:
 R/W BOUNDARY FOR MARSH RESTORATION
 ACQUISITION BY OCEMA (8.0 AC)
 ACQUISITION BY COE (84± AC)

REVISIONS		DATE	APPROVAL
DESIGNED BY:	U. S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS		
DRAWN BY:	SANTA ANA RIVER, CALIFORNIA PHASE II GENERAL DESIGN MEMORANDUM		
CHECKED BY:	LOWER SANTA ANA RIVER CHANNEL MARSH RESTORATION BOUNDARY		
SUBMITTED BY:	DATE APPROVED:	SHEET 83 OF 105	
DISTRICT FILE NO.		PLATE 86	

A2 FEMA Map

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevation (BFE)** and/or **floodway** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevation (CBFE) shown on this map apply only landward of 0.0' North American Vertical Datum (NAVD). Users of this FIRM should be aware that coastal flood elevations may also be provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map is Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** is NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by Orange County GIS Department.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

An accompanying Flood Insurance Study report, Letters of Map Revision or Letters of Map Amendment, revising portions of this panel, and digital versions of this panel, may be available. Contact the **FEMA Map Service Center** at the following phone numbers and Internet address for information on all related products available from FEMA:

Phone: 800-358-9616
FAX: 800-358-9520
www.fema.gov/mssc

If you have **questions about this map** or general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at www.fema.gov.

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report may reflect stream channel distances that differ from what is shown on this map.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently identified. Zone AR indicates that the former flood control system is being removed to provide protection from the 1% annual chance or greater flood event.
- ZONE A99** Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
- Base Flood Elevation line and value; elevation in feet*
(EL 987)
- Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

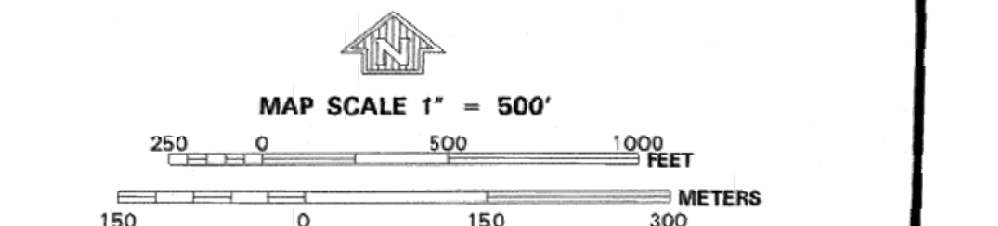
- Cross Section Line
- Transect Line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
42°00'00"N, 32°22'30"W
1000-meter Universal Transverse Mercator grid values, zone 11
600000 FT
5000-foot grid ticks
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
SEPTEMBER 15, 1989

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
February 15, 1992 November 3, 1993 January 3, 1997
February 18, 2004, to update corporate limits, to add special flood hazard areas, to change zone designations, to update map format, to incorporate previously issued letters of map revision, to update roads and road names.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 838-6620.



PANEL 0264H

FIRM
FLOOD INSURANCE RATE MAP
ORANGE COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 264 OF 550

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

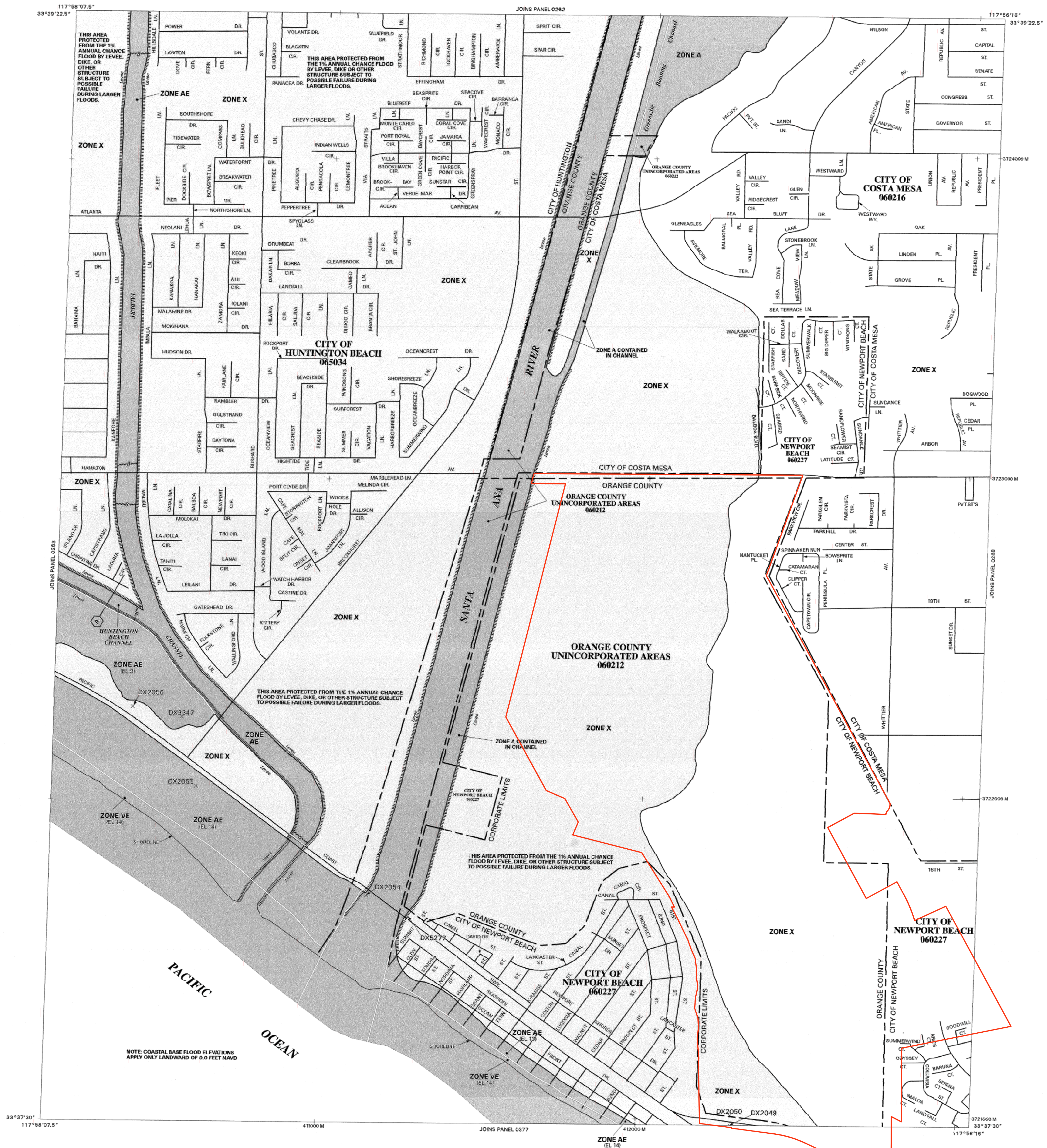
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HUNTINGTON BEACH, CITY OF	060508	0264	H
ORANGE COUNTY, UNINCORPORATED AREAS	060510	0264	H
COSTA MESA, CITY OF	060514	0264	H
NEWPORT BEACH, CITY OF	060527	0264	H

Notice to User: The Map Number shown below should be used when placing this map in order to update corporate limits, to add special flood hazard areas, to change zone designations, to update map format, to incorporate previously issued letters of map revision, to update roads and road names.

MAP NUMBER
06059C0264H
MAP REVISED:
FEBRUARY 18, 2004

Federal Emergency Management Agency



B HYDROLOGY CALCULATIONS

B1 Existing Condition Rational Method Calculations

a) High Confidence Events

- i. HC 100-Year Storm Event

Drainage A

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2007 Advanced Engineering Software (aes)
Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X100_A.DAT
TIME/DATE OF STUDY: 16:12 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 240.00
ELEVATION DATA: UPSTREAM(FEET) = 106.20 DOWNSTREAM(FEET) = 105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.372
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.605
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.68 0.20 0.200 91 8.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 2.79
TOTAL AREA(ACRES) = 0.68 PEAK FLOW RATE(CFS) = 2.79

FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 300.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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


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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          4.75
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.37
HALFSTREET FLOOD WIDTH(FEET) = 11.68
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.68
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.62
STREET FLOW TRAVEL TIME(MIN.) = 2.98   Tc(MIN.) = 11.35
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.869
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        1.13    0.20    0.200    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.13    SUBAREA RUNOFF(CFS) = 3.89
EFFECTIVE AREA(ACRES) = 1.81    AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.8    PEAK FLOW RATE(CFS) = 6.24

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.40    HALFSTREET FLOOD WIDTH(FEET) = 13.16
FLOW VELOCITY(FEET/SEC.) = 1.79    DEPTH*VELOCITY(FT*FT/SEC.) = 0.71
LONGEST FLOWPATH FROM NODE    1.00 TO NODE    3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE    3.00 TO NODE    4.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 260.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          11.54
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 17.07
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.96
STREET FLOW TRAVEL TIME(MIN.) = 2.10   Tc(MIN.) = 13.45
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.510
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.39    0.20    0.200    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.39    SUBAREA RUNOFF(CFS) = 10.59
EFFECTIVE AREA(ACRES) = 5.20    AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.2    PEAK FLOW RATE(CFS) = 16.24

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.51    HALFSTREET FLOOD WIDTH(FEET) = 19.65
FLOW VELOCITY(FEET/SEC.) = 2.23    DEPTH*VELOCITY(FT*FT/SEC.) = 1.14
LONGEST FLOWPATH FROM NODE    1.00 TO NODE    4.00 = 800.00 FEET.

*****
FLOW PROCESS FROM NODE    4.00 TO NODE    5.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 310.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 25.60
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.58
HALFSTREET FLOOD WIDTH(FEET) = 23.48
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.50
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.46
STREET FLOW TRAVEL TIME(MIN.) = 2.06 Tc(MIN.) = 15.51
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.234
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.51 0.20 0.200 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 6.51 SUBAREA RUNOFF(CFS) = 18.71
EFFECTIVE AREA(ACRES) = 11.71 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 11.7 PEAK FLOW RATE(CFS) = 33.66

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.63 HALFSTREET FLOOD WIDTH(FEET) = 26.13
FLOW VELOCITY(FEET/SEC.) = 2.67 DEPTH*VELOCITY(FT*FT/SEC.) = 1.68
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 1110.00 FEET.

FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 440.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 44.77
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.69
HALFSTREET FLOOD WIDTH(FEET) = 30.18
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.85
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.95
STREET FLOW TRAVEL TIME(MIN.) = 2.57 Tc(MIN.) = 18.08
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.962
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 8.39 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 8.39 SUBAREA RUNOFF(CFS) = 22.22
EFFECTIVE AREA(ACRES) = 20.10 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 20.1 PEAK FLOW RATE(CFS) = 53.01

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.71 HALFSTREET FLOOD WIDTH(FEET) = 32.41
FLOW VELOCITY(FEET/SEC.) = 3.02 DEPTH*VELOCITY(FT*FT/SEC.) = 2.16
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 1550.00 FEET.

FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 360.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 76.14
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.78
HALFSTREET FLOOD WIDTH(FEET) = 35.89
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.41
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.68
STREET FLOW TRAVEL TIME(MIN.) = 1.76 Tc(MIN.) = 19.84
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.809
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 18.43 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 18.43 SUBAREA RUNOFF(CFS) = 46.26
EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 96.49

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.84 HALFSTREET FLOOD WIDTH(FEET) = 38.57
FLOW VELOCITY(FEET/SEC.) = 3.67 DEPTH*VELOCITY(FT*FT/SEC.) = 3.07
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 360.0 FT WITH ELEVATION-DROP = 1.8 FT, IS 71.9 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 7.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.04
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 96.49
PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 20.45
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.45
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.760
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.81 0.20 0.100 91
NATURAL FAIR COVER
"OPEN BRUSH" D 4.99 0.20 1.000 96
COMMERCIAL D 6.24 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA AREA(ACRES) = 12.04 SUBAREA RUNOFF(CFS) = 28.89
EFFECTIVE AREA(ACRES) = 50.57 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 50.6 PEAK FLOW RATE(CFS) = 123.70

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 9.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.1000
FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 21.9 INCHES

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PIPE-FLOW VELOCITY(FEET/SEC.) = 29.54
ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 123.70
PIPE TRAVEL TIME(MIN.) = 0.08    Tc(MIN.) = 20.53
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 9.00 = 2600.00 FEET.

*****
FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 1180.00
REPRESENTATIVE CHANNEL SLOPE = 0.0300
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.550
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE    GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN
NATURAL FAIR COVER
"OPEN BRUSH"    D    25.52    0.20    1.000    96
NATURAL POOR COVER
"BAREN"    D    6.51    0.20    1.000    98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 157.60
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.66
AVERAGE FLOW DEPTH(FEET) = 0.91    TRAVEL TIME(MIN.) = 2.95
Tc(MIN.) = 23.48
SUBAREA AREA(ACRES) = 32.03    SUBAREA RUNOFF(CFS) = 67.75
EFFECTIVE AREA(ACRES) = 82.60    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 82.6    PEAK FLOW RATE(CFS) = 181.89

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.00    FLOW VELOCITY(FEET/SEC.) = 7.02
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 10.00 = 3780.00 FEET.

*****
FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.445
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE    GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN
NATURAL FAIR COVER
"OPEN BRUSH"    D    29.92    0.20    1.000    96
NATURAL POOR COVER
"BAREN"    D    14.41    0.20    1.000    98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 226.69
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.13
AVERAGE FLOW DEPTH(FEET) = 1.40    TRAVEL TIME(MIN.) = 1.79
Tc(MIN.) = 25.28
SUBAREA AREA(ACRES) = 44.33    SUBAREA RUNOFF(CFS) = 89.56
EFFECTIVE AREA(ACRES) = 126.93    AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.69
TOTAL AREA(ACRES) = 126.9    PEAK FLOW RATE(CFS) = 263.62

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.54    FLOW VELOCITY(FEET/SEC.) = 6.47
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 11.00 = 4440.00 FEET.

*****
FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 580.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.367

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SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          14.64    0.20    1.000    96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 277.90
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 6.60
AVERAGE FLOW DEPTH(Feet) = 1.58    TRAVEL TIME(MIN.) = 1.46
Tc(MIN.) = 26.74
SUBAREA AREA(ACRES) = 14.64    SUBAREA RUNOFF(CFS) = 28.56
EFFECTIVE AREA(ACRES) = 141.57    AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 141.6    PEAK FLOW RATE(CFS) = 283.31

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.61    FLOW VELOCITY(Feet/Sec.) = 6.63
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 5020.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 20.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(Feet) = 440.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 284.89
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.94
HALFSTREET FLOOD WIDTH(Feet) = 43.64
AVERAGE FLOW VELOCITY(Feet/Sec.) = 8.22
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 7.72
STREET FLOW TRAVEL TIME(MIN.) = 0.89    Tc(MIN.) = 27.63
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.323
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          A          1.83    0.40    1.000    66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 1.83    SUBAREA RUNOFF(CFS) = 3.17
EFFECTIVE AREA(ACRES) = 143.40    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 143.4    PEAK FLOW RATE(CFS) = 283.31
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.94    HALFSTREET FLOOD WIDTH(Feet) = 43.58
FLOW VELOCITY(Feet/Sec.) = 8.20    DEPTH*VELOCITY(FT*FT/SEC.) = 7.70
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5460.00 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 13.00 TO NODE 14.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(Feet) = 370.00
ELEVATION DATA: UPSTREAM(Feet) = 102.50    DOWNSTREAM(Feet) = 100.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.373

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* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.316
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.17    0.20    0.200    91   9.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 12.20
TOTAL AREA(ACRES) = 3.17    PEAK FLOW RATE(CFS) = 12.20

*****
FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0500
FLOW LENGTH(FEET) = 1660.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.62
ESTIMATED PIPE DIAMETER(INCH) = 15.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.20
PIPE TRAVEL TIME(MIN.) = 2.19    Tc(MIN.) = 11.56
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 15.00 = 2030.00 FEET.

*****
FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.56
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.827
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    B        31.84    0.30    0.200    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 31.84    SUBAREA RUNOFF(CFS) = 107.94
EFFECTIVE AREA(ACRES) = 35.01    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.29    AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 35.0    PEAK FLOW RATE(CFS) = 118.74

*****
FLOW PROCESS FROM NODE 15.00 TO NODE 16.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 780.00
REPRESENTATIVE CHANNEL SLOPE = 0.0400
CHANNEL BASE(FEET) = 0.00    "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) = 3.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.702
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        11.64    0.20    0.200    91
NATURAL FAIR COVER
"OPEN BRUSH"            A        13.96    0.40    1.000    66
COMMERCIAL               D        2.65    0.20    0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.37
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.586
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 163.07
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 18.88
AVERAGE FLOW DEPTH(FEET) = 2.08    TRAVEL TIME(MIN.) = 0.69
Tc(MIN.) = 12.25
SUBAREA AREA(ACRES) = 28.25    SUBAREA RUNOFF(CFS) = 88.63
EFFECTIVE AREA(ACRES) = 63.26    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.35    AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 63.3    PEAK FLOW RATE(CFS) = 203.44

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.26    FLOW VELOCITY(FEET/SEC.) = 19.90
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.00 = 2810.00 FEET.

*****
FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
FLOW LENGTH(FEET) = 1510.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 49.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.74
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 203.44
PIPE TRAVEL TIME(MIN.) = 2.34 Tc(MIN.) = 14.60
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 17.00 = 4320.00 FEET.

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.60
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.349
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          D      44.48    0.20    1.000    96
RESIDENTIAL
"11+ DWELLINGS/ACRE" A       6.11    0.40    0.200    52
COMMERCIAL            A       4.75    0.40    0.100    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.834
SUBAREA AREA(ACRES) = 55.34 SUBAREA RUNOFF(CFS) = 158.17
EFFECTIVE AREA(ACRES) = 118.60 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 118.6 PEAK FLOW RATE(CFS) = 341.49

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 18.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 53.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.72
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 341.49
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 14.88
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 18.00 = 4590.00 FEET.

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.88
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.312
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BARREN"              A       4.65    0.40    1.000    93
RESIDENTIAL
"11+ DWELLINGS/ACRE" A      13.94    0.40    0.200    52
COMMERCIAL            A       2.82    0.40    0.100    52
NATURAL FAIR COVER
"OPEN BRUSH"          A       2.64    0.40    1.000    66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
SUBAREA AREA(ACRES) = 24.05 SUBAREA RUNOFF(CFS) = 67.95
EFFECTIVE AREA(ACRES) = 142.65 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.56
TOTAL AREA(ACRES) = 142.7 PEAK FLOW RATE(CFS) = 405.49

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 19.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 610.00
REPRESENTATIVE CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 35.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.190

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SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          A          2.68    0.40    1.000    66
RESIDENTIAL
"11+ DWELLINGS/ACRE"  A          9.73    0.40    0.200    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 422.47
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.16
AVERAGE FLOW DEPTH(FEET) = 1.12 TRAVEL TIME(MIN.) = 1.00
Tc(MIN.) = 15.88
SUBAREA AREA(ACRES) = 12.41 SUBAREA RUNOFF(CFS) = 33.97
EFFECTIVE AREA(ACRES) = 155.06 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 155.1 PEAK FLOW RATE(CFS) = 423.90

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.12 FLOW VELOCITY(FEET/SEC.) = 10.18
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 19.00 = 5200.00 FEET.

*****
FLOW PROCESS FROM NODE 19.00 TO NODE 20.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 360.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.981
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            A          1.58    0.40    0.100    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 425.99
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.01
AVERAGE FLOW DEPTH(FEET) = 1.05 TRAVEL TIME(MIN.) = 2.00
Tc(MIN.) = 17.88
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 4.18
EFFECTIVE AREA(ACRES) = 156.64 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 156.6 PEAK FLOW RATE(CFS) = 423.90
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.04 FLOW VELOCITY(FEET/SEC.) = 3.01
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 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    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)    (ACRES)    NODE
1        423.90 17.88 2.981 0.28( 0.15) 0.54 156.6 13.00
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)    (ACRES)    NODE
1        283.31 27.63 2.323 0.20( 0.15) 0.72 143.4 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5460.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)    (ACRES)    NODE
1        662.66 17.88 2.981 0.25( 0.15) 0.61 249.4 13.00
2        608.62 27.63 2.323 0.24( 0.15) 0.63 300.0 1.00
TOTAL AREA(ACRES) = 300.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 662.66 Tc(MIN.) = 17.881
EFFECTIVE AREA(ACRES) = 249.43 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.61
TOTAL AREA(ACRES) = 300.0

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LONGEST FLOWPATH FROM NODE      13.00 TO NODE      20.00 =      5560.00 FEET.

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      20.00 IS CODE =  12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      21.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) =   570.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(Feet) = 130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(Feet) =   6.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =   2.757
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        11.87    0.40    0.200    52
NATURAL FAIR COVER
"OPEN BRUSH"              D        16.10    0.20    1.000    96
COMMERCIAL                 A         1.56    0.40    0.100    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.631
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   697.40
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) =   3.63
AVERAGE FLOW DEPTH(Feet) =   1.40  TRAVEL TIME(MIN.) =   2.61
Tc(MIN.) =   20.50
SUBAREA AREA(ACRES) =   29.53  SUBAREA RUNOFF(CFS) =   69.46
EFFECTIVE AREA(ACRES) =   278.96  AREA-AVERAGED Fm(INCH/HR) =   0.15
AREA-AVERAGED Fp(INCH/HR) =   0.24  AREA-AVERAGED Ap =   0.61
TOTAL AREA(ACRES) =   329.6  PEAK FLOW RATE(CFS) =   662.66
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.36  FLOW VELOCITY(Feet/Sec.) =   3.56
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      21.00 =   6130.00 FEET.

*****
FLOW PROCESS FROM NODE      21.00 TO NODE      22.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) =   600.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(Feet) = 130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(Feet) =   6.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =   2.563
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 A         1.73    0.40    0.100    52
NATURAL FAIR COVER
"OPEN BRUSH"              D         8.52    0.20    1.000    96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.848
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   673.68
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) =   3.59
AVERAGE FLOW DEPTH(Feet) =   1.37  TRAVEL TIME(MIN.) =   2.78
Tc(MIN.) =   23.28
SUBAREA AREA(ACRES) =   10.25  SUBAREA RUNOFF(CFS) =   22.05
EFFECTIVE AREA(ACRES) =   289.21  AREA-AVERAGED Fm(INCH/HR) =   0.15
AREA-AVERAGED Fp(INCH/HR) =   0.24  AREA-AVERAGED Ap =   0.62
TOTAL AREA(ACRES) =   339.8  PEAK FLOW RATE(CFS) =   662.66
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.36  FLOW VELOCITY(Feet/Sec.) =   3.56
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      22.00 =   6730.00 FEET.

*****
FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) =   450.00

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REPRESENTATIVE CHANNEL SLOPE = 0.0050
 CHANNEL BASE(Feet) = 130.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 6.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.440

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	3.62	0.40	0.200	52
NATURAL FAIR COVER					
"OPEN BRUSH"	D	4.47	0.20	1.000	96
COMMERCIAL	A	1.68	0.40	0.100	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.549

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 672.83

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 3.59

AVERAGE FLOW DEPTH(Feet) = 1.37 TRAVEL TIME(MIN.) = 2.09

Tc(MIN.) = 25.37

SUBAREA AREA(ACRES) = 9.77 SUBAREA RUNOFF(CFS) = 20.33

EFFECTIVE AREA(ACRES) = 298.98 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.62

TOTAL AREA(ACRES) = 349.6 PEAK FLOW RATE(CFS) = 662.66

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(Feet) = 1.36 FLOW VELOCITY(Feet/Sec.) = 3.56

LONGEST FLOWPATH FROM NODE 13.00 TO NODE 23.00 = 7180.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 349.6 TC(MIN.) = 25.37

EFFECTIVE AREA(ACRES) = 298.98 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.617

PEAK FLOW RATE(CFS) = 662.66

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	662.66	25.37	2.440	0.24(0.15)	0.62	299.0	13.00
2	609.02	35.37	2.017	0.24(0.15)	0.63	349.6	1.00

END OF RATIONAL METHOD ANALYSIS

Drainage B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X100_B.DAT
TIME/DATE OF STUDY: 16:13 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====

1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
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GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 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) = 110.00 DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.477
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.913
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.54 0.20 0.100 91 7.48
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.38
TOTAL AREA(ACRES) = 0.54 PEAK FLOW RATE(CFS) = 2.38

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          3.53
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.59
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.07
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.65
STREET FLOW TRAVEL TIME(MIN.) = 2.82 Tc(MIN.) = 10.29
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.091
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      0.63    0.20    0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 2.31
EFFECTIVE AREA(ACRES) = 1.17 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 4.29

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 9.47
FLOW VELOCITY(FEET/SEC.) = 2.16 DEPTH*VELOCITY(FT*FT/SEC.) = 0.71
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          5.43
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 10.59
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.27
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.80
STREET FLOW TRAVEL TIME(MIN.) = 2.93 Tc(MIN.) = 13.23
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.543
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      0.72    0.20    0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.72 SUBAREA RUNOFF(CFS) = 2.28
EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 5.99

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 11.13
FLOW VELOCITY(FEET/SEC.) = 2.30 DEPTH*VELOCITY(FT*FT/SEC.) = 0.83
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.58
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 16.76
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.88
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.33
STREET FLOW TRAVEL TIME(MIN.) = 2.89 Tc(MIN.) = 16.12
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.164
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.76 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 6.76 SUBAREA RUNOFF(CFS) = 19.13
EFFECTIVE AREA(ACRES) = 8.65 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 24.47

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 20.12
FLOW VELOCITY(FEET/SEC.) = 3.21 DEPTH*VELOCITY(FT*FT/SEC.) = 1.68
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 1550.00 FEET.

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 600.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 34.08
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.57
HALFSTREET FLOOD WIDTH(FEET) = 22.93
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.49
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.99
STREET FLOW TRAVEL TIME(MIN.) = 2.87 Tc(MIN.) = 18.99
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.880
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 7.46 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.46 SUBAREA RUNOFF(CFS) = 19.20
EFFECTIVE AREA(ACRES) = 16.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 41.47

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.61 HALFSTREET FLOOD WIDTH(FEET) = 24.80
FLOW VELOCITY(FEET/SEC.) = 3.65 DEPTH*VELOCITY(FT*FT/SEC.) = 2.21
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 2150.00 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 56.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.25
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FeET) = 0.61
HALFSTREET FLOOD WIDTH(FeET) = 25.20
AVERAGE FLOW VELOCITY(FeET/SEC.) = 3.69
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.26
STREET FLOW TRAVEL TIME(MIN.) = 2.26 Tc(MIN.) = 21.25
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.701
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.47 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.47 SUBAREA RUNOFF(CFS) = 3.55
EFFECTIVE AREA(ACRES) = 17.58 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 17.6 PEAK FLOW RATE(CFS) = 42.41

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FeET) = 0.61 HALFSTREET FLOOD WIDTH(FeET) = 25.04
FLOW VELOCITY(FeET/SEC.) = 3.66 DEPTH*VELOCITY(FT*FT/SEC.) = 2.23
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 2650.00 FEET.

*****
FLOW PROCESS FROM NODE 56.00 TO NODE 57.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FeET) = 580.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FeET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 56.32
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FeET) = 0.66
HALFSTREET FLOOD WIDTH(FeET) = 27.93
AVERAGE FLOW VELOCITY(FeET/SEC.) = 3.93
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.60
STREET FLOW TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 23.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.536
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 12.28 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 12.28 SUBAREA RUNOFF(CFS) = 27.81
EFFECTIVE AREA(ACRES) = 29.86 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 29.9 PEAK FLOW RATE(CFS) = 67.63

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FeET) = 0.70 HALFSTREET FLOOD WIDTH(FeET) = 31.51
FLOW VELOCITY(FeET/SEC.) = 4.11 DEPTH*VELOCITY(FT*FT/SEC.) = 2.86
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 3230.00 FEET.

*****
FLOW PROCESS FROM NODE 57.00 TO NODE 58.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FeET) = 680.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FeET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 109.80
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.79
HALFSTREET FLOOD WIDTH(FEET) = 36.13
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.84
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.82
STREET FLOW TRAVEL TIME(MIN.) = 2.34 Tc(MIN.) = 26.05
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.403
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      29.81    0.20    0.100    91
SCHOOL                D      9.91    0.20    0.600    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 39.72    SUBAREA RUNOFF(CFS) = 84.30
EFFECTIVE AREA(ACRES) = 69.58    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 69.6    PEAK FLOW RATE(CFS) = 148.35

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.86    HALFSTREET FLOOD WIDTH(FEET) = 39.55
FLOW VELOCITY(FEET/SEC.) = 5.33    DEPTH*VELOCITY(FT*FT/SEC.) = 4.57
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
      AND L = 680.0 FT WITH ELEVATION-DROP = 6.8 FT, IS 144.0 CFS,
      WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 58.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 58.00 = 3910.00 FEET.

*****
FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 760.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.82
ESTIMATED PIPE DIAMETER(INCH) = 51.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 148.35
PIPE TRAVEL TIME(MIN.) = 0.99    Tc(MIN.) = 27.03
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 59.00 = 4670.00 FEET.

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 59.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 27.03
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.353
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      11.44    0.20    0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.44    SUBAREA RUNOFF(CFS) = 24.02
EFFECTIVE AREA(ACRES) = 81.02    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 81.0    PEAK FLOW RATE(CFS) = 169.19

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 580.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.29
ESTIMATED PIPE DIAMETER(INCH) = 54.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 169.19

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PIPE TRAVEL TIME(MIN.) = 0.73    Tc(MIN.) = 27.76
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 60.00 = 5250.00 FEET.

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 27.76
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.317
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D        15.82    0.20    0.100    91
RESIDENTIAL
"11+ DWELLINGS/ACRE" D        4.45    0.20    0.200    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.122
SUBAREA AREA(ACRES) = 20.27    SUBAREA RUNOFF(CFS) = 41.82
EFFECTIVE AREA(ACRES) = 101.29    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 101.3    PEAK FLOW RATE(CFS) = 208.42

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 950.00
REPRESENTATIVE CHANNEL SLOPE = 0.0350
CHANNEL BASE(FEET) = 15.00    "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030    MAXIMUM DEPTH(FEET) = 7.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.242
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"        D        20.98    0.20    1.000    96
NATURAL POOR COVER
"BARREN"            D        12.82    0.20    1.000    98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 239.49
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.66
AVERAGE FLOW DEPTH(FEET) = 1.31    TRAVEL TIME(MIN.) = 1.64
Tc(MIN.) = 29.40
SUBAREA AREA(ACRES) = 33.80    SUBAREA RUNOFF(CFS) = 62.12
EFFECTIVE AREA(ACRES) = 135.09    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 135.1    PEAK FLOW RATE(CFS) = 263.72

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.38    FLOW VELOCITY(FEET/SEC.) = 9.95
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 61.00 = 6200.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 135.1    TC(MIN.) = 29.40
EFFECTIVE AREA(ACRES) = 135.09    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.365
PEAK FLOW RATE(CFS) = 263.72
=====
END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

FILE NAME: X100_C.DAT
TIME/DATE OF STUDY: 16:13 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
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
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 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) = 107.00 DOWNSTREAM(FEET) = 104.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.912
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.593
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN" D 2.27 0.20 1.000 98 12.91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 6.93
TOTAL AREA(ACRES) = 2.27 PEAK FLOW RATE(CFS) = 6.93

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.36
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.74
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.77
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.23
STREET FLOW TRAVEL TIME(MIN.) = 2.10 Tc(MIN.) = 15.01
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.295
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BARREN"              D        4.61    0.20    1.000    98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.61 SUBAREA RUNOFF(CFS) = 12.84
EFFECTIVE AREA(ACRES) = 6.88 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 19.16

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 18.24
FLOW VELOCITY(FEET/SEC.) = 3.03 DEPTH*VELOCITY(FT*FT/SEC.) = 1.48
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.38
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.48
HALFSTREET FLOOD WIDTH(FEET) = 17.77
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.21
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.02
STREET FLOW TRAVEL TIME(MIN.) = 1.58 Tc(MIN.) = 16.60
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.111
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          D        4.74    0.20    1.000    96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.74 SUBAREA RUNOFF(CFS) = 12.42
EFFECTIVE AREA(ACRES) = 11.62 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 11.6 PEAK FLOW RATE(CFS) = 30.44

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 19.10
FLOW VELOCITY(FEET/SEC.) = 4.41 DEPTH*VELOCITY(FT*FT/SEC.) = 2.22
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.1200
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 40.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.43
HALFSTREET FLOOD WIDTH(Feet) = 14.88
AVERAGE FLOW VELOCITY(Feet/Sec.) = 9.32
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.99
STREET FLOW TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 17.40
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.028
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 7.90 0.20 1.000 96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 20.11
EFFECTIVE AREA(ACRES) = 19.52 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 19.5 PEAK FLOW RATE(CFS) = 49.68

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.45 HALFSTREET FLOOD WIDTH(Feet) = 16.21
FLOW VELOCITY(Feet/Sec.) = 9.78 DEPTH*VELOCITY(FT*FT/SEC.) = 4.42
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 84.00 = 1500.00 FEET.

*****
FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0900
STREET LENGTH(Feet) = 370.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 104.66
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.58
HALFSTREET FLOOD WIDTH(Feet) = 23.16
AVERAGE FLOW VELOCITY(Feet/Sec.) = 10.50
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 6.05
STREET FLOW TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 17.99
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.971
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 34.33 0.20 1.000 96
NATURAL POOR COVER
"BARREN" D 9.76 0.20 1.000 98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 44.09 SUBAREA RUNOFF(CFS) = 109.95
EFFECTIVE AREA(ACRES) = 63.61 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 63.6 PEAK FLOW RATE(CFS) = 158.62

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.65 HALFSTREET FLOOD WIDTH(Feet) = 27.23
FLOW VELOCITY(Feet/Sec.) = 11.64 DEPTH*VELOCITY(FT*FT/SEC.) = 7.55
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 1870.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 63.6 TC(MIN.) = 17.99
EFFECTIVE AREA(ACRES) = 63.61 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS) = 158.62
=====

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END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X100_D.DAT
TIME/DATE OF STUDY: 10:01 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 280.00
ELEVATION DATA: UPSTREAM(FEET) = 95.00 DOWNSTREAM(FEET) = 83.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.794
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.686
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.10 0.20 0.200 91 5.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 5.59
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 5.59

FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 420.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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


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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.14
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 16.60
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.85
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.31
STREET FLOW TRAVEL TIME(MIN.) = 2.46  Tc(MIN.) = 8.25
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.644
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE          GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      D        4.58      0.20      0.200      91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 4.58      SUBAREA RUNOFF(CFS) = 18.98
EFFECTIVE AREA(ACRES) = 5.68      AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.7      PEAK FLOW RATE(CFS) = 23.53

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.52  HALFSTREET FLOOD WIDTH(FEET) = 19.80
FLOW VELOCITY(FEET/SEC.) = 3.18  DEPTH*VELOCITY(FT*FT/SEC.) = 1.64
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 700.00 FEET.

*****
FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 740.00
REPRESENTATIVE CHANNEL SLOPE = 0.0600
CHANNEL BASE(FEET) = 15.00  "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(FEET) = 7.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.096
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE          GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"      D        8.61      0.20      1.000      96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 38.68
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.10
AVERAGE FLOW DEPTH(FEET) = 0.39  TRAVEL TIME(MIN.) = 2.02
Tc(MIN.) = 10.27
SUBAREA AREA(ACRES) = 8.61      SUBAREA RUNOFF(CFS) = 30.19
EFFECTIVE AREA(ACRES) = 14.29  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.68
TOTAL AREA(ACRES) = 14.3      PEAK FLOW RATE(CFS) = 50.92

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.46  FLOW VELOCITY(FEET/SEC.) = 6.75
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 123.00 = 1440.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 14.3  TC(MIN.) = 10.27
EFFECTIVE AREA(ACRES) = 14.29  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.682
PEAK FLOW RATE(CFS) = 50.92
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage E

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

FILE NAME: X100_E.DAT
TIME/DATE OF STUDY: 16:35 04/08/2008
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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 105.00 DOWNSTREAM(FEET) = 103.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.151
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.376
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	2.39	0.20	0.200	91	9.15

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 9.33
TOTAL AREA(ACRES) = 2.39 PEAK FLOW RATE(CFS) = 9.33

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.72
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 16.84
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.88
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.34
STREET FLOW TRAVEL TIME(MIN.) = 2.89 Tc(MIN.) = 12.04
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.739
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.83    0.20    0.200    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.83 SUBAREA RUNOFF(CFS) = 12.75
EFFECTIVE AREA(ACRES) = 6.22 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.2 PEAK FLOW RATE(CFS) = 20.71

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 18.87
FLOW VELOCITY(FEET/SEC.) = 3.07 DEPTH*VELOCITY(FT*FT/SEC.) = 1.53
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 830.00 FEET.

*****
FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.20
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.53
HALFSTREET FLOOD WIDTH(FEET) = 20.66
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.27
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.74
STREET FLOW TRAVEL TIME(MIN.) = 2.29 Tc(MIN.) = 14.33
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.384
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.65    0.20    0.200    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.65 SUBAREA RUNOFF(CFS) = 10.98
EFFECTIVE AREA(ACRES) = 9.87 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 9.9 PEAK FLOW RATE(CFS) = 29.70

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.55 HALFSTREET FLOOD WIDTH(FEET) = 21.76
FLOW VELOCITY(FEET/SEC.) = 3.36 DEPTH*VELOCITY(FT*FT/SEC.) = 1.85
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1280.00 FEET.

*****
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 360.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 52.16
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.65
HALFSTREET FLOOD WIDTH(FEET) = 27.15
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.85
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.49
STREET FLOW TRAVEL TIME(MIN.) = 1.56 Tc(MIN.) = 15.89
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.189
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.18 0.20 0.100 91
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 9.62 0.20 0.200 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.161
SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 44.90
EFFECTIVE AREA(ACRES) = 25.67 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 25.7 PEAK FLOW RATE(CFS) = 72.87

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.71 HALFSTREET FLOOD WIDTH(FEET) = 32.16
FLOW VELOCITY(FEET/SEC.) = 4.22 DEPTH*VELOCITY(FT*FT/SEC.) = 3.00
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 360.0 FT WITH ELEVATION-DROP = 3.6 FT, IS 66.5 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 104.00
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 1640.00 FEET.

FLOW PROCESS FROM NODE 104.00 TO NODE 105.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 1090.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 96.36
STREET FLOWING FULL
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.76
HALFSTREET FLOOD WIDTH(FEET) = 34.79
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.64
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.54
STREET FLOW TRAVEL TIME(MIN.) = 3.91 Tc(MIN.) = 19.81
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.811
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 16.93 0.20 0.100 91
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.76 0.20 0.200 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.109
SUBAREA AREA(ACRES) = 18.69 SUBAREA RUNOFF(CFS) = 46.92
EFFECTIVE AREA(ACRES) = 44.36 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 44.4 PEAK FLOW RATE(CFS) = 111.06

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.79 HALFSTREET FLOOD WIDTH(FEET) = 36.25
FLOW VELOCITY(FEET/SEC.) = 4.86 DEPTH*VELOCITY(FT*FT/SEC.) = 3.85
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 1090.0 FT WITH ELEVATION-DROP = 10.9 FT, IS 61.1 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 105.00
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2730.00 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 106.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 700.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 123.37
STREET FLOWING FULL

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.81
HALFSTREET FLOOD WIDTH(Feet) = 37.35
AVERAGE FLOW VELOCITY(Feet/Sec.) = 5.04
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 4.10
STREET FLOW TRAVEL TIME(MIN.) = 2.31 Tc(MIN.) = 22.12
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.639

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	2.36	0.20	0.200	91
COMMERCIAL	D	8.10	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.123
SUBAREA AREA(ACRES) = 10.46 SUBAREA RUNOFF(CFS) = 24.61
EFFECTIVE AREA(ACRES) = 54.82 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 54.8 PEAK FLOW RATE(CFS) = 128.79

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.82 HALFSTREET FLOOD WIDTH(Feet) = 37.84
FLOW VELOCITY(Feet/Sec.) = 5.11 DEPTH*VELOCITY(FT*FT/SEC.) = 4.21
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 3430.00 FEET.

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 630.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 135.56
STREET FLOWING FULL

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.84
HALFSTREET FLOOD WIDTH(Feet) = 38.45
AVERAGE FLOW VELOCITY(Feet/Sec.) = 5.19
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 4.34
STREET FLOW TRAVEL TIME(MIN.) = 2.02 Tc(MIN.) = 24.14
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.510

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	6.09	0.20	0.200	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 6.09 SUBAREA RUNOFF(CFS) = 13.54

EFFECTIVE AREA(ACRES) = 60.91 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 60.9 PEAK FLOW RATE(CFS) = 135.96

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.84 HALFSTREET FLOOD WIDTH(FEET) = 38.51
FLOW VELOCITY(FEET/SEC.) = 5.18 DEPTH*VELOCITY(FT*FT/SEC.) = 4.34
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 107.00 = 4060.00 FEET.

FLOW PROCESS FROM NODE 107.00 TO NODE 108.00 IS CODE = 31

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

=====

REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.130
DEPTH OF FLOW IN 114.0 INCH PIPE IS 92.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.20
ESTIMATED PIPE DIAMETER(INCH) = 114.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 135.96
PIPE TRAVEL TIME(MIN.) = 1.89 Tc(MIN.) = 26.04
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 108.00 = 4310.00 FEET.

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

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

=====

MAINLINE Tc(MIN.) = 26.04
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.404
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	4.84	0.20	0.100	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	14.79	0.20	0.200	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.175
SUBAREA AREA(ACRES) = 19.63 SUBAREA RUNOFF(CFS) = 41.85
EFFECTIVE AREA(ACRES) = 80.54 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 80.5 PEAK FLOW RATE(CFS) = 171.98

FLOW PROCESS FROM NODE 108.00 TO NODE 109.00 IS CODE = 31

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

=====

REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 470.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.31
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 171.98
PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 26.63
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 109.00 = 4780.00 FEET.

FLOW PROCESS FROM NODE 109.00 TO NODE 109.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 26.63
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.373
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	D	16.62	0.20	1.000	96

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 16.62 SUBAREA RUNOFF(CFS) = 32.50
EFFECTIVE AREA(ACRES) = 97.16 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 97.2 PEAK FLOW RATE(CFS) = 202.26

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 97.2 TC(MIN.) = 26.63
EFFECTIVE AREA(ACRES) = 97.16 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.300
PEAK FLOW RATE(CFS) = 202.26

=====

END OF RATIONAL METHOD ANALYSIS

Drainage F

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

FILE NAME: X100_F.DAT
TIME/DATE OF STUDY: 16:35 04/08/2008
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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 9.00 DOWNSTREAM(FEET) = 6.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.969
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.737
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 5.80 0.40 0.200 52 7.97
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 24.31
TOTAL AREA(ACRES) = 5.80 PEAK FLOW RATE(CFS) = 24.31
=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 5.8 TC(MIN.) = 7.97
EFFECTIVE AREA(ACRES) = 5.80 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 24.31
=====

END OF RATIONAL METHOD ANALYSIS

Drainage G

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Analysis prepared by:

FILE NAME: X100_G.DAT
TIME/DATE OF STUDY: 16:35 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 9.00 DOWNSTREAM(FEET) = 5.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.110
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.690
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.75 0.40 0.200 52 8.11
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 7.26
TOTAL AREA(ACRES) = 1.75 PEAK FLOW RATE(CFS) = 7.26
=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.8 TC(MIN.) = 8.11
EFFECTIVE AREA(ACRES) = 1.75 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 7.26
=====

END OF RATIONAL METHOD ANALYSIS

Drainage H

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FILE NAME: X100_H.DAT

TIME/DATE OF STUDY: 16:35 04/08/2008

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 210.00 TO NODE 211.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 70.00
ELEVATION DATA: UPSTREAM(FEET) = 10.00 DOWNSTREAM(FEET) = 9.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 0.63 0.40 0.200 52 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 3.46
TOTAL AREA(ACRES) = 0.63 PEAK FLOW RATE(CFS) = 3.46

FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 31

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

=====

REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.14
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.46
PIPE TRAVEL TIME(MIN.) = 2.20 Tc(MIN.) = 7.20
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 750.00 FEET.

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81

```

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 7.20
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.019
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 3.53 0.40 0.200 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.53 SUBAREA RUNOFF(CFS) = 15.69
EFFECTIVE AREA(ACRES) = 4.16 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 4.2 PEAK FLOW RATE(CFS) = 18.49

*****
FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.68
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 18.49
PIPE TRAVEL TIME(MIN.) = 0.87 Tc(MIN.) = 8.07
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 1150.00 FEET.

*****
FLOW PROCESS FROM NODE 213.00 TO NODE 213.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 8.07
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.702
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 2.82 0.40 0.200 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 2.82 SUBAREA RUNOFF(CFS) = 11.73
EFFECTIVE AREA(ACRES) = 6.98 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 7.0 PEAK FLOW RATE(CFS) = 29.04

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 7.0 TC(MIN.) = 8.07
EFFECTIVE AREA(ACRES) = 6.98 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 29.04
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage I

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Analysis prepared by:

FILE NAME: X100_I.DAT
TIME/DATE OF STUDY: 16:36 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

=====

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 250.00
ELEVATION DATA: UPSTREAM(FEET) = 8.00 DOWNSTREAM(FEET) = 6.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.746
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.815
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	0.47	0.40	0.200	52	7.75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 2.00
TOTAL AREA(ACRES) = 0.47 PEAK FLOW RATE(CFS) = 2.00

FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(FEET) = 290.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          3.10
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.28
HALFSTREET FLOOD WIDTH(FEET) = 6.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.70
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.75
STREET FLOW TRAVEL TIME(MIN.) = 1.79   Tc(MIN.) = 9.54
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.273
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        0.58      0.40      0.200      52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.58      SUBAREA RUNOFF(CFS) = 2.19
EFFECTIVE AREA(ACRES) = 1.05      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.0      PEAK FLOW RATE(CFS) = 3.96

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) = 7.59
FLOW VELOCITY(FEET/SEC.) = 2.80   DEPTH*VELOCITY(FT*FT/SEC.) = 0.83
LONGEST FLOWPATH FROM NODE 215.00 TO NODE 217.00 = 540.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.0   TC(MIN.) = 9.54
EFFECTIVE AREA(ACRES) = 1.05   AREA-AVERAGED Fm(INCH/HR)= 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40   AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 3.96
=====
=====
END OF RATIONAL METHOD ANALYSIS

```

Drainage J

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Analysis prepared by:

FILE NAME: X100_J.DAT
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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

=====

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 220.00 TO NODE 221.00 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) = 8.00 DOWNSTREAM(FEET) = 6.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.642
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.522
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	1.55	0.40	0.200	52	8.64

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 6.20
TOTAL AREA(ACRES) = 1.55 PEAK FLOW RATE(CFS) = 6.20

FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.19
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 15.12
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.73
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.18
STREET FLOW TRAVEL TIME(MIN.) = 2.44 Tc(MIN.) = 11.09
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.921
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        3.46    0.40    0.200    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.46 SUBAREA RUNOFF(CFS) = 11.96
EFFECTIVE AREA(ACRES) = 5.01 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.0 PEAK FLOW RATE(CFS) = 17.32

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.54
FLOW VELOCITY(FEET/SEC.) = 2.94 DEPTH*VELOCITY(FT*FT/SEC.) = 1.40
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 222.00 = 700.00 FEET.

*****
FLOW PROCESS FROM NODE 222.00 TO NODE 223.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.58
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.53
HALFSTREET FLOOD WIDTH(FEET) = 20.82
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.27
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.75
STREET FLOW TRAVEL TIME(MIN.) = 2.29 Tc(MIN.) = 13.38
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.520
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        5.98    0.40    0.200    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 5.98 SUBAREA RUNOFF(CFS) = 18.51
EFFECTIVE AREA(ACRES) = 10.99 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 11.0 PEAK FLOW RATE(CFS) = 34.03

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 22.93
FLOW VELOCITY(FEET/SEC.) = 3.48 DEPTH*VELOCITY(FT*FT/SEC.) = 1.99
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 223.00 = 1150.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 11.0 TC(MIN.) = 13.38
EFFECTIVE AREA(ACRES) = 10.99 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 34.03
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage K

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X100_K.DAT
TIME/DATE OF STUDY: 16:36 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 225.00 TO NODE 226.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 7.00 DOWNSTREAM(FEET) = 5.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.151
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.376
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.53 0.40 0.200 52 9.15
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 5.92
TOTAL AREA(ACRES) = 1.53 PEAK FLOW RATE(CFS) = 5.92

FLOW PROCESS FROM NODE 226.00 TO NODE 227.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0150
STREET LENGTH(FEET) = 330.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.28
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 14.88
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.29
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.41
STREET FLOW TRAVEL TIME(MIN.) = 1.67   Tc(MIN.) = 10.82
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.975
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        4.77      0.40    0.200    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 4.77      SUBAREA RUNOFF(CFS) = 16.72
EFFECTIVE AREA(ACRES) = 6.30     AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.3         PEAK FLOW RATE(CFS) = 22.08

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) = 17.77
FLOW VELOCITY(FEET/SEC.) = 3.66   DEPTH*VELOCITY(FT*FT/SEC.) = 1.76
LONGEST FLOWPATH FROM NODE 225.00 TO NODE 227.00 = 660.00 FEET.

*****
FLOW PROCESS FROM NODE 227.00 TO NODE 228.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 170.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.11
ESTIMATED PIPE DIAMETER(INCH) = 27.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 22.08
PIPE TRAVEL TIME(MIN.) = 0.35   Tc(MIN.) = 11.17
LONGEST FLOWPATH FROM NODE 225.00 TO NODE 228.00 = 830.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 6.3   TC(MIN.) = 11.17
EFFECTIVE AREA(ACRES) = 6.30   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40   AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 22.08
=====
END OF RATIONAL METHOD ANALYSIS

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ii. HC 25-Year Storm Event

Drainage A

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

FILE NAME: X025_A.DAT
TIME/DATE OF STUDY: 16:13 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 240.00
ELEVATION DATA: UPSTREAM(FEET) = 106.20 DOWNSTREAM(FEET) = 105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.372
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.603
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.68 0.20 0.200 75 8.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 2.18
TOTAL AREA(ACRES) = 0.68 PEAK FLOW RATE(CFS) = 2.18

FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 300.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.69
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 10.43
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.58
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.55
STREET FLOW TRAVEL TIME(MIN.) = 3.16 Tc(MIN.) = 11.53
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.007
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        1.13    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.13 SUBAREA RUNOFF(CFS) = 3.02
EFFECTIVE AREA(ACRES) = 1.81 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 4.83

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.84
FLOW VELOCITY(FEET/SEC.) = 1.67 DEPTH*VELOCITY(FT*FT/SEC.) = 0.63
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 260.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.92
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.35
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.94
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.85
STREET FLOW TRAVEL TIME(MIN.) = 2.23 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
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.39    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.39 SUBAREA RUNOFF(CFS) = 8.18
EFFECTIVE AREA(ACRES) = 5.20 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.2 PEAK FLOW RATE(CFS) = 12.54

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.70
FLOW VELOCITY(FEET/SEC.) = 2.10 DEPTH*VELOCITY(FT*FT/SEC.) = 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 800.00 FEET.

*****
FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 310.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.75
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.54
HALFSTREET FLOOD WIDTH(Feet) = 21.21
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.35
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.27
STREET FLOW TRAVEL TIME(Min.) = 2.20 Tc(Min.) = 15.96
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.501
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.51 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(Acres) = 6.51 SUBAREA RUNOFF(CFS) = 14.42
EFFECTIVE AREA(Acres) = 11.71 AREA-AVERAGED Fm(Inch/Hr) = 0.04
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(Acres) = 11.7 PEAK FLOW RATE(CFS) = 25.93

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.58 HALFSTREET FLOOD WIDTH(Feet) = 23.63
FLOW VELOCITY(Feet/Sec.) = 2.50 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.46
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 1110.00 FEET.

FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 440.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 34.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.63
HALFSTREET FLOOD WIDTH(Feet) = 26.45
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.68
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.70
STREET FLOW TRAVEL TIME(Min.) = 2.74 Tc(Min.) = 18.70
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.286
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 8.39 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 8.39 SUBAREA RUNOFF(CFS) = 17.11
EFFECTIVE AREA(Acres) = 20.10 AREA-AVERAGED Fm(Inch/Hr) = 0.03
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(Acres) = 20.1 PEAK FLOW RATE(CFS) = 40.79

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.67 HALFSTREET FLOOD WIDTH(Feet) = 28.16
FLOW VELOCITY(Feet/Sec.) = 2.80 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.87
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 1550.00 FEET.

FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 360.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

```

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 58.57
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.73
HALFSTREET FLOOD WIDTH(FEET) = 33.32
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.12
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.29
STREET FLOW TRAVEL TIME(MIN.) = 1.92 Tc(MIN.) = 20.62
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.163
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 18.43 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 18.43 SUBAREA RUNOFF(CFS) = 35.55
EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 74.11

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.78 HALFSTREET FLOOD WIDTH(FEET) = 35.58
FLOW VELOCITY(FEET/SEC.) = 3.39 DEPTH*VELOCITY(FT*FT/SEC.) = 2.64
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 360.0 FT WITH ELEVATION-DROP = 1.8 FT, IS 56.2 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 7.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.15
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 74.11
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 21.27
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.27
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.126
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.81 0.20 0.100 75
NATURAL FAIR COVER
"OPEN BRUSH" D 4.99 0.20 1.000 83
COMMERCIAL D 6.24 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA AREA(ACRES) = 12.04 SUBAREA RUNOFF(CFS) = 22.01
EFFECTIVE AREA(ACRES) = 50.57 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 50.6 PEAK FLOW RATE(CFS) = 94.81

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 9.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.1000
FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.8 INCHES

```

PIPE-FLOW VELOCITY(FEET/SEC.) = 27.66
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 94.81
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 21.36
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 9.00 = 2600.00 FEET.

FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 1180.00
REPRESENTATIVE CHANNEL SLOPE = 0.0300
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.956
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 25.52 0.20 1.000 83
NATURAL POOR COVER
"BAREN" D 6.51 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 120.15
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.01
AVERAGE FLOW DEPTH(FEET) = 0.78 TRAVEL TIME(MIN.) = 3.27
Tc(MIN.) = 24.63
SUBAREA AREA(ACRES) = 32.03 SUBAREA RUNOFF(CFS) = 50.63
EFFECTIVE AREA(ACRES) = 82.60 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 82.6 PEAK FLOW RATE(CFS) = 137.75

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.84 FLOW VELOCITY(FEET/SEC.) = 6.32
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 10.00 = 3780.00 FEET.

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.872
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 29.92 0.20 1.000 83
NATURAL POOR COVER
"BAREN" D 14.41 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 171.11
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.51
AVERAGE FLOW DEPTH(FEET) = 1.19 TRAVEL TIME(MIN.) = 2.00
Tc(MIN.) = 26.62
SUBAREA AREA(ACRES) = 44.33 SUBAREA RUNOFF(CFS) = 66.71
EFFECTIVE AREA(ACRES) = 126.93 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.69
TOTAL AREA(ACRES) = 126.9 PEAK FLOW RATE(CFS) = 198.18

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.29 FLOW VELOCITY(FEET/SEC.) = 5.82
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 11.00 = 4440.00 FEET.

FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 580.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.810

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SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          14.64    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 208.79
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 5.95
AVERAGE FLOW DEPTH(Feet) = 1.33    TRAVEL TIME(MIN.) = 1.62
Tc(MIN.) = 28.25
SUBAREA AREA(ACRES) = 14.64    SUBAREA RUNOFF(CFS) = 21.22
EFFECTIVE AREA(ACRES) = 141.57    AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 141.6    PEAK FLOW RATE(CFS) = 212.35

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.35    FLOW VELOCITY(Feet/Sec.) = 5.98
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 5020.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 20.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(Feet) = 440.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 213.48
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.86
HALFSTREET FLOOD WIDTH(Feet) = 39.79
AVERAGE FLOW VELOCITY(Feet/Sec.) = 7.56
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 6.52
STREET FLOW TRAVEL TIME(MIN.) = 0.97    Tc(MIN.) = 29.22
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.776
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          A          1.83    0.40    1.000    46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 1.83    SUBAREA RUNOFF(CFS) = 2.27
EFFECTIVE AREA(ACRES) = 143.40    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 143.4    PEAK FLOW RATE(CFS) = 212.35
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.86    HALFSTREET FLOOD WIDTH(Feet) = 39.73
FLOW VELOCITY(Feet/Sec.) = 7.55    DEPTH*VELOCITY(FT*FT/SEC.) = 6.50
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5460.00 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 13.00 TO NODE 14.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(Feet) = 370.00
ELEVATION DATA: UPSTREAM(Feet) = 102.50    DOWNSTREAM(Feet) = 100.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.373

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* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.380
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.17    0.20    0.200    75   9.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 9.53
TOTAL AREA(ACRES) = 3.17    PEAK FLOW RATE(CFS) = 9.53

*****
FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0500
FLOW LENGTH(FEET) = 1660.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.07
ESTIMATED PIPE DIAMETER(INCH) = 15.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.53
PIPE TRAVEL TIME(MIN.) = 2.29    Tc(MIN.) = 11.67
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 15.00 = 2030.00 FEET.

*****
FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.986
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    B        31.84    0.30    0.200    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 31.84    SUBAREA RUNOFF(CFS) = 83.86
EFFECTIVE AREA(ACRES) = 35.01    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.29    AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 35.0    PEAK FLOW RATE(CFS) = 92.26

*****
FLOW PROCESS FROM NODE 15.00 TO NODE 16.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 780.00
REPRESENTATIVE CHANNEL SLOPE = 0.0400
CHANNEL BASE(FEET) = 0.00    "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) = 3.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.885
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        11.64    0.20    0.200    75
NATURAL FAIR COVER
"OPEN BRUSH"            A        13.96    0.40    1.000    46
COMMERCIAL              D        2.65    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.37
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.586
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 126.20
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 17.71
AVERAGE FLOW DEPTH(FEET) = 1.89    TRAVEL TIME(MIN.) = 0.73
Tc(MIN.) = 12.40
SUBAREA AREA(ACRES) = 28.25    SUBAREA RUNOFF(CFS) = 67.86
EFFECTIVE AREA(ACRES) = 63.26    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.35    AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 63.3    PEAK FLOW RATE(CFS) = 156.93

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.05    FLOW VELOCITY(FEET/SEC.) = 18.68
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.00 = 2810.00 FEET.

*****
FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
FLOW LENGTH(FEET) = 1510.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.07
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 156.93
PIPE TRAVEL TIME(MIN.) = 2.50 Tc(MIN.) = 14.90
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 17.00 = 4320.00 FEET.

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.90
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.600
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 44.48 0.20 1.000 83
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 6.11 0.40 0.200 32
COMMERCIAL A 4.75 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.834
SUBAREA AREA(ACRES) = 55.34 SUBAREA RUNOFF(CFS) = 120.88
EFFECTIVE AREA(ACRES) = 118.60 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 118.6 PEAK FLOW RATE(CFS) = 261.59

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 18.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 48.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.77
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 261.59
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 15.20
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 18.00 = 4590.00 FEET.

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.570
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BARREN" A 4.65 0.40 1.000 78
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 13.94 0.40 0.200 32
COMMERCIAL A 2.82 0.40 0.100 32
NATURAL FAIR COVER
"OPEN BRUSH" A 2.64 0.40 1.000 46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
SUBAREA AREA(ACRES) = 24.05 SUBAREA RUNOFF(CFS) = 51.91
EFFECTIVE AREA(ACRES) = 142.65 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.56
TOTAL AREA(ACRES) = 142.7 PEAK FLOW RATE(CFS) = 310.34

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 19.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 610.00
REPRESENTATIVE CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 35.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.471

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SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          A          2.68    0.40    1.000    46
RESIDENTIAL
"11+ DWELLINGS/ACRE" A          9.73    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 323.30
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.21
AVERAGE FLOW DEPTH(FEET) = 0.95 TRAVEL TIME(MIN.) = 1.10
Tc(MIN.) = 16.31
SUBAREA AREA(ACRES) = 12.41 SUBAREA RUNOFF(CFS) = 25.93
EFFECTIVE AREA(ACRES) = 155.06 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 155.1 PEAK FLOW RATE(CFS) = 323.44

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.95 FLOW VELOCITY(FEET/SEC.) = 9.22
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 19.00 = 5200.00 FEET.

*****
FLOW PROCESS FROM NODE 19.00 TO NODE 20.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 360.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.299
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            A          1.58    0.40    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 325.04
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.72
AVERAGE FLOW DEPTH(FEET) = 0.89 TRAVEL TIME(MIN.) = 2.21
Tc(MIN.) = 18.52
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 3.21
EFFECTIVE AREA(ACRES) = 156.64 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 156.6 PEAK FLOW RATE(CFS) = 323.44
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.89 FLOW VELOCITY(FEET/SEC.) = 2.71
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 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    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1        323.44 18.52 2.299 0.28( 0.15) 0.54 156.6 13.00
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1        212.35 29.22 1.776 0.20( 0.15) 0.72 143.4 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5460.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1        501.23 18.52 2.299 0.25( 0.15) 0.61 247.5 13.00
2        457.00 29.22 1.776 0.24( 0.15) 0.63 300.0 1.00
TOTAL AREA(ACRES) = 300.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 501.23 Tc(MIN.) = 18.515
EFFECTIVE AREA(ACRES) = 247.52 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.61
TOTAL AREA(ACRES) = 300.0

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LONGEST FLOWPATH FROM NODE      13.00 TO NODE      20.00 =      5560.00 FEET.

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      20.00 IS CODE =  12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      21.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) =   570.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(Feet) = 130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(Feet) =   6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =   2.117
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        11.87    0.40    0.200    32
NATURAL FAIR COVER
"OPEN BRUSH"              D        16.10    0.20    1.000    83
COMMERCIAL                A         1.56    0.40    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.631
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   527.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) =   3.27
AVERAGE FLOW DEPTH(Feet) =   1.19  TRAVEL TIME(MIN.) =   2.91
Tc(MIN.) =   21.42
SUBAREA AREA(ACRES) =   29.53  SUBAREA RUNOFF(CFS) =   52.46
EFFECTIVE AREA(ACRES) =   277.05  AREA-AVERAGED Fm(INCH/HR) =   0.15
AREA-AVERAGED Fp(INCH/HR) =   0.24  AREA-AVERAGED Ap =   0.61
TOTAL AREA(ACRES) =   329.6  PEAK FLOW RATE(CFS) =   501.23
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.15  FLOW VELOCITY(Feet/Sec.) =   3.21
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      21.00 =   6130.00 FEET.

*****
FLOW PROCESS FROM NODE      21.00 TO NODE      22.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) =   600.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(Feet) = 130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(Feet) =   6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =   1.961
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                A         1.73    0.40    0.100    32
NATURAL FAIR COVER
"OPEN BRUSH"              D        8.52    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.848
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   509.48
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) =   3.23
AVERAGE FLOW DEPTH(Feet) =   1.16  TRAVEL TIME(MIN.) =   3.10
Tc(MIN.) =   24.52
SUBAREA AREA(ACRES) =   10.25  SUBAREA RUNOFF(CFS) =   16.50
EFFECTIVE AREA(ACRES) =   287.30  AREA-AVERAGED Fm(INCH/HR) =   0.15
AREA-AVERAGED Fp(INCH/HR) =   0.24  AREA-AVERAGED Ap =   0.62
TOTAL AREA(ACRES) =   339.8  PEAK FLOW RATE(CFS) =   501.23
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.15  FLOW VELOCITY(Feet/Sec.) =   3.21
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      22.00 =   6730.00 FEET.

*****
FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) =   450.00

```

REPRESENTATIVE CHANNEL SLOPE = 0.0050
 CHANNEL BASE(Feet) = 130.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 6.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.863

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	3.62	0.40	0.200	32
NATURAL FAIR COVER					
"OPEN BRUSH"	D	4.47	0.20	1.000	83
COMMERCIAL	A	1.68	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.549

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 508.86

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 3.22

AVERAGE FLOW DEPTH(Feet) = 1.16 TRAVEL TIME(MIN.) = 2.33

Tc(MIN.) = 26.85

SUBAREA AREA(ACRES) = 9.77 SUBAREA RUNOFF(CFS) = 15.26

EFFECTIVE AREA(ACRES) = 297.07 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.62

TOTAL AREA(ACRES) = 349.6 PEAK FLOW RATE(CFS) = 501.23

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(Feet) = 1.15 FLOW VELOCITY(Feet/Sec.) = 3.21

LONGEST FLOWPATH FROM NODE 13.00 TO NODE 23.00 = 7180.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 349.6 TC(MIN.) = 26.85

EFFECTIVE AREA(ACRES) = 297.07 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.617

PEAK FLOW RATE(CFS) = 501.23

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	501.23	26.85	1.863	0.24(0.15)	0.62	297.1	13.00
2	457.00	37.87	1.533	0.24(0.15)	0.63	349.6	1.00

END OF RATIONAL METHOD ANALYSIS

Drainage B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X025_B.DAT

TIME/DATE OF STUDY: 16:14 04/08/2008

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 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) = 110.00 DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.477
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.841
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.54 0.20 0.100 75 7.48
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.86
TOTAL AREA(ACRES) = 0.54 PEAK FLOW RATE(CFS) = 1.86

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.76
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.30
HALFSTREET FLOOD WIDTH(FEET) = 7.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.58
STREET FLOW TRAVEL TIME(MIN.) = 2.97 Tc(MIN.) = 10.44
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.180
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL      D      0.63      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 1.79
EFFECTIVE AREA(ACRES) = 1.17 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 3.33

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 8.34
FLOW VELOCITY(FEET/SEC.) = 2.04 DEPTH*VELOCITY(FT*FT/SEC.) = 0.64
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.21
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 9.41
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.14
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.71
STREET FLOW TRAVEL TIME(MIN.) = 3.12 Tc(MIN.) = 13.56
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.743
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL      D      0.72      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.72 SUBAREA RUNOFF(CFS) = 1.76
EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 4.63

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 9.84
FLOW VELOCITY(FEET/SEC.) = 2.19 DEPTH*VELOCITY(FT*FT/SEC.) = 0.74
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.02
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 15.04
AVERAGE FLOW VELOCITY(FT*FT/SEC.) = 2.71
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.17
STREET FLOW TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 16.63
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.76 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 6.76 SUBAREA RUNOFF(CFS) = 14.74
EFFECTIVE AREA(ACRES) = 8.65 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 18.87

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 18.16
FLOW VELOCITY(FT*FT/SEC.) = 3.00 DEPTH*VELOCITY(FT*FT/SEC.) = 1.46
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 1550.00 FEET.

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FT) = 600.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FT) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FT) = 0.53
HALFSTREET FLOOD WIDTH(FT) = 20.74
AVERAGE FLOW VELOCITY(FT*FT/SEC.) = 3.25
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.73
STREET FLOW TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 19.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.220
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 7.46 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.46 SUBAREA RUNOFF(CFS) = 14.77
EFFECTIVE AREA(ACRES) = 16.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 31.89

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FT) = 0.56 HALFSTREET FLOOD WIDTH(FT) = 22.38
FLOW VELOCITY(FT*FT/SEC.) = 3.42 DEPTH*VELOCITY(FT*FT/SEC.) = 1.92
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 2150.00 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 56.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FT) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FT) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.57
HALFSTREET FLOOD WIDTH(Feet) = 22.77
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.45
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.96
STREET FLOW TRAVEL TIME(Min.) = 2.42 Tc(Min.) = 22.12
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.079
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 1.47 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 1.47 SUBAREA RUNOFF(CFS) = 2.72
EFFECTIVE AREA(Acres) = 17.58 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(Acres) = 17.6 PEAK FLOW RATE(CFS) = 32.58

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.57 HALFSTREET FLOOD WIDTH(Feet) = 22.54
FLOW VELOCITY(Feet/Sec.) = 3.44 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.95
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 2650.00 Feet.

FLOW PROCESS FROM NODE 56.00 TO NODE 57.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 580.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.25
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.61
HALFSTREET FLOOD WIDTH(Feet) = 25.20
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.69
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 2.26
STREET FLOW TRAVEL TIME(Min.) = 2.62 Tc(Min.) = 24.74
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 1.951
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 12.28 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 12.28 SUBAREA RUNOFF(CFS) = 21.34
EFFECTIVE AREA(Acres) = 29.86 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(Acres) = 29.9 PEAK FLOW RATE(CFS) = 51.90

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.65 HALFSTREET FLOOD WIDTH(Feet) = 27.07
FLOW VELOCITY(Feet/Sec.) = 3.85 DEPTH*VELOCITY(Feet*Feet/Sec.) = 2.49
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 3230.00 Feet.

FLOW PROCESS FROM NODE 57.00 TO NODE 58.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 680.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 84.11
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.74
HALFSTREET FLOOD WIDTH(FEET) = 33.44
AVERAGE FLOW VELOCITY(FT/SEC.) = 4.44
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.27
STREET FLOW TRAVEL TIME(MIN.) = 2.55 Tc(MIN.) = 27.29
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.846
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      29.81    0.20    0.100    75
SCHOOL                D       9.91    0.20    0.600    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 39.72 SUBAREA RUNOFF(CFS) = 64.38
EFFECTIVE AREA(ACRES) = 69.58 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 69.6 PEAK FLOW RATE(CFS) = 113.45

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.80 HALFSTREET FLOOD WIDTH(FEET) = 36.44
FLOW VELOCITY(FT/SEC.) = 4.91 DEPTH*VELOCITY(FT*FT/SEC.) = 3.90
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
      AND L = 680.0 FT WITH ELEVATION-DROP = 6.8 FT, IS 112.5 CFS,
      WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 58.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 58.00 = 3910.00 FEET.

*****
FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 760.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.4 INCHES
PIPE-FLOW VELOCITY(FT/SEC.) = 11.84
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 113.45
PIPE TRAVEL TIME(MIN.) = 1.07 Tc(MIN.) = 28.36
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 59.00 = 4670.00 FEET.

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 59.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 28.36
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.806
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      11.44    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.44 SUBAREA RUNOFF(CFS) = 18.39
EFFECTIVE AREA(ACRES) = 81.02 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 81.0 PEAK FLOW RATE(CFS) = 129.35

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 580.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.3 INCHES
PIPE-FLOW VELOCITY(FT/SEC.) = 12.34
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 129.35

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PIPE TRAVEL TIME(MIN.) = 0.78    Tc(MIN.) = 29.15
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 60.00 = 5250.00 FEET.

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 29.15
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.779
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D        15.82    0.20    0.100    75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D        4.45    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.122
SUBAREA AREA(ACRES) = 20.27    SUBAREA RUNOFF(CFS) = 32.00
EFFECTIVE AREA(ACRES) = 101.29    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 101.3    PEAK FLOW RATE(CFS) = 159.33

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 950.00
REPRESENTATIVE CHANNEL SLOPE = 0.0350
CHANNEL BASE(FEET) = 15.00    "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030    MAXIMUM DEPTH(FEET) = 7.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"        D        20.98    0.20    1.000    83
NATURAL POOR COVER
"BARREN"            D        12.82    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 182.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.83
AVERAGE FLOW DEPTH(FEET) = 1.12    TRAVEL TIME(MIN.) = 1.79
Tc(MIN.) = 30.94
SUBAREA AREA(ACRES) = 33.80    SUBAREA RUNOFF(CFS) = 46.22
EFFECTIVE AREA(ACRES) = 135.09    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 135.1    PEAK FLOW RATE(CFS) = 200.17

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.19    FLOW VELOCITY(FEET/SEC.) = 9.10
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 61.00 = 6200.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 135.1    TC(MIN.) = 30.94
EFFECTIVE AREA(ACRES) = 135.09    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.365
PEAK FLOW RATE(CFS) = 200.17
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage C

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

FILE NAME: X025_C.DAT
TIME/DATE OF STUDY: 16:14 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 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) = 107.00 DOWNSTREAM(FEET) = 104.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.912
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.819
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN" D 2.27 0.20 1.000 93 12.91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 5.35
TOTAL AREA(ACRES) = 2.27 PEAK FLOW RATE(CFS) = 5.35

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.28
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 14.10
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.08
STREET FLOW TRAVEL TIME(MIN.) = 2.23 Tc(MIN.) = 15.15
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.576
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL POOR COVER
"BARREN"              D          4.61    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.61 SUBAREA RUNOFF(CFS) = 9.86
EFFECTIVE AREA(ACRES) = 6.88 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 14.71

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45 HALFSTREET FLOOD WIDTH(FEET) = 16.37
FLOW VELOCITY(FEET/SEC.) = 2.84 DEPTH*VELOCITY(FT*FT/SEC.) = 1.29
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.46
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.45
HALFSTREET FLOOD WIDTH(FEET) = 15.90
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.77
STREET FLOW TRAVEL TIME(MIN.) = 1.68 Tc(MIN.) = 16.83
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.427
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          4.74    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.74 SUBAREA RUNOFF(CFS) = 9.50
EFFECTIVE AREA(ACRES) = 11.62 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 11.6 PEAK FLOW RATE(CFS) = 23.29

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 17.15
FLOW VELOCITY(FEET/SEC.) = 4.13 DEPTH*VELOCITY(FT*FT/SEC.) = 1.94
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.1200
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 30.97
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.40
HALFSTREET FLOOD WIDTH(Feet) = 13.24
AVERAGE FLOW VELOCITY(Feet/Sec.) = 8.80
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.51
STREET FLOW TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 17.68
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.360
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 7.90 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 15.36
EFFECTIVE AREA(ACRES) = 19.52 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 19.5 PEAK FLOW RATE(CFS) = 37.95

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.42 HALFSTREET FLOOD WIDTH(Feet) = 14.49
FLOW VELOCITY(Feet/Sec.) = 9.17 DEPTH*VELOCITY(FT*FT/SEC.) = 3.86
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 84.00 = 1500.00 FEET.

*****
FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0900
STREET LENGTH(Feet) = 370.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 79.90
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.53
HALFSTREET FLOOD WIDTH(Feet) = 20.82
AVERAGE FLOW VELOCITY(Feet/Sec.) = 9.83
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 5.25
STREET FLOW TRAVEL TIME(MIN.) = 0.63 Tc(MIN.) = 18.31
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.314
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 34.33 0.20 1.000 83
NATURAL POOR COVER
"BARREN" D 9.76 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 44.09 SUBAREA RUNOFF(CFS) = 83.89
EFFECTIVE AREA(ACRES) = 63.61 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 63.6 PEAK FLOW RATE(CFS) = 121.03

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.60 HALFSTREET FLOOD WIDTH(Feet) = 24.57
FLOW VELOCITY(Feet/Sec.) = 10.84 DEPTH*VELOCITY(FT*FT/SEC.) = 6.52
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 1870.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 63.6 TC(MIN.) = 18.31
EFFECTIVE AREA(ACRES) = 63.61 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS) = 121.03
=====

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END OF RATIONAL METHOD ANALYSIS

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Analysis prepared by:

FILE NAME: X025_D.DAT
TIME/DATE OF STUDY: 10:05 04/09/2008
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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 280.00
ELEVATION DATA: UPSTREAM(FEET) = 95.00 DOWNSTREAM(FEET) = 83.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.794
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.438
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.10 0.20 0.200 75 5.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 4.35
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 4.35

FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 420.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.73
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 14.88
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.70
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.16
STREET FLOW TRAVEL TIME(MIN.) = 2.59  Tc(MIN.) = 8.39
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.600
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
  LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      D        4.58      0.20      0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 4.58      SUBAREA RUNOFF(CFS) = 14.67
EFFECTIVE AREA(ACRES) = 5.68      AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.7          PEAK FLOW RATE(CFS) = 18.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48  HALFSTREET FLOOD WIDTH(FEET) = 17.85
FLOW VELOCITY(FEET/SEC.) = 2.99  DEPTH*VELOCITY(FT*FT/SEC.) = 1.44
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 700.00 FEET.

*****
FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 740.00
REPRESENTATIVE CHANNEL SLOPE = 0.0600
CHANNEL BASE(FEET) = 15.00  "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(FEET) = 7.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.153
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
  LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"              D        8.61      0.20      1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 29.68
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.57
AVERAGE FLOW DEPTH(FEET) = 0.33  TRAVEL TIME(MIN.) = 2.21
Tc(MIN.) = 10.60
SUBAREA AREA(ACRES) = 8.61      SUBAREA RUNOFF(CFS) = 22.88
EFFECTIVE AREA(ACRES) = 14.29  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.68
TOTAL AREA(ACRES) = 14.3        PEAK FLOW RATE(CFS) = 38.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.39  FLOW VELOCITY(FEET/SEC.) = 6.12
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 123.00 = 1440.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 14.3  TC(MIN.) = 10.60
EFFECTIVE AREA(ACRES) = 14.29  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.682
PEAK FLOW RATE(CFS) = 38.79
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage E

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

FILE NAME: X025_E.DAT

TIME/DATE OF STUDY: 16:37 04/08/2008

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 105.00 DOWNSTREAM(FEET) = 103.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.151
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.426
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.39 0.20 0.200 75 9.15
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 7.28
TOTAL AREA(ACRES) = 2.39 PEAK FLOW RATE(CFS) = 7.28

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

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

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REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.24
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 15.20
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.71
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.18
STREET FLOW TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 12.22
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.909
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.83    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.83 SUBAREA RUNOFF(CFS) = 9.89
EFFECTIVE AREA(ACRES) = 6.22 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.2 PEAK FLOW RATE(CFS) = 16.06

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 16.99
FLOW VELOCITY(FEET/SEC.) = 2.90 DEPTH*VELOCITY(FT*FT/SEC.) = 1.35
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 830.00 FEET.

*****
FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.30
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 18.71
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.52
STREET FLOW TRAVEL TIME(MIN.) = 2.45 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
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.65    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.65 SUBAREA RUNOFF(CFS) = 8.48
EFFECTIVE AREA(ACRES) = 9.87 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 9.9 PEAK FLOW RATE(CFS) = 22.94

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 19.65
FLOW VELOCITY(FEET/SEC.) = 3.15 DEPTH*VELOCITY(FT*FT/SEC.) = 1.62
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1280.00 FEET.

*****
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 360.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 40.27
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.60
HALFSTREET FLOOD WIDTH(Feet) = 24.49
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.63
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.18
STREET FLOW TRAVEL TIME(MIN.) = 1.65 Tc(MIN.) = 16.33
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.469
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.18 0.20 0.100 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 9.62 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.161
SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 34.65
EFFECTIVE AREA(ACRES) = 25.67 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 25.7 PEAK FLOW RATE(CFS) = 56.22

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.66 HALFSTREET FLOOD WIDTH(Feet) = 27.93
FLOW VELOCITY(Feet/Sec.) = 3.93 DEPTH*VELOCITY(FT*FT/SEC.) = 2.60
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 1640.00 FEET.

FLOW PROCESS FROM NODE 104.00 TO NODE 105.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 1090.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 74.26
STREET FLOWING FULL
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.71
HALFSTREET FLOOD WIDTH(Feet) = 32.35
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.25
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.03
STREET FLOW TRAVEL TIME(MIN.) = 4.28 Tc(MIN.) = 20.61
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.164
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 16.93 0.20 0.100 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.76 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.109
SUBAREA AREA(ACRES) = 18.69 SUBAREA RUNOFF(CFS) = 36.03
EFFECTIVE AREA(ACRES) = 44.36 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 44.4 PEAK FLOW RATE(CFS) = 85.22

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.74 HALFSTREET FLOOD WIDTH(Feet) = 33.57
FLOW VELOCITY(Feet/Sec.) = 4.46 DEPTH*VELOCITY(FT*FT/SEC.) = 3.29
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2730.00 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 106.00 IS CODE = 62

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


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=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 700.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 94.65
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.76
HALFSTREET FLOOD WIDTH(Feet) = 34.60
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.61
PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 3.50
STREET FLOW TRAVEL TIME(Min.) = 2.53 Tc(Min.) = 23.13
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.027
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.36 0.20 0.200 75
COMMERCIAL D 8.10 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.123
SUBAREA AREA(ACRES) = 10.46 SUBAREA RUNOFF(CFS) = 18.85
EFFECTIVE AREA(ACRES) = 54.82 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 54.8 PEAK FLOW RATE(CFS) = 98.59

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.77 HALFSTREET FLOOD WIDTH(Feet) = 34.97
FLOW VELOCITY(Feet/Sec.) = 4.69 DEPTH*VELOCITY(Ft*Ft/Sec.) = 3.59
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 3430.00 FEET.

*****
FLOW PROCESS FROM NODE 106.00 TO NODE 107.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 630.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 103.76
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.78
HALFSTREET FLOOD WIDTH(Feet) = 35.52
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.76
PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 3.70
STREET FLOW TRAVEL TIME(Min.) = 2.21 Tc(Min.) = 25.34
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.925
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.09 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 6.09 SUBAREA RUNOFF(CFS) = 10.33
EFFECTIVE AREA(ACRES) = 60.91 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 60.9 PEAK FLOW RATE(CFS) = 103.90

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.78 HALFSTREET FLOOD WIDTH(Feet) = 35.52

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FLOW VELOCITY(FEET/SEC.) = 4.77   DEPTH*VELOCITY(FT*FT/SEC.) = 3.70
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 107.00 = 4060.00 FEET.

*****
FLOW PROCESS FROM NODE 107.00 TO NODE 108.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 250.00   MANNING'S N = 0.130
DEPTH OF FLOW IN 108.0 INCH PIPE IS 78.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.10
ESTIMATED PIPE DIAMETER(INCH) = 108.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 103.90
PIPE TRAVEL TIME(MIN.) = 1.98   Tc(MIN.) = 27.32
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 108.00 = 4310.00 FEET.

*****
FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 27.32
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.845
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           D         4.84   0.20   0.100   75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D        14.79   0.20   0.200   75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.175
SUBAREA AREA(ACRES) = 19.63   SUBAREA RUNOFF(CFS) = 31.97
EFFECTIVE AREA(ACRES) = 80.54   AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 80.5   PEAK FLOW RATE(CFS) = 131.46

*****
FLOW PROCESS FROM NODE 108.00 TO NODE 109.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 470.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.35
ESTIMATED PIPE DIAMETER(INCH) = 48.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 131.46
PIPE TRAVEL TIME(MIN.) = 0.63   Tc(MIN.) = 27.96
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 109.00 = 4780.00 FEET.

*****
FLOW PROCESS FROM NODE 109.00 TO NODE 109.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 27.96
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.821
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"         D        16.62   0.20   1.000   83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 16.62   SUBAREA RUNOFF(CFS) = 24.24
EFFECTIVE AREA(ACRES) = 97.16   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 97.2   PEAK FLOW RATE(CFS) = 153.98
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 97.2   TC(MIN.) = 27.96
EFFECTIVE AREA(ACRES) = 97.16   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.300
PEAK FLOW RATE(CFS) = 153.98
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage F

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FILE NAME: X025_F.DAT
TIME/DATE OF STUDY: 16:37 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 9.00 DOWNSTREAM(FEET) = 6.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.969
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.705
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 5.80 0.40 0.200 32 7.97
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 18.92
TOTAL AREA(ACRES) = 5.80 PEAK FLOW RATE(CFS) = 18.92
=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 5.8 TC(MIN.) = 7.97
EFFECTIVE AREA(ACRES) = 5.80 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 18.92
=====

END OF RATIONAL METHOD ANALYSIS

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TIME/DATE OF STUDY: 16:37 04/08/2008
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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 9.00 DOWNSTREAM(FEET) = 5.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.110
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.669
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.75 0.40 0.200 32 8.11
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 5.65
TOTAL AREA(ACRES) = 1.75 PEAK FLOW RATE(CFS) = 5.65
=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.8 TC(MIN.) = 8.11
EFFECTIVE AREA(ACRES) = 1.75 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 5.65
=====

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00

SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00

SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90

DATA BANK RAINFALL USED

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET

as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 210.00 TO NODE 211.00 IS CODE = 21

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

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 70.00

ELEVATION DATA: UPSTREAM(FEET) = 10.00 DOWNSTREAM(FEET) = 9.00

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

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824

SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	0.63	0.40	0.200	32	5.00

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

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.200

SUBAREA RUNOFF(CFS) = 2.69

TOTAL AREA(ACRES) = 0.63 PEAK FLOW RATE(CFS) = 2.69

FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE = 0.0100

FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 4.78

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 2.69

PIPE TRAVEL TIME(MIN.) = 2.37 T_c (MIN.) = 7.37

LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 750.00 FEET.

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 7.37
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.872
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        3.53    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.53    SUBAREA RUNOFF(CFS) = 12.05
EFFECTIVE AREA(ACRES) = 4.16    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40    AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 4.2    PEAK FLOW RATE(CFS) = 14.20

*****
FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 400.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.11
ESTIMATED PIPE DIAMETER(INCH) = 21.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.20
PIPE TRAVEL TIME(MIN.) = 0.94    Tc(MIN.) = 8.31
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 1150.00 FEET.

*****
FLOW PROCESS FROM NODE 213.00 TO NODE 213.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 8.31
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.618
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        2.82    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 2.82    SUBAREA RUNOFF(CFS) = 8.98
EFFECTIVE AREA(ACRES) = 6.98    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40    AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 7.0    PEAK FLOW RATE(CFS) = 22.23

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 7.0    TC(MIN.) = 8.31
EFFECTIVE AREA(ACRES) = 6.98    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40    AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 22.23
=====
=====
END OF RATIONAL METHOD ANALYSIS

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TIME/DATE OF STUDY: 16:39 04/08/2008
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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 250.00
ELEVATION DATA: UPSTREAM(FEET) = 8.00 DOWNSTREAM(FEET) = 6.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.746
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.765
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 0.47 0.40 0.200 32 7.75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 1.56
TOTAL AREA(ACRES) = 0.47 PEAK FLOW RATE(CFS) = 1.56

FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(FEET) = 290.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          2.41
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.26
HALFSTREET FLOOD WIDTH(FEET) = 5.47
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.68
STREET FLOW TRAVEL TIME(MIN.) = 1.85   Tc(MIN.) = 9.60
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.335
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        0.58      0.40      0.200      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.58      SUBAREA RUNOFF(CFS) = 1.70
EFFECTIVE AREA(ACRES) = 1.05      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.0      PEAK FLOW RATE(CFS) = 3.08

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) = 6.53
FLOW VELOCITY(FEET/SEC.) = 2.68   DEPTH*VELOCITY(FT*FT/SEC.) = 0.75
LONGEST FLOWPATH FROM NODE 215.00 TO NODE 217.00 = 540.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.0   TC(MIN.) = 9.60
EFFECTIVE AREA(ACRES) = 1.05   AREA-AVERAGED Fm(INCH/HR)= 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40   AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 3.08
=====
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage J

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Analysis prepared by:

FILE NAME: X025_J.DAT
TIME/DATE OF STUDY: 16:39 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150

=====

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 220.00 TO NODE 221.00 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) = 8.00 DOWNSTREAM(FEET) = 6.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.642
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.539
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	1.55	0.40	0.200	32	8.64

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 4.83
TOTAL AREA(ACRES) = 1.55 PEAK FLOW RATE(CFS) = 4.83

FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          9.46
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 13.63
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.55
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.04
STREET FLOW TRAVEL TIME(MIN.) = 2.61  Tc(MIN.) = 11.25
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.048
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        3.46    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.46    SUBAREA RUNOFF(CFS) = 9.24
EFFECTIVE AREA(ACRES) = 5.01    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40    AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.0    PEAK FLOW RATE(CFS) = 13.38

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44    HALFSTREET FLOOD WIDTH(FEET) = 15.74
FLOW VELOCITY(FEET/SEC.) = 2.78    DEPTH*VELOCITY(FT*FT/SEC.) = 1.23
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 222.00 = 700.00 FEET.

*****
FLOW PROCESS FROM NODE 222.00 TO NODE 223.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 450.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          20.51
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 18.79
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.53
STREET FLOW TRAVEL TIME(MIN.) = 2.45  Tc(MIN.) = 13.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.726
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        5.98    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 5.98    SUBAREA RUNOFF(CFS) = 14.24
EFFECTIVE AREA(ACRES) = 10.99    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40    AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 11.0    PEAK FLOW RATE(CFS) = 26.18

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53    HALFSTREET FLOOD WIDTH(FEET) = 20.66
FLOW VELOCITY(FEET/SEC.) = 3.27    DEPTH*VELOCITY(FT*FT/SEC.) = 1.74
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 223.00 = 1150.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 11.0    TC(MIN.) = 13.70
EFFECTIVE AREA(ACRES) = 10.99    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40    AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 26.18
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage K

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X025_K.DAT
TIME/DATE OF STUDY: 16:39 04/08/2008
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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 225.00 TO NODE 226.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 7.00 DOWNSTREAM(FEET) = 5.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.151
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.426
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.53 0.40 0.200 32 9.15
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 4.61
TOTAL AREA(ACRES) = 1.53 PEAK FLOW RATE(CFS) = 4.61

FLOW PROCESS FROM NODE 226.00 TO NODE 227.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0150
STREET LENGTH(FEET) = 330.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.10
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.40
HALFSTREET FLOOD WIDTH(FEET) = 13.32
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.12
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.25
STREET FLOW TRAVEL TIME(MIN.) = 1.76   Tc(MIN.) = 10.91
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.101
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        4.77      0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 4.77      SUBAREA RUNOFF(CFS) = 12.97
EFFECTIVE AREA(ACRES) = 6.30     AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.3         PEAK FLOW RATE(CFS) = 17.13

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) = 16.05
FLOW VELOCITY(FEET/SEC.) = 3.43   DEPTH*VELOCITY(FT*FT/SEC.) = 1.54
LONGEST FLOWPATH FROM NODE 225.00 TO NODE 227.00 = 660.00 FEET.

*****
FLOW PROCESS FROM NODE 227.00 TO NODE 228.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 170.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.59
ESTIMATED PIPE DIAMETER(INCH) = 24.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.13
PIPE TRAVEL TIME(MIN.) = 0.37   Tc(MIN.) = 11.29
LONGEST FLOWPATH FROM NODE 225.00 TO NODE 228.00 = 830.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 6.3   TC(MIN.) = 11.29
EFFECTIVE AREA(ACRES) = 6.30   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40   AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 17.13
=====
END OF RATIONAL METHOD ANALYSIS

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iii. HC 10-Year Storm Event

Drainage A

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

FILE NAME: X010_A.DAT
TIME/DATE OF STUDY: 16:24 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 240.00
ELEVATION DATA: UPSTREAM(FEET) = 106.20 DOWNSTREAM(FEET) = 105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.372
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.021
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.68 0.20 0.200 75 8.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 1.82
TOTAL AREA(ACRES) = 0.68 PEAK FLOW RATE(CFS) = 1.82

FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 300.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          3.08
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 9.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.53
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.51
STREET FLOW TRAVEL TIME(MIN.) = 3.27  Tc(MIN.) = 11.64
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.502
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        1.13    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.13    SUBAREA RUNOFF(CFS) = 2.50
EFFECTIVE AREA(ACRES) = 1.81    AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.8    PEAK FLOW RATE(CFS) = 4.01

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36  HALFSTREET FLOOD WIDTH(FEET) = 10.82
FLOW VELOCITY(FEET/SEC.) = 1.62  DEPTH*VELOCITY(FT*FT/SEC.) = 0.58
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 260.00  CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          7.39
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 14.18
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.86
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.77
STREET FLOW TRAVEL TIME(MIN.) = 2.33  Tc(MIN.) = 13.97
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.253
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.39    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.39    SUBAREA RUNOFF(CFS) = 6.75
EFFECTIVE AREA(ACRES) = 5.20    AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.2    PEAK FLOW RATE(CFS) = 10.36

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45  HALFSTREET FLOOD WIDTH(FEET) = 16.37
FLOW VELOCITY(FEET/SEC.) = 2.00  DEPTH*VELOCITY(FT*FT/SEC.) = 0.91
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 800.00 FEET.

*****
FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 310.00  CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.29
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.51
HALFSTREET FLOOD WIDTH(Feet) = 19.65
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.24
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.15
STREET FLOW TRAVEL TIME(Min.) = 2.31 Tc(Min.) = 16.28
* 10 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.064
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.51 0.20 0.200 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(Acres) = 6.51 SUBAREA RUNOFF(CFS) = 11.86
EFFECTIVE AREA(Acres) = 11.71 AREA-AVERAGED Fm(Inch/Hr) = 0.04
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(Acres) = 11.7 PEAK FLOW RATE(CFS) = 21.33

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.55 HALFSTREET FLOOD WIDTH(Feet) = 21.91
FLOW VELOCITY(Feet/Sec.) = 2.38 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.32
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 1110.00 Feet.

FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 440.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 28.36
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.60
HALFSTREET FLOOD WIDTH(Feet) = 24.49
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.55
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.53
STREET FLOW TRAVEL TIME(Min.) = 2.87 Tc(Min.) = 19.15
* 10 YEAR RAINFALL INTENSITY(Inch/Hr) = 1.881
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 8.39 0.20 0.100 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 8.39 SUBAREA RUNOFF(CFS) = 14.05
EFFECTIVE AREA(Acres) = 20.10 AREA-AVERAGED Fm(Inch/Hr) = 0.03
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(Acres) = 20.1 PEAK FLOW RATE(CFS) = 33.45

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.63 HALFSTREET FLOOD WIDTH(Feet) = 26.13
FLOW VELOCITY(Feet/Sec.) = 2.66 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.67
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 1550.00 Feet.

FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 360.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 47.99
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.70
HALFSTREET FLOOD WIDTH(FEET) = 31.61
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.90
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.03
STREET FLOW TRAVEL TIME(MIN.) = 2.07 Tc(MIN.) = 21.22
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.773
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 18.43 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 18.43 SUBAREA RUNOFF(CFS) = 29.08
EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 60.59

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.74 HALFSTREET FLOOD WIDTH(FEET) = 33.63
FLOW VELOCITY(FEET/SEC.) = 3.16 DEPTH*VELOCITY(FT*FT/SEC.) = 2.34
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 360.0 FT WITH ELEVATION-DROP = 1.8 FT, IS 47.0 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 7.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.42
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 60.59
PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 21.90
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.90
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.741
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.81 0.20 0.100 75
NATURAL FAIR COVER
"OPEN BRUSH" D 4.99 0.20 1.000 83
COMMERCIAL D 6.24 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA AREA(ACRES) = 12.04 SUBAREA RUNOFF(CFS) = 17.84
EFFECTIVE AREA(ACRES) = 50.57 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 50.6 PEAK FLOW RATE(CFS) = 77.32

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 9.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.1000
FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.8 INCHES

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PIPE-FLOW VELOCITY(FEET/SEC.) = 26.14
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 77.32
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 21.99
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 9.00 = 2600.00 FEET.

FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 1180.00
REPRESENTATIVE CHANNEL SLOPE = 0.0300
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.595
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 25.52 0.20 1.000 83
NATURAL POOR COVER
"BAREN" D 6.51 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 97.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.55
AVERAGE FLOW DEPTH(FEET) = 0.68 TRAVEL TIME(MIN.) = 3.54
Tc(MIN.) = 25.54
SUBAREA AREA(ACRES) = 32.03 SUBAREA RUNOFF(CFS) = 40.21
EFFECTIVE AREA(ACRES) = 82.60 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 82.6 PEAK FLOW RATE(CFS) = 110.86

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.74 FLOW VELOCITY(FEET/SEC.) = 5.80
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 10.00 = 3780.00 FEET.

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.522
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 29.92 0.20 1.000 83
NATURAL POOR COVER
"BAREN" D 14.41 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 137.25
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.09
AVERAGE FLOW DEPTH(FEET) = 1.03 TRAVEL TIME(MIN.) = 2.16
Tc(MIN.) = 27.70
SUBAREA AREA(ACRES) = 44.33 SUBAREA RUNOFF(CFS) = 52.75
EFFECTIVE AREA(ACRES) = 126.93 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.69
TOTAL AREA(ACRES) = 126.9 PEAK FLOW RATE(CFS) = 158.22

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.13 FLOW VELOCITY(FEET/SEC.) = 5.35
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 11.00 = 4440.00 FEET.

FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 580.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.469

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SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          14.64    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 166.58
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 5.47
AVERAGE FLOW DEPTH(Feet) = 1.16    TRAVEL TIME(MIN.) = 1.77
Tc(MIN.) = 29.46
SUBAREA AREA(ACRES) = 14.64    SUBAREA RUNOFF(CFS) = 16.72
EFFECTIVE AREA(ACRES) = 141.57    AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 141.6    PEAK FLOW RATE(CFS) = 168.89

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.17    FLOW VELOCITY(Feet/Sec.) = 5.51
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 5020.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 20.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(Feet) = 440.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 169.75
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.81
HALFSTREET FLOOD WIDTH(Feet) = 37.05
AVERAGE FLOW VELOCITY(Feet/Sec.) = 7.07
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 5.71
STREET FLOW TRAVEL TIME(MIN.) = 1.04    Tc(MIN.) = 30.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.440
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          A          1.83    0.40    1.000    46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 1.83    SUBAREA RUNOFF(CFS) = 1.71
EFFECTIVE AREA(ACRES) = 143.40    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 143.4    PEAK FLOW RATE(CFS) = 168.89
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.81    HALFSTREET FLOOD WIDTH(Feet) = 36.98
FLOW VELOCITY(Feet/Sec.) = 7.06    DEPTH*VELOCITY(FT*FT/SEC.) = 5.69
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5460.00 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 13.00 TO NODE 14.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(Feet) = 370.00
ELEVATION DATA: UPSTREAM(Feet) = 102.50    DOWNSTREAM(Feet) = 100.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.373

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* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.832
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS    Tc
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.17    0.20    0.200    75    9.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 7.97
TOTAL AREA(ACRES) = 3.17    PEAK FLOW RATE(CFS) = 7.97

*****
FLOW PROCESS FROM NODE    14.00 TO NODE    15.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0500
FLOW LENGTH(FEET) = 1660.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.58
ESTIMATED PIPE DIAMETER(INCH) = 15.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.97
PIPE TRAVEL TIME(MIN.) = 2.39    Tc(MIN.) = 11.76
LONGEST FLOWPATH FROM NODE    13.00 TO NODE    15.00 = 2030.00 FEET.

*****
FLOW PROCESS FROM NODE    15.00 TO NODE    15.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.76
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.487
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    B        31.84    0.30    0.200    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 31.84    SUBAREA RUNOFF(CFS) = 69.53
EFFECTIVE AREA(ACRES) = 35.01    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.29    AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 35.0    PEAK FLOW RATE(CFS) = 76.51

*****
FLOW PROCESS FROM NODE    15.00 TO NODE    16.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 780.00
REPRESENTATIVE CHANNEL SLOPE = 0.0400
CHANNEL BASE(FEET) = 0.00    "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) = 3.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.398
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        11.64    0.20    0.200    75
NATURAL FAIR COVER
"OPEN BRUSH"            A        13.96    0.40    1.000    46
COMMERCIAL              D        2.65    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.37
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.586
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 104.26
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 16.87
AVERAGE FLOW DEPTH(FEET) = 1.76    TRAVEL TIME(MIN.) = 0.77
Tc(MIN.) = 12.53
SUBAREA AREA(ACRES) = 28.25    SUBAREA RUNOFF(CFS) = 55.47
EFFECTIVE AREA(ACRES) = 63.26    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.35    AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 63.3    PEAK FLOW RATE(CFS) = 129.19

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.90    FLOW VELOCITY(FEET/SEC.) = 17.81
LONGEST FLOWPATH FROM NODE    13.00 TO NODE    16.00 = 2810.00 FEET.

*****
FLOW PROCESS FROM NODE    16.00 TO NODE    17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
FLOW LENGTH(FEET) = 1510.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 43.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.45
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 129.19
PIPE TRAVEL TIME(MIN.) = 2.66 Tc(MIN.) = 15.19
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 17.00 = 4320.00 FEET.

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.19
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.147
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          D      44.48    0.20    1.000    83
RESIDENTIAL
"11+ DWELLINGS/ACRE" A       6.11    0.40    0.200    32
COMMERCIAL            A       4.75    0.40    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.834
SUBAREA AREA(ACRES) = 55.34 SUBAREA RUNOFF(CFS) = 98.33
EFFECTIVE AREA(ACRES) = 118.60 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 118.6 PEAK FLOW RATE(CFS) = 213.25

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 18.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 46.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.86
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 213.25
PIPE TRAVEL TIME(MIN.) = 0.32 Tc(MIN.) = 15.52
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 18.00 = 4590.00 FEET.

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.52
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.121
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BARREN"              A       4.65    0.40    1.000    78
RESIDENTIAL
"11+ DWELLINGS/ACRE" A      13.94    0.40    0.200    32
COMMERCIAL            A       2.82    0.40    0.100    32
NATURAL FAIR COVER
"OPEN BRUSH"          A       2.64    0.40    1.000    46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
SUBAREA AREA(ACRES) = 24.05 SUBAREA RUNOFF(CFS) = 42.19
EFFECTIVE AREA(ACRES) = 142.65 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.56
TOTAL AREA(ACRES) = 142.7 PEAK FLOW RATE(CFS) = 252.68

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 19.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 610.00
REPRESENTATIVE CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 35.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.033

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SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"            A            2.68    0.40    1.000    46
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A            9.73    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 263.20
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 8.52
AVERAGE FLOW DEPTH(Feet) = 0.84 TRAVEL TIME(MIN.) = 1.19
Tc(MIN.) = 16.71
SUBAREA AREA(ACRES) = 12.41 SUBAREA RUNOFF(CFS) = 21.04
EFFECTIVE AREA(ACRES) = 155.06 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 155.1 PEAK FLOW RATE(CFS) = 262.40

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.84 FLOW VELOCITY(Feet/Sec.) = 8.49
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 19.00 = 5200.00 FEET.

*****
FLOW PROCESS FROM NODE 19.00 TO NODE 20.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) = 360.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(Feet) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 6.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.884
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            A            1.58    0.40    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 263.71
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 2.52
AVERAGE FLOW DEPTH(Feet) = 0.78 TRAVEL TIME(MIN.) = 2.39
Tc(MIN.) = 19.10
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 2.62
EFFECTIVE AREA(ACRES) = 156.64 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 156.6 PEAK FLOW RATE(CFS) = 262.40
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.78 FLOW VELOCITY(Feet/Sec.) = 2.50
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 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    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)    (ACRES)    NODE
1        262.40 19.10 1.884 0.28( 0.15) 0.54 156.6 13.00
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)    (ACRES)    NODE
1        168.89 30.50 1.440 0.20( 0.15) 0.72 143.4 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5460.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)    (ACRES)    NODE
1        404.39 19.10 1.884 0.25( 0.15) 0.61 246.4 13.00
2        364.14 30.50 1.440 0.24( 0.15) 0.63 300.0 1.00
TOTAL AREA(ACRES) = 300.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 404.39 Tc(MIN.) = 19.098
EFFECTIVE AREA(ACRES) = 246.43 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.61
TOTAL AREA(ACRES) = 300.0

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LONGEST FLOWPATH FROM NODE      13.00 TO NODE      20.00 =      5560.00 FEET.

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      20.00 IS CODE =  12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      21.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   570.00
REPRESENTATIVE CHANNEL SLOPE =  0.0050
CHANNEL BASE(FEET) =  130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR =  0.035  MAXIMUM DEPTH(FEET) =   6.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.726
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        11.87    0.40    0.200    32
NATURAL FAIR COVER
"OPEN BRUSH"              D        16.10    0.20    1.000    83
COMMERCIAL                 A         1.56    0.40    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.631
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   425.42
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.02
AVERAGE FLOW DEPTH(FEET) =  1.04  TRAVEL TIME(MIN.) =  3.15
Tc(MIN.) =  22.25
SUBAREA AREA(ACRES) =  29.53      SUBAREA RUNOFF(CFS) =  42.06
EFFECTIVE AREA(ACRES) =  275.96    AREA-AVERAGED Fm(INCH/HR) =  0.15
AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.61
TOTAL AREA(ACRES) =  329.6      PEAK FLOW RATE(CFS) =  404.39
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.01  FLOW VELOCITY(FEET/SEC.) =  2.96
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      21.00 =  6130.00 FEET.

*****
FLOW PROCESS FROM NODE      21.00 TO NODE      22.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00
REPRESENTATIVE CHANNEL SLOPE =  0.0050
CHANNEL BASE(FEET) =  130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR =  0.035  MAXIMUM DEPTH(FEET) =   6.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.592
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 A         1.73    0.40    0.100    32
NATURAL FAIR COVER
"OPEN BRUSH"              D         8.52    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.848
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   410.93
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.97
AVERAGE FLOW DEPTH(FEET) =  1.03  TRAVEL TIME(MIN.) =  3.37
Tc(MIN.) =  25.62
SUBAREA AREA(ACRES) =  10.25      SUBAREA RUNOFF(CFS) =  13.09
EFFECTIVE AREA(ACRES) =  286.21    AREA-AVERAGED Fm(INCH/HR) =  0.15
AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.62
TOTAL AREA(ACRES) =  339.8      PEAK FLOW RATE(CFS) =  404.39
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.01  FLOW VELOCITY(FEET/SEC.) =  2.96
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      22.00 =  6730.00 FEET.

*****
FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   450.00

```

REPRESENTATIVE CHANNEL SLOPE = 0.0050
 CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.508

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	3.62	0.40	0.200	32
NATURAL FAIR COVER					
"OPEN BRUSH"	D	4.47	0.20	1.000	83
COMMERCIAL	A	1.68	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.549

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 410.46

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.96

AVERAGE FLOW DEPTH(FEET) = 1.03 TRAVEL TIME(MIN.) = 2.53

Tc(MIN.) = 28.15

SUBAREA AREA(ACRES) = 9.77 SUBAREA RUNOFF(CFS) = 12.14

EFFECTIVE AREA(ACRES) = 295.98 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.62

TOTAL AREA(ACRES) = 349.6 PEAK FLOW RATE(CFS) = 404.39

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.01 FLOW VELOCITY(FEET/SEC.) = 2.96

LONGEST FLOWPATH FROM NODE 13.00 TO NODE 23.00 = 7180.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 349.6 TC(MIN.) = 28.15

EFFECTIVE AREA(ACRES) = 295.98 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.616

PEAK FLOW RATE(CFS) = 404.39

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	404.39	28.15	1.508	0.24(0.15)	0.62	296.0	13.00
2	364.14	39.93	1.234	0.24(0.15)	0.63	349.6	1.00

END OF RATIONAL METHOD ANALYSIS

Drainage B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X010_B.DAT

TIME/DATE OF STUDY: 16:26 04/08/2008

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 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) = 110.00 DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.477
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.224
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.54 0.20 0.100 75 7.48
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.56
TOTAL AREA(ACRES) = 0.54 PEAK FLOW RATE(CFS) = 1.56

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.30
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.28
HALFSTREET FLOOD WIDTH(FEET) = 6.78
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.91
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.54
STREET FLOW TRAVEL TIME(MIN.) = 3.06 Tc(MIN.) = 10.54
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.648
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            D      0.63      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 1.49
EFFECTIVE AREA(ACRES) = 1.17 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.77

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.30 HALFSTREET FLOOD WIDTH(FEET) = 7.53
FLOW VELOCITY(FEET/SEC.) = 1.98 DEPTH*VELOCITY(FT*FT/SEC.) = 0.59
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 8.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.07
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.65
STREET FLOW TRAVEL TIME(MIN.) = 3.22 Tc(MIN.) = 13.75
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.273
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            D      0.72      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.72 SUBAREA RUNOFF(CFS) = 1.46
EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 3.83

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 8.97
FLOW VELOCITY(FEET/SEC.) = 2.10 DEPTH*VELOCITY(FT*FT/SEC.) = 0.68
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.91
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 13.87
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.59
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.06
STREET FLOW TRAVEL TIME(MIN.) = 3.21 Tc(MIN.) = 16.97
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.016
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.76 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 6.76 SUBAREA RUNOFF(CFS) = 12.14
EFFECTIVE AREA(ACRES) = 8.65 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 15.54

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 16.76
FLOW VELOCITY(FEET/SEC.) = 2.88 DEPTH*VELOCITY(FT*FT/SEC.) = 1.33
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 1550.00 FEET.

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 600.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.60
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.51
HALFSTREET FLOOD WIDTH(FEET) = 19.18
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.10
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.57
STREET FLOW TRAVEL TIME(MIN.) = 3.22 Tc(MIN.) = 20.19
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.825
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 7.46 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.46 SUBAREA RUNOFF(CFS) = 12.12
EFFECTIVE AREA(ACRES) = 16.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 26.17

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.66
FLOW VELOCITY(FEET/SEC.) = 3.26 DEPTH*VELOCITY(FT*FT/SEC.) = 1.74
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 2150.00 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 56.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 27.28
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FeET) = 0.54
HALFSTREET FLOOD WIDTH(FeET) = 21.05
AVERAGE FLOW VELOCITY(FeET/SEC.) = 3.28
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.77
STREET FLOW TRAVEL TIME(MIN.) = 2.54 Tc(MIN.) = 22.72
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.705
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.47 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.47 SUBAREA RUNOFF(CFS) = 2.23
EFFECTIVE AREA(ACRES) = 17.58 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 17.6 PEAK FLOW RATE(CFS) = 26.66

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FeET) = 0.53 HALFSTREET FLOOD WIDTH(FeET) = 20.82
FLOW VELOCITY(FeET/SEC.) = 3.28 DEPTH*VELOCITY(FT*FT/SEC.) = 1.75
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 2650.00 FEET.

*****
FLOW PROCESS FROM NODE 56.00 TO NODE 57.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FeET) = 580.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FeET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 35.37
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FeET) = 0.58
HALFSTREET FLOOD WIDTH(FeET) = 23.32
AVERAGE FLOW VELOCITY(FeET/SEC.) = 3.50
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.03
STREET FLOW TRAVEL TIME(MIN.) = 2.76 Tc(MIN.) = 25.48
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.597
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 12.28 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 12.28 SUBAREA RUNOFF(CFS) = 17.42
EFFECTIVE AREA(ACRES) = 29.86 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 29.9 PEAK FLOW RATE(CFS) = 42.37

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FeET) = 0.61 HALFSTREET FLOOD WIDTH(FeET) = 25.04
FLOW VELOCITY(FeET/SEC.) = 3.66 DEPTH*VELOCITY(FT*FT/SEC.) = 2.23
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 3230.00 FEET.

*****
FLOW PROCESS FROM NODE 57.00 TO NODE 58.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FeET) = 680.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FeET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 68.49
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.70
HALFSTREET FLOOD WIDTH(FEET) = 31.67
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.12
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.88
STREET FLOW TRAVEL TIME(MIN.) = 2.75 Tc(MIN.) = 28.24
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.505
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      29.81    0.20    0.100    75
SCHOOL                D      9.91    0.20    0.600    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 39.72 SUBAREA RUNOFF(CFS) = 52.21
EFFECTIVE AREA(ACRES) = 69.58 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 69.6 PEAK FLOW RATE(CFS) = 92.13

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.75 HALFSTREET FLOOD WIDTH(FEET) = 34.30
FLOW VELOCITY(FEET/SEC.) = 4.59 DEPTH*VELOCITY(FT*FT/SEC.) = 3.45
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
      AND L = 680.0 FT WITH ELEVATION-DROP = 6.8 FT, IS 93.9 CFS,
      WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 58.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 58.00 = 3910.00 FEET.

*****
FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 760.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 33.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.30
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 92.13
PIPE TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 29.36
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 59.00 = 4670.00 FEET.

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 59.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 29.36
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.472
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      11.44    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.44 SUBAREA RUNOFF(CFS) = 14.95
EFFECTIVE AREA(ACRES) = 81.02 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 81.0 PEAK FLOW RATE(CFS) = 105.00

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 580.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.78
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 105.00

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PIPE TRAVEL TIME(MIN.) = 0.82    Tc(MIN.) = 30.18
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 60.00 = 5250.00 FEET.

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 30.18
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.449
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D        15.82    0.20    0.100    75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D        4.45    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.122
SUBAREA AREA(ACRES) = 20.27    SUBAREA RUNOFF(CFS) = 25.99
EFFECTIVE AREA(ACRES) = 101.29    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 101.3    PEAK FLOW RATE(CFS) = 129.31

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 950.00
REPRESENTATIVE CHANNEL SLOPE = 0.0350
CHANNEL BASE(FEET) = 15.00    "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030    MAXIMUM DEPTH(FEET) = 7.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.399
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"        D        20.98    0.20    1.000    83
NATURAL POOR COVER
"BARREN"            D        12.82    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 147.55
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.25
AVERAGE FLOW DEPTH(FEET) = 0.99    TRAVEL TIME(MIN.) = 1.92
Tc(MIN.) = 32.10
SUBAREA AREA(ACRES) = 33.80    SUBAREA RUNOFF(CFS) = 36.47
EFFECTIVE AREA(ACRES) = 135.09    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 135.1    PEAK FLOW RATE(CFS) = 161.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.05    FLOW VELOCITY(FEET/SEC.) = 8.48
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 61.00 = 6200.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 135.1    TC(MIN.) = 32.10
EFFECTIVE AREA(ACRES) = 135.09    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.365
PEAK FLOW RATE(CFS) = 161.20
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage C

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

FILE NAME: X010_C.DAT
TIME/DATE OF STUDY: 16:15 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 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) = 107.00 DOWNSTREAM(FEET) = 104.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.912
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.357
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN" D 2.27 0.20 1.000 93 12.91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 4.41
TOTAL AREA(ACRES) = 2.27 PEAK FLOW RATE(CFS) = 4.41

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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


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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.44
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.93
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.50
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.98
STREET FLOW TRAVEL TIME(MIN.) = 2.33 Tc(MIN.) = 15.24
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.143
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL POOR COVER
"BARREN"              D          4.61    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.61 SUBAREA RUNOFF(CFS) = 8.06
EFFECTIVE AREA(ACRES) = 6.88 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 12.03

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 15.04
FLOW VELOCITY(FEET/SEC.) = 2.72 DEPTH*VELOCITY(FT*FT/SEC.) = 1.17
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.90
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 14.65
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.77
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.60
STREET FLOW TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 17.01
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.013
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          4.74    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.74 SUBAREA RUNOFF(CFS) = 7.73
EFFECTIVE AREA(ACRES) = 11.62 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 11.6 PEAK FLOW RATE(CFS) = 18.96

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.74
FLOW VELOCITY(FEET/SEC.) = 3.94 DEPTH*VELOCITY(FT*FT/SEC.) = 1.75
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.1200
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 25.19
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.38
HALFSTREET FLOOD WIDTH(FEET) = 12.15
AVERAGE FLOW VELOCITY(FEET/SEC.) = 8.33
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.16
STREET FLOW TRAVEL TIME(MIN.) = 0.90 Tc(MIN.) = 17.91
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.954
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 7.90 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 12.47
EFFECTIVE AREA(ACRES) = 19.52 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 19.5 PEAK FLOW RATE(CFS) = 30.81

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.40 HALFSTREET FLOOD WIDTH(FEET) = 13.24
FLOW VELOCITY(FEET/SEC.) = 8.76 DEPTH*VELOCITY(FT*FT/SEC.) = 3.49
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 84.00 = 1500.00 FEET.

*****
FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0900
STREET LENGTH(FEET) = 370.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 64.82
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.51
HALFSTREET FLOOD WIDTH(FEET) = 19.18
AVERAGE FLOW VELOCITY(FEET/SEC.) = 9.32
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 4.71
STREET FLOW TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 18.57
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.914
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 34.33 0.20 1.000 83
NATURAL POOR COVER
"BARREN" D 9.76 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 44.09 SUBAREA RUNOFF(CFS) = 68.00
EFFECTIVE AREA(ACRES) = 63.61 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 63.6 PEAK FLOW RATE(CFS) = 98.11

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 22.62
FLOW VELOCITY(FEET/SEC.) = 10.30 DEPTH*VELOCITY(FT*FT/SEC.) = 5.84
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 1870.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 63.6 TC(MIN.) = 18.57
EFFECTIVE AREA(ACRES) = 63.61 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS) = 98.11
=====

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END OF RATIONAL METHOD ANALYSIS

Drainage D

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

FILE NAME: X010_D.DAT
TIME/DATE OF STUDY: 10:05 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 280.00
ELEVATION DATA: UPSTREAM(FEET) = 95.00 DOWNSTREAM(FEET) = 83.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.794
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.731
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.10 0.20 0.200 75 5.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 3.65
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 3.65

FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 420.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          9.78
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 13.79
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.58
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.06
STREET FLOW TRAVEL TIME(MIN.) = 2.71  Tc(MIN.) = 8.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.995
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
  LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      D        4.58      0.20      0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 4.58      SUBAREA RUNOFF(CFS) = 12.18
EFFECTIVE AREA(ACRES) = 5.68      AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.7          PEAK FLOW RATE(CFS) = 15.10

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46  HALFSTREET FLOOD WIDTH(FEET) = 16.52
FLOW VELOCITY(FEET/SEC.) = 2.87  DEPTH*VELOCITY(FT*FT/SEC.) = 1.31
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 700.00 FEET.

*****
FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 740.00
REPRESENTATIVE CHANNEL SLOPE = 0.0600
CHANNEL BASE(FEET) = 15.00  "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(FEET) = 7.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.602
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
  LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"              D        8.61      0.20      1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.22
AVERAGE FLOW DEPTH(FEET) = 0.29  TRAVEL TIME(MIN.) = 2.36
Tc(MIN.) = 10.86
SUBAREA AREA(ACRES) = 8.61      SUBAREA RUNOFF(CFS) = 18.62
EFFECTIVE AREA(ACRES) = 14.29  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.68
TOTAL AREA(ACRES) = 14.3        PEAK FLOW RATE(CFS) = 31.71

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.35  FLOW VELOCITY(FEET/SEC.) = 5.71
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 123.00 = 1440.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 14.3  TC(MIN.) = 10.86
EFFECTIVE AREA(ACRES) = 14.29  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.682
PEAK FLOW RATE(CFS) = 31.71
=====
END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X010_E.DAT
TIME/DATE OF STUDY: 16:40 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

=====

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 105.00 DOWNSTREAM(FEET) = 103.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.151
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.871
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	2.39	0.20	0.200	75	9.15

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 6.09
TOTAL AREA(ACRES) = 2.39 PEAK FLOW RATE(CFS) = 6.09

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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


```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.20
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 14.02
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.62
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.08
STREET FLOW TRAVEL TIME(MIN.) = 3.19 Tc(MIN.) = 12.34
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.419
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.83    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.83 SUBAREA RUNOFF(CFS) = 8.20
EFFECTIVE AREA(ACRES) = 6.22 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.2 PEAK FLOW RATE(CFS) = 13.32

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.74
FLOW VELOCITY(FEET/SEC.) = 2.77 DEPTH*VELOCITY(FT*FT/SEC.) = 1.23
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 830.00 FEET.

*****
FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.82
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 17.30
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.93
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.38
STREET FLOW TRAVEL TIME(MIN.) = 2.56 Tc(MIN.) = 14.89
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.172
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.65    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.65 SUBAREA RUNOFF(CFS) = 7.00
EFFECTIVE AREA(ACRES) = 9.87 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 9.9 PEAK FLOW RATE(CFS) = 18.94

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 18.16
FLOW VELOCITY(FEET/SEC.) = 3.02 DEPTH*VELOCITY(FT*FT/SEC.) = 1.47
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1280.00 FEET.

*****
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 360.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.21
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.57
HALFSTREET FLOOD WIDTH(FEET) = 22.70
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.46
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.97
STREET FLOW TRAVEL TIME(MIN.) = 1.73 Tc(MIN.) = 16.63
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.039
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.18 0.20 0.100 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 9.62 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.161
SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 28.54
EFFECTIVE AREA(ACRES) = 25.67 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 25.7 PEAK FLOW RATE(CFS) = 46.30

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.63 HALFSTREET FLOOD WIDTH(FEET) = 25.90
FLOW VELOCITY(FEET/SEC.) = 3.74 DEPTH*VELOCITY(FT*FT/SEC.) = 2.34
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 1640.00 FEET.

FLOW PROCESS FROM NODE 104.00 TO NODE 105.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 1090.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 61.07
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.68
HALFSTREET FLOOD WIDTH(FEET) = 29.29
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.02
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.72
STREET FLOW TRAVEL TIME(MIN.) = 4.52 Tc(MIN.) = 21.15
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.777
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 16.93 0.20 0.100 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.76 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.109
SUBAREA AREA(ACRES) = 18.69 SUBAREA RUNOFF(CFS) = 29.52
EFFECTIVE AREA(ACRES) = 44.36 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 44.4 PEAK FLOW RATE(CFS) = 69.75

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.70 HALFSTREET FLOOD WIDTH(FEET) = 31.80
FLOW VELOCITY(FEET/SEC.) = 4.16 DEPTH*VELOCITY(FT*FT/SEC.) = 2.92
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2730.00 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 106.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 700.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 77.45
STREET FLOWING FULL
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.72
HALFSTREET FLOOD WIDTH(Feet) = 32.71
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.31
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.11
STREET FLOW TRAVEL TIME(MIN.) = 2.71 Tc(MIN.) = 23.85
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.658
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.36 0.20 0.200 75
COMMERCIAL D 8.10 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.123
SUBAREA AREA(ACRES) = 10.46 SUBAREA RUNOFF(CFS) = 15.38
EFFECTIVE AREA(ACRES) = 54.82 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 54.8 PEAK FLOW RATE(CFS) = 80.41

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.73 HALFSTREET FLOOD WIDTH(Feet) = 33.02
FLOW VELOCITY(Feet/Sec.) = 4.38 DEPTH*VELOCITY(FT*FT/SEC.) = 3.18
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 3430.00 FEET.

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 630.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 84.60
STREET FLOWING FULL
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.74
HALFSTREET FLOOD WIDTH(Feet) = 33.51
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.45
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.28
STREET FLOW TRAVEL TIME(MIN.) = 2.36 Tc(MIN.) = 26.21
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.571
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.09 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 60.9 SUBAREA RUNOFF(CFS) = 8.39
EFFECTIVE AREA(ACRES) = 60.91 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 60.9 PEAK FLOW RATE(CFS) = 84.49

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.74 HALFSTREET FLOOD WIDTH(Feet) = 33.51
FLOW VELOCITY(Feet/Sec.) = 4.44 DEPTH*VELOCITY(FT*FT/SEC.) = 3.27

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LONGEST FLOWPATH FROM NODE      100.00 TO NODE      107.00 =      4060.00 FEET.

*****
FLOW PROCESS FROM NODE      107.00 TO NODE      108.00 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.130
DEPTH OF FLOW IN 96.0 INCH PIPE IS 76.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 1.96
ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 84.49
PIPE TRAVEL TIME(MIN.) = 2.12 Tc(MIN.) = 28.34
LONGEST FLOWPATH FROM NODE      100.00 TO NODE      108.00 =      4310.00 FEET.

*****
FLOW PROCESS FROM NODE      108.00 TO NODE      108.00 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 28.34
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.502
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
COMMERCIAL      D      4.84      0.20      0.100      75
RESIDENTIAL
"11+ DWELLINGS/ACRE"      D      14.79      0.20      0.200      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.175
SUBAREA AREA(ACRES) = 19.63 SUBAREA RUNOFF(CFS) = 25.92
EFFECTIVE AREA(ACRES) = 80.54 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 80.5 PEAK FLOW RATE(CFS) = 106.66

*****
FLOW PROCESS FROM NODE      108.00 TO NODE      109.00 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 470.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.80
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 106.66
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 29.00
LONGEST FLOWPATH FROM NODE      100.00 TO NODE      109.00 =      4780.00 FEET.

*****
FLOW PROCESS FROM NODE      109.00 TO NODE      109.00 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 29.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.483
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
NATURAL FAIR COVER
"OPEN BRUSH"      D      16.62      0.20      1.000      83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 16.62 SUBAREA RUNOFF(CFS) = 19.19
EFFECTIVE AREA(ACRES) = 97.16 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 97.2 PEAK FLOW RATE(CFS) = 124.41
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 97.2 TC(MIN.) = 29.00
EFFECTIVE AREA(ACRES) = 97.16 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.300
PEAK FLOW RATE(CFS) = 124.41
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage F

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

FILE NAME: X010_F.DAT

TIME/DATE OF STUDY: 16:41 04/08/2008

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 9.00 DOWNSTREAM(FEET) = 6.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 7.969
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.108
SUBAREA T_c AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 5.80 0.40 0.200 32 7.97
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.200
SUBAREA RUNOFF(CFS) = 15.81
TOTAL AREA(ACRES) = 5.80 PEAK FLOW RATE(CFS) = 15.81

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 5.8 TC(MIN.) = 7.97
EFFECTIVE AREA(ACRES) = 5.80 AREA-AVERAGED F_m (INCH/HR) = 0.08
AREA-AVERAGED F_p (INCH/HR) = 0.40 AREA-AVERAGED A_p = 0.200
PEAK FLOW RATE(CFS) = 15.81

=====

END OF RATIONAL METHOD ANALYSIS

Drainage G

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Analysis prepared by:

FILE NAME: X010_G.DAT
TIME/DATE OF STUDY: 16:41 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 9.00 DOWNSTREAM(FEET) = 5.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.110
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.077
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.75 0.40 0.200 32 8.11
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 4.72
TOTAL AREA(ACRES) = 1.75 PEAK FLOW RATE(CFS) = 4.72
=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.8 TC(MIN.) = 8.11
EFFECTIVE AREA(ACRES) = 1.75 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 4.72
=====

END OF RATIONAL METHOD ANALYSIS

Drainage H

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Analysis prepared by:

FILE NAME: X010_H.DAT
TIME/DATE OF STUDY: 16:41 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 210.00 TO NODE 211.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 70.00
ELEVATION DATA: UPSTREAM(FEET) = 10.00 DOWNSTREAM(FEET) = 9.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 0.63 0.40 0.200 32 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 2.26
TOTAL AREA(ACRES) = 0.63 PEAK FLOW RATE(CFS) = 2.26

FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.61
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.26
PIPE TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 7.46
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 750.00 FEET.

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 7.46
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.228
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 3.53 0.40 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.53 SUBAREA RUNOFF(CFS) = 10.00
EFFECTIVE AREA(ACRES) = 4.16 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 4.2 PEAK FLOW RATE(CFS) = 11.79

*****
FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.92
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.79
PIPE TRAVEL TIME(MIN.) = 0.96 Tc(MIN.) = 8.42
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 1150.00 FEET.

*****
FLOW PROCESS FROM NODE 213.00 TO NODE 213.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 8.42
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.011
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 2.82 0.40 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 2.82 SUBAREA RUNOFF(CFS) = 7.44
EFFECTIVE AREA(ACRES) = 6.98 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 7.0 PEAK FLOW RATE(CFS) = 18.41

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 7.0 TC(MIN.) = 8.42
EFFECTIVE AREA(ACRES) = 6.98 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 18.41
=====
END OF RATIONAL METHOD ANALYSIS

```

Drainage I

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Analysis prepared by:

FILE NAME: X010_I.DAT
TIME/DATE OF STUDY: 16:42 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

=====

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 21
=====

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 250.00
ELEVATION DATA: UPSTREAM(FEET) = 8.00 DOWNSTREAM(FEET) = 6.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.746
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.159
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	0.47	0.40	0.200	32	7.75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 1.30
TOTAL AREA(ACRES) = 0.47 PEAK FLOW RATE(CFS) = 1.30

FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 62
=====

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

REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(FEET) = 290.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          2.01
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.25
HALFSTREET FLOOD WIDTH(FEET) = 4.72
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.56
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.63
STREET FLOW TRAVEL TIME(MIN.) = 1.89   Tc(MIN.) = 9.64
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.788
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        0.58      0.40      0.200      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.58      SUBAREA RUNOFF(CFS) = 1.41
EFFECTIVE AREA(ACRES) = 1.05      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.0      PEAK FLOW RATE(CFS) = 2.56

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) = 5.72
FLOW VELOCITY(FEET/SEC.) = 2.63   DEPTH*VELOCITY(FT*FT/SEC.) = 0.70
LONGEST FLOWPATH FROM NODE 215.00 TO NODE 217.00 = 540.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.0   TC(MIN.) = 9.64
EFFECTIVE AREA(ACRES) = 1.05   AREA-AVERAGED Fm(INCH/HR)= 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40   AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 2.56
=====
=====
END OF RATIONAL METHOD ANALYSIS

```

Drainage J

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

FILE NAME: X010_J.DAT
TIME/DATE OF STUDY: 16:42 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

=====

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 220.00 TO NODE 221.00 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) = 8.00 DOWNSTREAM(FEET) = 6.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.642
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.967
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	1.55	0.40	0.200	32	8.64

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 4.03
TOTAL AREA(ACRES) = 1.55 PEAK FLOW RATE(CFS) = 4.03

FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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


```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          7.86
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.54
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.46
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.95
STREET FLOW TRAVEL TIME(MIN.) = 2.71  Tc(MIN.) = 11.35
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.538
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        3.46    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.46    SUBAREA RUNOFF(CFS) = 7.65
EFFECTIVE AREA(ACRES) = 5.01    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.0    PEAK FLOW RATE(CFS) = 11.08

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42    HALFSTREET FLOOD WIDTH(FEET) = 14.57
FLOW VELOCITY(FEET/SEC.) = 2.65    DEPTH*VELOCITY(FT*FT/SEC.) = 1.12
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 222.00 = 700.00 FEET.

*****
FLOW PROCESS FROM NODE 222.00 TO NODE 223.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 450.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          16.95
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 17.38
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.93
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.39
STREET FLOW TRAVEL TIME(MIN.) = 2.56  Tc(MIN.) = 13.91
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.259
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        5.98    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 5.98    SUBAREA RUNOFF(CFS) = 11.73
EFFECTIVE AREA(ACRES) = 10.99    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 11.0    PEAK FLOW RATE(CFS) = 21.55

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.50    HALFSTREET FLOOD WIDTH(FEET) = 19.10
FLOW VELOCITY(FEET/SEC.) = 3.12    DEPTH*VELOCITY(FT*FT/SEC.) = 1.57
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 223.00 = 1150.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 11.0  TC(MIN.) = 13.91
EFFECTIVE AREA(ACRES) = 10.99  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 21.55
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage K

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Analysis prepared by:

FILE NAME: X010_K.DAT
TIME/DATE OF STUDY: 16:42 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 225.00 TO NODE 226.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 7.00 DOWNSTREAM(FEET) = 5.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.151
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.871
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.53 0.40 0.200 32 9.15
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 3.84
TOTAL AREA(ACRES) = 1.53 PEAK FLOW RATE(CFS) = 3.84

FLOW PROCESS FROM NODE 226.00 TO NODE 227.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0150
STREET LENGTH(FEET) = 330.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          9.22
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.38
HALFSTREET FLOOD WIDTH(FEET) = 12.30
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.98
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.14
STREET FLOW TRAVEL TIME(MIN.) = 1.84   Tc(MIN.) = 10.99
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.585
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        4.77      0.40      0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 4.77      SUBAREA RUNOFF(CFS) = 10.75
EFFECTIVE AREA(ACRES) = 6.30      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.3          PEAK FLOW RATE(CFS) = 14.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) = 14.80
FLOW VELOCITY(FEET/SEC.) = 3.30   DEPTH*VELOCITY(FT*FT/SEC.) = 1.41
LONGEST FLOWPATH FROM NODE 225.00 TO NODE 227.00 = 660.00 FEET.

*****
FLOW PROCESS FROM NODE 227.00 TO NODE 228.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 170.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.11
ESTIMATED PIPE DIAMETER(INCH) = 21.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.20
PIPE TRAVEL TIME(MIN.) = 0.40   Tc(MIN.) = 11.39
LONGEST FLOWPATH FROM NODE 225.00 TO NODE 228.00 = 830.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 6.3   TC(MIN.) = 11.39
EFFECTIVE AREA(ACRES) = 6.3   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40   AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 14.20
=====
END OF RATIONAL METHOD ANALYSIS

```

b) Expected Value (50% Confidence) Events

- i. EV 100-Year Storm Event

Drainage A

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Analysis prepared by:

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

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====

1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
---	------	------	-------------------	------	------	--------	-------	--------

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 240.00
ELEVATION DATA: UPSTREAM(FEET) = 106.20 DOWNSTREAM(FEET) = 105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.372
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.603
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.68 0.20 0.200 75 8.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 2.18
TOTAL AREA(ACRES) = 0.68 PEAK FLOW RATE(CFS) = 2.18

FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 300.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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


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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.69
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 10.43
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.58
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.55
STREET FLOW TRAVEL TIME(MIN.) = 3.16 Tc(MIN.) = 11.53
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.007
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        1.13    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.13 SUBAREA RUNOFF(CFS) = 3.02
EFFECTIVE AREA(ACRES) = 1.81 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 4.83

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.84
FLOW VELOCITY(FEET/SEC.) = 1.67 DEPTH*VELOCITY(FT*FT/SEC.) = 0.63
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 260.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.92
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.35
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.94
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.85
STREET FLOW TRAVEL TIME(MIN.) = 2.23 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
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.39    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.39 SUBAREA RUNOFF(CFS) = 8.18
EFFECTIVE AREA(ACRES) = 5.20 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.2 PEAK FLOW RATE(CFS) = 12.54

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.70
FLOW VELOCITY(FEET/SEC.) = 2.10 DEPTH*VELOCITY(FT*FT/SEC.) = 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 800.00 FEET.

*****
FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 310.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.75
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.54
HALFSTREET FLOOD WIDTH(Feet) = 21.21
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.35
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.27
STREET FLOW TRAVEL TIME(Min.) = 2.20 Tc(Min.) = 15.96
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.501
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.51 0.20 0.200 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(Acres) = 6.51 SUBAREA RUNOFF(CFS) = 14.42
EFFECTIVE AREA(Acres) = 11.71 AREA-AVERAGED Fm(Inch/Hr) = 0.04
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(Acres) = 11.7 PEAK FLOW RATE(CFS) = 25.93

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.58 HALFSTREET FLOOD WIDTH(Feet) = 23.63
FLOW VELOCITY(Feet/Sec.) = 2.50 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.46
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 1110.00 FEET.

FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 440.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 34.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.63
HALFSTREET FLOOD WIDTH(Feet) = 26.45
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.68
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.70
STREET FLOW TRAVEL TIME(Min.) = 2.74 Tc(Min.) = 18.70
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.286
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 8.39 0.20 0.100 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 8.39 SUBAREA RUNOFF(CFS) = 17.11
EFFECTIVE AREA(Acres) = 20.10 AREA-AVERAGED Fm(Inch/Hr) = 0.03
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(Acres) = 20.1 PEAK FLOW RATE(CFS) = 40.79

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.67 HALFSTREET FLOOD WIDTH(Feet) = 28.16
FLOW VELOCITY(Feet/Sec.) = 2.80 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.87
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 1550.00 FEET.

FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 360.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 58.57
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.73
HALFSTREET FLOOD WIDTH(FEET) = 33.32
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.12
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.29
STREET FLOW TRAVEL TIME(MIN.) = 1.92 Tc(MIN.) = 20.62
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.163
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 18.43 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 18.43 SUBAREA RUNOFF(CFS) = 35.55
EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 74.11

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.78 HALFSTREET FLOOD WIDTH(FEET) = 35.58
FLOW VELOCITY(FEET/SEC.) = 3.39 DEPTH*VELOCITY(FT*FT/SEC.) = 2.64
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 360.0 FT WITH ELEVATION-DROP = 1.8 FT, IS 56.2 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 7.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.15
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 74.11
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 21.27
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.27
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.126
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.81 0.20 0.100 75
NATURAL FAIR COVER
"OPEN BRUSH" D 4.99 0.20 1.000 83
COMMERCIAL D 6.24 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA AREA(ACRES) = 12.04 SUBAREA RUNOFF(CFS) = 22.01
EFFECTIVE AREA(ACRES) = 50.57 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 50.6 PEAK FLOW RATE(CFS) = 94.81

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 9.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.1000
FLOW LENGTH(FEET) = 140.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.8 INCHES

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PIPE-FLOW VELOCITY(FEET/SEC.) = 27.66
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 94.81
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 21.36
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 9.00 = 2600.00 FEET.

FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 1180.00
REPRESENTATIVE CHANNEL SLOPE = 0.0300
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.956
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 25.52 0.20 1.000 83
NATURAL POOR COVER
"BAREN" D 6.51 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 120.15
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.01
AVERAGE FLOW DEPTH(FEET) = 0.78 TRAVEL TIME(MIN.) = 3.27
Tc(MIN.) = 24.63
SUBAREA AREA(ACRES) = 32.03 SUBAREA RUNOFF(CFS) = 50.63
EFFECTIVE AREA(ACRES) = 82.60 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 82.6 PEAK FLOW RATE(CFS) = 137.75

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.84 FLOW VELOCITY(FEET/SEC.) = 6.32
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 10.00 = 3780.00 FEET.

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.872
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 29.92 0.20 1.000 83
NATURAL POOR COVER
"BAREN" D 14.41 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 171.11
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.51
AVERAGE FLOW DEPTH(FEET) = 1.19 TRAVEL TIME(MIN.) = 2.00
Tc(MIN.) = 26.62
SUBAREA AREA(ACRES) = 44.33 SUBAREA RUNOFF(CFS) = 66.71
EFFECTIVE AREA(ACRES) = 126.93 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.69
TOTAL AREA(ACRES) = 126.9 PEAK FLOW RATE(CFS) = 198.18

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.29 FLOW VELOCITY(FEET/SEC.) = 5.82
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 11.00 = 4440.00 FEET.

FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 580.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.810

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SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          14.64    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 208.79
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 5.95
AVERAGE FLOW DEPTH(Feet) = 1.33    TRAVEL TIME(MIN.) = 1.62
Tc(MIN.) = 28.25
SUBAREA AREA(ACRES) = 14.64    SUBAREA RUNOFF(CFS) = 21.22
EFFECTIVE AREA(ACRES) = 141.57    AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 141.6    PEAK FLOW RATE(CFS) = 212.35

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.35    FLOW VELOCITY(Feet/Sec.) = 5.98
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 5020.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 20.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(Feet) = 440.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 213.48
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.86
HALFSTREET FLOOD WIDTH(Feet) = 39.79
AVERAGE FLOW VELOCITY(Feet/Sec.) = 7.56
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 6.52
STREET FLOW TRAVEL TIME(MIN.) = 0.97    Tc(MIN.) = 29.22
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.776
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          A          1.83    0.40    1.000    46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 1.83    SUBAREA RUNOFF(CFS) = 2.27
EFFECTIVE AREA(ACRES) = 143.40    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 143.4    PEAK FLOW RATE(CFS) = 212.35
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.86    HALFSTREET FLOOD WIDTH(Feet) = 39.73
FLOW VELOCITY(Feet/Sec.) = 7.55    DEPTH*VELOCITY(FT*FT/SEC.) = 6.50
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5460.00 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 13.00 TO NODE 14.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(Feet) = 370.00
ELEVATION DATA: UPSTREAM(Feet) = 102.50    DOWNSTREAM(Feet) = 100.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.373

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* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.380
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.17    0.20    0.200    75   9.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 9.53
TOTAL AREA(ACRES) = 3.17 PEAK FLOW RATE(CFS) = 9.53

*****
FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0500
FLOW LENGTH(FEET) = 1660.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.07
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.53
PIPE TRAVEL TIME(MIN.) = 2.29 Tc(MIN.) = 11.67
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 15.00 = 2030.00 FEET.

*****
FLOW PROCESS FROM NODE 15.00 TO NODE 15.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.986
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    B        31.84    0.30    0.200    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 31.84 SUBAREA RUNOFF(CFS) = 83.86
EFFECTIVE AREA(ACRES) = 35.01 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.29 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 35.0 PEAK FLOW RATE(CFS) = 92.26

*****
FLOW PROCESS FROM NODE 15.00 TO NODE 16.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 780.00
REPRESENTATIVE CHANNEL SLOPE = 0.0400
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.885
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        11.64    0.20    0.200    75
NATURAL FAIR COVER
"OPEN BRUSH"           A        13.96    0.40    1.000    46
COMMERCIAL              D        2.65    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.37
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.586
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 126.20
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 17.71
AVERAGE FLOW DEPTH(FEET) = 1.89 TRAVEL TIME(MIN.) = 0.73
Tc(MIN.) = 12.40
SUBAREA AREA(ACRES) = 28.25 SUBAREA RUNOFF(CFS) = 67.86
EFFECTIVE AREA(ACRES) = 63.26 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.35 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 63.3 PEAK FLOW RATE(CFS) = 156.93

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.05 FLOW VELOCITY(FEET/SEC.) = 18.68
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.00 = 2810.00 FEET.

*****
FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
FLOW LENGTH(FEET) = 1510.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.07
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 156.93
PIPE TRAVEL TIME(MIN.) = 2.50 Tc(MIN.) = 14.90
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 17.00 = 4320.00 FEET.

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.90
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.600
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
  LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 44.48 0.20 1.000 83
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 6.11 0.40 0.200 32
COMMERCIAL A 4.75 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.834
SUBAREA AREA(ACRES) = 55.34 SUBAREA RUNOFF(CFS) = 120.88
EFFECTIVE AREA(ACRES) = 118.60 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 118.6 PEAK FLOW RATE(CFS) = 261.59

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 18.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 48.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.77
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 261.59
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 15.20
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 18.00 = 4590.00 FEET.

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.570
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
  LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BARREN" A 4.65 0.40 1.000 78
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 13.94 0.40 0.200 32
COMMERCIAL A 2.82 0.40 0.100 32
NATURAL FAIR COVER
"OPEN BRUSH" A 2.64 0.40 1.000 46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
SUBAREA AREA(ACRES) = 24.05 SUBAREA RUNOFF(CFS) = 51.91
EFFECTIVE AREA(ACRES) = 142.65 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.56
TOTAL AREA(ACRES) = 142.7 PEAK FLOW RATE(CFS) = 310.34

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 19.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 610.00
REPRESENTATIVE CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 35.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.471

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SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"           A         2.68    0.40    1.000    46
RESIDENTIAL
"11+ DWELLINGS/ACRE"  A         9.73    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 323.30
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.21
AVERAGE FLOW DEPTH(FEET) = 0.95 TRAVEL TIME(MIN.) = 1.10
Tc(MIN.) = 16.31
SUBAREA AREA(ACRES) = 12.41 SUBAREA RUNOFF(CFS) = 25.93
EFFECTIVE AREA(ACRES) = 155.06 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 155.1 PEAK FLOW RATE(CFS) = 323.44

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.95 FLOW VELOCITY(FEET/SEC.) = 9.22
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 19.00 = 5200.00 FEET.

*****
FLOW PROCESS FROM NODE 19.00 TO NODE 20.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 360.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.299
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL             A         1.58    0.40    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 325.04
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.72
AVERAGE FLOW DEPTH(FEET) = 0.89 TRAVEL TIME(MIN.) = 2.21
Tc(MIN.) = 18.52
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 3.21
EFFECTIVE AREA(ACRES) = 156.64 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 156.6 PEAK FLOW RATE(CFS) = 323.44
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.89 FLOW VELOCITY(FEET/SEC.) = 2.71
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 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    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1         323.44 18.52 2.299 0.28( 0.15) 0.54 156.6 13.00
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1         212.35 29.22 1.776 0.20( 0.15) 0.72 143.4 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5460.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1         501.23 18.52 2.299 0.25( 0.15) 0.61 247.5 13.00
2         457.00 29.22 1.776 0.24( 0.15) 0.63 300.0 1.00
TOTAL AREA(ACRES) = 300.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 501.23 Tc(MIN.) = 18.515
EFFECTIVE AREA(ACRES) = 247.52 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.61
TOTAL AREA(ACRES) = 300.0

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LONGEST FLOWPATH FROM NODE      13.00 TO NODE      20.00 =      5560.00 FEET.

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      20.00 IS CODE =  12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      21.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) =   570.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(Feet) = 130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(Feet) =   6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =   2.117
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        11.87    0.40    0.200    32
NATURAL FAIR COVER
"OPEN BRUSH"              D        16.10    0.20    1.000    83
COMMERCIAL                A         1.56    0.40    0.100    32
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) =   0.23
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap =   0.631
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   527.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) =   3.27
AVERAGE FLOW DEPTH(Feet) =   1.19  TRAVEL TIME(MIN.) =   2.91
Tc(MIN.) =   21.42
SUBAREA AREA(ACRES) =   29.53  SUBAREA RUNOFF(CFS) =   52.46
EFFECTIVE AREA(ACRES) =   277.05  AREA-AVERAGED Fm(INCH/HR) =   0.15
AREA-AVERAGED Fp(INCH/HR) =   0.24  AREA-AVERAGED Ap =   0.61
TOTAL AREA(ACRES) =   329.6  PEAK FLOW RATE(CFS) =   501.23
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.15  FLOW VELOCITY(Feet/Sec.) =   3.21
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      21.00 =   6130.00 FEET.

*****
FLOW PROCESS FROM NODE      21.00 TO NODE      22.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) =   600.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(Feet) = 130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(Feet) =   6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =   1.961
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                A         1.73    0.40    0.100    32
NATURAL FAIR COVER
"OPEN BRUSH"              D         8.52    0.20    1.000    83
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) =   0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap =   0.848
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   509.48
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) =   3.23
AVERAGE FLOW DEPTH(Feet) =   1.16  TRAVEL TIME(MIN.) =   3.10
Tc(MIN.) =   24.52
SUBAREA AREA(ACRES) =   10.25  SUBAREA RUNOFF(CFS) =   16.50
EFFECTIVE AREA(ACRES) =   287.30  AREA-AVERAGED Fm(INCH/HR) =   0.15
AREA-AVERAGED Fp(INCH/HR) =   0.24  AREA-AVERAGED Ap =   0.62
TOTAL AREA(ACRES) =   339.8  PEAK FLOW RATE(CFS) =   501.23
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.15  FLOW VELOCITY(Feet/Sec.) =   3.21
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      22.00 =   6730.00 FEET.

*****
FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) =   450.00

```

REPRESENTATIVE CHANNEL SLOPE = 0.0050
 CHANNEL BASE(Feet) = 130.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 6.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.863

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	3.62	0.40	0.200	32
NATURAL FAIR COVER					
"OPEN BRUSH"	D	4.47	0.20	1.000	83
COMMERCIAL	A	1.68	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.549

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 508.86

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 3.22

AVERAGE FLOW DEPTH(Feet) = 1.16 TRAVEL TIME(MIN.) = 2.33

Tc(MIN.) = 26.85

SUBAREA AREA(ACRES) = 9.77 SUBAREA RUNOFF(CFS) = 15.26

EFFECTIVE AREA(ACRES) = 297.07 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.62

TOTAL AREA(ACRES) = 349.6 PEAK FLOW RATE(CFS) = 501.23

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(Feet) = 1.15 FLOW VELOCITY(Feet/Sec.) = 3.21

LONGEST FLOWPATH FROM NODE 13.00 TO NODE 23.00 = 7180.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 349.6 TC(MIN.) = 26.85

EFFECTIVE AREA(ACRES) = 297.07 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.617

PEAK FLOW RATE(CFS) = 501.23

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	501.23	26.85	1.863	0.24(0.15)	0.62	297.1	13.00
2	457.00	37.87	1.533	0.24(0.15)	0.63	349.6	1.00

END OF RATIONAL METHOD ANALYSIS

Drainage B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X025_B.DAT

TIME/DATE OF STUDY: 16:14 04/08/2008

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 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) = 110.00 DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.477
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.841
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.54 0.20 0.100 75 7.48
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.86
TOTAL AREA(ACRES) = 0.54 PEAK FLOW RATE(CFS) = 1.86

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          2.76
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.30
HALFSTREET FLOOD WIDTH(Feet) = 7.53
AVERAGE FLOW VELOCITY(Feet/Sec.) = 1.97
PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 0.58
STREET FLOW TRAVEL TIME(Min.) = 2.97   Tc(Min.) = 10.44
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.180
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)   (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        0.63      0.20     0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63   SUBAREA RUNOFF(CFS) = 1.79
EFFECTIVE AREA(ACRES) = 1.17   AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2       PEAK FLOW RATE(CFS) = 3.33

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.31   HALFSTREET FLOOD WIDTH(Feet) = 8.34
FLOW VELOCITY(Feet/Sec.) = 2.04   DEPTH*VELOCITY(Ft*Ft/Sec.) = 0.64
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 400.00   CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          4.21
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.33
HALFSTREET FLOOD WIDTH(Feet) = 9.41
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.14
PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 0.71
STREET FLOW TRAVEL TIME(Min.) = 3.12   Tc(Min.) = 13.56
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.743
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)   (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        0.72      0.20     0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.72   SUBAREA RUNOFF(CFS) = 1.76
EFFECTIVE AREA(ACRES) = 1.89   AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9       PEAK FLOW RATE(CFS) = 4.63

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.34   HALFSTREET FLOOD WIDTH(Feet) = 9.84
FLOW VELOCITY(Feet/Sec.) = 2.19   DEPTH*VELOCITY(Ft*Ft/Sec.) = 0.74
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 500.00   CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.02
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 15.04
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.71
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.17
STREET FLOW TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 16.63
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.76 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 6.76 SUBAREA RUNOFF(CFS) = 14.74
EFFECTIVE AREA(ACRES) = 8.65 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 18.87

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 18.16
FLOW VELOCITY(FEET/SEC.) = 3.00 DEPTH*VELOCITY(FT*FT/SEC.) = 1.46
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 1550.00 FEET.

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 600.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.53
HALFSTREET FLOOD WIDTH(FEET) = 20.74
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.25
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.73
STREET FLOW TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 19.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.220
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 7.46 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.46 SUBAREA RUNOFF(CFS) = 14.77
EFFECTIVE AREA(ACRES) = 16.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 31.89

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.56 HALFSTREET FLOOD WIDTH(FEET) = 22.38
FLOW VELOCITY(FEET/SEC.) = 3.42 DEPTH*VELOCITY(FT*FT/SEC.) = 1.92
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 2150.00 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 56.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.57
HALFSTREET FLOOD WIDTH(Feet) = 22.77
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.45
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.96
STREET FLOW TRAVEL TIME(Min.) = 2.42 Tc(Min.) = 22.12
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.079
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 1.47 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 1.47 SUBAREA RUNOFF(CFS) = 2.72
EFFECTIVE AREA(Acres) = 17.58 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(Acres) = 17.6 PEAK FLOW RATE(CFS) = 32.58

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.57 HALFSTREET FLOOD WIDTH(Feet) = 22.54
FLOW VELOCITY(Feet/Sec.) = 3.44 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.95
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 2650.00 Feet.

FLOW PROCESS FROM NODE 56.00 TO NODE 57.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 580.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.25
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.61
HALFSTREET FLOOD WIDTH(Feet) = 25.20
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.69
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 2.26
STREET FLOW TRAVEL TIME(Min.) = 2.62 Tc(Min.) = 24.74
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 1.951
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 12.28 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 12.28 SUBAREA RUNOFF(CFS) = 21.34
EFFECTIVE AREA(Acres) = 29.86 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(Acres) = 29.9 PEAK FLOW RATE(CFS) = 51.90

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.65 HALFSTREET FLOOD WIDTH(Feet) = 27.07
FLOW VELOCITY(Feet/Sec.) = 3.85 DEPTH*VELOCITY(Feet*Feet/Sec.) = 2.49
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 3230.00 Feet.

FLOW PROCESS FROM NODE 57.00 TO NODE 58.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 680.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 84.11
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.74
HALFSTREET FLOOD WIDTH(FEET) = 33.44
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.44
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.27
STREET FLOW TRAVEL TIME(MIN.) = 2.55 Tc(MIN.) = 27.29
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.846
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      29.81    0.20    0.100    75
SCHOOL                D       9.91    0.20    0.600    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 39.72    SUBAREA RUNOFF(CFS) = 64.38
EFFECTIVE AREA(ACRES) = 69.58    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 69.6    PEAK FLOW RATE(CFS) = 113.45

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.80    HALFSTREET FLOOD WIDTH(FEET) = 36.44
FLOW VELOCITY(FEET/SEC.) = 4.91    DEPTH*VELOCITY(FT*FT/SEC.) = 3.90
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
      AND L = 680.0 FT WITH ELEVATION-DROP = 6.8 FT, IS 112.5 CFS,
      WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 58.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 58.00 = 3910.00 FEET.

*****
FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 760.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.84
ESTIMATED PIPE DIAMETER(INCH) = 45.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 113.45
PIPE TRAVEL TIME(MIN.) = 1.07    Tc(MIN.) = 28.36
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 59.00 = 4670.00 FEET.

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 59.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 28.36
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.806
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      11.44    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.44    SUBAREA RUNOFF(CFS) = 18.39
EFFECTIVE AREA(ACRES) = 81.02    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 81.0    PEAK FLOW RATE(CFS) = 129.35

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 580.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.34
ESTIMATED PIPE DIAMETER(INCH) = 48.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 129.35

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PIPE TRAVEL TIME(MIN.) = 0.78    Tc(MIN.) = 29.15
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 60.00 = 5250.00 FEET.

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 29.15
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.779
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D        15.82    0.20    0.100    75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D        4.45    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.122
SUBAREA AREA(ACRES) = 20.27    SUBAREA RUNOFF(CFS) = 32.00
EFFECTIVE AREA(ACRES) = 101.29    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 101.3    PEAK FLOW RATE(CFS) = 159.33

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 950.00
REPRESENTATIVE CHANNEL SLOPE = 0.0350
CHANNEL BASE(FEET) = 15.00    "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030    MAXIMUM DEPTH(FEET) = 7.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"        D        20.98    0.20    1.000    83
NATURAL POOR COVER
"BARREN"            D        12.82    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 182.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.83
AVERAGE FLOW DEPTH(FEET) = 1.12    TRAVEL TIME(MIN.) = 1.79
Tc(MIN.) = 30.94
SUBAREA AREA(ACRES) = 33.80    SUBAREA RUNOFF(CFS) = 46.22
EFFECTIVE AREA(ACRES) = 135.09    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 135.1    PEAK FLOW RATE(CFS) = 200.17

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.19    FLOW VELOCITY(FEET/SEC.) = 9.10
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 61.00 = 6200.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 135.1    TC(MIN.) = 30.94
EFFECTIVE AREA(ACRES) = 135.09    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.365
PEAK FLOW RATE(CFS) = 200.17
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage C

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X025_C.DAT
TIME/DATE OF STUDY: 16:14 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 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) = 107.00 DOWNSTREAM(FEET) = 104.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.912
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.819
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN" D 2.27 0.20 1.000 93 12.91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 5.35
TOTAL AREA(ACRES) = 2.27 PEAK FLOW RATE(CFS) = 5.35

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.28
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 14.10
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.08
STREET FLOW TRAVEL TIME(MIN.) = 2.23 Tc(MIN.) = 15.15
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.576
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BARREN"              D        4.61    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.61 SUBAREA RUNOFF(CFS) = 9.86
EFFECTIVE AREA(ACRES) = 6.88 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 14.71

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45 HALFSTREET FLOOD WIDTH(FEET) = 16.37
FLOW VELOCITY(FEET/SEC.) = 2.84 DEPTH*VELOCITY(FT*FT/SEC.) = 1.29
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.46
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.45
HALFSTREET FLOOD WIDTH(FEET) = 15.90
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.77
STREET FLOW TRAVEL TIME(MIN.) = 1.68 Tc(MIN.) = 16.83
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.427
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          D        4.74    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.74 SUBAREA RUNOFF(CFS) = 9.50
EFFECTIVE AREA(ACRES) = 11.62 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 11.6 PEAK FLOW RATE(CFS) = 23.29

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 17.15
FLOW VELOCITY(FEET/SEC.) = 4.13 DEPTH*VELOCITY(FT*FT/SEC.) = 1.94
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.1200
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 30.97
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.40
HALFSTREET FLOOD WIDTH(FEET) = 13.24
AVERAGE FLOW VELOCITY(FEET/SEC.) = 8.80
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.51
STREET FLOW TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 17.68
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.360
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 7.90 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 15.36
EFFECTIVE AREA(ACRES) = 19.52 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 19.5 PEAK FLOW RATE(CFS) = 37.95

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.49
FLOW VELOCITY(FEET/SEC.) = 9.17 DEPTH*VELOCITY(FT*FT/SEC.) = 3.86
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 84.00 = 1500.00 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0900
STREET LENGTH(FEET) = 370.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 79.90
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.53
HALFSTREET FLOOD WIDTH(FEET) = 20.82
AVERAGE FLOW VELOCITY(FEET/SEC.) = 9.83
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 5.25
STREET FLOW TRAVEL TIME(MIN.) = 0.63 Tc(MIN.) = 18.31
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.314
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 34.33 0.20 1.000 83
NATURAL POOR COVER
"BARREN" D 9.76 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 44.09 SUBAREA RUNOFF(CFS) = 83.89
EFFECTIVE AREA(ACRES) = 63.61 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 63.6 PEAK FLOW RATE(CFS) = 121.03

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 24.57
FLOW VELOCITY(FEET/SEC.) = 10.84 DEPTH*VELOCITY(FT*FT/SEC.) = 6.52
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 1870.00 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 63.6 TC(MIN.) = 18.31
EFFECTIVE AREA(ACRES) = 63.61 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS) = 121.03

=====

END OF RATIONAL METHOD ANALYSIS

Drainage D

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X025_D.DAT
TIME/DATE OF STUDY: 10:05 04/09/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 280.00
ELEVATION DATA: UPSTREAM(FEET) = 95.00 DOWNSTREAM(FEET) = 83.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.794
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.438
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.10 0.20 0.200 75 5.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 4.35
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 4.35

FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 420.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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


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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.73
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 14.88
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.70
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.16
STREET FLOW TRAVEL TIME(MIN.) = 2.59  Tc(MIN.) = 8.39
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.600
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
  LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      D        4.58      0.20      0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 4.58      SUBAREA RUNOFF(CFS) = 14.67
EFFECTIVE AREA(ACRES) = 5.68      AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.7          PEAK FLOW RATE(CFS) = 18.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48  HALFSTREET FLOOD WIDTH(FEET) = 17.85
FLOW VELOCITY(FEET/SEC.) = 2.99  DEPTH*VELOCITY(FT*FT/SEC.) = 1.44
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 700.00 FEET.

*****
FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 740.00
REPRESENTATIVE CHANNEL SLOPE = 0.0600
CHANNEL BASE(FEET) = 15.00  "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(FEET) = 7.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.153
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
  LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"              D        8.61      0.20      1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 29.68
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.57
AVERAGE FLOW DEPTH(FEET) = 0.33  TRAVEL TIME(MIN.) = 2.21
Tc(MIN.) = 10.60
SUBAREA AREA(ACRES) = 8.61      SUBAREA RUNOFF(CFS) = 22.88
EFFECTIVE AREA(ACRES) = 14.29  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.68
TOTAL AREA(ACRES) = 14.3        PEAK FLOW RATE(CFS) = 38.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.39  FLOW VELOCITY(FEET/SEC.) = 6.12
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 123.00 = 1440.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 14.3  TC(MIN.) = 10.60
EFFECTIVE AREA(ACRES) = 14.29  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.682
PEAK FLOW RATE(CFS) = 38.79
=====
END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X025_E.DAT
TIME/DATE OF STUDY: 16:37 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 105.00 DOWNSTREAM(FEET) = 103.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.151
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.426
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.39 0.20 0.200 75 9.15
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 7.28
TOTAL AREA(ACRES) = 2.39 PEAK FLOW RATE(CFS) = 7.28

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.24
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 15.20
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.71
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.18
STREET FLOW TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 12.22
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.909
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.83    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.83 SUBAREA RUNOFF(CFS) = 9.89
EFFECTIVE AREA(ACRES) = 6.22 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.2 PEAK FLOW RATE(CFS) = 16.06

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 16.99
FLOW VELOCITY(FEET/SEC.) = 2.90 DEPTH*VELOCITY(FT*FT/SEC.) = 1.35
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 830.00 FEET.

*****
FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.30
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 18.71
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.52
STREET FLOW TRAVEL TIME(MIN.) = 2.45 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
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.65    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.65 SUBAREA RUNOFF(CFS) = 8.48
EFFECTIVE AREA(ACRES) = 9.87 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 9.9 PEAK FLOW RATE(CFS) = 22.94

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 19.65
FLOW VELOCITY(FEET/SEC.) = 3.15 DEPTH*VELOCITY(FT*FT/SEC.) = 1.62
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1280.00 FEET.

*****
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 360.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 40.27
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.60
HALFSTREET FLOOD WIDTH(Feet) = 24.49
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.63
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.18
STREET FLOW TRAVEL TIME(MIN.) = 1.65 Tc(MIN.) = 16.33
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.469
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.18 0.20 0.100 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 9.62 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.161
SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 34.65
EFFECTIVE AREA(ACRES) = 25.67 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 25.7 PEAK FLOW RATE(CFS) = 56.22

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.66 HALFSTREET FLOOD WIDTH(Feet) = 27.93
FLOW VELOCITY(Feet/Sec.) = 3.93 DEPTH*VELOCITY(FT*FT/SEC.) = 2.60
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 1640.00 FEET.

FLOW PROCESS FROM NODE 104.00 TO NODE 105.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 1090.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 74.26
STREET FLOWING FULL
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.71
HALFSTREET FLOOD WIDTH(Feet) = 32.35
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.25
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.03
STREET FLOW TRAVEL TIME(MIN.) = 4.28 Tc(MIN.) = 20.61
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.164
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 16.93 0.20 0.100 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.76 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.109
SUBAREA AREA(ACRES) = 18.69 SUBAREA RUNOFF(CFS) = 36.03
EFFECTIVE AREA(ACRES) = 44.36 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 44.4 PEAK FLOW RATE(CFS) = 85.22

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.74 HALFSTREET FLOOD WIDTH(Feet) = 33.57
FLOW VELOCITY(Feet/Sec.) = 4.46 DEPTH*VELOCITY(FT*FT/SEC.) = 3.29
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2730.00 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 106.00 IS CODE = 62

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

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=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 700.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 94.65
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.76
HALFSTREET FLOOD WIDTH(FEET) = 34.60
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.61
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.50
STREET FLOW TRAVEL TIME(MIN.) = 2.53 Tc(MIN.) = 23.13
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.027
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.36 0.20 0.200 75
COMMERCIAL D 8.10 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.123
SUBAREA AREA(ACRES) = 10.46 SUBAREA RUNOFF(CFS) = 18.85
EFFECTIVE AREA(ACRES) = 54.82 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 54.8 PEAK FLOW RATE(CFS) = 98.59

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.77 HALFSTREET FLOOD WIDTH(FEET) = 34.97
FLOW VELOCITY(FEET/SEC.) = 4.69 DEPTH*VELOCITY(FT*FT/SEC.) = 3.59
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 3430.00 FEET.

*****
FLOW PROCESS FROM NODE 106.00 TO NODE 107.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 630.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 103.76
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.78
HALFSTREET FLOOD WIDTH(FEET) = 35.52
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.76
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.70
STREET FLOW TRAVEL TIME(MIN.) = 2.21 Tc(MIN.) = 25.34
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.925
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.09 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 6.09 SUBAREA RUNOFF(CFS) = 10.33
EFFECTIVE AREA(ACRES) = 60.91 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 60.9 PEAK FLOW RATE(CFS) = 103.90

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.78 HALFSTREET FLOOD WIDTH(FEET) = 35.52

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FLOW VELOCITY(FEET/SEC.) = 4.77   DEPTH*VELOCITY(FT*FT/SEC.) = 3.70
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 107.00 = 4060.00 FEET.

*****
FLOW PROCESS FROM NODE 107.00 TO NODE 108.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 250.00   MANNING'S N = 0.130
DEPTH OF FLOW IN 108.0 INCH PIPE IS 78.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.10
ESTIMATED PIPE DIAMETER(INCH) = 108.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 103.90
PIPE TRAVEL TIME(MIN.) = 1.98   Tc(MIN.) = 27.32
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 108.00 = 4310.00 FEET.

*****
FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 27.32
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.845
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           D         4.84   0.20   0.100   75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D        14.79   0.20   0.200   75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.175
SUBAREA AREA(ACRES) = 19.63   SUBAREA RUNOFF(CFS) = 31.97
EFFECTIVE AREA(ACRES) = 80.54   AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 80.5   PEAK FLOW RATE(CFS) = 131.46

*****
FLOW PROCESS FROM NODE 108.00 TO NODE 109.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 470.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.35
ESTIMATED PIPE DIAMETER(INCH) = 48.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 131.46
PIPE TRAVEL TIME(MIN.) = 0.63   Tc(MIN.) = 27.96
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 109.00 = 4780.00 FEET.

*****
FLOW PROCESS FROM NODE 109.00 TO NODE 109.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 27.96
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.821
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"         D        16.62   0.20   1.000   83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 16.62   SUBAREA RUNOFF(CFS) = 24.24
EFFECTIVE AREA(ACRES) = 97.16   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 97.2   PEAK FLOW RATE(CFS) = 153.98
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 97.2   TC(MIN.) = 27.96
EFFECTIVE AREA(ACRES) = 97.16   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.300
PEAK FLOW RATE(CFS) = 153.98
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage F

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

FILE NAME: X025_F.DAT

TIME/DATE OF STUDY: 16:37 04/08/2008

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00

SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00

SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90

DATA BANK RAINFALL USED

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET

as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

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

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00

ELEVATION DATA: UPSTREAM(FEET) = 9.00 DOWNSTREAM(FEET) = 6.00

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

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 7.969

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.705

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.)
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RESIDENTIAL

"11+ DWELLINGS/ACRE" A 5.80 0.40 0.200 32 7.97

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

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.200

SUBAREA RUNOFF(CFS) = 18.92

TOTAL AREA(ACRES) = 5.80 PEAK FLOW RATE(CFS) = 18.92

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 5.8 T_c (MIN.) = 7.97

EFFECTIVE AREA(ACRES) = 5.80 AREA-AVERAGED F_m (INCH/HR) = 0.08

AREA-AVERAGED F_p (INCH/HR) = 0.40 AREA-AVERAGED A_p = 0.200

PEAK FLOW RATE(CFS) = 18.92

=====

END OF RATIONAL METHOD ANALYSIS

Drainage G

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Analysis prepared by:

FILE NAME: X025_G.DAT
TIME/DATE OF STUDY: 16:37 04/08/2008
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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 9.00 DOWNSTREAM(FEET) = 5.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.110
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.669
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.75 0.40 0.200 32 8.11
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 5.65
TOTAL AREA(ACRES) = 1.75 PEAK FLOW RATE(CFS) = 5.65

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.8 TC(MIN.) = 8.11
EFFECTIVE AREA(ACRES) = 1.75 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 5.65

=====

END OF RATIONAL METHOD ANALYSIS

Drainage H

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Analysis prepared by:

FILE NAME: X025_H.DAT

TIME/DATE OF STUDY: 16:37 04/08/2008

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00

SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00

SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90

DATA BANK RAINFALL USED

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET

as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 210.00 TO NODE 211.00 IS CODE = 21

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

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 70.00

ELEVATION DATA: UPSTREAM(FEET) = 10.00 DOWNSTREAM(FEET) = 9.00

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

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824

SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	A	0.63	0.40	0.200	32	5.00

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

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.200

SUBAREA RUNOFF(CFS) = 2.69

TOTAL AREA(ACRES) = 0.63 PEAK FLOW RATE(CFS) = 2.69

FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE = 0.0100

FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 4.78

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 2.69

PIPE TRAVEL TIME(MIN.) = 2.37 T_c (MIN.) = 7.37

LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 750.00 FEET.

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81

```

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 7.37
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.872
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 3.53 0.40 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.53 SUBAREA RUNOFF(CFS) = 12.05
EFFECTIVE AREA(ACRES) = 4.16 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 4.2 PEAK FLOW RATE(CFS) = 14.20

*****
FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.11
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.20
PIPE TRAVEL TIME(MIN.) = 0.94 Tc(MIN.) = 8.31
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 1150.00 FEET.

*****
FLOW PROCESS FROM NODE 213.00 TO NODE 213.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 8.31
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.618
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 2.82 0.40 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 2.82 SUBAREA RUNOFF(CFS) = 8.98
EFFECTIVE AREA(ACRES) = 6.98 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 7.0 PEAK FLOW RATE(CFS) = 22.23

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 7.0 TC(MIN.) = 8.31
EFFECTIVE AREA(ACRES) = 6.98 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 22.23
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage I

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X025_I.DAT
TIME/DATE OF STUDY: 16:39 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 250.00
ELEVATION DATA: UPSTREAM(FEET) = 8.00 DOWNSTREAM(FEET) = 6.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.746
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.765
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 0.47 0.40 0.200 32 7.75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 1.56
TOTAL AREA(ACRES) = 0.47 PEAK FLOW RATE(CFS) = 1.56

FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(FEET) = 290.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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


```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          2.41
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.26
HALFSTREET FLOOD WIDTH(FEET) = 5.47
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.68
STREET FLOW TRAVEL TIME(MIN.) = 1.85   Tc(MIN.) = 9.60
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.335
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        0.58      0.40      0.200      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.58      SUBAREA RUNOFF(CFS) = 1.70
EFFECTIVE AREA(ACRES) = 1.05      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.0      PEAK FLOW RATE(CFS) = 3.08

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) = 6.53
FLOW VELOCITY(FEET/SEC.) = 2.68   DEPTH*VELOCITY(FT*FT/SEC.) = 0.75
LONGEST FLOWPATH FROM NODE 215.00 TO NODE 217.00 = 540.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.0   TC(MIN.) = 9.60
EFFECTIVE AREA(ACRES) = 1.05   AREA-AVERAGED Fm(INCH/HR)= 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40   AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 3.08
=====
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage J

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*****
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Analysis prepared by:

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-----
FILE NAME: X025_J.DAT
TIME/DATE OF STUDY: 16:39 04/08/2008
=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

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```

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
*DATA BANK RAINFALL USED*
*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

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*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
  HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
  WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150

```

```

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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*****
FLOW PROCESS FROM NODE 220.00 TO NODE 221.00 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) = 8.00 DOWNSTREAM(FEET) = 6.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.642
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.539
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.55 0.40 0.200 32 8.64
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 4.83
TOTAL AREA(ACRES) = 1.55 PEAK FLOW RATE(CFS) = 4.83

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*****
FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 IS CODE = 62
-----

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```

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

```

```

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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```

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

```

```

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

```

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          9.46
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 13.63
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.55
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.04
STREET FLOW TRAVEL TIME(MIN.) = 2.61  Tc(MIN.) = 11.25
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.048
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        3.46    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.46    SUBAREA RUNOFF(CFS) = 9.24
EFFECTIVE AREA(ACRES) = 5.01    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.0    PEAK FLOW RATE(CFS) = 13.38

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44  HALFSTREET FLOOD WIDTH(FEET) = 15.74
FLOW VELOCITY(FEET/SEC.) = 2.78  DEPTH*VELOCITY(FT*FT/SEC.) = 1.23
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 222.00 = 700.00 FEET.

*****
FLOW PROCESS FROM NODE 222.00 TO NODE 223.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 450.00  CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          20.51
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 18.79
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.53
STREET FLOW TRAVEL TIME(MIN.) = 2.45  Tc(MIN.) = 13.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.726
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        5.98    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 5.98    SUBAREA RUNOFF(CFS) = 14.24
EFFECTIVE AREA(ACRES) = 10.99    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 11.0    PEAK FLOW RATE(CFS) = 26.18

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53  HALFSTREET FLOOD WIDTH(FEET) = 20.66
FLOW VELOCITY(FEET/SEC.) = 3.27  DEPTH*VELOCITY(FT*FT/SEC.) = 1.74
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 223.00 = 1150.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 11.0  TC(MIN.) = 13.70
EFFECTIVE AREA(ACRES) = 10.99  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 26.18
=====
END OF RATIONAL METHOD ANALYSIS

```

Drainage K

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

FILE NAME: X025_K.DAT
TIME/DATE OF STUDY: 16:39 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 225.00 TO NODE 226.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 7.00 DOWNSTREAM(FEET) = 5.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.151
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.426
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.53 0.40 0.200 32 9.15
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 4.61
TOTAL AREA(ACRES) = 1.53 PEAK FLOW RATE(CFS) = 4.61

FLOW PROCESS FROM NODE 226.00 TO NODE 227.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0150
STREET LENGTH(FEET) = 330.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.10
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.40
HALFSTREET FLOOD WIDTH(FEET) = 13.32
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.12
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.25
STREET FLOW TRAVEL TIME(MIN.) = 1.76   Tc(MIN.) = 10.91
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.101
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A        4.77      0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 4.77      SUBAREA RUNOFF(CFS) = 12.97
EFFECTIVE AREA(ACRES) = 6.30      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40  AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.3          PEAK FLOW RATE(CFS) = 17.13

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) = 16.05
FLOW VELOCITY(FEET/SEC.) = 3.43   DEPTH*VELOCITY(FT*FT/SEC.) = 1.54
LONGEST FLOWPATH FROM NODE 225.00 TO NODE 227.00 = 660.00 FEET.

*****
FLOW PROCESS FROM NODE 227.00 TO NODE 228.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 170.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.59
ESTIMATED PIPE DIAMETER(INCH) = 24.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.13
PIPE TRAVEL TIME(MIN.) = 0.37   Tc(MIN.) = 11.29
LONGEST FLOWPATH FROM NODE 225.00 TO NODE 228.00 = 830.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 6.3   TC(MIN.) = 11.29
EFFECTIVE AREA(ACRES) = 6.30   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40   AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 17.13
=====
END OF RATIONAL METHOD ANALYSIS

```

ii. EV 2-Year Storm Event

Drainage A

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*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2007 Advanced Engineering Software (aes)
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Analysis prepared by:

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-----
FILE NAME: X002_A.DAT
TIME/DATE OF STUDY: 16:16 04/08/2008
=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

```

```

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

```

```

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

```

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

```

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
  HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
  WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

```

```

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```

```

*****
FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 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) = 240.00
ELEVATION DATA: UPSTREAM(FEET) = 106.20 DOWNSTREAM(FEET) = 105.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.372
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.180
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.68 0.20 0.200 75 8.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 0.70
TOTAL AREA(ACRES) = 0.68 PEAK FLOW RATE(CFS) = 0.70

```

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*****
FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62
-----

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>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 300.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

```

```

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.16
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.26
HALFSTREET FLOOD WIDTH(FEET) = 5.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.29
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.33
STREET FLOW TRAVEL TIME(MIN.) = 3.86 Tc(MIN.) = 12.24
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.949
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.13 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.13 SUBAREA RUNOFF(CFS) = 0.92
EFFECTIVE AREA(ACRES) = 1.81 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 1.48

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.28 HALFSTREET FLOOD WIDTH(FEET) = 6.34
FLOW VELOCITY(FEET/SEC.) = 1.34 DEPTH*VELOCITY(FT*FT/SEC.) = 0.37
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 540.00 FEET.

FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 260.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.70
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.97
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.48
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.48
STREET FLOW TRAVEL TIME(MIN.) = 2.93 Tc(MIN.) = 15.16
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.839
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 3.39 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.39 SUBAREA RUNOFF(CFS) = 2.44
EFFECTIVE AREA(ACRES) = 5.20 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.2 PEAK FLOW RATE(CFS) = 3.74

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 10.51
FLOW VELOCITY(FEET/SEC.) = 1.58 DEPTH*VELOCITY(FT*FT/SEC.) = 0.56
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 800.00 FEET.

FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 310.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.84
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.39
HALFSTREET FLOOD WIDTH(Feet) = 12.85
AVERAGE FLOW VELOCITY(Feet/Sec.) = 1.75
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.69
STREET FLOW TRAVEL TIME(Min.) = 2.95 Tc(Min.) = 18.11
* 2 YEAR RAINFALL INTENSITY(Inch/Hr) = 0.758
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.51 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(Acres) = 6.51 SUBAREA RUNOFF(CFS) = 4.21
EFFECTIVE AREA(Acres) = 11.71 AREA-AVERAGED Fm(Inch/Hr) = 0.04
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(Acres) = 11.7 PEAK FLOW RATE(CFS) = 7.56

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.42 HALFSTREET FLOOD WIDTH(Feet) = 14.34
FLOW VELOCITY(Feet/Sec.) = 1.86 DEPTH*VELOCITY(Feet*Feet/Sec.) = 0.78
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 1110.00 FEET.

*****
FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 440.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.06
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.45
HALFSTREET FLOOD WIDTH(Feet) = 16.13
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.00
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.90
STREET FLOW TRAVEL TIME(Min.) = 3.67 Tc(Min.) = 21.78
* 2 YEAR RAINFALL INTENSITY(Inch/Hr) = 0.682
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 8.39 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 8.39 SUBAREA RUNOFF(CFS) = 5.00
EFFECTIVE AREA(Acres) = 20.10 AREA-AVERAGED Fm(Inch/Hr) = 0.03
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(Acres) = 20.1 PEAK FLOW RATE(CFS) = 11.76

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.47 HALFSTREET FLOOD WIDTH(Feet) = 17.23
FLOW VELOCITY(Feet/Sec.) = 2.07 DEPTH*VELOCITY(Feet*Feet/Sec.) = 0.97
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 1550.00 FEET.

*****
FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

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=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 360.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.88
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.52
HALFSTREET FLOOD WIDTH(Feet) = 19.96
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.25
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.17
STREET FLOW TRAVEL TIME(MIN.) = 2.67 Tc(MIN.) = 24.45
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.638
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 18.43 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 18.43 SUBAREA RUNOFF(CFS) = 10.25
EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 21.21

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.55 HALFSTREET FLOOD WIDTH(Feet) = 21.84
FLOW VELOCITY(Feet/Sec.) = 2.38 DEPTH*VELOCITY(FT*FT/SEC.) = 1.32
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(Feet) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 17.2 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 10.07
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.21
PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 25.36
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.36
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.625
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.81 0.20 0.100 75
NATURAL FAIR COVER
"OPEN BRUSH" D 4.99 0.20 1.000 83
COMMERCIAL D 6.24 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA AREA(ACRES) = 12.04 SUBAREA RUNOFF(CFS) = 5.74
EFFECTIVE AREA(ACRES) = 50.57 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.21
TOTAL AREA(ACRES) = 50.6 PEAK FLOW RATE(CFS) = 26.50

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 9.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.1000
FLOW LENGTH(Feet) = 140.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.6 INCHES

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PIPE-FLOW VELOCITY(FEET/SEC.) = 19.98
ESTIMATED PIPE DIAMETER(INCH) = 18.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.50
PIPE TRAVEL TIME(MIN.) = 0.12    Tc(MIN.) = 25.48
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 9.00 = 2600.00 FEET.

*****
FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 1180.00
REPRESENTATIVE CHANNEL SLOPE = 0.0300
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.557
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE    GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN
NATURAL FAIR COVER
"OPEN BRUSH"    D    25.52    0.20    1.000    83
NATURAL POOR COVER
"BAREN"    D    6.51    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 31.67
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.59
AVERAGE FLOW DEPTH(FEET) = 0.35    TRAVEL TIME(MIN.) = 5.48
Tc(MIN.) = 30.95
SUBAREA AREA(ACRES) = 32.03    SUBAREA RUNOFF(CFS) = 10.29
EFFECTIVE AREA(ACRES) = 82.60    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 82.6    PEAK FLOW RATE(CFS) = 33.72

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.36    FLOW VELOCITY(FEET/SEC.) = 3.68
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 10.00 = 3780.00 FEET.

*****
FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.524
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE    GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN
NATURAL FAIR COVER
"OPEN BRUSH"    D    29.92    0.20    1.000    83
NATURAL POOR COVER
"BAREN"    D    14.41    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 40.20
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.20
AVERAGE FLOW DEPTH(FEET) = 0.49    TRAVEL TIME(MIN.) = 3.44
Tc(MIN.) = 34.39
SUBAREA AREA(ACRES) = 44.33    SUBAREA RUNOFF(CFS) = 12.94
EFFECTIVE AREA(ACRES) = 126.93    AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.69
TOTAL AREA(ACRES) = 126.9    PEAK FLOW RATE(CFS) = 44.23

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.52    FLOW VELOCITY(FEET/SEC.) = 3.31
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 11.00 = 4440.00 FEET.

*****
FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 580.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.501

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SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          14.64    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 46.21
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 3.36
AVERAGE FLOW DEPTH(Feet) = 0.54    TRAVEL TIME(MIN.) = 2.88
Tc(MIN.) = 37.27
SUBAREA AREA(ACRES) = 14.64    SUBAREA RUNOFF(CFS) = 3.96
EFFECTIVE AREA(ACRES) = 141.57    AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 141.6    PEAK FLOW RATE(CFS) = 45.49

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.53    FLOW VELOCITY(Feet/Sec.) = 3.35
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 5020.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 20.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(Feet) = 440.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 45.56
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.56
HALFSTREET FLOOD WIDTH(Feet) = 22.46
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.85
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.73
STREET FLOW TRAVEL TIME(MIN.) = 1.51    Tc(MIN.) = 38.79
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.489
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          A          1.83    0.40    1.000    46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 1.83    SUBAREA RUNOFF(CFS) = 0.15
EFFECTIVE AREA(ACRES) = 143.40    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 143.4    PEAK FLOW RATE(CFS) = 45.49
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.56    HALFSTREET FLOOD WIDTH(Feet) = 22.46
FLOW VELOCITY(Feet/Sec.) = 4.84    DEPTH*VELOCITY(FT*FT/SEC.) = 2.73
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5460.00 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 13.00 TO NODE 14.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(Feet) = 370.00
ELEVATION DATA: UPSTREAM(Feet) = 102.50    DOWNSTREAM(Feet) = 100.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.373
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.106

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SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS    Tc
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.17    0.20    0.200    75    9.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 3.04
TOTAL AREA(ACRES) = 3.17    PEAK FLOW RATE(CFS) = 3.04

*****
FLOW PROCESS FROM NODE    14.00 TO NODE    15.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0500
FLOW LENGTH(FEET) = 1660.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 9.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.94
ESTIMATED PIPE DIAMETER(INCH) = 9.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.04
PIPE TRAVEL TIME(MIN.) = 3.10    Tc(MIN.) = 12.47
LONGEST FLOWPATH FROM NODE    13.00 TO NODE    15.00 = 2030.00 FEET.

*****
FLOW PROCESS FROM NODE    15.00 TO NODE    15.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.47
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.939
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    B        31.84    0.30    0.200    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 31.84    SUBAREA RUNOFF(CFS) = 25.18
EFFECTIVE AREA(ACRES) = 35.01    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.29    AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 35.0    PEAK FLOW RATE(CFS) = 27.75

*****
FLOW PROCESS FROM NODE    15.00 TO NODE    16.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 780.00
REPRESENTATIVE CHANNEL SLOPE = 0.0400
CHANNEL BASE(FEET) = 0.00    "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) = 3.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.898
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        11.64    0.20    0.200    75
NATURAL FAIR COVER
"OPEN BRUSH"            A        13.96    0.40    1.000    46
COMMERCIAL              D        2.65    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.37
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.586
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 36.42
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 12.96
AVERAGE FLOW DEPTH(FEET) = 1.19    TRAVEL TIME(MIN.) = 1.00
Tc(MIN.) = 13.47
SUBAREA AREA(ACRES) = 28.25    SUBAREA RUNOFF(CFS) = 17.34
EFFECTIVE AREA(ACRES) = 63.26    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.35    AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 63.3    PEAK FLOW RATE(CFS) = 43.80

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.27    FLOW VELOCITY(FEET/SEC.) = 13.59
LONGEST FLOWPATH FROM NODE    13.00 TO NODE    16.00 = 2810.00 FEET.

*****
FLOW PROCESS FROM NODE    16.00 TO NODE    17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

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=====
REPRESENTATIVE SLOPE = 0.0050
FLOW LENGTH(FEET) = 1510.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.21
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 43.80
PIPE TRAVEL TIME(MIN.) = 3.49 Tc(MIN.) = 16.96
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 17.00 = 4320.00 FEET.

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.96
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.787
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 44.48 0.20 1.000 83
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 6.11 0.40 0.200 32
COMMERCIAL A 4.75 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.834
SUBAREA AREA(ACRES) = 55.34 SUBAREA RUNOFF(CFS) = 30.57
EFFECTIVE AREA(ACRES) = 118.60 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 118.6 PEAK FLOW RATE(CFS) = 68.04

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 18.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.63
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 68.04
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 17.38
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 18.00 = 4590.00 FEET.

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.38
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.776
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BAREN" A 4.65 0.40 1.000 78
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 13.94 0.40 0.200 32
COMMERCIAL A 2.82 0.40 0.100 32
NATURAL FAIR COVER
"OPEN BRUSH" A 2.64 0.40 1.000 46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
SUBAREA AREA(ACRES) = 24.05 SUBAREA RUNOFF(CFS) = 13.06
EFFECTIVE AREA(ACRES) = 142.65 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.56
TOTAL AREA(ACRES) = 142.7 PEAK FLOW RATE(CFS) = 79.93

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 19.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 610.00
REPRESENTATIVE CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 35.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.732
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	A	2.68	0.40	1.000	46
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	9.73	0.40	0.200	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 83.18
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.47
 AVERAGE FLOW DEPTH(FEET) = 0.42 TRAVEL TIME(MIN.) = 1.86
 Tc(MIN.) = 19.24
 SUBAREA AREA(ACRES) = 12.41 SUBAREA RUNOFF(CFS) = 6.51
 EFFECTIVE AREA(ACRES) = 155.06 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.55
 TOTAL AREA(ACRES) = 155.1 PEAK FLOW RATE(CFS) = 80.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.42 FLOW VELOCITY(FEET/SEC.) = 5.41
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 19.00 = 5200.00 FEET.

FLOW PROCESS FROM NODE 19.00 TO NODE 20.00 IS CODE = 51

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

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

CHANNEL LENGTH THRU SUBAREA(FEET) = 360.00
 REPRESENTATIVE CHANNEL SLOPE = 0.0050
 CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.661
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.58	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 81.23
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.59
 AVERAGE FLOW DEPTH(FEET) = 0.39 TRAVEL TIME(MIN.) = 3.76
 Tc(MIN.) = 23.01
 SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 0.88
 EFFECTIVE AREA(ACRES) = 156.64 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 156.6 PEAK FLOW RATE(CFS) = 80.79
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.39 FLOW VELOCITY(FEET/SEC.) = 1.59
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 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	80.79	23.01	0.661	0.28(0.15)	0.54	156.6	13.00

LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 FEET.

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	45.49	38.79	0.489	0.20(0.15)	0.72	143.4	1.00

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5460.00 FEET.

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	121.26	23.01	0.661	0.25(0.15)	0.61	241.7	13.00
2	99.11	38.79	0.489	0.24(0.15)	0.63	300.0	1.00

TOTAL AREA(ACRES) = 300.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 121.26 Tc(MIN.) = 23.007
 EFFECTIVE AREA(ACRES) = 241.70 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.61
 TOTAL AREA(ACRES) = 300.0
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5560.00 FEET.

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*****
FLOW PROCESS FROM NODE      20.00 TO NODE      20.00 IS CODE =  12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      21.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   570.00
REPRESENTATIVE CHANNEL SLOPE =   0.0050
CHANNEL BASE( FEET) =  130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR =  0.035  MAXIMUM DEPTH( FEET) =   6.00
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   0.590
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        11.87      0.40      0.200      32
NATURAL FAIR COVER
"OPEN BRUSH"              D        16.10      0.20      1.000      83
COMMERCIAL                A         1.56      0.40      0.100      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.631
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   127.19
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY( FEET/SEC.) =   1.89
AVERAGE FLOW DEPTH( FEET) =   0.51  TRAVEL TIME(MIN.) =   5.03
Tc(MIN.) =   28.04
SUBAREA AREA(ACRES) =   29.53      SUBAREA RUNOFF(CFS) =   11.86
EFFECTIVE AREA(ACRES) =   271.23      AREA-AVERAGED Fm(INCH/HR) =   0.15
AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   0.61
TOTAL AREA(ACRES) =   329.6      PEAK FLOW RATE(CFS) =   121.26
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH( FEET) =   0.49  FLOW VELOCITY( FEET/SEC.) =   1.86
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      21.00 =   6130.00 FEET.

*****
FLOW PROCESS FROM NODE      21.00 TO NODE      22.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA( FEET) =   600.00
REPRESENTATIVE CHANNEL SLOPE =   0.0050
CHANNEL BASE( FEET) =  130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR =  0.035  MAXIMUM DEPTH( FEET) =   6.00
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   0.533
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                A         1.73      0.40      0.100      32
NATURAL FAIR COVER
"OPEN BRUSH"              D         8.52      0.20      1.000      83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.848
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   122.92
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY( FEET/SEC.) =   1.86
AVERAGE FLOW DEPTH( FEET) =   0.50  TRAVEL TIME(MIN.) =   5.38
Tc(MIN.) =   33.42
SUBAREA AREA(ACRES) =   10.25      SUBAREA RUNOFF(CFS) =   3.32
EFFECTIVE AREA(ACRES) =   281.48      AREA-AVERAGED Fm(INCH/HR) =   0.15
AREA-AVERAGED Fp(INCH/HR) =   0.24  AREA-AVERAGED Ap =   0.62
TOTAL AREA(ACRES) =   339.8      PEAK FLOW RATE(CFS) =   121.26
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH( FEET) =   0.49  FLOW VELOCITY( FEET/SEC.) =   1.86
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      22.00 =   6730.00 FEET.

*****
FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA( FEET) =   450.00
REPRESENTATIVE CHANNEL SLOPE =   0.0050

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CHANNEL BASE(Feet) = 130.00 "Z" FACTOR = 5.000
 MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(Feet) = 6.00
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.499
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	3.62	0.40	0.200	32
NATURAL FAIR COVER					
"OPEN BRUSH"	D	4.47	0.20	1.000	83
COMMERCIAL	A	1.68	0.40	0.100	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.549
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 122.89
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 1.86
 AVERAGE FLOW DEPTH(Feet) = 0.50 TRAVEL TIME(MIN.) = 4.03
 Tc(MIN.) = 37.45
 SUBAREA AREA(ACRES) = 9.77 SUBAREA RUNOFF(CFS) = 3.27
 EFFECTIVE AREA(ACRES) = 291.25 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.61
 TOTAL AREA(ACRES) = 349.6 PEAK FLOW RATE(CFS) = 121.26
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 0.49 FLOW VELOCITY(Feet/Sec.) = 1.86
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 23.00 = 7180.00 FEET.

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 349.6 TC(MIN.) = 37.45
 EFFECTIVE AREA(ACRES) = 291.25 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.615
 PEAK FLOW RATE(CFS) = 121.26

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	121.26	37.45	0.499	0.24(0.15)	0.61	291.3	13.00
2	99.11	54.37	0.403	0.24(0.15)	0.63	349.6	1.00

END OF RATIONAL METHOD ANALYSIS

Drainage B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: X002_B.DAT
TIME/DATE OF STUDY: 16:17 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE($\log(I; \text{IN/HR})$ vs. $\log(T_c; \text{MIN})$) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

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

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 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) = 110.00 DOWNSTREAM(FEET) = 107.00

$T_c = K * [(\text{LENGTH} ** 3.00) / (\text{ELEVATION CHANGE})] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 7.477
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.259
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	D	0.54	0.20	0.100	75	7.48

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 0.60
TOTAL AREA(ACRES) = 0.54 PEAK FLOW RATE(CFS) = 0.60

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 62

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.90
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.20
HALFSTREET FLOOD WIDTH(Feet) = 2.00
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.17
PRODUCT OF DEPTH&VELOCITY(Ft*ft/Sec.) = 0.43
STREET FLOW TRAVEL TIME(Min.) = 2.69 Tc(Min.) = 10.16
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.056
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.63 0.20 0.100 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 0.59
EFFECTIVE AREA(ACRES) = 1.17 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 1.09

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.22 HALFSTREET FLOOD WIDTH(Feet) = 3.34
FLOW VELOCITY(Feet/Sec.) = 1.86 DEPTH*VELOCITY(Ft*ft/Sec.) = 0.41
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.37
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.24
HALFSTREET FLOOD WIDTH(Feet) = 4.53
AVERAGE FLOW VELOCITY(Feet/Sec.) = 1.82
PRODUCT OF DEPTH&VELOCITY(Ft*ft/Sec.) = 0.44
STREET FLOW TRAVEL TIME(Min.) = 3.67 Tc(Min.) = 13.83
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.885
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.72 0.20 0.100 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.72 SUBAREA RUNOFF(CFS) = 0.56
EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 1.47

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.25 HALFSTREET FLOOD WIDTH(Feet) = 4.84
FLOW VELOCITY(Feet/Sec.) = 1.82 DEPTH*VELOCITY(Ft*ft/Sec.) = 0.45
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.74
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.32
HALFSTREET FLOOD WIDTH(Feet) = 8.84
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.10
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.67
STREET FLOW TRAVEL TIME(Min.) = 3.97 Tc(Min.) = 17.81
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.765
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.76 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 6.76 SUBAREA RUNOFF(CFS) = 4.53
EFFECTIVE AREA(ACRES) = 8.65 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 5.80

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.36 HALFSTREET FLOOD WIDTH(Feet) = 10.98
FLOW VELOCITY(Feet/Sec.) = 2.28 DEPTH*VELOCITY(Feet*Feet/Sec.) = 0.82
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 1550.00 FEET.

*****
FLOW PROCESS FROM NODE 54.00 TO NODE 55.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 600.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.02
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.39
HALFSTREET FLOOD WIDTH(Feet) = 12.70
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.46
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.96
STREET FLOW TRAVEL TIME(Min.) = 4.07 Tc(Min.) = 21.88
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.680
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 7.46 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.46 SUBAREA RUNOFF(CFS) = 4.43
EFFECTIVE AREA(ACRES) = 16.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 9.57

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.41 HALFSTREET FLOOD WIDTH(Feet) = 13.71
FLOW VELOCITY(Feet/Sec.) = 2.55 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.04
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 2150.00 FEET.

*****
FLOW PROCESS FROM NODE 55.00 TO NODE 56.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.97
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 13.95
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.58
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.06
STREET FLOW TRAVEL TIME(MIN.) = 3.23 Tc(MIN.) = 25.11
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.628
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.47 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.47 SUBAREA RUNOFF(CFS) = 0.80
EFFECTIVE AREA(ACRES) = 17.58 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 17.6 PEAK FLOW RATE(CFS) = 9.62

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 13.71
FLOW VELOCITY(FEET/SEC.) = 2.57 DEPTH*VELOCITY(FT*FT/SEC.) = 1.05
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 2650.00 FEET.

*****
FLOW PROCESS FROM NODE 56.00 TO NODE 57.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 580.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.73
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.43
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.74
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.20
STREET FLOW TRAVEL TIME(MIN.) = 3.52 Tc(MIN.) = 28.63
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.583
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 12.28 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 12.28 SUBAREA RUNOFF(CFS) = 6.22
EFFECTIVE AREA(ACRES) = 29.86 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 29.9 PEAK FLOW RATE(CFS) = 15.12

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 16.60
FLOW VELOCITY(FEET/SEC.) = 2.85 DEPTH*VELOCITY(FT*FT/SEC.) = 1.31
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 3230.00 FEET.

*****
FLOW PROCESS FROM NODE 57.00 TO NODE 58.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
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REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 680.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.06
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.52
HALFSTREET FLOOD WIDTH(FEET) = 19.96
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.21
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.66
STREET FLOW TRAVEL TIME(MIN.) = 3.53 Tc(MIN.) = 32.16
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.545
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 29.81 0.20 0.100 75
SCHOOL D 9.91 0.20 0.600 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 39.72 SUBAREA RUNOFF(CFS) = 17.87
EFFECTIVE AREA(ACRES) = 69.58 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 69.6 PEAK FLOW RATE(CFS) = 31.98

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.56 HALFSTREET FLOOD WIDTH(FEET) = 22.38
FLOW VELOCITY(FEET/SEC.) = 3.43 DEPTH*VELOCITY(FT*FT/SEC.) = 1.93
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 58.00 = 3910.00 FEET.

*****
FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 760.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.85
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.98
PIPE TRAVEL TIME(MIN.) = 1.43 Tc(MIN.) = 33.59
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 59.00 = 4670.00 FEET.

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 59.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 33.59
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.532
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 11.44 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.44 SUBAREA RUNOFF(CFS) = 5.27
EFFECTIVE AREA(ACRES) = 81.02 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 81.0 PEAK FLOW RATE(CFS) = 36.41

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 580.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.01
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 36.41

```

```

PIPE TRAVEL TIME(MIN.) = 1.07    Tc(MIN.) = 34.67
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 60.00 = 5250.00 FEET.

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 34.67
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.522
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D        15.82    0.20    0.100    75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D        4.45    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.122
SUBAREA AREA(ACRES) = 20.27    SUBAREA RUNOFF(CFS) = 9.08
EFFECTIVE AREA(ACRES) = 101.29    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 101.3    PEAK FLOW RATE(CFS) = 44.79

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 950.00
REPRESENTATIVE CHANNEL SLOPE = 0.0350
CHANNEL BASE(FEET) = 15.00    "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030    MAXIMUM DEPTH(FEET) = 7.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.499
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"        D        20.98    0.20    1.000    83
NATURAL POOR COVER
"BARREN"            D        12.82    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 49.35
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.62
AVERAGE FLOW DEPTH(FEET) = 0.53    TRAVEL TIME(MIN.) = 2.82
Tc(MIN.) = 37.48
SUBAREA AREA(ACRES) = 33.80    SUBAREA RUNOFF(CFS) = 9.10
EFFECTIVE AREA(ACRES) = 135.09    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 135.1    PEAK FLOW RATE(CFS) = 51.80

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.54    FLOW VELOCITY(FEET/SEC.) = 5.72
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 61.00 = 6200.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 135.1    TC(MIN.) = 37.48
EFFECTIVE AREA(ACRES) = 135.09    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.365
PEAK FLOW RATE(CFS) = 51.80
=====
END OF RATIONAL METHOD ANALYSIS

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*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

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-----
FILE NAME: X002_C.DAT
TIME/DATE OF STUDY: 16:17 04/08/2008
=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

```

```

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

```

```

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

```

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

```

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
  HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
  WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

```

```

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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*****
FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 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) = 107.00 DOWNSTREAM(FEET) = 104.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.912
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.920
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN" D 2.27 0.20 1.000 93 12.91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.47
TOTAL AREA(ACRES) = 2.27 PEAK FLOW RATE(CFS) = 1.47

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*****
FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 62
-----

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>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

```

```

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.75
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.30
HALFSTREET FLOOD WIDTH(FEET) = 7.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.58
STREET FLOW TRAVEL TIME(MIN.) = 2.97 Tc(MIN.) = 15.88
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.817
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BARREN" D 4.61 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.61 SUBAREA RUNOFF(CFS) = 2.56
EFFECTIVE AREA(ACRES) = 6.88 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 3.82

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 8.97
FLOW VELOCITY(FEET/SEC.) = 2.09 DEPTH*VELOCITY(FT*FT/SEC.) = 0.68
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 650.00 FEET.

FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.01
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.59
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.94
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.93
STREET FLOW TRAVEL TIME(MIN.) = 2.27 Tc(MIN.) = 18.15
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.757
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 4.74 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.74 SUBAREA RUNOFF(CFS) = 2.38
EFFECTIVE AREA(ACRES) = 11.62 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 11.6 PEAK FLOW RATE(CFS) = 5.82

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 9.28
FLOW VELOCITY(FEET/SEC.) = 3.02 DEPTH*VELOCITY(FT*FT/SEC.) = 0.99
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.00 = 1050.00 FEET.

FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.1200
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

```

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.71
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.28
HALFSTREET FLOOD WIDTH(FEET) = 6.59
AVERAGE FLOW VELOCITY(FEET/SEC.) = 6.62
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.86
STREET FLOW TRAVEL TIME(MIN.) = 1.13 Tc(MIN.) = 19.28
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.731
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 7.90 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 3.78
EFFECTIVE AREA(ACRES) = 19.52 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 19.5 PEAK FLOW RATE(CFS) = 9.33

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.29 HALFSTREET FLOOD WIDTH(FEET) = 7.41
FLOW VELOCITY(FEET/SEC.) = 6.82 DEPTH*VELOCITY(FT*FT/SEC.) = 2.01
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 84.00 = 1500.00 FEET.

*****
FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0900
STREET LENGTH(FEET) = 370.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.37
HALFSTREET FLOOD WIDTH(FEET) = 11.52
AVERAGE FLOW VELOCITY(FEET/SEC.) = 7.07
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.60
STREET FLOW TRAVEL TIME(MIN.) = 0.87 Tc(MIN.) = 20.15
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.713
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 34.33 0.20 1.000 83
NATURAL POOR COVER
"BARREN" D 9.76 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 44.09 SUBAREA RUNOFF(CFS) = 20.34
EFFECTIVE AREA(ACRES) = 63.61 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 63.6 PEAK FLOW RATE(CFS) = 29.35

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 13.79
FLOW VELOCITY(FEET/SEC.) = 7.76 DEPTH*VELOCITY(FT*FT/SEC.) = 3.17
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 1870.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 63.6 TC(MIN.) = 20.15

```

EFFECTIVE AREA(ACRES) = 63.61 AREA-AVERAGED Fm(INCH/HR)= 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS) = 29.35

=====
=====
END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

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-----
FILE NAME: X002_D.DAT
TIME/DATE OF STUDY: 11:25 04/09/2008
=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

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```

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

```

```

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

```

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

```

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
  HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
  WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

```

```

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```

```

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

```

```

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 280.00
ELEVATION DATA: UPSTREAM(FEET) = 95.00 DOWNSTREAM(FEET) = 83.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.794
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.458
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.10 0.20 0.200 75 5.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 1.40
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 1.40

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```

*****
FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 62
-----

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>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 420.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

```

```

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

```

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.65
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.72
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.09
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.67
STREET FLOW TRAVEL TIME(MIN.) = 3.35 Tc(MIN.) = 9.14
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.122
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 4.58 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 4.58 SUBAREA RUNOFF(CFS) = 4.46
EFFECTIVE AREA(ACRES) = 5.68 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.7 PEAK FLOW RATE(CFS) = 5.53

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 10.74
FLOW VELOCITY(FEET/SEC.) = 2.26 DEPTH*VELOCITY(FT*FT/SEC.) = 0.80
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 700.00 FEET.

*****
FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 740.00
REPRESENTATIVE CHANNEL SLOPE = 0.0600
CHANNEL BASE(FEET) = 15.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 7.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.928
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 8.61 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.39
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.44
AVERAGE FLOW DEPTH(FEET) = 0.16 TRAVEL TIME(MIN.) = 3.58
Tc(MIN.) = 12.72
SUBAREA AREA(ACRES) = 8.61 SUBAREA RUNOFF(CFS) = 5.64
EFFECTIVE AREA(ACRES) = 14.29 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.68
TOTAL AREA(ACRES) = 14.3 PEAK FLOW RATE(CFS) = 10.18

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.18 FLOW VELOCITY(FEET/SEC.) = 3.67
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 123.00 = 1440.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 14.3 TC(MIN.) = 12.72
EFFECTIVE AREA(ACRES) = 14.29 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.682
PEAK FLOW RATE(CFS) = 10.18
=====
END OF RATIONAL METHOD ANALYSIS

```

Drainage E

```

*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2007 Advanced Engineering Software (aes)
Ver. 13.5 Release Date: 02/06/2007 License ID 1355

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Analysis prepared by:

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-----
FILE NAME: X002_E.DAT
TIME/DATE OF STUDY: 16:43 04/08/2008
=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

```

```

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

```

```

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

```

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

```

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
  HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
  WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

```

```

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```

```

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

```

```

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 105.00 DOWNSTREAM(FEET) = 103.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.151
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.121
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.39 0.20 0.200 75 9.15
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 2.33
TOTAL AREA(ACRES) = 2.39 PEAK FLOW RATE(CFS) = 2.33

```

```

*****
FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62
-----

```

```

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

```

```

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.83
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.97
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.10
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.68
STREET FLOW TRAVEL TIME(MIN.) = 3.97 Tc(MIN.) = 13.12
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.912
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 3.83 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.83 SUBAREA RUNOFF(CFS) = 3.01
EFFECTIVE AREA(ACRES) = 6.22 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 6.2 PEAK FLOW RATE(CFS) = 4.88

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 10.12
FLOW VELOCITY(FEET/SEC.) = 2.20 DEPTH*VELOCITY(FT*FT/SEC.) = 0.76
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 830.00 FEET.

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

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.14
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.36
HALFSTREET FLOOD WIDTH(FEET) = 11.21
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.33
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.85
STREET FLOW TRAVEL TIME(MIN.) = 3.22 Tc(MIN.) = 16.33
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.804
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 3.65 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.65 SUBAREA RUNOFF(CFS) = 2.51
EFFECTIVE AREA(ACRES) = 9.87 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 9.9 PEAK FLOW RATE(CFS) = 6.79

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.76
FLOW VELOCITY(FEET/SEC.) = 2.38 DEPTH*VELOCITY(FT*FT/SEC.) = 0.89
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1280.00 FEET.

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

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 360.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.87
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 14.96
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.71
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.16
STREET FLOW TRAVEL TIME(MIN.) = 2.22 Tc(MIN.) = 18.55
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.747
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.18 0.20 0.100 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 9.62 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.161
SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 10.17
EFFECTIVE AREA(ACRES) = 25.67 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 25.7 PEAK FLOW RATE(CFS) = 16.45

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 17.15
FLOW VELOCITY(FEET/SEC.) = 2.92 DEPTH*VELOCITY(FT*FT/SEC.) = 1.37
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 1640.00 FEET.

FLOW PROCESS FROM NODE 104.00 TO NODE 105.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE =	0.0100
STREET LENGTH(FEET) =	1090.00
CURB HEIGHT(INCHES) =	8.0
STREET HALFWIDTH(FEET) =	30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.65
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.51
HALFSTREET FLOOD WIDTH(FEET) = 19.18
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.11
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.57
STREET FLOW TRAVEL TIME(MIN.) = 5.84 Tc(MIN.) = 24.39
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.639
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 16.93 0.20 0.100 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.76 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.109
SUBAREA AREA(ACRES) = 18.69 SUBAREA RUNOFF(CFS) = 10.38
EFFECTIVE AREA(ACRES) = 44.36 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 44.4 PEAK FLOW RATE(CFS) = 24.32

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 20.12
FLOW VELOCITY(FEET/SEC.) = 3.19 DEPTH*VELOCITY(FT*FT/SEC.) = 1.67
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2730.00 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 106.00 IS CODE = 62

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-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 700.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.99
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.54
HALFSTREET FLOOD WIDTH(FEET) = 20.90
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.30
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.77
STREET FLOW TRAVEL TIME(MIN.) = 3.54 Tc(MIN.) = 27.93
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.591
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.36 0.20 0.200 75
COMMERCIAL D 8.10 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.123
SUBAREA AREA(ACRES) = 10.46 SUBAREA RUNOFF(CFS) = 5.33
EFFECTIVE AREA(ACRES) = 54.82 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 54.8 PEAK FLOW RATE(CFS) = 27.74

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 21.13
FLOW VELOCITY(FEET/SEC.) = 3.32 DEPTH*VELOCITY(FT*FT/SEC.) = 1.79
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 3430.00 FEET.

*****
FLOW PROCESS FROM NODE 106.00 TO NODE 107.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 630.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 29.16
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.55
HALFSTREET FLOOD WIDTH(FEET) = 21.60
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.34
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.83
STREET FLOW TRAVEL TIME(MIN.) = 3.14 Tc(MIN.) = 31.07
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.556
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.09 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 60.9 SUBAREA RUNOFF(CFS) = 2.83
EFFECTIVE AREA(ACRES) = 60.91 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 60.9 PEAK FLOW RATE(CFS) = 28.84

END OF SUBAREA STREET FLOW HYDRAULICS:

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DEPTH(FEET) = 0.55    HALFSTREET FLOOD WIDTH(FEET) = 21.52
FLOW VELOCITY(FEET/SEC.) = 3.33    DEPTH*VELOCITY(FT*FT/SEC.) = 1.82
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    4060.00 FEET.

*****
FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =    31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =    0.0100
FLOW LENGTH(FEET) =    250.00    MANNING'S N =    0.130
DEPTH OF FLOW IN 66.0 INCH PIPE IS 49.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =    1.52
ESTIMATED PIPE DIAMETER(INCH) =    66.00    NUMBER OF PIPES =    1
PIPE-FLOW(CFS) =    28.84
PIPE TRAVEL TIME(MIN.) =    2.74    Tc(MIN.) =    33.81
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =    4310.00 FEET.

*****
FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =    81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =    33.81
*    2 YEAR RAINFALL INTENSITY(INCH/HR) =    0.530
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE    GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN
COMMERCIAL    D    4.84    0.20    0.100    75
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D    14.79    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    0.175
SUBAREA AREA(ACRES) =    19.63    SUBAREA RUNOFF(CFS) =    8.74
EFFECTIVE AREA(ACRES) =    80.54    AREA-AVERAGED Fm(INCH/HR) =    0.03
AREA-AVERAGED Fp(INCH/HR) =    0.20    AREA-AVERAGED Ap =    0.16
TOTAL AREA(ACRES) =    80.5    PEAK FLOW RATE(CFS) =    36.13

*****
FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =    31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =    0.0100
FLOW LENGTH(FEET) =    470.00    MANNING'S N =    0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =    9.00
ESTIMATED PIPE DIAMETER(INCH) =    30.00    NUMBER OF PIPES =    1
PIPE-FLOW(CFS) =    36.13
PIPE TRAVEL TIME(MIN.) =    0.87    Tc(MIN.) =    34.68
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    4780.00 FEET.

*****
FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =    81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =    34.68
*    2 YEAR RAINFALL INTENSITY(INCH/HR) =    0.522
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE    GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN
NATURAL FAIR COVER
"OPEN BRUSH"    D    16.62    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    1.000
SUBAREA AREA(ACRES) =    16.62    SUBAREA RUNOFF(CFS) =    4.81
EFFECTIVE AREA(ACRES) =    97.16    AREA-AVERAGED Fm(INCH/HR) =    0.06
AREA-AVERAGED Fp(INCH/HR) =    0.20    AREA-AVERAGED Ap =    0.30
TOTAL AREA(ACRES) =    97.2    PEAK FLOW RATE(CFS) =    40.39
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) =    97.2    TC(MIN.) =    34.68
EFFECTIVE AREA(ACRES) =    97.16    AREA-AVERAGED Fm(INCH/HR) =    0.06
AREA-AVERAGED Fp(INCH/HR) =    0.20    AREA-AVERAGED Ap =    0.300
PEAK FLOW RATE(CFS) =    40.39
=====
END OF RATIONAL METHOD ANALYSIS

```

Drainage F

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Analysis prepared by:

FILE NAME: X002_F.DAT
TIME/DATE OF STUDY: 16:43 04/08/2008
=====

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE($\log(I; \text{IN/HR})$ vs. $\log(T_c; \text{MIN})$) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 9.00 DOWNSTREAM(FEET) = 6.00

$T_c = K * [(\text{LENGTH} ** 3.00) / (\text{ELEVATION CHANGE})] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM $T_c(\text{MIN.}) = 7.969$
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.214
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	5.80	0.40	0.200	32	7.97

SUBAREA AVERAGE PERVIOUS LOSS RATE, $F_p(\text{INCH/HR}) = 0.40$
SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.200$
SUBAREA RUNOFF(CFS) = 5.92
TOTAL AREA(ACRES) = 5.80 PEAK FLOW RATE(CFS) = 5.92

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 5.8 TC(MIN.) = 7.97
EFFECTIVE AREA(ACRES) = 5.80 AREA-AVERAGED $F_m(\text{INCH/HR}) = 0.08$
AREA-AVERAGED $F_p(\text{INCH/HR}) = 0.40$ AREA-AVERAGED $A_p = 0.200$
PEAK FLOW RATE(CFS) = 5.92

=====

END OF RATIONAL METHOD ANALYSIS

Drainage G

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Analysis prepared by:

FILE NAME: X002_G.DAT
TIME/DATE OF STUDY: 16:44 04/08/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE($\log(I; \text{IN/HR})$ vs. $\log(T_c; \text{MIN})$) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

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

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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

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

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 9.00 DOWNSTREAM(FEET) = 5.00

$T_c = K * [(\text{LENGTH} ** 3.00) / (\text{ELEVATION CHANGE})] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 8.110

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.202

SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
-------------------------------	-------------------	-----------------	--------------------	--------------------	-----------	-----------------

RESIDENTIAL

"11+ DWELLINGS/ACRE" A 1.75 0.40 0.200 32 8.11

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

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.200

SUBAREA RUNOFF(CFS) = 1.77

TOTAL AREA(ACRES) = 1.75 PEAK FLOW RATE(CFS) = 1.77

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.8 T_c (MIN.) = 8.11

EFFECTIVE AREA(ACRES) = 1.75 AREA-AVERAGED F_m (INCH/HR) = 0.08

AREA-AVERAGED F_p (INCH/HR) = 0.40 AREA-AVERAGED A_p = 0.200

PEAK FLOW RATE(CFS) = 1.77

=====

END OF RATIONAL METHOD ANALYSIS

Drainage H

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Analysis prepared by:

FILE NAME: X002_H.DAT
TIME/DATE OF STUDY: 16:44 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE($\log(I; \text{IN/HR})$ vs. $\log(T_c; \text{MIN})$) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 210.00 TO NODE 211.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 70.00
ELEVATION DATA: UPSTREAM(FEET) = 10.00 DOWNSTREAM(FEET) = 9.00

$T_c = K * [(\text{LENGTH} ** 3.00) / (\text{ELEVATION CHANGE})] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.586
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	0.63	0.40	0.200	32	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.200
SUBAREA RUNOFF(CFS) = 0.85
TOTAL AREA(ACRES) = 0.63 PEAK FLOW RATE(CFS) = 0.85

FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 680.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.63
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.85
PIPE TRAVEL TIME(MIN.) = 3.13 T_c (MIN.) = 8.13
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 750.00 FEET.

```

*****
FLOW PROCESS FROM NODE      212.00 TO NODE      212.00 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =      8.13
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   1.200
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
    LAND USE          GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        3.53      0.40      0.200      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.200
SUBAREA AREA(ACRES) =    3.53      SUBAREA RUNOFF(CFS) =    3.56
EFFECTIVE AREA(ACRES) =    4.16      AREA-AVERAGED Fm(INCH/HR) =   0.08
AREA-AVERAGED Fp(INCH/HR) =   0.40      AREA-AVERAGED Ap =   0.20
TOTAL AREA(ACRES) =    4.2        PEAK FLOW RATE(CFS) =    4.19

*****
FLOW PROCESS FROM NODE      212.00 TO NODE      213.00 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =   0.0100
FLOW LENGTH(FEET) =   400.00      MANNING'S N =   0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS   9.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =    5.38
ESTIMATED PIPE DIAMETER(INCH) =   15.00      NUMBER OF PIPES =    1
PIPE-FLOW(CFS) =    4.19
PIPE TRAVEL TIME(MIN.) =    1.24      Tc(MIN.) =    9.37
LONGEST FLOWPATH FROM NODE    210.00 TO NODE    213.00 =   1150.00 FEET.

*****
FLOW PROCESS FROM NODE      213.00 TO NODE      213.00 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =    9.37
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   1.106
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
    LAND USE          GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        2.82      0.40      0.200      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.200
SUBAREA AREA(ACRES) =    2.82      SUBAREA RUNOFF(CFS) =    2.61
EFFECTIVE AREA(ACRES) =    6.98      AREA-AVERAGED Fm(INCH/HR) =   0.08
AREA-AVERAGED Fp(INCH/HR) =   0.40      AREA-AVERAGED Ap =   0.20
TOTAL AREA(ACRES) =    7.0        PEAK FLOW RATE(CFS) =    6.45
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) =    7.0      TC(MIN.) =    9.37
EFFECTIVE AREA(ACRES) =    6.98      AREA-AVERAGED Fm(INCH/HR)=   0.08
AREA-AVERAGED Fp(INCH/HR) =   0.40      AREA-AVERAGED Ap =   0.200
PEAK FLOW RATE(CFS) =    6.45
=====
END OF RATIONAL METHOD ANALYSIS

```


Drainage I

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Analysis prepared by:

FILE NAME: X002_I.DAT
TIME/DATE OF STUDY: 16:44 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE($\log(I; \text{IN/HR})$ vs. $\log(T_c; \text{MIN})$) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 250.00
ELEVATION DATA: UPSTREAM(FEET) = 8.00 DOWNSTREAM(FEET) = 6.00

$T_c = K * [(\text{LENGTH} ** 3.00) / (\text{ELEVATION CHANGE})] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 7.746
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.234
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	A	0.47	0.40	0.200	32	7.75

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.200
SUBAREA RUNOFF(CFS) = 0.49
TOTAL AREA(ACRES) = 0.47 PEAK FLOW RATE(CFS) = 0.49

FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0200
STREET LENGTH(FEET) = 290.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.76
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.20
 HALFSTREET FLOOD WIDTH(Feet) = 2.00
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.07
 PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.61
 STREET FLOW TRAVEL TIME(Min.) = 1.57 Tc(Min.) = 9.32
 * 2 YEAR RAINFALL INTENSITY(Inch/Hr) = 1.109

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	0.58	0.40	0.200	32

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA(ACRES) = 0.58 SUBAREA RUNOFF(CFS) = 0.54
 EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 0.97

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(Feet) = 0.20 HALFSTREET FLOOD WIDTH(Feet) = 2.00
 FLOW VELOCITY(Feet/Sec.) = 3.07 DEPTH*VELOCITY(Feet*Feet/Sec.) = 0.61
 LONGEST FLOWPATH FROM NODE 215.00 TO NODE 217.00 = 540.00 FEET.

=====
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 1.0 TC(Min.) = 9.32
 EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
 PEAK FLOW RATE(CFS) = 0.97
 =====

END OF RATIONAL METHOD ANALYSIS

Drainage J

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*****
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Analysis prepared by:

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FILE NAME: X002_J.DAT
TIME/DATE OF STUDY: 16:44 04/08/2008
=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

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USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

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```

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

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ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

```

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
  HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
  WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

```

```

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```

```

*****
FLOW PROCESS FROM NODE 220.00 TO NODE 221.00 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) = 8.00 DOWNSTREAM(FEET) = 6.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.642
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.159
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.55 0.40 0.200 32 8.64
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 1.50
TOTAL AREA(ACRES) = 1.55 PEAK FLOW RATE(CFS) = 1.50

```

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*****
FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 IS CODE = 62
-----

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```

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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```

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

```

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.88
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.30
HALFSTREET FLOOD WIDTH(Feet) = 7.72
AVERAGE FLOW VELOCITY(Feet/Sec.) = 1.98
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.60
STREET FLOW TRAVEL TIME(Min.) = 3.36 Tc(Min.) = 12.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.960
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 3.46 0.40 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.46 SUBAREA RUNOFF(CFS) = 2.74
EFFECTIVE AREA(ACRES) = 5.01 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.0 PEAK FLOW RATE(CFS) = 3.97

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.32 HALFSTREET FLOOD WIDTH(Feet) = 9.09
FLOW VELOCITY(Feet/Sec.) = 2.13 DEPTH*VELOCITY(Feet*Feet/Sec.) = 0.69
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 222.00 = 700.00 FEET.

*****
FLOW PROCESS FROM NODE 222.00 TO NODE 223.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 450.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.01
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.36
HALFSTREET FLOOD WIDTH(Feet) = 11.13
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.31
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.83
STREET FLOW TRAVEL TIME(Min.) = 3.25 Tc(Min.) = 15.25
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.836
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 5.98 0.40 0.200 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 5.98 SUBAREA RUNOFF(CFS) = 4.07
EFFECTIVE AREA(ACRES) = 10.99 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 11.0 PEAK FLOW RATE(CFS) = 7.48

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.38 HALFSTREET FLOOD WIDTH(Feet) = 12.30
FLOW VELOCITY(Feet/Sec.) = 2.42 DEPTH*VELOCITY(Feet*Feet/Sec.) = 0.92
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 223.00 = 1150.00 FEET.

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 11.0 TC(Min.) = 15.25
EFFECTIVE AREA(ACRES) = 10.99 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
PEAK FLOW RATE(CFS) = 7.48
=====
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage K

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*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

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Analysis prepared by:

```

-----
FILE NAME: X002_K.DAT
TIME/DATE OF STUDY: 16:45 04/08/2008
=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

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USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

```

```

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

```

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

```

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
  HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
  WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

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GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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*****
FLOW PROCESS FROM NODE 225.00 TO NODE 226.00 IS CODE = 21
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>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 7.00 DOWNSTREAM(FEET) = 5.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.151
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.121
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" A 1.53 0.40 0.200 32 9.15
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 1.43
TOTAL AREA(ACRES) = 1.53 PEAK FLOW RATE(CFS) = 1.43

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*****
FLOW PROCESS FROM NODE 226.00 TO NODE 227.00 IS CODE = 62
-----

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```

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0150
STREET LENGTH(FEET) = 330.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

```

```

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

```


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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.39
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.30
 HALFSTREET FLOOD WIDTH(FEET) = 7.53
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.42
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.72
 STREET FLOW TRAVEL TIME(MIN.) = 2.28 Tc(MIN.) = 11.43
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.987

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	4.77	0.40	0.200	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA(ACRES) = 4.77		SUBAREA RUNOFF(CFS) = 3.89			
EFFECTIVE AREA(ACRES) = 6.30		AREA-AVERAGED Fm(INCH/HR) = 0.08			
AREA-AVERAGED Fp(INCH/HR) = 0.40		AREA-AVERAGED Ap = 0.20			
TOTAL AREA(ACRES) = 6.3		PEAK FLOW RATE(CFS) = 5.14			

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 9.41
 FLOW VELOCITY(FEET/SEC.) = 2.61 DEPTH*VELOCITY(FT*FT/SEC.) = 0.86
 LONGEST FLOWPATH FROM NODE 225.00 TO NODE 227.00 = 660.00 FEET.

 FLOW PROCESS FROM NODE 227.00 TO NODE 228.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0100
 FLOW LENGTH(FEET) = 170.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.59
 ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.14
 PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 11.93
 LONGEST FLOWPATH FROM NODE 225.00 TO NODE 228.00 = 830.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 6.3 TC(MIN.) = 11.93
 EFFECTIVE AREA(ACRES) = 6.30 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.200
 PEAK FLOW RATE(CFS) = 5.14

END OF RATIONAL METHOD ANALYSIS

B2 Proposed Condition Rational Method Calculations

a) High Confidence Events

- i. HC 100-Year Storm Event

Drainage A

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P100_A.DAT
TIME/DATE OF STUDY: 10:26 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====

1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
---	------	------	-------------------	------	------	--------	-------	--------

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 240.00
ELEVATION DATA: UPSTREAM(FEET) = 106.20 DOWNSTREAM(FEET) = 105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.372
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.605
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.68 0.20 0.200 91 8.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 2.79
TOTAL AREA(ACRES) = 0.68 PEAK FLOW RATE(CFS) = 2.79

FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 300.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.75
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.37
HALFSTREET FLOOD WIDTH(FEET) = 11.68
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.68
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.62
STREET FLOW TRAVEL TIME(MIN.) = 2.98   Tc(MIN.) = 11.35
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.869
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        1.13    0.20    0.200    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.13    SUBAREA RUNOFF(CFS) = 3.89
EFFECTIVE AREA(ACRES) = 1.81    AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.8    PEAK FLOW RATE(CFS) = 6.24

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.40    HALFSTREET FLOOD WIDTH(FEET) = 13.16
FLOW VELOCITY(FEET/SEC.) = 1.79    DEPTH*VELOCITY(FT*FT/SEC.) = 0.71
LONGEST FLOWPATH FROM NODE    1.00 TO NODE    3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE    3.00 TO NODE    4.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 260.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.54
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 17.07
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.96
STREET FLOW TRAVEL TIME(MIN.) = 2.10   Tc(MIN.) = 13.45
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.510
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.39    0.20    0.200    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.39    SUBAREA RUNOFF(CFS) = 10.59
EFFECTIVE AREA(ACRES) = 5.20    AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.2    PEAK FLOW RATE(CFS) = 16.24

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.51    HALFSTREET FLOOD WIDTH(FEET) = 19.65
FLOW VELOCITY(FEET/SEC.) = 2.23    DEPTH*VELOCITY(FT*FT/SEC.) = 1.14
LONGEST FLOWPATH FROM NODE    1.00 TO NODE    4.00 = 800.00 FEET.

*****
FLOW PROCESS FROM NODE    4.00 TO NODE    5.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 310.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 25.60
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.58
HALFSTREET FLOOD WIDTH(FEET) = 23.48
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.50
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.46
STREET FLOW TRAVEL TIME(MIN.) = 2.06 Tc(MIN.) = 15.51
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.234
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.51 0.20 0.200 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 6.51 SUBAREA RUNOFF(CFS) = 18.71
EFFECTIVE AREA(ACRES) = 11.71 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 11.7 PEAK FLOW RATE(CFS) = 33.66

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.63 HALFSTREET FLOOD WIDTH(FEET) = 26.13
FLOW VELOCITY(FEET/SEC.) = 2.67 DEPTH*VELOCITY(FT*FT/SEC.) = 1.68
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 1110.00 FEET.

FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 440.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 44.77
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.69
HALFSTREET FLOOD WIDTH(FEET) = 30.18
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.85
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.95
STREET FLOW TRAVEL TIME(MIN.) = 2.57 Tc(MIN.) = 18.08
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.962
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 8.39 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 8.39 SUBAREA RUNOFF(CFS) = 22.22
EFFECTIVE AREA(ACRES) = 20.10 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 20.1 PEAK FLOW RATE(CFS) = 53.01

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.71 HALFSTREET FLOOD WIDTH(FEET) = 32.41
FLOW VELOCITY(FEET/SEC.) = 3.02 DEPTH*VELOCITY(FT*FT/SEC.) = 2.16
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 1550.00 FEET.

FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 360.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00


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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 76.14
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.78
HALFSTREET FLOOD WIDTH(FEET) = 35.89
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.41
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.68
STREET FLOW TRAVEL TIME(MIN.) = 1.76 Tc(MIN.) = 19.84
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.809
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 18.43 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 18.43 SUBAREA RUNOFF(CFS) = 46.26
EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 96.49

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.84 HALFSTREET FLOOD WIDTH(FEET) = 38.57
FLOW VELOCITY(FEET/SEC.) = 3.67 DEPTH*VELOCITY(FT*FT/SEC.) = 3.07
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 360.0 FT WITH ELEVATION-DROP = 1.8 FT, IS 71.9 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 7.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.04
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 96.49
PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 20.45
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.45
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.760
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.24 0.20 0.100 91
PUBLIC PARK D 6.35 0.20 0.850 91
COMMERCIAL D 2.47 0.20 0.100 91
NATURAL POOR COVER
"BARREN" D 3.55 0.20 1.000 98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.528
SUBAREA AREA(ACRES) = 18.61 SUBAREA RUNOFF(CFS) = 44.47
EFFECTIVE AREA(ACRES) = 57.14 AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.26
TOTAL AREA(ACRES) = 57.1 PEAK FLOW RATE(CFS) = 139.28

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 9.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.1000
FLOW LENGTH(FEET) = 430.00 MANNING'S N = 0.013

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DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.13
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 139.28
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 20.69
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 9.00 = 2890.00 FEET.

*****
FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 870.00
REPRESENTATIVE CHANNEL SLOPE = 0.0300
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.587
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 13.41 0.20 1.000 96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 153.69
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.57
AVERAGE FLOW DEPTH(FEET) = 0.90 TRAVEL TIME(MIN.) = 2.21
Tc(MIN.) = 22.90
SUBAREA AREA(ACRES) = 13.41 SUBAREA RUNOFF(CFS) = 28.81
EFFECTIVE AREA(ACRES) = 70.55 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 70.6 PEAK FLOW RATE(CFS) = 159.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.92 FLOW VELOCITY(FEET/SEC.) = 6.67
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 10.00 = 3760.00 FEET.

*****
FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.466
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 9.71 0.20 1.000 96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 169.11
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.48
AVERAGE FLOW DEPTH(FEET) = 1.18 TRAVEL TIME(MIN.) = 2.01
Tc(MIN.) = 24.90
SUBAREA AREA(ACRES) = 9.71 SUBAREA RUNOFF(CFS) = 19.80
EFFECTIVE AREA(ACRES) = 80.26 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 80.3 PEAK FLOW RATE(CFS) = 171.29

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.19 FLOW VELOCITY(FEET/SEC.) = 5.52
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 11.00 = 4420.00 FEET.

*****
FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 510.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 10.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.383
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

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NATURAL FAIR COVER
 "OPEN BRUSH" D 3.89 0.20 1.000 96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 175.11
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 5.57
 AVERAGE FLOW DEPTH(Feet) = 1.20 TRAVEL TIME(Min.) = 1.53
 Tc(Min.) = 26.43
 SUBAREA AREA(ACRES) = 3.89 SUBAREA RUNOFF(CFS) = 7.64
 EFFECTIVE AREA(ACRES) = 84.15 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 84.2 PEAK FLOW RATE(CFS) = 172.96

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 1.19 FLOW VELOCITY(Feet/Sec.) = 5.53
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

 FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 11.01 TO NODE 11.02 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 120.00
 ELEVATION DATA: UPSTREAM(Feet) = 100.00 DOWNSTREAM(Feet) = 99.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(Min.) = 5.375
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.936
 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	D	0.19	0.20	0.100	91	5.38

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.01
 TOTAL AREA(ACRES) = 0.19 PEAK FLOW RATE(CFS) = 1.01

 FLOW PROCESS FROM NODE 11.02 TO NODE 11.03 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0100
 STREET LENGTH(Feet) = 330.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

 **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.79
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.37
 HALFSTREET FLOOD WIDTH(Feet) = 11.76
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.38
 PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.89
 STREET FLOW TRAVEL TIME(Min.) = 2.31 Tc(Min.) = 7.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.836
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	D	1.84	0.20	0.850	91
COMMERCIAL	D	0.25	0.20	0.100	91
NATURAL FAIR COVER "OPEN BRUSH"	D	0.64	0.20	1.000	96

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.816
 SUBAREA AREA(ACRES) = 2.73 SUBAREA RUNOFF(CFS) = 11.48
 EFFECTIVE AREA(ACRES) = 2.92 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.77

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TOTAL AREA(ACRES) =          2.9          PEAK FLOW RATE(CFS) =          12.30

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.43  HALFSTREET FLOOD WIDTH(FEET) = 15.20
FLOW VELOCITY(FEET/SEC.) = 2.73  DEPTH*VELOCITY(FT*FT/SEC.) = 1.18
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.03 =          450.00 FEET.

*****
FLOW PROCESS FROM NODE      11.03 TO NODE      11.04 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 490.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.97
ESTIMATED PIPE DIAMETER(INCH) = 21.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.30
PIPE TRAVEL TIME(MIN.) = 1.17  Tc(MIN.) = 8.86
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.04 =          940.00 FEET.

*****
FLOW PROCESS FROM NODE      11.04 TO NODE      11.04 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 8.86
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.458
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              D        1.18      0.20      0.100      91
CONDOMINIUMS            D        1.15      0.20      0.350      91
CONDOMINIUMS            D        4.75      0.20      0.350      91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.308
SUBAREA AREA(ACRES) = 7.08  SUBAREA RUNOFF(CFS) = 28.01
EFFECTIVE AREA(ACRES) = 10.00  AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 10.0  PEAK FLOW RATE(CFS) = 39.33

*****
FLOW PROCESS FROM NODE      11.04 TO NODE      11.05 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 400.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.35
ESTIMATED PIPE DIAMETER(INCH) = 33.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 39.33
PIPE TRAVEL TIME(MIN.) = 0.71  Tc(MIN.) = 9.57
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.05 =          1340.00 FEET.

*****
FLOW PROCESS FROM NODE      11.05 TO NODE      11.05 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.57
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.265
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS            D        6.10      0.20      0.350      91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.10  SUBAREA RUNOFF(CFS) = 23.03
EFFECTIVE AREA(ACRES) = 16.10  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 16.1  PEAK FLOW RATE(CFS) = 60.61

*****
FLOW PROCESS FROM NODE      11.05 TO NODE      12.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 910.00  MANNING'S N = 0.013

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DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.19
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 60.61
PIPE TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 11.06
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 12.00 = 2250.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 60.61 11.06 3.926 0.20( 0.08) 0.41 16.1 11.01
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 12.00 = 2250.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 172.96 26.43 2.383 0.20( 0.10) 0.50 84.2 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 181.89 11.06 3.926 0.20( 0.09) 0.47 51.3 11.01
2 209.25 26.43 2.383 0.20( 0.10) 0.48 100.2 1.00
TOTAL AREA(ACRES) = 100.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 209.25 Tc(MIN.) = 26.428
EFFECTIVE AREA(ACRES) = 100.25 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 100.2
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====

*****
FLOW PROCESS FROM NODE 11.06 TO NODE 11.07 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 90.00 DOWNSTREAM(FEET) = 86.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.011
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.415
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 D 1.54 0.20 0.350 91 9.01
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 6.02
TOTAL AREA(ACRES) = 1.54 PEAK FLOW RATE(CFS) = 6.02

*****
FLOW PROCESS FROM NODE 11.07 TO NODE 11.08 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 450.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 12.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.69
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

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PIPE-FLOW(CFS) =          6.02
PIPE TRAVEL TIME(MIN.) =  1.32      Tc(MIN.) =   10.33
LONGEST FLOWPATH FROM NODE      11.06 TO NODE      11.08 =       790.00 FEET.

*****
FLOW PROCESS FROM NODE      11.08 TO NODE      11.08 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =   10.33
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.083
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
COMMERCIAL          D          0.43          0.20          0.100          91
CONDOMINIUMS        D          1.14          0.20          0.350          91
CONDOMINIUMS        D          4.05          0.20          0.350          91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.331
SUBAREA AREA(ACRES) =  5.62      SUBAREA RUNOFF(CFS) =  20.32
EFFECTIVE AREA(ACRES) =  7.16      AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.33
TOTAL AREA(ACRES) =  7.2      PEAK FLOW RATE(CFS) =  25.88

*****
FLOW PROCESS FROM NODE      11.08 TO NODE      11.09 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0100
FLOW LENGTH(FEET) =  500.00  MANNING'S N =  0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  8.34
ESTIMATED PIPE DIAMETER(INCH) = 27.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  25.88
PIPE TRAVEL TIME(MIN.) =  1.00      Tc(MIN.) =   11.33
LONGEST FLOWPATH FROM NODE      11.06 TO NODE      11.09 =  1290.00 FEET.

*****
FLOW PROCESS FROM NODE      11.09 TO NODE      11.09 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =   11.33
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.872
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
COMMERCIAL          D          0.41          0.20          0.100          91
CONDOMINIUMS        D          1.13          0.20          0.350          91
CONDOMINIUMS        D          0.62          0.20          0.350          91
CONDOMINIUMS        D          0.48          0.20          0.350          91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.311
SUBAREA AREA(ACRES) =  2.64      SUBAREA RUNOFF(CFS) =  9.05
EFFECTIVE AREA(ACRES) =  9.80      AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.33
TOTAL AREA(ACRES) =  9.8      PEAK FLOW RATE(CFS) =  33.58

*****
FLOW PROCESS FROM NODE      11.09 TO NODE      11.10 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0100
FLOW LENGTH(FEET) =  730.00  MANNING'S N =  0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  8.92
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  33.58
PIPE TRAVEL TIME(MIN.) =  1.36      Tc(MIN.) =   12.69
LONGEST FLOWPATH FROM NODE      11.06 TO NODE      11.10 =  2020.00 FEET.

*****
FLOW PROCESS FROM NODE      11.10 TO NODE      11.10 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =   12.69
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.628
SUBAREA LOSS RATE DATA(AMC III):

```

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.01	0.20	0.100	91
CONDOMINIUMS	D	2.10	0.20	0.350	91
CONDOMINIUMS	D	1.33	0.20	0.350	91
CONDOMINIUMS	D	7.17	0.20	0.350	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.328
 SUBAREA AREA(ACRES) = 11.61 SUBAREA RUNOFF(CFS) = 37.23
 EFFECTIVE AREA(ACRES) = 21.41 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
 TOTAL AREA(ACRES) = 21.4 PEAK FLOW RATE(CFS) = 68.65

FLOW PROCESS FROM NODE 11.10 TO NODE 11.11 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0100
 FLOW LENGTH(Feet) = 510.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.3 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 10.65
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 68.65
 PIPE TRAVEL TIME(Min.) = 0.80 Tc(Min.) = 13.49
 LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.11 = 2530.00 FEET.

FLOW PROCESS FROM NODE 11.11 TO NODE 11.11 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
 =====
 MAINLINE Tc(Min.) = 13.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.504
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.44	0.20	0.100	91
CONDOMINIUMS	D	6.60	0.20	0.350	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.334
 SUBAREA AREA(ACRES) = 7.04 SUBAREA RUNOFF(CFS) = 21.78
 EFFECTIVE AREA(ACRES) = 28.45 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
 TOTAL AREA(ACRES) = 28.5 PEAK FLOW RATE(CFS) = 88.02

FLOW PROCESS FROM NODE 11.11 TO NODE 12.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0100
 FLOW LENGTH(Feet) = 240.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.8 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 11.26
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 88.02
 PIPE TRAVEL TIME(Min.) = 0.36 Tc(Min.) = 13.85
 LONGEST FLOWPATH FROM NODE 11.06 TO NODE 12.00 = 2770.00 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 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 (ACRES)	Ae (ACRES)	HEADWATER NODE
1	88.02	13.85	3.452	0.20(0.07)	0.33	28.5	11.06

LONGEST FLOWPATH FROM NODE 11.06 TO NODE 12.00 = 2770.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (Min.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	181.89	11.06	3.926	0.20(0.09)	0.47	51.3	11.01
2	209.25	26.43	2.383	0.20(0.10)	0.48	100.2	1.00

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
--------	---	----	-----------	--------	----	----	-----------

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	262.05	11.06	3.926	0.20(0.09)	0.43	74.0
2	274.87	13.85	3.452	0.20(0.09)	0.43	88.6
3	269.49	26.43	2.383	0.20(0.09)	0.45	128.7
TOTAL AREA(ACRES) =			128.7			

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 274.87 Tc(MIN.) = 13.845
EFFECTIVE AREA(ACRES) = 88.63 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 128.7
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 12

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

FLOW PROCESS FROM NODE 12.00 TO NODE 20.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 510.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.47
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 274.87
PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 14.28
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5440.00 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.28
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.391
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 3.58 0.20 1.000 96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 3.58 SUBAREA RUNOFF(CFS) = 10.28
EFFECTIVE AREA(ACRES) = 92.21 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 132.3 PEAK FLOW RATE(CFS) = 274.87
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

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

FLOW PROCESS FROM NODE 13.00 TO NODE 14.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 370.00
ELEVATION DATA: UPSTREAM(FEET) = 102.50 DOWNSTREAM(FEET) = 100.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.373
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.316
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 3.17 0.20 0.200 91 9.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 12.20
TOTAL AREA(ACRES) = 3.17 PEAK FLOW RATE(CFS) = 12.20

```

FLOW PROCESS FROM NODE      14.00 TO NODE      15.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0500
FLOW LENGTH(FEET) =  1660.00  MANNING'S N =  0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.62
ESTIMATED PIPE DIAMETER(INCH) = 15.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) = 12.20
PIPE TRAVEL TIME(MIN.) =  2.19  Tc(MIN.) = 11.56
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      15.00 = 2030.00 FEET.

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      15.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.56
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.827
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      B      31.84      0.30      0.200      76
PUBLIC PARK      D      3.71      0.20      0.850      91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.268
SUBAREA AREA(ACRES) =  35.55  SUBAREA RUNOFF(CFS) = 120.15
EFFECTIVE AREA(ACRES) =  38.72  AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.26
TOTAL AREA(ACRES) =  38.7  PEAK FLOW RATE(CFS) = 130.95

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      16.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =  780.00
REPRESENTATIVE CHANNEL SLOPE =  0.0400
CHANNEL BASE(FEET) =  0.00  "Z" FACTOR =  2.000
MANNING'S FACTOR =  0.015  MAXIMUM DEPTH(FEET) =  3.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.704
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      D      11.64      0.20      0.200      91
NATURAL FAIR COVER
"OPEN BRUSH"      A      13.96      0.40      1.000      66
COMMERCIAL      D      2.65      0.20      0.100      91
PUBLIC PARK      A      1.60      0.40      0.850      52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 177.73
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 19.28
AVERAGE FLOW DEPTH(FEET) =  2.15  TRAVEL TIME(MIN.) =  0.67
Tc(MIN.) = 12.24
SUBAREA AREA(ACRES) =  29.85  SUBAREA RUNOFF(CFS) = 93.54
EFFECTIVE AREA(ACRES) =  68.57  AREA-AVERAGED Fm(INCH/HR) =  0.14
AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.41
TOTAL AREA(ACRES) =  68.6  PEAK FLOW RATE(CFS) = 220.23

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  2.32  FLOW VELOCITY(FEET/SEC.) = 20.39
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      16.00 = 2810.00 FEET.

*****
FLOW PROCESS FROM NODE      16.00 TO NODE      16.60 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0050
FLOW LENGTH(FEET) =  290.00  MANNING'S N =  0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 52.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.81
ESTIMATED PIPE DIAMETER(INCH) = 66.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) = 220.23
PIPE TRAVEL TIME(MIN.) =  0.45  Tc(MIN.) = 12.69
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      16.60 = 3100.00 FEET.

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*****
FLOW PROCESS FROM NODE      16.60 TO NODE      16.60 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =      12.69
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =    3.629
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
COMMERCIAL          A          1.13          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) =      1.13      SUBAREA RUNOFF(CFS) =      3.65
EFFECTIVE AREA(ACRES) =      69.70      AREA-AVERAGED Fm(INCH/HR) =    0.13
AREA-AVERAGED Fp(INCH/HR) =    0.33      AREA-AVERAGED Ap =    0.40
TOTAL AREA(ACRES) =      69.7      PEAK FLOW RATE(CFS) =      220.23
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE      16.60 TO NODE      16.60 IS CODE =   10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      16.10 TO NODE      16.20 IS CODE =   21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =      330.00
ELEVATION DATA: UPSTREAM(FEET) =      105.50  DOWNSTREAM(FEET) =      105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =      13.416
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =    3.515
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        D          1.80          0.20          0.350          91      13.42
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    0.350
SUBAREA RUNOFF(CFS) =      5.58
TOTAL AREA(ACRES) =      1.80      PEAK FLOW RATE(CFS) =      5.58

*****
FLOW PROCESS FROM NODE      16.20 TO NODE      16.30 IS CODE =   51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =      400.00
REPRESENTATIVE CHANNEL SLOPE =    0.0100
CHANNEL BASE(FEET) =      0.00  "Z" FACTOR =    1.000
MANNING'S FACTOR = 0.015  MAXIMUM DEPTH(FEET) =    1.50
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =    3.365
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
CONDOMINIUMS          B          2.42          0.30          0.350          76
COMMERCIAL              B          0.90          0.30          0.100          76
PUBLIC PARK              B          1.92          0.30          0.850          76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    0.490
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.17
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    6.31
AVERAGE FLOW DEPTH(FEET) =    1.44  TRAVEL TIME(MIN.) =    1.06
Tc(MIN.) =      14.47
SUBAREA AREA(ACRES) =      5.24      SUBAREA RUNOFF(CFS) =      15.18
EFFECTIVE AREA(ACRES) =      7.04      AREA-AVERAGED Fm(INCH/HR) =    0.13
AREA-AVERAGED Fp(INCH/HR) =    0.28      AREA-AVERAGED Ap =    0.45
TOTAL AREA(ACRES) =      7.0      PEAK FLOW RATE(CFS) =      20.52

==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
ALLOWABLE DEPTH).
AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

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DEPTH(FEET) = 1.50    FLOW VELOCITY(FEET/SEC.) = 9.12

==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.30 =      730.00 FEET.

*****
FLOW PROCESS FROM NODE      16.30 TO NODE      16.40 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 790.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.78
ESTIMATED PIPE DIAMETER(INCH) = 24.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.52
PIPE TRAVEL TIME(MIN.) = 1.69    Tc(MIN.) = 16.17
LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.40 =      1520.00 FEET.

*****
FLOW PROCESS FROM NODE      16.40 TO NODE      16.40 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.159
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL             B         3.09    0.30    0.100    76
PUBLIC PARK            B         2.54    0.30    0.850    76
PUBLIC PARK            B         2.54    0.30    0.850    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566
SUBAREA AREA(ACRES) = 8.17    SUBAREA RUNOFF(CFS) = 21.98
EFFECTIVE AREA(ACRES) = 15.21    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.29    AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 15.2    PEAK FLOW RATE(CFS) = 41.18

*****
FLOW PROCESS FROM NODE      16.40 TO NODE      16.50 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 390.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.43
ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.18
PIPE TRAVEL TIME(MIN.) = 0.69    Tc(MIN.) = 16.85
LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.50 =      1910.00 FEET.

*****
FLOW PROCESS FROM NODE      16.50 TO NODE      16.50 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.85
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.084
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL             D         1.85    0.20    0.100    91
CONDOMINIUMS           D         2.51    0.20    0.350    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 4.36    SUBAREA RUNOFF(CFS) = 11.91
EFFECTIVE AREA(ACRES) = 19.57    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.28    AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 19.6    PEAK FLOW RATE(CFS) = 52.07

*****
FLOW PROCESS FROM NODE      16.50 TO NODE      16.60 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 950.00    MANNING'S N = 0.013

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DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.99
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 52.07
PIPE TRAVEL TIME(MIN.) = 1.58 Tc(MIN.) = 18.44
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.60 = 2860.00 FEET.

*****
FLOW PROCESS FROM NODE 16.60 TO NODE 16.60 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.44
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.929
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK D 2.21 0.20 0.850 91
COMMERCIAL D 2.81 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430
SUBAREA AREA(ACRES) = 5.02 SUBAREA RUNOFF(CFS) = 12.85
EFFECTIVE AREA(ACRES) = 24.59 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 24.6 PEAK FLOW RATE(CFS) = 62.19

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====
** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 62.19 18.44 2.929 0.27( 0.12) 0.45 24.6 16.10
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.50 = 2860.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 220.23 12.69 3.629 0.33( 0.13) 0.40 69.7 13.00
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.50 = 3100.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 273.68 12.69 3.629 0.32( 0.13) 0.41 86.6 13.00
2 238.32 18.44 2.929 0.31( 0.13) 0.42 94.3 16.10
TOTAL AREA(ACRES) = 94.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 273.68 Tc(MIN.) = 12.686
EFFECTIVE AREA(ACRES) = 86.62 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.31 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 94.3
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.50 = 3100.00 FEET.

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
FLOW LENGTH(FEET) = 1230.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 72.0 INCH PIPE IS 56.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.44
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 273.68
PIPE TRAVEL TIME(MIN.) = 1.79 Tc(MIN.) = 14.48
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 17.00 = 4330.00 FEET.

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 14.48
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.365
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          A        8.07    0.40    1.000    66
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        6.11    0.40    0.200    52
COMMERCIAL            A        3.62    0.40    0.100    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.542
SUBAREA AREA(ACRES) = 17.80    SUBAREA RUNOFF(CFS) = 50.43
EFFECTIVE AREA(ACRES) = 104.42    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.34    AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 112.1    PEAK FLOW RATE(CFS) = 302.48

*****
FLOW PROCESS FROM NODE    17.00 TO NODE    18.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 51.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.26
ESTIMATED PIPE DIAMETER(INCH) = 66.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 302.48
PIPE TRAVEL TIME(MIN.) = 0.29    Tc(MIN.) = 14.77
LONGEST FLOWPATH FROM NODE    13.00 TO NODE    18.00 = 4600.00 FEET.

*****
FLOW PROCESS FROM NODE    18.00 TO NODE    18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.77
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.326
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          A        2.09    0.40    1.000    66
NATURAL POOR COVER
"BARREN"              A        4.65    0.40    1.000    93
COMMERCIAL            A        2.82    0.40    0.100    52
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        13.94    0.40    0.200    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.417
SUBAREA AREA(ACRES) = 23.50    SUBAREA RUNOFF(CFS) = 66.81
EFFECTIVE AREA(ACRES) = 127.92    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35    AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 135.6    PEAK FLOW RATE(CFS) = 365.66

*****
FLOW PROCESS FROM NODE    18.00 TO NODE    19.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 610.00
REPRESENTATIVE CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 35.00    "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) = 3.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.199
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          A        2.68    0.40    1.000    66
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        9.73    0.40    0.200    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 382.69
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.82
AVERAGE FLOW DEPTH(FEET) = 1.05    TRAVEL TIME(MIN.) = 1.03
Tc(MIN.) = 15.81
SUBAREA AREA(ACRES) = 12.41    SUBAREA RUNOFF(CFS) = 34.07
EFFECTIVE AREA(ACRES) = 140.33    AREA-AVERAGED Fm(INCH/HR) = 0.15

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AREA-AVERAGED Fp(INCH/HR) = 0.35 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 148.0 PEAK FLOW RATE(CFS) = 385.15

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.06 FLOW VELOCITY(FEET/SEC.) = 9.83
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 19.00 = 5210.00 FEET.

*****
FLOW PROCESS FROM NODE 19.00 TO NODE 20.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 360.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.982
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.58 0.40 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 387.25
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.91
AVERAGE FLOW DEPTH(FEET) = 0.99 TRAVEL TIME(MIN.) = 2.06
Tc(MIN.) = 17.87
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 4.18
EFFECTIVE AREA(ACRES) = 141.91 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 149.6 PEAK FLOW RATE(CFS) = 385.15
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.99 FLOW VELOCITY(FEET/SEC.) = 2.89
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 3 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
1 385.15 17.87 2.982 0.35( 0.15) 0.42 141.9 13.00
2 335.83 23.86 2.527 0.35( 0.15) 0.42 149.6 16.10
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 262.05 11.51 3.837 0.20( 0.09) 0.45 77.6 11.01
2 274.87 14.28 3.391 0.20( 0.09) 0.45 92.2 11.06
3 270.02 26.87 2.361 0.20( 0.09) 0.46 132.3 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5440.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 584.97 11.51 3.837 0.28( 0.12) 0.44 169.0 11.01
2 627.07 14.28 3.391 0.28( 0.12) 0.43 205.6 11.06
3 658.64 17.87 2.982 0.28( 0.12) 0.44 245.5 13.00
4 607.00 23.86 2.527 0.28( 0.12) 0.44 272.3 16.10
5 582.42 26.87 2.361 0.27( 0.12) 0.44 281.9 1.00
TOTAL AREA(ACRES) = 281.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 658.64 Tc(MIN.) = 17.871
EFFECTIVE AREA(ACRES) = 245.55 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 281.9
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 3 <<<<
=====
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FLOW PROCESS FROM NODE      20.00 TO NODE      21.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =  570.00
REPRESENTATIVE CHANNEL SLOPE =  0.0050
CHANNEL BASE(FEET) =  130.00  "Z" FACTOR =  5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(FEET) =  6.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.756
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        11.87      0.40      0.200      52
NATURAL FAIR COVER
"OPEN BRUSH"              D         5.63      0.20      1.000      96
COMMERCIAL                A         1.56      0.40      0.100      52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.428
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  681.32
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.60
AVERAGE FLOW DEPTH(FEET) =  1.38  TRAVEL TIME(MIN.) =  2.64
Tc(MIN.) =  20.51
SUBAREA AREA(ACRES) =  19.06      SUBAREA RUNOFF(CFS) =  45.35
EFFECTIVE AREA(ACRES) =  264.61  AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
TOTAL AREA(ACRES) =  300.9      PEAK FLOW RATE(CFS) =  658.64
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.36  FLOW VELOCITY(FEET/SEC.) =  3.55
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      21.00 =  6140.00 FEET.

*****
FLOW PROCESS FROM NODE      21.00 TO NODE      22.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =  600.00
REPRESENTATIVE CHANNEL SLOPE =  0.0050
CHANNEL BASE(FEET) =  130.00  "Z" FACTOR =  5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(FEET) =  6.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.561
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                A         1.73      0.40      0.100      52
NATURAL FAIR COVER
"OPEN BRUSH"              D         4.03      0.20      1.000      96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.730
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  664.88
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.57
AVERAGE FLOW DEPTH(FEET) =  1.36  TRAVEL TIME(MIN.) =  2.80
Tc(MIN.) =  23.32
SUBAREA AREA(ACRES) =  5.76      SUBAREA RUNOFF(CFS) =  12.49
EFFECTIVE AREA(ACRES) =  270.37  AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
TOTAL AREA(ACRES) =  306.7      PEAK FLOW RATE(CFS) =  658.64
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.36  FLOW VELOCITY(FEET/SEC.) =  3.55
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      22.00 =  6740.00 FEET.

*****
FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =  450.00
REPRESENTATIVE CHANNEL SLOPE =  0.0050
CHANNEL BASE(FEET) =  130.00  "Z" FACTOR =  5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(FEET) =  6.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.437
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A         3.62      0.40      0.200      52

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NATURAL FAIR COVER

"OPEN BRUSH" D 4.01 0.20 1.000 96
 COMMERCIAL A 1.68 0.40 0.100 52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.527
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 668.33
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.57
 AVERAGE FLOW DEPTH(FEET) = 1.37 TRAVEL TIME(MIN.) = 2.10
 T_c (MIN.) = 25.42
 SUBAREA AREA(ACRES) = 9.31 SUBAREA RUNOFF(CFS) = 19.38
 EFFECTIVE AREA(ACRES) = 279.68 AREA-AVERAGED F_m (INCH/HR) = 0.12
 AREA-AVERAGED F_p (INCH/HR) = 0.28 AREA-AVERAGED A_p = 0.44
 TOTAL AREA(ACRES) = 316.0 PEAK FLOW RATE(CFS) = 658.64
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.36 FLOW VELOCITY(FEET/SEC.) = 3.55
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 23.00 = 7190.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 316.0 T_c (MIN.) = 25.42
 EFFECTIVE AREA(ACRES) = 279.68 AREA-AVERAGED F_m (INCH/HR) = 0.12
 AREA-AVERAGED F_p (INCH/HR) = 0.28 AREA-AVERAGED A_p = 0.444
 PEAK FLOW RATE(CFS) = 658.64

** 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	584.97	19.38	2.847	0.27(0.12)	0.45	203.2	11.01
2	627.07	21.96	2.650	0.27(0.12)	0.44	239.8	11.06
3	658.64	25.42	2.437	0.28(0.12)	0.44	279.7	13.00
4	607.00	31.65	2.149	0.27(0.12)	0.45	306.4	16.10
5	582.42	34.77	2.037	0.27(0.12)	0.45	316.0	1.00

END OF RATIONAL METHOD ANALYSIS

Drainage B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P100_B.DAT

TIME/DATE OF STUDY: 10:28 04/08/2008

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00

SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00

SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90

DATA BANK RAINFALL USED

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET

as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 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) = 110.00 DOWNSTREAM(FEET) = 107.00

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

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 7.477

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.913

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	D	0.54	0.20	0.100	91	7.48

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

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100

SUBAREA RUNOFF(CFS) = 2.38

TOTAL AREA(ACRES) = 0.54 PEAK FLOW RATE(CFS) = 2.38

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 62

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

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

=====

REPRESENTATIVE SLOPE = 0.0100

STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0

STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.018

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          3.53
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.59
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.07
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.65
STREET FLOW TRAVEL TIME(MIN.) = 2.82 Tc(MIN.) = 10.29
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.091
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        0.63    0.20    0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 2.31
EFFECTIVE AREA(ACRES) = 1.17 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 4.29

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 9.47
FLOW VELOCITY(FEET/SEC.) = 2.16 DEPTH*VELOCITY(FT*FT/SEC.) = 0.71
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          5.43
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 10.59
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.27
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.80
STREET FLOW TRAVEL TIME(MIN.) = 2.93 Tc(MIN.) = 13.23
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.543
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        0.72    0.20    0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.72 SUBAREA RUNOFF(CFS) = 2.28
EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 5.99

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 11.13
FLOW VELOCITY(FEET/SEC.) = 2.30 DEPTH*VELOCITY(FT*FT/SEC.) = 0.83
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.58
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 16.76
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.88
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.33
STREET FLOW TRAVEL TIME(MIN.) = 2.89 Tc(MIN.) = 16.12
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.164
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.76 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 6.76 SUBAREA RUNOFF(CFS) = 19.13
EFFECTIVE AREA(ACRES) = 8.65 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 24.47

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 20.12
FLOW VELOCITY(FEET/SEC.) = 3.21 DEPTH*VELOCITY(FT*FT/SEC.) = 1.68
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 1550.00 FEET.

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 600.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 34.08
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.57
HALFSTREET FLOOD WIDTH(FEET) = 22.93
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.49
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.99
STREET FLOW TRAVEL TIME(MIN.) = 2.87 Tc(MIN.) = 18.99
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.880
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 7.46 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.46 SUBAREA RUNOFF(CFS) = 19.20
EFFECTIVE AREA(ACRES) = 16.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 41.47

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.61 HALFSTREET FLOOD WIDTH(FEET) = 24.80
FLOW VELOCITY(FEET/SEC.) = 3.65 DEPTH*VELOCITY(FT*FT/SEC.) = 2.21
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 2150.00 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 56.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.25
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FeET) = 0.61
HALFSTREET FLOOD WIDTH(FeET) = 25.20
AVERAGE FLOW VELOCITY(FeET/SEC.) = 3.69
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.26
STREET FLOW TRAVEL TIME(MIN.) = 2.26 Tc(MIN.) = 21.25
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.701
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.47 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.47 SUBAREA RUNOFF(CFS) = 3.55
EFFECTIVE AREA(ACRES) = 17.58 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 17.6 PEAK FLOW RATE(CFS) = 42.41

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FeET) = 0.61 HALFSTREET FLOOD WIDTH(FeET) = 25.04
FLOW VELOCITY(FeET/SEC.) = 3.66 DEPTH*VELOCITY(FT*FT/SEC.) = 2.23
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 2650.00 FEET.

*****
FLOW PROCESS FROM NODE 56.00 TO NODE 57.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FeET) = 580.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FeET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 56.32
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FeET) = 0.66
HALFSTREET FLOOD WIDTH(FeET) = 27.93
AVERAGE FLOW VELOCITY(FeET/SEC.) = 3.93
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.60
STREET FLOW TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 23.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.536
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 12.28 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 12.28 SUBAREA RUNOFF(CFS) = 27.81
EFFECTIVE AREA(ACRES) = 29.86 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 29.9 PEAK FLOW RATE(CFS) = 67.63

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FeET) = 0.70 HALFSTREET FLOOD WIDTH(FeET) = 31.51
FLOW VELOCITY(FeET/SEC.) = 4.11 DEPTH*VELOCITY(FT*FT/SEC.) = 2.86
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 3230.00 FEET.

*****
FLOW PROCESS FROM NODE 57.00 TO NODE 58.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FeET) = 680.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FeET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 109.80
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.79
HALFSTREET FLOOD WIDTH(FEET) = 36.13
AVERAGE FLOW VELOCITY(FT/SEC.) = 4.84
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.82
STREET FLOW TRAVEL TIME(MIN.) = 2.34 Tc(MIN.) = 26.05
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.403
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      29.81    0.20    0.100  91
SCHOOL                D      9.91    0.20    0.600  91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 39.72 SUBAREA RUNOFF(CFS) = 84.30
EFFECTIVE AREA(ACRES) = 69.58 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 69.6 PEAK FLOW RATE(CFS) = 148.35

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.86 HALFSTREET FLOOD WIDTH(FEET) = 39.55
FLOW VELOCITY(FT/SEC.) = 5.33 DEPTH*VELOCITY(FT*FT/SEC.) = 4.57
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
      AND L = 680.0 FT WITH ELEVATION-DROP = 6.8 FT, IS 144.0 CFS,
      WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 58.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 58.00 = 3910.00 FEET.

*****
FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 760.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.8 INCHES
PIPE-FLOW VELOCITY(FT/SEC.) = 12.82
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 148.35
PIPE TRAVEL TIME(MIN.) = 0.99 Tc(MIN.) = 27.03
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 59.00 = 4670.00 FEET.

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 59.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 27.03
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.353
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      11.44    0.20    0.100  91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.44 SUBAREA RUNOFF(CFS) = 24.02
EFFECTIVE AREA(ACRES) = 81.02 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 81.0 PEAK FLOW RATE(CFS) = 169.19

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 580.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.3 INCHES
PIPE-FLOW VELOCITY(FT/SEC.) = 13.29
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 169.19

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PIPE TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 27.76
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 60.00 = 5250.00 FEET.

FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 27.76
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.317
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	13.88	0.20	0.100	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	4.45	0.20	0.200	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.124
SUBAREA AREA(ACRES) = 18.33 SUBAREA RUNOFF(CFS) = 37.81
EFFECTIVE AREA(ACRES) = 99.35 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 99.4 PEAK FLOW RATE(CFS) = 204.41

FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 51

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

=====

CHANNEL LENGTH THRU SUBAREA(FEET) = 940.00
REPRESENTATIVE CHANNEL SLOPE = 0.0350
CHANNEL BASE(FEET) = 15.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 7.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.242
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	D	24.16	0.20	1.000	96
CONDOMINIUMS	D	4.43	0.20	0.350	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.899
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 230.95
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.54
AVERAGE FLOW DEPTH(FEET) = 1.28 TRAVEL TIME(MIN.) = 1.64
Tc(MIN.) = 29.40
SUBAREA AREA(ACRES) = 28.59 SUBAREA RUNOFF(CFS) = 53.06
EFFECTIVE AREA(ACRES) = 127.94 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 127.9 PEAK FLOW RATE(CFS) = 250.76

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.35 FLOW VELOCITY(FEET/SEC.) = 9.79
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 61.00 = 6190.00 FEET.

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 127.9 TC(MIN.) = 29.40
EFFECTIVE AREA(ACRES) = 127.94 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.321
PEAK FLOW RATE(CFS) = 250.76

=====

END OF RATIONAL METHOD ANALYSIS

Drainage C

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P100_C.DAT
TIME/DATE OF STUDY: 10:29 04/08/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 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) = 108.00 DOWNSTREAM(FEET) = 106.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.003
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.429
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN" D 1.53 0.20 1.000 98 14.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 4.45
TOTAL AREA(ACRES) = 1.53 PEAK FLOW RATE(CFS) = 4.45

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.74
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 14.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.65
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.11
STREET FLOW TRAVEL TIME(MIN.) = 2.20  Tc(MIN.) = 16.21
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.154
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BAREN"              D        4.73    0.20    1.000    98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.73    SUBAREA RUNOFF(CFS) = 12.57
EFFECTIVE AREA(ACRES) = 6.26    AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 6.3    PEAK FLOW RATE(CFS) = 16.64

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47  HALFSTREET FLOOD WIDTH(FEET) = 17.23
FLOW VELOCITY(FEET/SEC.) = 2.93  DEPTH*VELOCITY(FT*FT/SEC.) = 1.38
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 360.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.55
ESTIMATED PIPE DIAMETER(INCH) = 24.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.64
PIPE TRAVEL TIME(MIN.) = 0.79  Tc(MIN.) = 17.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.00 = 1010.00 FEET.

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 17.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.069
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL              D        2.81    0.20    0.100    91
CONDOMINIUMS            D        2.09    0.20    0.350    91
CONDOMINIUMS            D        3.05    0.20    0.350    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
SUBAREA AREA(ACRES) = 7.95    SUBAREA RUNOFF(CFS) = 21.58
EFFECTIVE AREA(ACRES) = 14.21  AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 14.2    PEAK FLOW RATE(CFS) = 37.74

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 250.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.03
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 37.74
PIPE TRAVEL TIME(MIN.) = 0.46  Tc(MIN.) = 17.46
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 84.00 = 1260.00 FEET.

*****
FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 17.46
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.022

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SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            D          0.73    0.20    0.100    91
CONDOMINIUMS         D          1.21    0.20    0.350    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.256
SUBAREA AREA(ACRES) = 1.94    SUBAREA RUNOFF(CFS) = 5.19
EFFECTIVE AREA(ACRES) = 16.15    AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 16.1    PEAK FLOW RATE(CFS) = 42.33

*****
FLOW PROCESS FROM NODE    84.00 TO NODE    85.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 180.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.47
ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 42.33
PIPE TRAVEL TIME(MIN.) = 0.32    Tc(MIN.) = 17.78
LONGEST FLOWPATH FROM NODE    80.00 TO NODE    85.00 = 1440.00 FEET.

*****
FLOW PROCESS FROM NODE    85.00 TO NODE    85.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.78
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.991
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            D          0.32    0.20    0.100    91
CONDOMINIUMS         D          2.49    0.20    0.350    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.322
SUBAREA AREA(ACRES) = 2.81    SUBAREA RUNOFF(CFS) = 7.40
EFFECTIVE AREA(ACRES) = 18.96    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 19.0    PEAK FLOW RATE(CFS) = 49.28

*****
FLOW PROCESS FROM NODE    85.00 TO NODE    86.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 340.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.63
ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 49.28
PIPE TRAVEL TIME(MIN.) = 0.59    Tc(MIN.) = 18.37
LONGEST FLOWPATH FROM NODE    80.00 TO NODE    86.00 = 1780.00 FEET.

*****
FLOW PROCESS FROM NODE    86.00 TO NODE    86.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.37
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.936
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS         D          3.14    0.20    0.350    91
COMMERCIAL            D          0.62    0.20    0.100    91
PUBLIC PARK          D          1.37    0.20    0.850    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.453
SUBAREA AREA(ACRES) = 5.13    SUBAREA RUNOFF(CFS) = 13.13
EFFECTIVE AREA(ACRES) = 24.09    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 24.1    PEAK FLOW RATE(CFS) = 61.47

*****
FLOW PROCESS FROM NODE    86.00 TO NODE    87.00 IS CODE = 31

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-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.20
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 61.47
PIPE TRAVEL TIME(MIN.) = 1.03 Tc(MIN.) = 19.40
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 2410.00 FEET.

*****
FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.40
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.845
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 3.51 0.20 0.350 91
COMMERCIAL D 1.12 0.20 0.100 91
NATURAL FAIR COVER
"OPEN BRUSH" D 0.43 0.20 1.000 96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.06 SUBAREA RUNOFF(CFS) = 12.64
EFFECTIVE AREA(ACRES) = 29.15 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 29.1 PEAK FLOW RATE(CFS) = 72.16

*****
FLOW PROCESS FROM NODE 87.00 TO NODE 88.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.71
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 72.16
PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 19.83
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 88.00 = 2690.00 FEET.

*****
FLOW PROCESS FROM NODE 88.00 TO NODE 88.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.83
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.809
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 5.34 0.20 0.350 91
COMMERCIAL D 0.48 0.20 0.100 91
CONDOMINIUMS D 2.16 0.20 0.350 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335
SUBAREA AREA(ACRES) = 7.98 SUBAREA RUNOFF(CFS) = 19.70
EFFECTIVE AREA(ACRES) = 37.13 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 37.1 PEAK FLOW RATE(CFS) = 90.91

*****
FLOW PROCESS FROM NODE 88.00 TO NODE 89.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.29
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 90.91
PIPE TRAVEL TIME(MIN.) = 0.40 Tc(MIN.) = 20.23
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 2960.00 FEET.

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*****
FLOW PROCESS FROM NODE      89.00 TO NODE      89.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.23
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.777
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
CONDOMINIUMS      D      2.41      0.20      0.350      91
COMMERCIAL      D      2.55      0.20      0.100      91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.221
SUBAREA AREA(ACRES) = 4.96      SUBAREA RUNOFF(CFS) = 12.20
EFFECTIVE AREA(ACRES) = 42.09      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20      AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 42.1      PEAK FLOW RATE(CFS) = 102.04

*****
FLOW PROCESS FROM NODE      89.00 TO NODE      97.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 560.00      MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.74
ESTIMATED PIPE DIAMETER(INCH) = 45.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 102.04
PIPE TRAVEL TIME(MIN.) = 0.80      Tc(MIN.) = 21.03
LONGEST FLOWPATH FROM NODE      80.00 TO NODE      97.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE      97.00 TO NODE      97.00 IS CODE =  10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
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) = 108.00      DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.314
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.332
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS      Tc
    LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN      (MIN.)
COMMERCIAL      D      0.88      0.20      0.100      91      9.31
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.42
TOTAL AREA(ACRES) = 0.88      PEAK FLOW RATE(CFS) = 3.42

*****
FLOW PROCESS FROM NODE      91.00 TO NODE      92.00 IS CODE =  62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 260.00      CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

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STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 10.43
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.26
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.79
STREET FLOW TRAVEL TIME(MIN.) = 1.92 Tc(MIN.) = 11.23
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.891
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              D      1.06      0.20      0.100      91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 3.69
EFFECTIVE AREA(ACRES) = 1.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 6.76

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.76
FLOW VELOCITY(FEET/SEC.) = 2.37 DEPTH*VELOCITY(FT*FT/SEC.) = 0.88
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 92.00 = 560.00 FEET.

*****
FLOW PROCESS FROM NODE 92.00 TO NODE 93.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.06
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.76
PIPE TRAVEL TIME(MIN.) = 1.73 Tc(MIN.) = 12.97
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 93.00 = 1190.00 FEET.

*****
FLOW PROCESS FROM NODE 93.00 TO NODE 93.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.97
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.584
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS            D      5.84      0.20      0.350      91
COMMERCIAL              D      2.34      0.20      0.100      91
CONDOMINIUMS            D      8.66      0.20      0.350      91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.315
SUBAREA AREA(ACRES) = 16.84 SUBAREA RUNOFF(CFS) = 53.36
EFFECTIVE AREA(ACRES) = 18.78 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 18.8 PEAK FLOW RATE(CFS) = 59.59

*****
FLOW PROCESS FROM NODE 93.00 TO NODE 94.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.18
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 59.59
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 13.36
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 94.00 = 1430.00 FEET.

*****
FLOW PROCESS FROM NODE 94.00 TO NODE 94.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.36
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.523
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
PUBLIC PARK             D      3.80      0.20      0.850      91

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COMMERCIAL          D          0.27      0.20      0.100      91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.800
SUBAREA AREA(ACRES) = 4.07      SUBAREA RUNOFF(CFS) = 12.32
EFFECTIVE AREA(ACRES) = 22.85      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20      AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 22.9      PEAK FLOW RATE(CFS) = 70.88

*****
FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 190.00      MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.69
ESTIMATED PIPE DIAMETER(INCH) = 39.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 70.88
PIPE TRAVEL TIME(MIN.) = 0.30      Tc(MIN.) = 13.66
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 1620.00 FEET.

*****
FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.66
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.479
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE              GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
COMMERCIAL              D          0.20      0.20      0.100      91
CONDOMINIUMS            D          2.24      0.20      0.350      91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA(ACRES) = 2.44      SUBAREA RUNOFF(CFS) = 7.50
EFFECTIVE AREA(ACRES) = 25.29      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20      AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 25.3      PEAK FLOW RATE(CFS) = 77.47

*****
FLOW PROCESS FROM NODE 95.00 TO NODE 96.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 310.00      MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.76
ESTIMATED PIPE DIAMETER(INCH) = 39.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 77.47
PIPE TRAVEL TIME(MIN.) = 0.48      Tc(MIN.) = 14.14
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 96.00 = 1930.00 FEET.

*****
FLOW PROCESS FROM NODE 96.00 TO NODE 96.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.14
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.411
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE              GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
PUBLIC PARK              D          5.07      0.20      0.850      91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 5.07      SUBAREA RUNOFF(CFS) = 14.79
EFFECTIVE AREA(ACRES) = 30.36      AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20      AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 30.4      PEAK FLOW RATE(CFS) = 90.70

*****
FLOW PROCESS FROM NODE 96.00 TO NODE 97.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 230.00      MANNING'S N = 0.013

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DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.29
ESTIMATED PIPE DIAMETER(INCH) = 42.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 90.70
PIPE TRAVEL TIME(MIN.) = 0.34    Tc(MIN.) = 14.48
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 97.00 = 2160.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          90.70  14.48   3.365   0.20( 0.09)  0.46      30.4      90.00
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 97.00 = 2160.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          102.04  21.03   2.717   0.20( 0.08)  0.42      42.1      80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          178.24  14.48   3.365   0.20( 0.09)  0.44      59.3      90.00
2          174.79  21.03   2.717   0.20( 0.09)  0.43      72.4      80.00
TOTAL AREA(ACRES) = 72.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 178.24    Tc(MIN.) = 14.475
EFFECTIVE AREA(ACRES) = 59.33    AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 72.4
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 98.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 280.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 42.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.35
ESTIMATED PIPE DIAMETER(INCH) = 54.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 178.24
PIPE TRAVEL TIME(MIN.) = 0.35    Tc(MIN.) = 14.82
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 98.00 = 3800.00 FEET.

*****
FLOW PROCESS FROM NODE 98.00 TO NODE 98.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.82
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.319
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"      D      22.13      0.20      1.000      96
NATURAL POOR COVER
"BARREN"      D      9.76      0.20      1.000      98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 31.89    SUBAREA RUNOFF(CFS) = 89.52
EFFECTIVE AREA(ACRES) = 91.22    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.63
TOTAL AREA(ACRES) = 104.3    PEAK FLOW RATE(CFS) = 262.10
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 104.3    TC(MIN.) = 14.82

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EFFECTIVE AREA(ACRES) = 91.22 AREA-AVERAGED Fm(INCH/HR)= 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.635
PEAK FLOW RATE(CFS) = 262.10

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	262.10	14.82	3.319	0.20(0.13)	0.63	91.2	90.00
2	241.31	21.38	2.691	0.20(0.12)	0.61	104.3	80.00

=====

=====

END OF RATIONAL METHOD ANALYSIS

ii. HC 25-Year Storm Event

Drainage A

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P025_A.DAT
TIME/DATE OF STUDY: 09:36 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 240.00
ELEVATION DATA: UPSTREAM(FEET) = 106.20 DOWNSTREAM(FEET) = 105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.372
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.603
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.68 0.20 0.200 75 8.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 2.18
TOTAL AREA(ACRES) = 0.68 PEAK FLOW RATE(CFS) = 2.18

FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 300.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.69
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 10.43
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.58
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.55
STREET FLOW TRAVEL TIME(MIN.) = 3.16 Tc(MIN.) = 11.53
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.007
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        1.13    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.13 SUBAREA RUNOFF(CFS) = 3.02
EFFECTIVE AREA(ACRES) = 1.81 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 4.83

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.84
FLOW VELOCITY(FEET/SEC.) = 1.67 DEPTH*VELOCITY(FT*FT/SEC.) = 0.63
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 260.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.92
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.35
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.94
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.85
STREET FLOW TRAVEL TIME(MIN.) = 2.23 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
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.39    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.39 SUBAREA RUNOFF(CFS) = 8.18
EFFECTIVE AREA(ACRES) = 5.20 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.2 PEAK FLOW RATE(CFS) = 12.54

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.70
FLOW VELOCITY(FEET/SEC.) = 2.10 DEPTH*VELOCITY(FT*FT/SEC.) = 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 800.00 FEET.

*****
FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 310.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.75
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.54
HALFSTREET FLOOD WIDTH(Feet) = 21.21
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.35
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.27
STREET FLOW TRAVEL TIME(Min.) = 2.20 Tc(Min.) = 15.96
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.501
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.51 0.20 0.200 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(Acres) = 6.51 SUBAREA RUNOFF(CFS) = 14.42
EFFECTIVE AREA(Acres) = 11.71 AREA-AVERAGED Fm(Inch/Hr) = 0.04
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(Acres) = 11.7 PEAK FLOW RATE(CFS) = 25.93

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.58 HALFSTREET FLOOD WIDTH(Feet) = 23.63
FLOW VELOCITY(Feet/Sec.) = 2.50 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.46
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 1110.00 FEET.

FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 440.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 34.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.63
HALFSTREET FLOOD WIDTH(Feet) = 26.45
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.68
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.70
STREET FLOW TRAVEL TIME(Min.) = 2.74 Tc(Min.) = 18.70
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.286
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 8.39 0.20 0.100 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 8.39 SUBAREA RUNOFF(CFS) = 17.11
EFFECTIVE AREA(Acres) = 20.10 AREA-AVERAGED Fm(Inch/Hr) = 0.03
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(Acres) = 20.1 PEAK FLOW RATE(CFS) = 40.79

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.67 HALFSTREET FLOOD WIDTH(Feet) = 28.16
FLOW VELOCITY(Feet/Sec.) = 2.80 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.87
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 1550.00 FEET.

FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 360.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 58.57
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.73
HALFSTREET FLOOD WIDTH(FEET) = 33.32
AVERAGE FLOW VELOCITY(FT/SEC.) = 3.12
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.29
STREET FLOW TRAVEL TIME(MIN.) = 1.92 Tc(MIN.) = 20.62
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.163
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 18.43 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 18.43 SUBAREA RUNOFF(CFS) = 35.55
EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 74.11

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.78 HALFSTREET FLOOD WIDTH(FEET) = 35.58
FLOW VELOCITY(FT/SEC.) = 3.39 DEPTH*VELOCITY(FT*FT/SEC.) = 2.64
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 360.0 FT WITH ELEVATION-DROP = 1.8 FT, IS 56.2 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 7.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.0 INCHES
PIPE-FLOW VELOCITY(FT/SEC.) = 14.15
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 74.11
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 21.27
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.27
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.126
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.24 0.20 0.100 75
PUBLIC PARK D 6.35 0.20 0.850 75
COMMERCIAL D 2.47 0.20 0.100 75
NATURAL POOR COVER
"BARREN" D 3.55 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.528
SUBAREA AREA(ACRES) = 18.61 SUBAREA RUNOFF(CFS) = 33.83
EFFECTIVE AREA(ACRES) = 57.14 AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.26
TOTAL AREA(ACRES) = 57.1 PEAK FLOW RATE(CFS) = 106.64

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 9.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.1000
FLOW LENGTH(FEET) = 430.00 MANNING'S N = 0.013

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DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.22
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 106.64
PIPE TRAVEL TIME(MIN.) = 0.25    Tc(MIN.) = 21.52
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 9.00 = 2890.00 FEET.

*****
FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 870.00
REPRESENTATIVE CHANNEL SLOPE = 0.0300
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.987
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          13.41    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 117.42
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.95
AVERAGE FLOW DEPTH(FEET) = 0.77    TRAVEL TIME(MIN.) = 2.44
Tc(MIN.) = 23.96
SUBAREA AREA(ACRES) = 13.41    SUBAREA RUNOFF(CFS) = 21.57
EFFECTIVE AREA(ACRES) = 70.55    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 70.6    PEAK FLOW RATE(CFS) = 121.08

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.78    FLOW VELOCITY(FEET/SEC.) = 6.01
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 10.00 = 3760.00 FEET.

*****
FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.890
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          9.71    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 128.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.96
AVERAGE FLOW DEPTH(FEET) = 1.00    TRAVEL TIME(MIN.) = 2.22
Tc(MIN.) = 26.18
SUBAREA AREA(ACRES) = 9.71    SUBAREA RUNOFF(CFS) = 14.77
EFFECTIVE AREA(ACRES) = 80.26    AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 80.3    PEAK FLOW RATE(CFS) = 129.68

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.00    FLOW VELOCITY(FEET/SEC.) = 4.98
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 11.00 = 4420.00 FEET.

*****
FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 510.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.824
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN

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NATURAL FAIR COVER
 "OPEN BRUSH" D 3.89 0.20 1.000 83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 132.52
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 5.01
 AVERAGE FLOW DEPTH(Feet) = 1.02 TRAVEL TIME(Min.) = 1.70
 Tc(Min.) = 27.88
 SUBAREA AREA(ACRES) = 3.89 SUBAREA RUNOFF(CFS) = 5.69
 EFFECTIVE AREA(ACRES) = 84.15 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 84.2 PEAK FLOW RATE(CFS) = 130.59

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 1.00 FLOW VELOCITY(Feet/Sec.) = 5.00
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

 FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 11.01 TO NODE 11.02 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 120.00
 ELEVATION DATA: UPSTREAM(Feet) = 100.00 DOWNSTREAM(Feet) = 99.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(Min.) = 5.375
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.630
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (Min.)
COMMERCIAL	D	0.19	0.20	0.100	75	5.38

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.79
 TOTAL AREA(ACRES) = 0.19 PEAK FLOW RATE(CFS) = 0.79

 FLOW PROCESS FROM NODE 11.02 TO NODE 11.03 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0100
 STREET LENGTH(Feet) = 330.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

 **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.22
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.35
 HALFSTREET FLOOD WIDTH(Feet) = 10.43
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.24
 PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.78
 STREET FLOW TRAVEL TIME(Min.) = 2.46 Tc(Min.) = 7.83
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.742
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	D	1.84	0.20	0.850	75
COMMERCIAL	D	0.25	0.20	0.100	75
NATURAL FAIR COVER "OPEN BRUSH"	D	0.64	0.20	1.000	83

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.816
 SUBAREA AREA(ACRES) = 2.73 SUBAREA RUNOFF(CFS) = 8.79
 EFFECTIVE AREA(ACRES) = 2.92 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.77

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TOTAL AREA(ACRES) =          2.9          PEAK FLOW RATE(CFS) =          9.43

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.40  HALFSTREET FLOOD WIDTH(FEET) = 13.55
FLOW VELOCITY(FEET/SEC.) = 2.57  DEPTH*VELOCITY(FT*FT/SEC.) = 1.04
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.03 =      450.00 FEET.

*****
FLOW PROCESS FROM NODE      11.03 TO NODE      11.04 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 490.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.41
ESTIMATED PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.43
PIPE TRAVEL TIME(MIN.) = 1.27  Tc(MIN.) = 9.10
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.04 =      940.00 FEET.

*****
FLOW PROCESS FROM NODE      11.04 TO NODE      11.04 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.10
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.436
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA      Fp      Ap      SCS
LAND USE          GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL        D      1.18      0.20      0.100      75
CONDOMINIUMS      D      1.15      0.20      0.350      75
CONDOMINIUMS      D      4.75      0.20      0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.308
SUBAREA AREA(ACRES) = 7.08  SUBAREA RUNOFF(CFS) = 21.50
EFFECTIVE AREA(ACRES) = 10.00  AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 10.0  PEAK FLOW RATE(CFS) = 30.13

*****
FLOW PROCESS FROM NODE      11.04 TO NODE      11.05 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 400.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.75
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 30.13
PIPE TRAVEL TIME(MIN.) = 0.76  Tc(MIN.) = 9.87
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.05 =      1340.00 FEET.

*****
FLOW PROCESS FROM NODE      11.05 TO NODE      11.05 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.87
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.283
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA      Fp      Ap      SCS
LAND USE          GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS      D      6.10      0.20      0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.10  SUBAREA RUNOFF(CFS) = 17.64
EFFECTIVE AREA(ACRES) = 16.10  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 16.1  PEAK FLOW RATE(CFS) = 46.40

*****
FLOW PROCESS FROM NODE      11.05 TO NODE      12.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 910.00  MANNING'S N = 0.013

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DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.59
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 46.40
PIPE TRAVEL TIME(MIN.) = 1.58 Tc(MIN.) = 11.45
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 12.00 = 2250.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 46.40 11.45 3.018 0.20( 0.08) 0.41 16.1 11.01
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 12.00 = 2250.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 130.59 27.88 1.824 0.20( 0.10) 0.50 84.2 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 137.17 11.45 3.018 0.20( 0.09) 0.47 50.7 11.01
2 158.12 27.88 1.824 0.20( 0.10) 0.48 100.2 1.00
TOTAL AREA(ACRES) = 100.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 158.12 Tc(MIN.) = 27.878
EFFECTIVE AREA(ACRES) = 100.25 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 100.2
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====

*****
FLOW PROCESS FROM NODE 11.06 TO NODE 11.07 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 90.00 DOWNSTREAM(FEET) = 86.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.011
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.456
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 D 1.54 0.20 0.350 75 9.01
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 4.69
TOTAL AREA(ACRES) = 1.54 PEAK FLOW RATE(CFS) = 4.69

*****
FLOW PROCESS FROM NODE 11.07 TO NODE 11.08 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 450.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.50
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

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PIPE-FLOW(CFS) = 4.69
PIPE TRAVEL TIME(MIN.) = 1.36 Tc(MIN.) = 10.38
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.08 = 790.00 FEET.

*****
FLOW PROCESS FROM NODE 11.08 TO NODE 11.08 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 10.38
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.191
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.43 0.20 0.100 75
CONDOMINIUMS D 1.14 0.20 0.350 75
CONDOMINIUMS D 4.05 0.20 0.350 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.331
SUBAREA AREA(ACRES) = 5.62 SUBAREA RUNOFF(CFS) = 15.81
EFFECTIVE AREA(ACRES) = 7.16 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 7.2 PEAK FLOW RATE(CFS) = 20.13

*****
FLOW PROCESS FROM NODE 11.08 TO NODE 11.09 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 500.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.77
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.13
PIPE TRAVEL TIME(MIN.) = 1.07 Tc(MIN.) = 11.45
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.09 = 1290.00 FEET.

*****
FLOW PROCESS FROM NODE 11.09 TO NODE 11.09 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.45
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.018
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.41 0.20 0.100 75
CONDOMINIUMS D 1.13 0.20 0.350 75
CONDOMINIUMS D 0.62 0.20 0.350 75
CONDOMINIUMS D 0.48 0.20 0.350 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.311
SUBAREA AREA(ACRES) = 2.64 SUBAREA RUNOFF(CFS) = 7.02
EFFECTIVE AREA(ACRES) = 9.80 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 9.8 PEAK FLOW RATE(CFS) = 26.04

*****
FLOW PROCESS FROM NODE 11.09 TO NODE 11.10 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 730.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.35
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.04
PIPE TRAVEL TIME(MIN.) = 1.46 Tc(MIN.) = 12.91
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.10 = 2020.00 FEET.

*****
FLOW PROCESS FROM NODE 11.10 TO NODE 11.10 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.91
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.820
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.01	0.20	0.100	75
CONDOMINIUMS	D	2.10	0.20	0.350	75
CONDOMINIUMS	D	1.33	0.20	0.350	75
CONDOMINIUMS	D	7.17	0.20	0.350	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.328
 SUBAREA AREA(ACRES) = 11.61 SUBAREA RUNOFF(CFS) = 28.78
 EFFECTIVE AREA(ACRES) = 21.41 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
 TOTAL AREA(ACRES) = 21.4 PEAK FLOW RATE(CFS) = 53.08

FLOW PROCESS FROM NODE 11.10 TO NODE 11.11 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0100
 FLOW LENGTH(Feet) = 510.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.2 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 10.03
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 53.08
 PIPE TRAVEL TIME(Min.) = 0.85 Tc(Min.) = 13.75
 LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.11 = 2530.00 FEET.

FLOW PROCESS FROM NODE 11.11 TO NODE 11.11 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
 =====
 MAINLINE Tc(Min.) = 13.75
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.721
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.44	0.20	0.100	75
CONDOMINIUMS	D	6.60	0.20	0.350	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.334
 SUBAREA AREA(ACRES) = 7.04 SUBAREA RUNOFF(CFS) = 16.81
 EFFECTIVE AREA(ACRES) = 28.45 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
 TOTAL AREA(ACRES) = 28.5 PEAK FLOW RATE(CFS) = 67.97

FLOW PROCESS FROM NODE 11.11 TO NODE 12.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0100
 FLOW LENGTH(Feet) = 240.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.1 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 10.63
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 67.97
 PIPE TRAVEL TIME(Min.) = 0.38 Tc(Min.) = 14.13
 LONGEST FLOWPATH FROM NODE 11.06 TO NODE 12.00 = 2770.00 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 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 (ACRES)	Ae (ACRES)	HEADWATER NODE
1	67.97	14.13	2.679	0.20(0.07)	0.33	28.5	11.06

LONGEST FLOWPATH FROM NODE 11.06 TO NODE 12.00 = 2770.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (Min.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	137.17	11.45	3.018	0.20(0.09)	0.47	50.7	11.01
2	158.12	27.88	1.824	0.20(0.10)	0.48	100.2	1.00

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
--------	---	----	-----------	--------	----	----	-----------

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	199.38	11.45	3.018	0.20(0.09)	0.43	73.7 11.01
2	208.56	14.13	2.679	0.20(0.09)	0.43	87.2 11.06
3	203.84	27.88	1.824	0.20(0.09)	0.45	128.7 1.00
TOTAL AREA(ACRES) =			128.7			

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 208.56 Tc(MIN.) = 14.130
EFFECTIVE AREA(ACRES) = 87.20 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 128.7
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 12

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

FLOW PROCESS FROM NODE 12.00 TO NODE 20.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 510.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.12
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 208.56
PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 14.60
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5440.00 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.60
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.630
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 3.58 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 3.58 SUBAREA RUNOFF(CFS) = 7.83
EFFECTIVE AREA(ACRES) = 90.78 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 132.3 PEAK FLOW RATE(CFS) = 208.56
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

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

FLOW PROCESS FROM NODE 13.00 TO NODE 14.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 370.00
ELEVATION DATA: UPSTREAM(FEET) = 102.50 DOWNSTREAM(FEET) = 100.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.373
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.380
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 3.17 0.20 0.200 75 9.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 9.53
TOTAL AREA(ACRES) = 3.17 PEAK FLOW RATE(CFS) = 9.53

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FLOW PROCESS FROM NODE      14.00 TO NODE      15.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0500
FLOW LENGTH(FEET) =  1660.00  MANNING'S N =  0.013
DEPTH OF FLOW IN  15.0 INCH PIPE IS  9.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  12.07
ESTIMATED PIPE DIAMETER(INCH) =  15.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  9.53
PIPE TRAVEL TIME(MIN.) =  2.29  Tc(MIN.) =  11.67
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      15.00 =  2030.00 FEET.

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      15.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =  11.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.986
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      B      31.84      0.30      0.200      56
PUBLIC PARK      D      3.71      0.20      0.850      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.268
SUBAREA AREA(ACRES) =  35.55  SUBAREA RUNOFF(CFS) =  93.26
EFFECTIVE AREA(ACRES) =  38.72  AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.26
TOTAL AREA(ACRES) =  38.7  PEAK FLOW RATE(CFS) =  101.67

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      16.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =  780.00
REPRESENTATIVE CHANNEL SLOPE =  0.0400
CHANNEL BASE(FEET) =  0.00  "Z" FACTOR =  2.000
MANNING'S FACTOR =  0.015  MAXIMUM DEPTH(FEET) =  3.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.887
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      D      11.64      0.20      0.200      75
NATURAL FAIR COVER
"OPEN BRUSH"      A      13.96      0.40      1.000      46
COMMERCIAL      D      2.65      0.20      0.100      75
PUBLIC PARK      A      1.60      0.40      0.850      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  137.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  18.07
AVERAGE FLOW DEPTH(FEET) =  1.95  TRAVEL TIME(MIN.) =  0.72
Tc(MIN.) =  12.38
SUBAREA AREA(ACRES) =  29.85  SUBAREA RUNOFF(CFS) =  71.57
EFFECTIVE AREA(ACRES) =  68.57  AREA-AVERAGED Fm(INCH/HR) =  0.14
AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.41
TOTAL AREA(ACRES) =  68.6  PEAK FLOW RATE(CFS) =  169.77

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  2.11  FLOW VELOCITY(FEET/SEC.) =  19.06
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      16.00 =  2810.00 FEET.

*****
FLOW PROCESS FROM NODE      16.00 TO NODE      16.60 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0050
FLOW LENGTH(FEET) =  290.00  MANNING'S N =  0.013
DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  10.14
ESTIMATED PIPE DIAMETER(INCH) =  60.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  169.77
PIPE TRAVEL TIME(MIN.) =  0.48  Tc(MIN.) =  12.86
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      16.60 =  3100.00 FEET.

```

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*****
FLOW PROCESS FROM NODE      16.60 TO NODE      16.60 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =      12.86
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =    2.826
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
COMMERCIAL          A          1.13          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) =      1.13      SUBAREA RUNOFF(CFS) =      2.83
EFFECTIVE AREA(ACRES) =      69.70      AREA-AVERAGED Fm(INCH/HR) =    0.13
AREA-AVERAGED Fp(INCH/HR) =    0.33      AREA-AVERAGED Ap =    0.40
TOTAL AREA(ACRES) =      69.7      PEAK FLOW RATE(CFS) =      169.77
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE      16.60 TO NODE      16.60 IS CODE =   10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      16.10 TO NODE      16.20 IS CODE =   21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =    330.00
ELEVATION DATA: UPSTREAM(FEET) =    105.50  DOWNSTREAM(FEET) =    105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    13.416
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =    2.759
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        D          1.80          0.20          0.350          75      13.42
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    0.350
SUBAREA RUNOFF(CFS) =      4.36
TOTAL AREA(ACRES) =      1.80      PEAK FLOW RATE(CFS) =      4.36

*****
FLOW PROCESS FROM NODE      16.20 TO NODE      16.30 IS CODE =   51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =    400.00
REPRESENTATIVE CHANNEL SLOPE =    0.0100
CHANNEL BASE(FEET) =    0.00  "Z" FACTOR =    1.000
MANNING'S FACTOR =    0.015  MAXIMUM DEPTH(FEET) =    1.50
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =    2.636
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
CONDOMINIUMS        B          2.42          0.30          0.350          56
COMMERCIAL          B          0.90          0.30          0.100          56
PUBLIC PARK          B          1.92          0.30          0.850          56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    0.490
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    10.23
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    5.92
AVERAGE FLOW DEPTH(FEET) =    1.32  TRAVEL TIME(MIN.) =    1.13
Tc(MIN.) =    14.54
SUBAREA AREA(ACRES) =      5.24      SUBAREA RUNOFF(CFS) =    11.74
EFFECTIVE AREA(ACRES) =      7.04      AREA-AVERAGED Fm(INCH/HR) =    0.13
AREA-AVERAGED Fp(INCH/HR) =    0.28      AREA-AVERAGED Ap =    0.45
TOTAL AREA(ACRES) =      7.0      PEAK FLOW RATE(CFS) =    15.89

==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
ALLOWABLE DEPTH).
AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

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DEPTH(FEET) = 1.50    FLOW VELOCITY(FEET/SEC.) = 7.06

==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.30 =      730.00 FEET.

*****
FLOW PROCESS FROM NODE      16.30 TO NODE      16.40 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 790.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.48
ESTIMATED PIPE DIAMETER(INCH) = 24.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.89
PIPE TRAVEL TIME(MIN.) = 1.76    Tc(MIN.) = 16.30
LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.40 =      1520.00 FEET.

*****
FLOW PROCESS FROM NODE      16.40 TO NODE      16.40 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.30
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.471
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            B        3.09    0.30    0.100    56
PUBLIC PARK           B        2.54    0.30    0.850    56
PUBLIC PARK           B        2.54    0.30    0.850    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566
SUBAREA AREA(ACRES) = 8.17    SUBAREA RUNOFF(CFS) = 16.92
EFFECTIVE AREA(ACRES) = 15.21    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.29    AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 15.2    PEAK FLOW RATE(CFS) = 31.77

*****
FLOW PROCESS FROM NODE      16.40 TO NODE      16.50 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 390.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.84
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.77
PIPE TRAVEL TIME(MIN.) = 0.74    Tc(MIN.) = 17.04
LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.50 =      1910.00 FEET.

*****
FLOW PROCESS FROM NODE      16.50 TO NODE      16.50 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.04
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.410
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        1.85    0.20    0.100    75
CONDOMINIUMS          D        2.51    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 4.36    SUBAREA RUNOFF(CFS) = 9.27
EFFECTIVE AREA(ACRES) = 19.57    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.28    AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 19.6    PEAK FLOW RATE(CFS) = 40.20

*****
FLOW PROCESS FROM NODE      16.50 TO NODE      16.60 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 950.00    MANNING'S N = 0.013

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DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.39
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.20
PIPE TRAVEL TIME(MIN.) = 1.69 Tc(MIN.) = 18.73
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.60 = 2860.00 FEET.

*****
FLOW PROCESS FROM NODE 16.60 TO NODE 16.60 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.73
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.285
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK D 2.21 0.20 0.850 75
COMMERCIAL D 2.81 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430
SUBAREA AREA(ACRES) = 5.02 SUBAREA RUNOFF(CFS) = 9.93
EFFECTIVE AREA(ACRES) = 24.59 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 24.6 PEAK FLOW RATE(CFS) = 47.92

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====
** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 47.92 18.73 2.285 0.27( 0.12) 0.45 24.6 16.10
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.50 = 2860.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 169.77 12.86 2.826 0.33( 0.13) 0.40 69.7 13.00
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.50 = 3100.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 210.92 12.86 2.826 0.32( 0.13) 0.41 86.6 13.00
2 183.55 18.73 2.285 0.31( 0.13) 0.42 94.3 16.10
TOTAL AREA(ACRES) = 94.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 210.92 Tc(MIN.) = 12.862
EFFECTIVE AREA(ACRES) = 86.59 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.31 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 94.3
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.50 = 3100.00 FEET.

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE 16.50 TO NODE 17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
FLOW LENGTH(FEET) = 1230.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 50.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.78
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 210.92
PIPE TRAVEL TIME(MIN.) = 1.90 Tc(MIN.) = 14.76
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 17.00 = 4330.00 FEET.

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 14.76
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.614
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          A        8.07    0.40    1.000    46
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        6.11    0.40    0.200    32
COMMERCIAL            A        3.62    0.40    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.542
SUBAREA AREA(ACRES) = 17.80    SUBAREA RUNOFF(CFS) = 38.39
EFFECTIVE AREA(ACRES) = 104.39    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.34    AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 112.1    PEAK FLOW RATE(CFS) = 231.84

*****
FLOW PROCESS FROM NODE    17.00 TO NODE    18.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 46.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.30
ESTIMATED PIPE DIAMETER(INCH) = 60.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 231.84
PIPE TRAVEL TIME(MIN.) = 0.31    Tc(MIN.) = 15.08
LONGEST FLOWPATH FROM NODE    13.00 TO NODE    18.00 = 4600.00 FEET.

*****
FLOW PROCESS FROM NODE    18.00 TO NODE    18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.08
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.583
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          A        2.09    0.40    1.000    46
NATURAL POOR COVER
"BARREN"              A        4.65    0.40    1.000    78
COMMERCIAL            A        2.82    0.40    0.100    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        13.94    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.417
SUBAREA AREA(ACRES) = 23.50    SUBAREA RUNOFF(CFS) = 51.09
EFFECTIVE AREA(ACRES) = 127.89    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35    AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 135.6    PEAK FLOW RATE(CFS) = 280.01

*****
FLOW PROCESS FROM NODE    18.00 TO NODE    19.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 610.00
REPRESENTATIVE CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 35.00    "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) = 3.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.478
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          A        2.68    0.40    1.000    46
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        9.73    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 293.02
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.87
AVERAGE FLOW DEPTH(FEET) = 0.90    TRAVEL TIME(MIN.) = 1.15
Tc(MIN.) = 16.22
SUBAREA AREA(ACRES) = 12.41    SUBAREA RUNOFF(CFS) = 26.01
EFFECTIVE AREA(ACRES) = 140.30    AREA-AVERAGED Fm(INCH/HR) = 0.15

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AREA-AVERAGED Fp(INCH/HR) = 0.35 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 148.0 PEAK FLOW RATE(CFS) = 293.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.90 FLOW VELOCITY(FEET/SEC.) = 8.90
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 19.00 = 5210.00 FEET.

*****
FLOW PROCESS FROM NODE 19.00 TO NODE 20.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 360.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.299
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.58 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 295.56
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.62
AVERAGE FLOW DEPTH(FEET) = 0.84 TRAVEL TIME(MIN.) = 2.29
Tc(MIN.) = 18.52
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 3.21
EFFECTIVE AREA(ACRES) = 141.88 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 149.6 PEAK FLOW RATE(CFS) = 293.95
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.84 FLOW VELOCITY(FEET/SEC.) = 2.62
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 3 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
    1 293.95 18.52 2.299 0.35( 0.15) 0.42 141.9 13.00
    2 256.41 24.65 1.956 0.35( 0.15) 0.42 149.6 16.10
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
  STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
  NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
    1 199.38 11.92 2.950 0.20( 0.09) 0.45 77.3 11.01
    2 208.56 14.60 2.630 0.20( 0.09) 0.45 90.8 11.06
    3 204.03 28.35 1.807 0.20( 0.09) 0.46 132.3 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5440.00 FEET.

** PEAK FLOW RATE TABLE **
  STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
  NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
    1 445.86 11.92 2.950 0.28( 0.12) 0.44 168.6 11.01
    2 475.99 14.60 2.630 0.28( 0.12) 0.43 202.6 11.06
    3 501.22 18.52 2.299 0.29( 0.12) 0.44 244.5 13.00
    4 461.66 24.65 1.956 0.28( 0.12) 0.44 270.7 16.10
    5 439.33 28.35 1.807 0.27( 0.12) 0.44 281.9 1.00
TOTAL AREA(ACRES) = 281.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 501.22 Tc(MIN.) = 18.518
EFFECTIVE AREA(ACRES) = 244.49 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 281.9
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 3 <<<<
=====
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FLOW PROCESS FROM NODE      20.00 TO NODE      21.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   570.00
REPRESENTATIVE CHANNEL SLOPE =   0.0050
CHANNEL BASE(FEET) =   130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(FEET) =   6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =   2.115
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        11.87      0.40      0.200      32
NATURAL FAIR COVER
"OPEN BRUSH"              D         5.63      0.20      1.000      83
COMMERCIAL                A         1.56      0.40      0.100      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.428
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   518.41
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.24
AVERAGE FLOW DEPTH(FEET) =   1.18  TRAVEL TIME(MIN.) =   2.93
Tc(MIN.) =   21.45
SUBAREA AREA(ACRES) =   19.06      SUBAREA RUNOFF(CFS) =   34.36
EFFECTIVE AREA(ACRES) =   263.55  AREA-AVERAGED Fm(INCH/HR) =   0.12
AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   0.43
TOTAL AREA(ACRES) =   300.9      PEAK FLOW RATE(CFS) =   501.22
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =   1.15  FLOW VELOCITY(FEET/SEC.) =   3.21
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      21.00 =   6140.00 FEET.

*****
FLOW PROCESS FROM NODE      21.00 TO NODE      22.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00
REPRESENTATIVE CHANNEL SLOPE =   0.0050
CHANNEL BASE(FEET) =   130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(FEET) =   6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =   1.960
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                A         1.73      0.40      0.100      32
NATURAL FAIR COVER
"OPEN BRUSH"              D         4.03      0.20      1.000      83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.730
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   505.91
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.22
AVERAGE FLOW DEPTH(FEET) =   1.16  TRAVEL TIME(MIN.) =   3.10
Tc(MIN.) =   24.56
SUBAREA AREA(ACRES) =   5.76      SUBAREA RUNOFF(CFS) =   9.37
EFFECTIVE AREA(ACRES) =   269.31  AREA-AVERAGED Fm(INCH/HR) =   0.12
AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   0.44
TOTAL AREA(ACRES) =   306.7      PEAK FLOW RATE(CFS) =   501.22
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =   1.15  FLOW VELOCITY(FEET/SEC.) =   3.21
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      22.00 =   6740.00 FEET.

*****
FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   450.00
REPRESENTATIVE CHANNEL SLOPE =   0.0050
CHANNEL BASE(FEET) =   130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(FEET) =   6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =   1.862
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A         3.62      0.40      0.200      32

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NATURAL FAIR COVER

"OPEN BRUSH" D 4.01 0.20 1.000 83
 COMMERCIAL A 1.68 0.40 0.100 32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.527
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 508.50
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.22
 AVERAGE FLOW DEPTH(FEET) = 1.16 TRAVEL TIME(MIN.) = 2.33
 T_c (MIN.) = 26.88
 SUBAREA AREA(ACRES) = 9.31 SUBAREA RUNOFF(CFS) = 14.56
 EFFECTIVE AREA(ACRES) = 278.62 AREA-AVERAGED F_m (INCH/HR) = 0.12
 AREA-AVERAGED F_p (INCH/HR) = 0.28 AREA-AVERAGED A_p = 0.44
 TOTAL AREA(ACRES) = 316.0 PEAK FLOW RATE(CFS) = 501.22
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.15 FLOW VELOCITY(FEET/SEC.) = 3.21
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 23.00 = 7190.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 316.0 T_c (MIN.) = 26.88
 EFFECTIVE AREA(ACRES) = 278.62 AREA-AVERAGED F_m (INCH/HR) = 0.12
 AREA-AVERAGED F_p (INCH/HR) = 0.28 AREA-AVERAGED A_p = 0.444
 PEAK FLOW RATE(CFS) = 501.22

** 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	445.86	20.63	2.163	0.27(0.12)	0.45	202.7	11.01
2	475.99	23.11	2.028	0.27(0.12)	0.44	236.8	11.06
3	501.22	26.88	1.862	0.28(0.12)	0.44	278.6	13.00
4	461.66	33.27	1.650	0.27(0.12)	0.45	304.8	16.10
5	439.33	37.15	1.550	0.27(0.12)	0.45	316.0	1.00

END OF RATIONAL METHOD ANALYSIS

Drainage B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P025_B.DAT
TIME/DATE OF STUDY: 09:36 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 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) = 110.00 DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.477
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.841
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.54 0.20 0.100 75 7.48
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.86
TOTAL AREA(ACRES) = 0.54 PEAK FLOW RATE(CFS) = 1.86

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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


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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.76
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.30
HALFSTREET FLOOD WIDTH(FEET) = 7.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.58
STREET FLOW TRAVEL TIME(MIN.) = 2.97 Tc(MIN.) = 10.44
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.180
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)   (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      0.63      0.20      0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 1.79
EFFECTIVE AREA(ACRES) = 1.17 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 3.33

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 8.34
FLOW VELOCITY(FEET/SEC.) = 2.04 DEPTH*VELOCITY(FT*FT/SEC.) = 0.64
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.21
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 9.41
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.14
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.71
STREET FLOW TRAVEL TIME(MIN.) = 3.12 Tc(MIN.) = 13.56
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.743
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)   (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      0.72      0.20      0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.72 SUBAREA RUNOFF(CFS) = 1.76
EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 4.63

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 9.84
FLOW VELOCITY(FEET/SEC.) = 2.19 DEPTH*VELOCITY(FT*FT/SEC.) = 0.74
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.02
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 15.04
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.71
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.17
STREET FLOW TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 16.63
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.76 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 6.76 SUBAREA RUNOFF(CFS) = 14.74
EFFECTIVE AREA(ACRES) = 8.65 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 18.87

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 18.16
FLOW VELOCITY(FEET/SEC.) = 3.00 DEPTH*VELOCITY(FT*FT/SEC.) = 1.46
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 1550.00 FEET.

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 600.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.53
HALFSTREET FLOOD WIDTH(FEET) = 20.74
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.25
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.73
STREET FLOW TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 19.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.220
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 7.46 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.46 SUBAREA RUNOFF(CFS) = 14.77
EFFECTIVE AREA(ACRES) = 16.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 31.89

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.56 HALFSTREET FLOOD WIDTH(FEET) = 22.38
FLOW VELOCITY(FEET/SEC.) = 3.42 DEPTH*VELOCITY(FT*FT/SEC.) = 1.92
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 2150.00 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 56.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.57
HALFSTREET FLOOD WIDTH(Feet) = 22.77
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.45
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.96
STREET FLOW TRAVEL TIME(Min.) = 2.42 Tc(Min.) = 22.12
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.079
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 1.47 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 1.47 SUBAREA RUNOFF(CFS) = 2.72
EFFECTIVE AREA(Acres) = 17.58 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(Acres) = 17.6 PEAK FLOW RATE(CFS) = 32.58

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.57 HALFSTREET FLOOD WIDTH(Feet) = 22.54
FLOW VELOCITY(Feet/Sec.) = 3.44 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.95
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 2650.00 Feet.

FLOW PROCESS FROM NODE 56.00 TO NODE 57.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 580.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.25
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.61
HALFSTREET FLOOD WIDTH(Feet) = 25.20
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.69
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 2.26
STREET FLOW TRAVEL TIME(Min.) = 2.62 Tc(Min.) = 24.74
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 1.951
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 12.28 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 12.28 SUBAREA RUNOFF(CFS) = 21.34
EFFECTIVE AREA(Acres) = 29.86 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(Acres) = 29.9 PEAK FLOW RATE(CFS) = 51.90

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.65 HALFSTREET FLOOD WIDTH(Feet) = 27.07
FLOW VELOCITY(Feet/Sec.) = 3.85 DEPTH*VELOCITY(Feet*Feet/Sec.) = 2.49
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 3230.00 Feet.

FLOW PROCESS FROM NODE 57.00 TO NODE 58.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 680.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 84.11
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.74
HALFSTREET FLOOD WIDTH(FEET) = 33.44
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.44
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.27
STREET FLOW TRAVEL TIME(MIN.) = 2.55 Tc(MIN.) = 27.29
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.846
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      29.81    0.20    0.100    75
SCHOOL                D       9.91    0.20    0.600    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 39.72 SUBAREA RUNOFF(CFS) = 64.38
EFFECTIVE AREA(ACRES) = 69.58 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 69.6 PEAK FLOW RATE(CFS) = 113.45

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.80 HALFSTREET FLOOD WIDTH(FEET) = 36.44
FLOW VELOCITY(FEET/SEC.) = 4.91 DEPTH*VELOCITY(FT*FT/SEC.) = 3.90
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
      AND L = 680.0 FT WITH ELEVATION-DROP = 6.8 FT, IS 112.5 CFS,
      WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 58.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 58.00 = 3910.00 FEET.

*****
FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 760.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.84
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 113.45
PIPE TRAVEL TIME(MIN.) = 1.07 Tc(MIN.) = 28.36
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 59.00 = 4670.00 FEET.

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 59.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 28.36
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.806
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      11.44    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.44 SUBAREA RUNOFF(CFS) = 18.39
EFFECTIVE AREA(ACRES) = 81.02 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 81.0 PEAK FLOW RATE(CFS) = 129.35

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 580.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.34
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 129.35

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PIPE TRAVEL TIME(MIN.) = 0.78    Tc(MIN.) = 29.15
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 60.00 = 5250.00 FEET.

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 29.15
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.779
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL          D        13.88    0.20    0.100    75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D        4.45    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.124
SUBAREA AREA(ACRES) = 18.33    SUBAREA RUNOFF(CFS) = 28.93
EFFECTIVE AREA(ACRES) = 99.35    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 99.4    PEAK FLOW RATE(CFS) = 156.26

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) = 940.00
REPRESENTATIVE CHANNEL SLOPE = 0.0350
CHANNEL BASE(Feet) = 15.00    "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030    MAXIMUM DEPTH(Feet) = 7.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"        D        24.16    0.20    1.000    83
CONDOMINIUMS        D        4.43    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.899
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 176.08
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 8.73
AVERAGE FLOW DEPTH(Feet) = 1.10    TRAVEL TIME(MIN.) = 1.79
Tc(MIN.) = 30.94
SUBAREA AREA(ACRES) = 28.59    SUBAREA RUNOFF(CFS) = 39.61
EFFECTIVE AREA(ACRES) = 127.94    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 127.9    PEAK FLOW RATE(CFS) = 190.59

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.15    FLOW VELOCITY(Feet/Sec.) = 8.99
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 61.00 = 6190.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 127.9    Tc(MIN.) = 30.94
EFFECTIVE AREA(ACRES) = 127.94    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.321
PEAK FLOW RATE(CFS) = 190.59
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage C

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P025_C.DAT
TIME/DATE OF STUDY: 09:37 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 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) = 108.00 DOWNSTREAM(FEET) = 106.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.003
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.693
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN" D 1.53 0.20 1.000 93 14.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 3.43
TOTAL AREA(ACRES) = 1.53 PEAK FLOW RATE(CFS) = 3.43

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.85
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.48
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.97
STREET FLOW TRAVEL TIME(MIN.) = 2.36 Tc(MIN.) = 16.36
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.466
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BAREN"              D        4.73    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.73 SUBAREA RUNOFF(CFS) = 9.65
EFFECTIVE AREA(ACRES) = 6.26 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 6.3 PEAK FLOW RATE(CFS) = 12.77

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.43
FLOW VELOCITY(FEET/SEC.) = 2.75 DEPTH*VELOCITY(FT*FT/SEC.) = 1.21
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 360.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.02
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.77
PIPE TRAVEL TIME(MIN.) = 0.86 Tc(MIN.) = 17.21
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.00 = 1010.00 FEET.

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 17.21
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.396
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        2.81    0.20    0.100    75
CONDOMINIUMS          D        2.09    0.20    0.350    75
CONDOMINIUMS          D        3.05    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
SUBAREA AREA(ACRES) = 7.95 SUBAREA RUNOFF(CFS) = 16.77
EFFECTIVE AREA(ACRES) = 14.21 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 14.2 PEAK FLOW RATE(CFS) = 29.14

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.42
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 29.14
PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 17.71
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 84.00 = 1260.00 FEET.

*****
FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 17.71
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.358

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SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        0.73    0.20    0.100    75
CONDOMINIUMS         D        1.21    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.256
SUBAREA AREA(ACRES) = 1.94    SUBAREA RUNOFF(CFS) = 4.03
EFFECTIVE AREA(ACRES) = 16.15    AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 16.1    PEAK FLOW RATE(CFS) = 32.68

*****
FLOW PROCESS FROM NODE    84.00 TO NODE    85.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 180.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.88
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 32.68
PIPE TRAVEL TIME(MIN.) = 0.34    Tc(MIN.) = 18.05
LONGEST FLOWPATH FROM NODE    80.00 TO NODE    85.00 = 1440.00 FEET.

*****
FLOW PROCESS FROM NODE    85.00 TO NODE    85.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.05
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.333
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        0.32    0.20    0.100    75
CONDOMINIUMS         D        2.49    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.322
SUBAREA AREA(ACRES) = 2.81    SUBAREA RUNOFF(CFS) = 5.74
EFFECTIVE AREA(ACRES) = 18.96    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 19.0    PEAK FLOW RATE(CFS) = 38.05

*****
FLOW PROCESS FROM NODE    85.00 TO NODE    86.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 340.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.04
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.05
PIPE TRAVEL TIME(MIN.) = 0.63    Tc(MIN.) = 18.67
LONGEST FLOWPATH FROM NODE    80.00 TO NODE    86.00 = 1780.00 FEET.

*****
FLOW PROCESS FROM NODE    86.00 TO NODE    86.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.288
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS         D        3.14    0.20    0.350    75
COMMERCIAL            D        0.62    0.20    0.100    75
PUBLIC PARK          D        1.37    0.20    0.850    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.453
SUBAREA AREA(ACRES) = 5.13    SUBAREA RUNOFF(CFS) = 10.15
EFFECTIVE AREA(ACRES) = 24.09    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 24.1    PEAK FLOW RATE(CFS) = 47.44

*****
FLOW PROCESS FROM NODE    86.00 TO NODE    87.00 IS CODE = 31

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-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.61
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 47.44
PIPE TRAVEL TIME(MIN.) = 1.09 Tc(MIN.) = 19.77
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 2410.00 FEET.

*****
FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.77
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.216
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 3.51 0.20 0.350 75
COMMERCIAL D 1.12 0.20 0.100 75
NATURAL FAIR COVER
"OPEN BRUSH" D 0.43 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.06 SUBAREA RUNOFF(CFS) = 9.77
EFFECTIVE AREA(ACRES) = 29.15 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 29.1 PEAK FLOW RATE(CFS) = 55.64

*****
FLOW PROCESS FROM NODE 87.00 TO NODE 88.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.10
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 55.64
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 20.23
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 88.00 = 2690.00 FEET.

*****
FLOW PROCESS FROM NODE 88.00 TO NODE 88.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.23
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.187
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 5.34 0.20 0.350 75
COMMERCIAL D 0.48 0.20 0.100 75
CONDOMINIUMS D 2.16 0.20 0.350 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335
SUBAREA AREA(ACRES) = 7.98 SUBAREA RUNOFF(CFS) = 15.22
EFFECTIVE AREA(ACRES) = 37.13 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 37.1 PEAK FLOW RATE(CFS) = 70.11

*****
FLOW PROCESS FROM NODE 88.00 TO NODE 89.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.68
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 70.11
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 20.65
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 2960.00 FEET.

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*****
FLOW PROCESS FROM NODE      89.00 TO NODE      89.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.65
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.161
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS      D      2.41    0.20    0.350    75
COMMERCIAL        D      2.55    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.221
SUBAREA AREA(ACRES) = 4.96    SUBAREA RUNOFF(CFS) = 9.45
EFFECTIVE AREA(ACRES) = 42.09    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 42.1    PEAK FLOW RATE(CFS) = 78.71

*****
FLOW PROCESS FROM NODE      89.00 TO NODE      97.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 560.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.08
ESTIMATED PIPE DIAMETER(INCH) = 42.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 78.71
PIPE TRAVEL TIME(MIN.) = 0.84    Tc(MIN.) = 21.49
LONGEST FLOWPATH FROM NODE      80.00 TO NODE      97.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE      97.00 TO NODE      97.00 IS CODE =  10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
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) = 108.00    DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.314
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.392
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
    LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL        D      0.88    0.20    0.100    75  9.31
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.67
TOTAL AREA(ACRES) = 0.88    PEAK FLOW RATE(CFS) = 2.67

*****
FLOW PROCESS FROM NODE      91.00 TO NODE      92.00 IS CODE =  62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 260.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.11
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

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STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 9.28
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.13
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.70
STREET FLOW TRAVEL TIME(MIN.) = 2.03 Tc(MIN.) = 11.35
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.034
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              D      1.06      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 2.88
EFFECTIVE AREA(ACRES) = 1.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 5.26

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 10.43
FLOW VELOCITY(FEET/SEC.) = 2.26 DEPTH*VELOCITY(FT*FT/SEC.) = 0.79
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 92.00 = 560.00 FEET.

*****
FLOW PROCESS FROM NODE 92.00 TO NODE 93.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.62
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.26
PIPE TRAVEL TIME(MIN.) = 1.87 Tc(MIN.) = 13.21
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 93.00 = 1190.00 FEET.

*****
FLOW PROCESS FROM NODE 93.00 TO NODE 93.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.21
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.783
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS            D      5.84      0.20      0.350      75
COMMERCIAL              D      2.34      0.20      0.100      75
CONDOMINIUMS            D      8.66      0.20      0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.315
SUBAREA AREA(ACRES) = 16.84 SUBAREA RUNOFF(CFS) = 41.22
EFFECTIVE AREA(ACRES) = 18.78 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 18.8 PEAK FLOW RATE(CFS) = 46.04

*****
FLOW PROCESS FROM NODE 93.00 TO NODE 94.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.58
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 46.04
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 13.63
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 94.00 = 1430.00 FEET.

*****
FLOW PROCESS FROM NODE 94.00 TO NODE 94.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.63
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.734
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
PUBLIC PARK              D      3.80      0.20      0.850      75

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COMMERCIAL          D          0.27      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.800
SUBAREA AREA(ACRES) = 4.07      SUBAREA RUNOFF(CFS) = 9.43
EFFECTIVE AREA(ACRES) = 22.85   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 22.9      PEAK FLOW RATE(CFS) = 54.65

*****
FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.07
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 54.65
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 13.95
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 1620.00 FEET.

*****
FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.95
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.699
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL              D        0.20      0.20      0.100      75
CONDOMINIUMS            D        2.24      0.20      0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA(ACRES) = 2.44      SUBAREA RUNOFF(CFS) = 5.78
EFFECTIVE AREA(ACRES) = 25.29   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 25.3      PEAK FLOW RATE(CFS) = 59.71

*****
FLOW PROCESS FROM NODE 95.00 TO NODE 96.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 310.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.18
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 59.71
PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 14.45
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 96.00 = 1930.00 FEET.

*****
FLOW PROCESS FROM NODE 96.00 TO NODE 96.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.45
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.645
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK              D        5.07      0.20      0.850      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 5.07      SUBAREA RUNOFF(CFS) = 11.29
EFFECTIVE AREA(ACRES) = 30.36   AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 30.4      PEAK FLOW RATE(CFS) = 69.78

*****
FLOW PROCESS FROM NODE 96.00 TO NODE 97.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 230.00 MANNING'S N = 0.013

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DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.67
ESTIMATED PIPE DIAMETER(INCH) = 39.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 69.78
PIPE TRAVEL TIME(MIN.) = 0.36    Tc(MIN.) = 14.81
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 97.00 = 2160.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          69.78  14.81   2.609   0.20( 0.09)  0.46      30.4      90.00
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 97.00 = 2160.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          78.71  21.49   2.113   0.20( 0.08)  0.42      42.1      80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          137.27  14.81   2.609   0.20( 0.09)  0.44      59.4      90.00
2          134.75  21.49   2.113   0.20( 0.09)  0.43      72.4      80.00
TOTAL AREA(ACRES) = 72.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 137.27    Tc(MIN.) = 14.813
EFFECTIVE AREA(ACRES) = 59.37    AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 72.4
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 98.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 280.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.69
ESTIMATED PIPE DIAMETER(INCH) = 51.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 137.27
PIPE TRAVEL TIME(MIN.) = 0.37    Tc(MIN.) = 15.18
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 98.00 = 3800.00 FEET.

*****
FLOW PROCESS FROM NODE 98.00 TO NODE 98.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.18
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.573
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"      D      22.13      0.20      1.000      83
NATURAL POOR COVER
"BARREN"      D      9.76      0.20      1.000      93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 31.89    SUBAREA RUNOFF(CFS) = 68.10
EFFECTIVE AREA(ACRES) = 91.26    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.63
TOTAL AREA(ACRES) = 104.3    PEAK FLOW RATE(CFS) = 200.88
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 104.3    TC(MIN.) = 15.18

```

EFFECTIVE AREA(ACRES) = 91.26 AREA-AVERAGED Fm(INCH/HR)= 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.634
 PEAK FLOW RATE(CFS) = 200.88

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	200.88	15.18	2.573	0.20(0.13)	0.63	91.3	90.00
2	185.08	21.87	2.092	0.20(0.12)	0.61	104.3	80.00

=====

=====

END OF RATIONAL METHOD ANALYSIS

iii. HC 10-Year Storm Event

Drainage A

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P010_A.DAT
TIME/DATE OF STUDY: 09:37 04/09/2008
=====

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

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

=====

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21
=====

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 240.00
ELEVATION DATA: UPSTREAM(FEET) = 106.20 DOWNSTREAM(FEET) = 105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.372
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.021
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	0.68	0.20	0.200	75	8.37

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 1.82
TOTAL AREA(ACRES) = 0.68 PEAK FLOW RATE(CFS) = 1.82

FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62
=====

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 300.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          3.08
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 9.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.53
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.51
STREET FLOW TRAVEL TIME(MIN.) = 3.27 Tc(MIN.) = 11.64
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.502
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        1.13    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.13 SUBAREA RUNOFF(CFS) = 2.50
EFFECTIVE AREA(ACRES) = 1.81 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 4.01

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 10.82
FLOW VELOCITY(FEET/SEC.) = 1.62 DEPTH*VELOCITY(FT*FT/SEC.) = 0.58
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 260.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          7.39
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 14.18
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.86
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.77
STREET FLOW TRAVEL TIME(MIN.) = 2.33 Tc(MIN.) = 13.97
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.253
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.39    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.39 SUBAREA RUNOFF(CFS) = 6.75
EFFECTIVE AREA(ACRES) = 5.20 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.2 PEAK FLOW RATE(CFS) = 10.36

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45 HALFSTREET FLOOD WIDTH(FEET) = 16.37
FLOW VELOCITY(FEET/SEC.) = 2.00 DEPTH*VELOCITY(FT*FT/SEC.) = 0.91
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 800.00 FEET.

*****
FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 310.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.29
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.51
HALFSTREET FLOOD WIDTH(Feet) = 19.65
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.24
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.15
STREET FLOW TRAVEL TIME(Min.) = 2.31 Tc(Min.) = 16.28
* 10 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.064
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.51 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(Acres) = 6.51 SUBAREA RUNOFF(CFS) = 11.86
EFFECTIVE AREA(Acres) = 11.71 AREA-AVERAGED Fm(Inch/Hr) = 0.04
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(Acres) = 11.7 PEAK FLOW RATE(CFS) = 21.33

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.55 HALFSTREET FLOOD WIDTH(Feet) = 21.91
FLOW VELOCITY(Feet/Sec.) = 2.38 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.32
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 1110.00 FEET.

FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 440.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 28.36
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.60
HALFSTREET FLOOD WIDTH(Feet) = 24.49
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.55
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.53
STREET FLOW TRAVEL TIME(Min.) = 2.87 Tc(Min.) = 19.15
* 10 YEAR RAINFALL INTENSITY(Inch/Hr) = 1.881
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 8.39 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 8.39 SUBAREA RUNOFF(CFS) = 14.05
EFFECTIVE AREA(Acres) = 20.10 AREA-AVERAGED Fm(Inch/Hr) = 0.03
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(Acres) = 20.1 PEAK FLOW RATE(CFS) = 33.45

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.63 HALFSTREET FLOOD WIDTH(Feet) = 26.13
FLOW VELOCITY(Feet/Sec.) = 2.66 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.67
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 1550.00 FEET.

FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 360.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 47.99
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.70
HALFSTREET FLOOD WIDTH(FEET) = 31.61
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.90
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.03
STREET FLOW TRAVEL TIME(MIN.) = 2.07 Tc(MIN.) = 21.22
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.773
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 18.43 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 18.43 SUBAREA RUNOFF(CFS) = 29.08
EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 60.59

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.74 HALFSTREET FLOOD WIDTH(FEET) = 33.63
FLOW VELOCITY(FEET/SEC.) = 3.16 DEPTH*VELOCITY(FT*FT/SEC.) = 2.34
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 360.0 FT WITH ELEVATION-DROP = 1.8 FT, IS 47.0 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 7.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.42
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 60.59
PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 21.90
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.90
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.741
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.24 0.20 0.100 75
PUBLIC PARK D 6.35 0.20 0.850 75
COMMERCIAL D 2.47 0.20 0.100 75
NATURAL POOR COVER
"BARREN" D 3.55 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.528
SUBAREA AREA(ACRES) = 18.61 SUBAREA RUNOFF(CFS) = 27.40
EFFECTIVE AREA(ACRES) = 57.14 AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.26
TOTAL AREA(ACRES) = 57.1 PEAK FLOW RATE(CFS) = 86.88

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 9.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.1000
FLOW LENGTH(FEET) = 430.00 MANNING'S N = 0.013

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DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.56
ESTIMATED PIPE DIAMETER(INCH) = 27.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 86.88
PIPE TRAVEL TIME(MIN.) = 0.27    Tc(MIN.) = 22.17
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 9.00 = 2890.00 FEET.

*****
FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 870.00
REPRESENTATIVE CHANNEL SLOPE = 0.0300
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.621
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          13.41    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 95.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.50
AVERAGE FLOW DEPTH(FEET) = 0.68    TRAVEL TIME(MIN.) = 2.64
Tc(MIN.) = 24.81
SUBAREA AREA(ACRES) = 13.41    SUBAREA RUNOFF(CFS) = 17.15
EFFECTIVE AREA(ACRES) = 70.55    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 70.6    PEAK FLOW RATE(CFS) = 97.86

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.69    FLOW VELOCITY(FEET/SEC.) = 5.52
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 10.00 = 3760.00 FEET.

*****
FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.538
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          9.71    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 103.71
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.58
AVERAGE FLOW DEPTH(FEET) = 0.87    TRAVEL TIME(MIN.) = 2.40
Tc(MIN.) = 27.21
SUBAREA AREA(ACRES) = 9.71    SUBAREA RUNOFF(CFS) = 11.69
EFFECTIVE AREA(ACRES) = 80.26    AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 80.3    PEAK FLOW RATE(CFS) = 104.25

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.88    FLOW VELOCITY(FEET/SEC.) = 4.58
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 11.00 = 4420.00 FEET.

*****
FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 510.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.481
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN

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NATURAL FAIR COVER
 "OPEN BRUSH" D 3.89 0.20 1.000 83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 106.49
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 4.62
 AVERAGE FLOW DEPTH(Feet) = 0.89 TRAVEL TIME(Min.) = 1.84
 Tc(Min.) = 29.05
 SUBAREA AREA(ACRES) = 3.89 SUBAREA RUNOFF(CFS) = 4.49
 EFFECTIVE AREA(ACRES) = 84.15 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 84.2 PEAK FLOW RATE(CFS) = 104.65

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 0.88 FLOW VELOCITY(Feet/Sec.) = 4.59
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

 FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 11.01 TO NODE 11.02 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 120.00
 ELEVATION DATA: UPSTREAM(Feet) = 100.00 DOWNSTREAM(Feet) = 99.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(Min.) = 5.375
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.895
 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	D	0.19	0.20	0.100	75	5.38

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.66
 TOTAL AREA(ACRES) = 0.19 PEAK FLOW RATE(CFS) = 0.66

 FLOW PROCESS FROM NODE 11.02 TO NODE 11.03 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0100
 STREET LENGTH(Feet) = 330.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

 **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.33
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.33
 HALFSTREET FLOOD WIDTH(Feet) = 9.53
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.15
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.72
 STREET FLOW TRAVEL TIME(Min.) = 2.55 Tc(Min.) = 7.93
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.117
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	D	1.84	0.20	0.850	75
COMMERCIAL	D	0.25	0.20	0.100	75
NATURAL FAIR COVER "OPEN BRUSH"	D	0.64	0.20	1.000	83

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.816
 SUBAREA AREA(ACRES) = 2.73 SUBAREA RUNOFF(CFS) = 7.26
 EFFECTIVE AREA(ACRES) = 2.92 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.77

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TOTAL AREA(ACRES) =          2.9          PEAK FLOW RATE(CFS) =          7.79

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.39  HALFSTREET FLOOD WIDTH(FEET) = 12.54
FLOW VELOCITY(FEET/SEC.) = 2.44  DEPTH*VELOCITY(FT*FT/SEC.) = 0.94
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.03 =          450.00 FEET.

*****
FLOW PROCESS FROM NODE      11.03 TO NODE      11.04 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 490.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.24
ESTIMATED PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.79
PIPE TRAVEL TIME(MIN.) = 1.31  Tc(MIN.) = 9.24
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.04 =          940.00 FEET.

*****
FLOW PROCESS FROM NODE      11.04 TO NODE      11.04 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.24
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.856
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/  SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE        GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL          D        1.18    0.20    0.100    75
CONDOMINIUMS        D        1.15    0.20    0.350    75
CONDOMINIUMS        D        4.75    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.308
SUBAREA AREA(ACRES) = 7.08  SUBAREA RUNOFF(CFS) = 17.80
EFFECTIVE AREA(ACRES) = 10.00  AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 10.0  PEAK FLOW RATE(CFS) = 24.90

*****
FLOW PROCESS FROM NODE      11.04 TO NODE      11.05 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 400.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.29
ESTIMATED PIPE DIAMETER(INCH) = 27.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.90
PIPE TRAVEL TIME(MIN.) = 0.80  Tc(MIN.) = 10.04
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.05 =          1340.00 FEET.

*****
FLOW PROCESS FROM NODE      11.05 TO NODE      11.05 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 10.04
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.722
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/  SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE        GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS        D        6.10    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.10  SUBAREA RUNOFF(CFS) = 14.56
EFFECTIVE AREA(ACRES) = 16.10  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 16.1  PEAK FLOW RATE(CFS) = 38.26

*****
FLOW PROCESS FROM NODE      11.05 TO NODE      12.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 910.00  MANNING'S N = 0.013

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DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.04
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.26
PIPE TRAVEL TIME(MIN.) = 1.68 Tc(MIN.) = 11.72
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 12.00 = 2250.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 38.26 11.72 2.492 0.20( 0.08) 0.41 16.1 11.01
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 12.00 = 2250.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 104.65 29.05 1.481 0.20( 0.10) 0.50 84.2 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 111.36 11.72 2.492 0.20( 0.09) 0.47 50.1 11.01
2 126.87 29.05 1.481 0.20( 0.10) 0.48 100.2 1.00
TOTAL AREA(ACRES) = 100.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 126.87 Tc(MIN.) = 29.048
EFFECTIVE AREA(ACRES) = 100.25 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 100.2
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====

*****
FLOW PROCESS FROM NODE 11.06 TO NODE 11.07 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 90.00 DOWNSTREAM(FEET) = 86.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.011
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.897
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 D 1.54 0.20 0.350 75 9.01
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 3.92
TOTAL AREA(ACRES) = 1.54 PEAK FLOW RATE(CFS) = 3.92

*****
FLOW PROCESS FROM NODE 11.07 TO NODE 11.08 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 450.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.30
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

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PIPE-FLOW(CFS) =          3.92
PIPE TRAVEL TIME(MIN.) =  1.42      Tc(MIN.) =   10.43
LONGEST FLOWPATH FROM NODE      11.06 TO NODE      11.08 =       790.00 FEET.

*****
FLOW PROCESS FROM NODE      11.08 TO NODE      11.08 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =   10.43
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.664
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
COMMERCIAL          D          0.43          0.20          0.100      75
CONDOMINIUMS        D          1.14          0.20          0.350      75
CONDOMINIUMS        D          4.05          0.20          0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.331
SUBAREA AREA(ACRES) =  5.62      SUBAREA RUNOFF(CFS) =  13.14
EFFECTIVE AREA(ACRES) =  7.16      AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.20      AREA-AVERAGED Ap =  0.33
TOTAL AREA(ACRES) =  7.2      PEAK FLOW RATE(CFS) =  16.74

*****
FLOW PROCESS FROM NODE      11.08 TO NODE      11.09 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0100
FLOW LENGTH(FEET) =  500.00      MANNING'S N =  0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  7.55
ESTIMATED PIPE DIAMETER(INCH) =  24.00      NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  16.74
PIPE TRAVEL TIME(MIN.) =  1.10      Tc(MIN.) =  11.53
LONGEST FLOWPATH FROM NODE      11.06 TO NODE      11.09 =  1290.00 FEET.

*****
FLOW PROCESS FROM NODE      11.09 TO NODE      11.09 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =  11.53
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.515
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
COMMERCIAL          D          0.41          0.20          0.100      75
CONDOMINIUMS        D          1.13          0.20          0.350      75
CONDOMINIUMS        D          0.62          0.20          0.350      75
CONDOMINIUMS        D          0.48          0.20          0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.311
SUBAREA AREA(ACRES) =  2.64      SUBAREA RUNOFF(CFS) =  5.83
EFFECTIVE AREA(ACRES) =  9.80      AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.20      AREA-AVERAGED Ap =  0.33
TOTAL AREA(ACRES) =  9.8      PEAK FLOW RATE(CFS) =  21.60

*****
FLOW PROCESS FROM NODE      11.09 TO NODE      11.10 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0100
FLOW LENGTH(FEET) =  730.00      MANNING'S N =  0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  8.08
ESTIMATED PIPE DIAMETER(INCH) =  27.00      NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  21.60
PIPE TRAVEL TIME(MIN.) =  1.51      Tc(MIN.) =  13.04
LONGEST FLOWPATH FROM NODE      11.06 TO NODE      11.10 =  2020.00 FEET.

*****
FLOW PROCESS FROM NODE      11.10 TO NODE      11.10 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =  13.04
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.344
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            D        1.01      0.20      0.100      75
CONDOMINIUMS          D        2.10      0.20      0.350      75
CONDOMINIUMS          D        1.33      0.20      0.350      75
CONDOMINIUMS          D        7.17      0.20      0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.328
SUBAREA AREA(ACRES) = 11.61      SUBAREA RUNOFF(CFS) = 23.81
EFFECTIVE AREA(ACRES) = 21.41      AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20      AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 21.4      PEAK FLOW RATE(CFS) = 43.90

*****
FLOW PROCESS FROM NODE 11.10 TO NODE 11.11 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 510.00      MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.52
ESTIMATED PIPE DIAMETER(INCH) = 33.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 43.90
PIPE TRAVEL TIME(MIN.) = 0.89      Tc(MIN.) = 13.93
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.11 = 2530.00 FEET.

*****
FLOW PROCESS FROM NODE 11.11 TO NODE 11.11 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE 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            D        0.44      0.20      0.100      75
CONDOMINIUMS          D        6.60      0.20      0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.334
SUBAREA AREA(ACRES) = 7.04      SUBAREA RUNOFF(CFS) = 13.88
EFFECTIVE AREA(ACRES) = 28.45      AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20      AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 28.5      PEAK FLOW RATE(CFS) = 56.10

*****
FLOW PROCESS FROM NODE 11.11 TO NODE 12.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 240.00      MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.11
ESTIMATED PIPE DIAMETER(INCH) = 36.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 56.10
PIPE TRAVEL TIME(MIN.) = 0.40      Tc(MIN.) = 14.33
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 12.00 = 2770.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 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      56.10  14.33  2.221  0.20( 0.07)  0.33      28.5      11.06
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 12.00 = 2770.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)      (ACRES)      NODE
1      111.36  11.72  2.492  0.20( 0.09)  0.47      50.1      11.01
2      126.87  29.05  1.481  0.20( 0.10)  0.48      100.2      1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER

```

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	163.03	11.72	2.492	0.20(0.08)	0.42	73.3 11.01
2	169.79	14.33	2.221	0.20(0.08)	0.42	86.0 11.06
3	163.71	29.05	1.481	0.20(0.09)	0.45	128.7 1.00
TOTAL AREA(ACRES) =			128.7			

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 169.79 Tc(MIN.) = 14.325
EFFECTIVE AREA(ACRES) = 86.05 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 128.7
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 12

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

FLOW PROCESS FROM NODE 12.00 TO NODE 20.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 510.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.31
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 169.79
PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 14.82
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5440.00 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.82
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.178
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 3.58 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 3.58 SUBAREA RUNOFF(CFS) = 6.37
EFFECTIVE AREA(ACRES) = 89.63 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 132.3 PEAK FLOW RATE(CFS) = 169.79
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

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

FLOW PROCESS FROM NODE 13.00 TO NODE 14.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 370.00
ELEVATION DATA: UPSTREAM(FEET) = 102.50 DOWNSTREAM(FEET) = 100.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.373
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.832
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 3.17 0.20 0.200 75 9.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 7.97
TOTAL AREA(ACRES) = 3.17 PEAK FLOW RATE(CFS) = 7.97

```

FLOW PROCESS FROM NODE      14.00 TO NODE      15.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0500
FLOW LENGTH(FEET) =  1660.00  MANNING'S N =  0.013
DEPTH OF FLOW IN  15.0 INCH PIPE IS  8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  11.58
ESTIMATED PIPE DIAMETER(INCH) =  15.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  7.97
PIPE TRAVEL TIME(MIN.) =  2.39  Tc(MIN.) =  11.76
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      15.00 =  2030.00 FEET.

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      15.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =  11.76
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.487
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      B      31.84      0.30      0.200      56
PUBLIC PARK      D      3.71      0.20      0.850      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.268
SUBAREA AREA(ACRES) =  35.55  SUBAREA RUNOFF(CFS) =  77.27
EFFECTIVE AREA(ACRES) =  38.72  AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.26
TOTAL AREA(ACRES) =  38.7  PEAK FLOW RATE(CFS) =  84.25

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      16.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =  780.00
REPRESENTATIVE CHANNEL SLOPE =  0.0400
CHANNEL BASE(FEET) =  0.00  "Z" FACTOR =  2.000
MANNING'S FACTOR =  0.015  MAXIMUM DEPTH(FEET) =  3.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.400
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE      GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      D      11.64      0.20      0.200      75
NATURAL FAIR COVER
"OPEN BRUSH"      A      13.96      0.40      1.000      46
COMMERCIAL      D      2.65      0.20      0.100      75
PUBLIC PARK      A      1.60      0.40      0.850      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  113.50
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  17.27
AVERAGE FLOW DEPTH(FEET) =  1.81  TRAVEL TIME(MIN.) =  0.75
Tc(MIN.) =  12.52
SUBAREA AREA(ACRES) =  29.85  SUBAREA RUNOFF(CFS) =  58.49
EFFECTIVE AREA(ACRES) =  68.57  AREA-AVERAGED Fm(INCH/HR) =  0.14
AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.41
TOTAL AREA(ACRES) =  68.6  PEAK FLOW RATE(CFS) =  139.71

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.96  FLOW VELOCITY(FEET/SEC.) =  18.12
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      16.00 =  2810.00 FEET.

*****
FLOW PROCESS FROM NODE      16.00 TO NODE      16.60 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0050
FLOW LENGTH(FEET) =  290.00  MANNING'S N =  0.013
DEPTH OF FLOW IN  57.0 INCH PIPE IS  43.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  9.75
ESTIMATED PIPE DIAMETER(INCH) =  57.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  139.71
PIPE TRAVEL TIME(MIN.) =  0.50  Tc(MIN.) =  13.01
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      16.60 =  3100.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE      16.60 TO NODE      16.60 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =    13.01
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =    2.347
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A         1.13      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) =    1.13      SUBAREA RUNOFF(CFS) =    2.35
EFFECTIVE AREA(ACRES) =    69.70      AREA-AVERAGED Fm(INCH/HR) =    0.13
AREA-AVERAGED Fp(INCH/HR) =    0.33      AREA-AVERAGED Ap =    0.40
TOTAL AREA(ACRES) =    69.7      PEAK FLOW RATE(CFS) =    139.71
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE      16.60 TO NODE      16.60 IS CODE =   10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      16.10 TO NODE      16.20 IS CODE =   21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =    330.00
ELEVATION DATA: UPSTREAM(FEET) =    105.50  DOWNSTREAM(FEET) =    105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    13.416
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =    2.306
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          D         1.80      0.20      0.350     75    13.42
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    0.350
SUBAREA RUNOFF(CFS) =    3.62
TOTAL AREA(ACRES) =    1.80      PEAK FLOW RATE(CFS) =    3.62

*****
FLOW PROCESS FROM NODE      16.20 TO NODE      16.30 IS CODE =   51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =    400.00
REPRESENTATIVE CHANNEL SLOPE =    0.0100
CHANNEL BASE(FEET) =    0.00  "Z" FACTOR =    1.000
MANNING'S FACTOR =    0.015  MAXIMUM DEPTH(FEET) =    1.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =    2.197
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS          B         2.42      0.30      0.350     56
COMMERCIAL              B         0.90      0.30      0.100     56
PUBLIC PARK            B         1.92      0.30      0.850     56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    0.490
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    8.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    5.65
AVERAGE FLOW DEPTH(FEET) =    1.22  TRAVEL TIME(MIN.) =    1.18
Tc(MIN.) =    14.60
SUBAREA AREA(ACRES) =    5.24      SUBAREA RUNOFF(CFS) =    9.67
EFFECTIVE AREA(ACRES) =    7.04      AREA-AVERAGED Fm(INCH/HR) =    0.13
AREA-AVERAGED Fp(INCH/HR) =    0.28      AREA-AVERAGED Ap =    0.45
TOTAL AREA(ACRES) =    7.0      PEAK FLOW RATE(CFS) =    13.11

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =    1.44  FLOW VELOCITY(FEET/SEC.) =    6.33
LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.30 =    730.00 FEET.

*****
FLOW PROCESS FROM NODE      16.30 TO NODE      16.40 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 790.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.04
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.11
PIPE TRAVEL TIME(MIN.) = 1.87 Tc(MIN.) = 16.47
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.40 = 1520.00 FEET.

*****
FLOW PROCESS FROM NODE 16.40 TO NODE 16.40 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.47
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.051
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 3.09 0.30 0.100 56
PUBLIC PARK B 2.54 0.30 0.850 56
PUBLIC PARK B 2.54 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566
SUBAREA AREA(ACRES) = 8.17 SUBAREA RUNOFF(CFS) = 13.83
EFFECTIVE AREA(ACRES) = 15.21 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.29 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 15.2 PEAK FLOW RATE(CFS) = 26.01

*****
FLOW PROCESS FROM NODE 16.40 TO NODE 16.50 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 390.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.34
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.01
PIPE TRAVEL TIME(MIN.) = 0.78 Tc(MIN.) = 17.24
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.50 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.24
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.997
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.85 0.20 0.100 75
CONDOMINIUMS D 2.51 0.20 0.350 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 4.36 SUBAREA RUNOFF(CFS) = 7.64
EFFECTIVE AREA(ACRES) = 19.57 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 19.6 PEAK FLOW RATE(CFS) = 32.93

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.60 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 950.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.89
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 32.93
PIPE TRAVEL TIME(MIN.) = 1.78 Tc(MIN.) = 19.03
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.60 = 2860.00 FEET.

*****
FLOW PROCESS FROM NODE 16.60 TO NODE 16.60 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.03
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.888
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN
PUBLIC PARK              D        2.21      0.20      0.850      75
COMMERCIAL                D        2.81      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430
SUBAREA AREA(ACRES) = 5.02      SUBAREA RUNOFF(CFS) = 8.14
EFFECTIVE AREA(ACRES) = 24.59    AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.27  AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 24.6      PEAK FLOW RATE(CFS) = 39.14

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)    (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          39.14    19.03    1.888    0.27( 0.12)  0.45      24.6      16.10
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.50 = 2860.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)    (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          139.71    13.01    2.347    0.33( 0.13)  0.40      69.7      13.00
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.50 = 3100.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)    (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          173.42    13.01    2.347    0.32( 0.13)  0.41      86.5      13.00
2          149.85    19.03    1.888    0.31( 0.13)  0.42      94.3      16.10
TOTAL AREA(ACRES) = 94.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 173.42 Tc(MIN.) = 13.011
EFFECTIVE AREA(ACRES) = 86.52 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.31 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 94.3
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.50 = 3100.00 FEET.

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
FLOW LENGTH(Feet) = 1230.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 48.8 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 10.14
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 173.42
PIPE TRAVEL TIME(MIN.) = 2.02 Tc(MIN.) = 15.03
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 17.00 = 4330.00 FEET.

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.03
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.161
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)    (INCH/HR)    (DECIMAL)    CN
NATURAL FAIR COVER
"OPEN BRUSH"              A        8.07      0.40      1.000      46
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        6.11      0.40      0.200      32

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COMMERCIAL          A          3.62      0.40      0.100      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.542
SUBAREA AREA(ACRES) = 17.80      SUBAREA RUNOFF(CFS) = 31.14
EFFECTIVE AREA(ACRES) = 104.32      AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.34      AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 112.1      PEAK FLOW RATE(CFS) = 189.14

*****
FLOW PROCESS FROM NODE      17.00 TO NODE      18.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00      MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.72
ESTIMATED PIPE DIAMETER(INCH) = 57.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 189.14
PIPE TRAVEL TIME(MIN.) = 0.33      Tc(MIN.) = 15.36
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      18.00 = 4600.00 FEET.

*****
FLOW PROCESS FROM NODE      18.00 TO NODE      18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.36
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.134
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
NATURAL FAIR COVER
"OPEN BRUSH"          A          2.09      0.40      1.000      46
NATURAL POOR COVER
"BARREN"              A          4.65      0.40      1.000      78
COMMERCIAL            A          2.82      0.40      0.100      32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A          13.94      0.40      0.200      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.417
SUBAREA AREA(ACRES) = 23.50      SUBAREA RUNOFF(CFS) = 41.60
EFFECTIVE AREA(ACRES) = 127.82      AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35      AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 135.6      PEAK FLOW RATE(CFS) = 228.24

*****
FLOW PROCESS FROM NODE      18.00 TO NODE      19.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 610.00
REPRESENTATIVE CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 35.00      "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015      MAXIMUM DEPTH(FEET) = 3.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.041
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
NATURAL FAIR COVER
"OPEN BRUSH"          A          2.68      0.40      1.000      46
RESIDENTIAL
"11+ DWELLINGS/ACRE" A          9.73      0.40      0.200      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 238.81
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.20
AVERAGE FLOW DEPTH(FEET) = 0.80      TRAVEL TIME(MIN.) = 1.24
Tc(MIN.) = 16.60
SUBAREA AREA(ACRES) = 12.41      SUBAREA RUNOFF(CFS) = 21.13
EFFECTIVE AREA(ACRES) = 140.23      AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35      AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 148.0      PEAK FLOW RATE(CFS) = 238.69

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.80      FLOW VELOCITY(FEET/SEC.) = 8.19
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      19.00 = 5210.00 FEET.

*****
FLOW PROCESS FROM NODE      19.00 TO NODE      20.00 IS CODE = 51
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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 360.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.884
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.58 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 240.00
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.42
AVERAGE FLOW DEPTH(FEET) = 0.74 TRAVEL TIME(MIN.) = 2.48
Tc(MIN.) = 19.08
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 2.62
EFFECTIVE AREA(ACRES) = 141.81 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 149.6 PEAK FLOW RATE(CFS) = 238.69
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.74 FLOW VELOCITY(FEET/SEC.) = 2.40
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 3 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
1 238.69 19.08 1.884 0.35( 0.15) 0.42 141.8 13.00
2 207.12 25.39 1.600 0.35( 0.15) 0.42 149.6 16.10
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 163.03 12.22 2.433 0.20( 0.09) 0.45 76.9 11.01
2 169.79 14.82 2.178 0.20( 0.09) 0.45 89.6 11.06
3 163.71 29.54 1.467 0.20( 0.09) 0.46 132.3 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5440.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 364.12 12.22 2.433 0.28( 0.12) 0.44 167.7 11.01
2 386.50 14.82 2.178 0.28( 0.12) 0.43 199.7 11.06
3 406.72 19.08 1.884 0.29( 0.12) 0.44 243.8 13.00
4 372.54 25.39 1.600 0.28( 0.12) 0.44 269.8 16.10
5 351.86 29.54 1.467 0.27( 0.12) 0.44 281.9 1.00
TOTAL AREA(ACRES) = 281.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 406.72 Tc(MIN.) = 19.084
EFFECTIVE AREA(ACRES) = 243.80 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 281.9
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 3 <<<<
=====

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 21.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 570.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.725

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SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	11.87	0.40	0.200	32
NATURAL FAIR COVER					
"OPEN BRUSH"	D	5.63	0.20	1.000	83
COMMERCIAL	A	1.56	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.428
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 420.56
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.99
AVERAGE FLOW DEPTH(FEET) = 1.04 TRAVEL TIME(MIN.) = 3.18
Tc(MIN.) = 22.26
SUBAREA AREA(ACRES) = 19.06 SUBAREA RUNOFF(CFS) = 27.67
EFFECTIVE AREA(ACRES) = 262.86 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 300.9 PEAK FLOW RATE(CFS) = 406.72
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.02 FLOW VELOCITY(FEET/SEC.) = 2.96
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 21.00 = 6140.00 FEET.

FLOW PROCESS FROM NODE 21.00 TO NODE 22.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 600.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.591
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.73	0.40	0.100	32
NATURAL FAIR COVER					
"OPEN BRUSH"	D	4.03	0.20	1.000	83

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.730
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 410.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.96
AVERAGE FLOW DEPTH(FEET) = 1.03 TRAVEL TIME(MIN.) = 3.38
Tc(MIN.) = 25.64
SUBAREA AREA(ACRES) = 5.76 SUBAREA RUNOFF(CFS) = 7.46
EFFECTIVE AREA(ACRES) = 268.62 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 306.7 PEAK FLOW RATE(CFS) = 406.72
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.02 FLOW VELOCITY(FEET/SEC.) = 2.96
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 22.00 = 6740.00 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 23.00 IS CODE = 51

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

CHANNEL LENGTH THRU SUBAREA(FEET) = 450.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.508
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	3.62	0.40	0.200	32
NATURAL FAIR COVER					
"OPEN BRUSH"	D	4.01	0.20	1.000	83
COMMERCIAL	A	1.68	0.40	0.100	32

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 412.52
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.98
AVERAGE FLOW DEPTH(FEET) = 1.03 TRAVEL TIME(MIN.) = 2.52
Tc(MIN.) = 28.16
SUBAREA AREA(ACRES) = 9.31 SUBAREA RUNOFF(CFS) = 11.59

EFFECTIVE AREA(ACRES) = 277.93 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.44
 TOTAL AREA(ACRES) = 316.0 PEAK FLOW RATE(CFS) = 406.72
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.02 FLOW VELOCITY(FEET/SEC.) = 2.96
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 23.00 = 7190.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 316.0 TC(MIN.) = 28.16
 EFFECTIVE AREA(ACRES) = 277.93 AREA-AVERAGED Fm(INCH/HR)= 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.444
 PEAK FLOW RATE(CFS) = 406.72

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	364.12	21.64	1.753	0.27(0.12)	0.45	201.8	11.01
2	386.50	24.04	1.651	0.27(0.12)	0.44	233.9	11.06
3	406.72	28.16	1.508	0.28(0.12)	0.44	277.9	13.00
4	372.54	34.76	1.336	0.27(0.12)	0.45	304.0	16.10
5	351.86	39.12	1.249	0.27(0.12)	0.45	316.0	1.00

END OF RATIONAL METHOD ANALYSIS

Drainage B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2007 Advanced Engineering Software (aes)
Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P010_B.DAT
TIME/DATE OF STUDY: 09:37 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 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) = 110.00 DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.477
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.224
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.54 0.20 0.100 75 7.48
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.56
TOTAL AREA(ACRES) = 0.54 PEAK FLOW RATE(CFS) = 1.56

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.30
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.28
HALFSTREET FLOOD WIDTH(FEET) = 6.78
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.91
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.54
STREET FLOW TRAVEL TIME(MIN.) = 3.06 Tc(MIN.) = 10.54
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.648
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)   (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      0.63      0.20      0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 1.49
EFFECTIVE AREA(ACRES) = 1.17 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.77

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.30 HALFSTREET FLOOD WIDTH(FEET) = 7.53
FLOW VELOCITY(FEET/SEC.) = 1.98 DEPTH*VELOCITY(FT*FT/SEC.) = 0.59
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 8.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.07
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.65
STREET FLOW TRAVEL TIME(MIN.) = 3.22 Tc(MIN.) = 13.75
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.273
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)   (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      0.72      0.20      0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.72 SUBAREA RUNOFF(CFS) = 1.46
EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 3.83

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 8.97
FLOW VELOCITY(FEET/SEC.) = 2.10 DEPTH*VELOCITY(FT*FT/SEC.) = 0.68
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.91
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 13.87
AVERAGE FLOW VELOCITY(FT*FT/SEC.) = 2.59
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.06
STREET FLOW TRAVEL TIME(MIN.) = 3.21 Tc(MIN.) = 16.97
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.016
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.76 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 6.76 SUBAREA RUNOFF(CFS) = 12.14
EFFECTIVE AREA(ACRES) = 8.65 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 15.54

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 16.76
FLOW VELOCITY(FT*FT/SEC.) = 2.88 DEPTH*VELOCITY(FT*FT/SEC.) = 1.33
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 1550.00 FEET.

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 600.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.60
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.51
HALFSTREET FLOOD WIDTH(FEET) = 19.18
AVERAGE FLOW VELOCITY(FT*FT/SEC.) = 3.10
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.57
STREET FLOW TRAVEL TIME(MIN.) = 3.22 Tc(MIN.) = 20.19
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.825
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 7.46 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.46 SUBAREA RUNOFF(CFS) = 12.12
EFFECTIVE AREA(ACRES) = 16.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 26.17

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.66
FLOW VELOCITY(FT*FT/SEC.) = 3.26 DEPTH*VELOCITY(FT*FT/SEC.) = 1.74
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 2150.00 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 56.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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


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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 27.28
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.54
HALFSTREET FLOOD WIDTH(FEET) = 21.05
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.28
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.77
STREET FLOW TRAVEL TIME(MIN.) = 2.54 Tc(MIN.) = 22.72
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.705
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.47 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.47 SUBAREA RUNOFF(CFS) = 2.23
EFFECTIVE AREA(ACRES) = 17.58 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 17.6 PEAK FLOW RATE(CFS) = 26.66

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.82
FLOW VELOCITY(FEET/SEC.) = 3.28 DEPTH*VELOCITY(FT*FT/SEC.) = 1.75
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 2650.00 FEET.

*****
FLOW PROCESS FROM NODE 56.00 TO NODE 57.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 580.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 35.37
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.58
HALFSTREET FLOOD WIDTH(FEET) = 23.32
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.50
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.03
STREET FLOW TRAVEL TIME(MIN.) = 2.76 Tc(MIN.) = 25.48
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.597
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 12.28 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 12.28 SUBAREA RUNOFF(CFS) = 17.42
EFFECTIVE AREA(ACRES) = 29.86 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 29.9 PEAK FLOW RATE(CFS) = 42.37

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.61 HALFSTREET FLOOD WIDTH(FEET) = 25.04
FLOW VELOCITY(FEET/SEC.) = 3.66 DEPTH*VELOCITY(FT*FT/SEC.) = 2.23
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 3230.00 FEET.

*****
FLOW PROCESS FROM NODE 57.00 TO NODE 58.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 680.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 68.49
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.70
HALFSTREET FLOOD WIDTH(FEET) = 31.67
AVERAGE FLOW VELOCITY(FT/SEC.) = 4.12
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.88
STREET FLOW TRAVEL TIME(MIN.) = 2.75 Tc(MIN.) = 28.24
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.505
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      29.81    0.20    0.100    75
SCHOOL                D       9.91    0.20    0.600    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 39.72 SUBAREA RUNOFF(CFS) = 52.21
EFFECTIVE AREA(ACRES) = 69.58 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 69.6 PEAK FLOW RATE(CFS) = 92.13

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.75 HALFSTREET FLOOD WIDTH(FEET) = 34.30
FLOW VELOCITY(FT/SEC.) = 4.59 DEPTH*VELOCITY(FT*FT/SEC.) = 3.45
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
      AND L = 680.0 FT WITH ELEVATION-DROP = 6.8 FT, IS 93.9 CFS,
      WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 58.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 58.00 = 3910.00 FEET.

*****
FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 760.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 33.2 INCHES
PIPE-FLOW VELOCITY(FT/SEC.) = 11.30
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 92.13
PIPE TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 29.36
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 59.00 = 4670.00 FEET.

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 59.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 29.36
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.472
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      11.44    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.44 SUBAREA RUNOFF(CFS) = 14.95
EFFECTIVE AREA(ACRES) = 81.02 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 81.0 PEAK FLOW RATE(CFS) = 105.00

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 580.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.9 INCHES
PIPE-FLOW VELOCITY(FT/SEC.) = 11.78
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 105.00

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PIPE TRAVEL TIME(MIN.) = 0.82    Tc(MIN.) = 30.18
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 60.00 = 5250.00 FEET.

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 30.18
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.449
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL          D        13.88    0.20    0.100    75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D        4.45    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.124
SUBAREA AREA(ACRES) = 18.33    SUBAREA RUNOFF(CFS) = 23.50
EFFECTIVE AREA(ACRES) = 99.35    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 99.4    PEAK FLOW RATE(CFS) = 126.82

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 940.00
REPRESENTATIVE CHANNEL SLOPE = 0.0350
CHANNEL BASE(FEET) = 15.00    "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030    MAXIMUM DEPTH(FEET) = 7.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.399
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"        D        24.16    0.20    1.000    83
CONDOMINIUMS        D        4.43    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.899
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 142.50
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.17
AVERAGE FLOW DEPTH(FEET) = 0.97    TRAVEL TIME(MIN.) = 1.92
Tc(MIN.) = 32.10
SUBAREA AREA(ACRES) = 28.59    SUBAREA RUNOFF(CFS) = 31.37
EFFECTIVE AREA(ACRES) = 127.94    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 127.9    PEAK FLOW RATE(CFS) = 153.69

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.02    FLOW VELOCITY(FEET/SEC.) = 8.37
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 61.00 = 6190.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 127.9    TC(MIN.) = 32.10
EFFECTIVE AREA(ACRES) = 127.94    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.321
PEAK FLOW RATE(CFS) = 153.69
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage C

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

FILE NAME: P010_C.DAT
TIME/DATE OF STUDY: 09:37 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====

1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
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GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 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) = 108.00 DOWNSTREAM(FEET) = 106.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.003
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.250
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN" D 1.53 0.20 1.000 93 14.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 2.82
TOTAL AREA(ACRES) = 1.53 PEAK FLOW RATE(CFS) = 2.82

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.77
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.37
HALFSTREET FLOOD WIDTH(FEET) = 11.76
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.37
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.88
STREET FLOW TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 16.47
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.051
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BAREN" D 4.73 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.73 SUBAREA RUNOFF(CFS) = 7.88
EFFECTIVE AREA(ACRES) = 6.26 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 6.3 PEAK FLOW RATE(CFS) = 10.43

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.18
FLOW VELOCITY(FEET/SEC.) = 2.62 DEPTH*VELOCITY(FT*FT/SEC.) = 1.09
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 360.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.75
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.43
PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 17.35
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.00 = 1010.00 FEET.

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.35
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.990
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 2.81 0.20 0.100 75
CONDOMINIUMS D 2.09 0.20 0.350 75
CONDOMINIUMS D 3.05 0.20 0.350 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
SUBAREA AREA(ACRES) = 7.95 SUBAREA RUNOFF(CFS) = 13.86
EFFECTIVE AREA(ACRES) = 14.21 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 14.2 PEAK FLOW RATE(CFS) = 23.95

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.24
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 23.95
PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 17.86
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 84.00 = 1260.00 FEET.

*****
FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.957

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SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        0.73    0.20    0.100    75
CONDOMINIUMS         D        1.21    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.256
SUBAREA AREA(ACRES) = 1.94    SUBAREA RUNOFF(CFS) = 3.33
EFFECTIVE AREA(ACRES) = 16.15    AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 16.1    PEAK FLOW RATE(CFS) = 26.86

*****
FLOW PROCESS FROM NODE    84.00 TO NODE    85.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 180.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.38
ESTIMATED PIPE DIAMETER(INCH) = 27.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.86
PIPE TRAVEL TIME(MIN.) = 0.36    Tc(MIN.) = 18.22
LONGEST FLOWPATH FROM NODE    80.00 TO NODE    85.00 = 1440.00 FEET.

*****
FLOW PROCESS FROM NODE    85.00 TO NODE    85.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.22
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.935
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        0.32    0.20    0.100    75
CONDOMINIUMS         D        2.49    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.322
SUBAREA AREA(ACRES) = 2.81    SUBAREA RUNOFF(CFS) = 4.73
EFFECTIVE AREA(ACRES) = 18.96    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 19.0    PEAK FLOW RATE(CFS) = 31.27

*****
FLOW PROCESS FROM NODE    85.00 TO NODE    86.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 340.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.81
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.27
PIPE TRAVEL TIME(MIN.) = 0.64    Tc(MIN.) = 18.86
LONGEST FLOWPATH FROM NODE    80.00 TO NODE    86.00 = 1780.00 FEET.

*****
FLOW PROCESS FROM NODE    86.00 TO NODE    86.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.897
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS         D        3.14    0.20    0.350    75
COMMERCIAL            D        0.62    0.20    0.100    75
PUBLIC PARK           D        1.37    0.20    0.850    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.453
SUBAREA AREA(ACRES) = 5.13    SUBAREA RUNOFF(CFS) = 8.34
EFFECTIVE AREA(ACRES) = 24.09    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 24.1    PEAK FLOW RATE(CFS) = 38.96

*****
FLOW PROCESS FROM NODE    86.00 TO NODE    87.00 IS CODE = 31

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-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 21.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.33
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.96
PIPE TRAVEL TIME(MIN.) = 1.13 Tc(MIN.) = 19.99
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 2410.00 FEET.

*****
FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.99
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.835
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 3.51 0.20 0.350 75
COMMERCIAL D 1.12 0.20 0.100 75
NATURAL FAIR COVER
"OPEN BRUSH" D 0.43 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.06 SUBAREA RUNOFF(CFS) = 8.04
EFFECTIVE AREA(ACRES) = 29.15 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 29.1 PEAK FLOW RATE(CFS) = 45.65

*****
FLOW PROCESS FROM NODE 87.00 TO NODE 88.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.57
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 45.65
PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 20.47
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 88.00 = 2690.00 FEET.

*****
FLOW PROCESS FROM NODE 88.00 TO NODE 88.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.47
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.810
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 5.34 0.20 0.350 75
COMMERCIAL D 0.48 0.20 0.100 75
CONDOMINIUMS D 2.16 0.20 0.350 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335
SUBAREA AREA(ACRES) = 7.98 SUBAREA RUNOFF(CFS) = 12.52
EFFECTIVE AREA(ACRES) = 37.13 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 37.1 PEAK FLOW RATE(CFS) = 57.51

*****
FLOW PROCESS FROM NODE 88.00 TO NODE 89.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.14
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 57.51
PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 20.92
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 2960.00 FEET.

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*****
FLOW PROCESS FROM NODE      89.00 TO NODE      89.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.92
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.788
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS      D      2.41    0.20    0.350    75
COMMERCIAL        D      2.55    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.221
SUBAREA AREA(ACRES) = 4.96    SUBAREA RUNOFF(CFS) = 7.78
EFFECTIVE AREA(ACRES) = 42.09    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 42.1    PEAK FLOW RATE(CFS) = 64.56

*****
FLOW PROCESS FROM NODE      89.00 TO NODE      97.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 560.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.55
ESTIMATED PIPE DIAMETER(INCH) = 39.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 64.56
PIPE TRAVEL TIME(MIN.) = 0.89    Tc(MIN.) = 21.80
LONGEST FLOWPATH FROM NODE      80.00 TO NODE      97.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE      97.00 TO NODE      97.00 IS CODE =  10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
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) = 108.00    DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.314
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.842
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
    LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL        D      0.88    0.20    0.100    75  9.31
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.24
TOTAL AREA(ACRES) = 0.88    PEAK FLOW RATE(CFS) = 2.24

*****
FLOW PROCESS FROM NODE      91.00 TO NODE      92.00 IS CODE =  62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 260.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.43
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

```

```

STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 8.47
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.65
STREET FLOW TRAVEL TIME(MIN.) = 2.11 Tc(MIN.) = 11.42
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.529
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              D      1.06      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 2.39
EFFECTIVE AREA(ACRES) = 1.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 4.38

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 9.59
FLOW VELOCITY(FEET/SEC.) = 2.16 DEPTH*VELOCITY(FT*FT/SEC.) = 0.72
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 92.00 = 560.00 FEET.

*****
FLOW PROCESS FROM NODE 92.00 TO NODE 93.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.43
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.38
PIPE TRAVEL TIME(MIN.) = 1.94 Tc(MIN.) = 13.36
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 93.00 = 1190.00 FEET.

*****
FLOW PROCESS FROM NODE 93.00 TO NODE 93.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.36
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.312
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS            D      5.84      0.20      0.350      75
COMMERCIAL              D      2.34      0.20      0.100      75
CONDOMINIUMS            D      8.66      0.20      0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.315
SUBAREA AREA(ACRES) = 16.84 SUBAREA RUNOFF(CFS) = 34.08
EFFECTIVE AREA(ACRES) = 18.78 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 18.8 PEAK FLOW RATE(CFS) = 38.09

*****
FLOW PROCESS FROM NODE 93.00 TO NODE 94.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.04
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.09
PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 13.80
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 94.00 = 1430.00 FEET.

*****
FLOW PROCESS FROM NODE 94.00 TO NODE 94.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.80
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.269
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
PUBLIC PARK             D      3.80      0.20      0.850      75

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COMMERCIAL          D          0.27      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.800
SUBAREA AREA(ACRES) = 4.07      SUBAREA RUNOFF(CFS) = 7.73
EFFECTIVE AREA(ACRES) = 22.85   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 22.9      PEAK FLOW RATE(CFS) = 45.09

*****
FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.56
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 45.09
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 14.13
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 1620.00 FEET.

*****
FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.13
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.238
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL              D        0.20      0.20      0.100      75
CONDOMINIUMS            D        2.24      0.20      0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA(ACRES) = 2.44      SUBAREA RUNOFF(CFS) = 4.77
EFFECTIVE AREA(ACRES) = 25.29   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 25.3      PEAK FLOW RATE(CFS) = 49.23

*****
FLOW PROCESS FROM NODE 95.00 TO NODE 96.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 310.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.63
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 49.23
PIPE TRAVEL TIME(MIN.) = 0.54 Tc(MIN.) = 14.67
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 96.00 = 1930.00 FEET.

*****
FLOW PROCESS FROM NODE 96.00 TO NODE 96.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.67
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.191
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK              D        5.07      0.20      0.850      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 5.07      SUBAREA RUNOFF(CFS) = 9.22
EFFECTIVE AREA(ACRES) = 30.36   AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 30.4      PEAK FLOW RATE(CFS) = 57.37

*****
FLOW PROCESS FROM NODE 96.00 TO NODE 97.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 230.00 MANNING'S N = 0.013

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DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.14
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 57.37
PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 15.04
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 97.00 = 2160.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 57.37 15.04 2.159 0.20( 0.09) 0.46 30.4 90.00
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 97.00 = 2160.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 64.56 21.80 1.746 0.20( 0.08) 0.42 42.1 80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 113.00 15.04 2.159 0.20( 0.09) 0.44 59.4 90.00
2 110.46 21.80 1.746 0.20( 0.09) 0.43 72.4 80.00
TOTAL AREA(ACRES) = 72.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 113.00 Tc(MIN.) = 15.044
EFFECTIVE AREA(ACRES) = 59.40 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 72.4
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 98.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.84
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 113.00
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 15.44
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 98.00 = 3800.00 FEET.

*****
FLOW PROCESS FROM NODE 98.00 TO NODE 98.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.44
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.128
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 22.13 0.20 1.000 83
NATURAL POOR COVER
"BARREN" D 9.76 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 31.89 SUBAREA RUNOFF(CFS) = 55.33
EFFECTIVE AREA(ACRES) = 91.29 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.63
TOTAL AREA(ACRES) = 104.3 PEAK FLOW RATE(CFS) = 164.40
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 104.3 TC(MIN.) = 15.44

```

EFFECTIVE AREA(ACRES) = 91.29 AREA-AVERAGED Fm(INCH/HR)= 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.634
 PEAK FLOW RATE(CFS) = 164.40

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	164.40	15.44	2.128	0.20(0.13)	0.63	91.3	90.00
2	150.87	22.20	1.728	0.20(0.12)	0.61	104.3	80.00

=====

=====

END OF RATIONAL METHOD ANALYSIS

b) Expected Value (50% Confidence) Events

- i. EV 100-Year Storm Event

Drainage A

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

FILE NAME: P025_A.DAT
TIME/DATE OF STUDY: 09:36 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====

1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
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GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 240.00
ELEVATION DATA: UPSTREAM(FEET) = 106.20 DOWNSTREAM(FEET) = 105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.372
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.603
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.68 0.20 0.200 75 8.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 2.18
TOTAL AREA(ACRES) = 0.68 PEAK FLOW RATE(CFS) = 2.18

FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 300.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.69
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 10.43
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.58
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.55
STREET FLOW TRAVEL TIME(MIN.) = 3.16 Tc(MIN.) = 11.53
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.007
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        1.13    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.13 SUBAREA RUNOFF(CFS) = 3.02
EFFECTIVE AREA(ACRES) = 1.81 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 4.83

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.84
FLOW VELOCITY(FEET/SEC.) = 1.67 DEPTH*VELOCITY(FT*FT/SEC.) = 0.63
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 260.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.92
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.35
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.94
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.85
STREET FLOW TRAVEL TIME(MIN.) = 2.23 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
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        3.39    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.39 SUBAREA RUNOFF(CFS) = 8.18
EFFECTIVE AREA(ACRES) = 5.20 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.2 PEAK FLOW RATE(CFS) = 12.54

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.70
FLOW VELOCITY(FEET/SEC.) = 2.10 DEPTH*VELOCITY(FT*FT/SEC.) = 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 800.00 FEET.

*****
FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 310.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.75
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.54
HALFSTREET FLOOD WIDTH(Feet) = 21.21
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.35
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.27
STREET FLOW TRAVEL TIME(Min.) = 2.20 Tc(Min.) = 15.96
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.501
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.51 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(Acres) = 6.51 SUBAREA RUNOFF(CFS) = 14.42
EFFECTIVE AREA(Acres) = 11.71 AREA-AVERAGED Fm(Inch/Hr) = 0.04
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(Acres) = 11.7 PEAK FLOW RATE(CFS) = 25.93

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.58 HALFSTREET FLOOD WIDTH(Feet) = 23.63
FLOW VELOCITY(Feet/Sec.) = 2.50 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.46
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 1110.00 Feet.

FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 440.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 34.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.63
HALFSTREET FLOOD WIDTH(Feet) = 26.45
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.68
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.70
STREET FLOW TRAVEL TIME(Min.) = 2.74 Tc(Min.) = 18.70
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.286
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 8.39 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 8.39 SUBAREA RUNOFF(CFS) = 17.11
EFFECTIVE AREA(Acres) = 20.10 AREA-AVERAGED Fm(Inch/Hr) = 0.03
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(Acres) = 20.1 PEAK FLOW RATE(CFS) = 40.79

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.67 HALFSTREET FLOOD WIDTH(Feet) = 28.16
FLOW VELOCITY(Feet/Sec.) = 2.80 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.87
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 1550.00 Feet.

FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 360.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 58.57
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.73
HALFSTREET FLOOD WIDTH(FEET) = 33.32
AVERAGE FLOW VELOCITY(FT/SEC.) = 3.12
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.29
STREET FLOW TRAVEL TIME(MIN.) = 1.92 Tc(MIN.) = 20.62
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.163
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 18.43 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 18.43 SUBAREA RUNOFF(CFS) = 35.55
EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 74.11

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.78 HALFSTREET FLOOD WIDTH(FEET) = 35.58
FLOW VELOCITY(FT/SEC.) = 3.39 DEPTH*VELOCITY(FT*FT/SEC.) = 2.64
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 360.0 FT WITH ELEVATION-DROP = 1.8 FT, IS 56.2 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 7.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.0 INCHES
PIPE-FLOW VELOCITY(FT/SEC.) = 14.15
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 74.11
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 21.27
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.27
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.126
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.24 0.20 0.100 75
PUBLIC PARK D 6.35 0.20 0.850 75
COMMERCIAL D 2.47 0.20 0.100 75
NATURAL POOR COVER
"BARREN" D 3.55 0.20 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.528
SUBAREA AREA(ACRES) = 18.61 SUBAREA RUNOFF(CFS) = 33.83
EFFECTIVE AREA(ACRES) = 57.14 AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.26
TOTAL AREA(ACRES) = 57.1 PEAK FLOW RATE(CFS) = 106.64

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 9.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.1000
FLOW LENGTH(FEET) = 430.00 MANNING'S N = 0.013

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DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.22
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 106.64
PIPE TRAVEL TIME(MIN.) = 0.25    Tc(MIN.) = 21.52
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 9.00 = 2890.00 FEET.

*****
FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 870.00
REPRESENTATIVE CHANNEL SLOPE = 0.0300
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.987
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          13.41    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 117.42
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.95
AVERAGE FLOW DEPTH(FEET) = 0.77    TRAVEL TIME(MIN.) = 2.44
Tc(MIN.) = 23.96
SUBAREA AREA(ACRES) = 13.41    SUBAREA RUNOFF(CFS) = 21.57
EFFECTIVE AREA(ACRES) = 70.55    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 70.6    PEAK FLOW RATE(CFS) = 121.08

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.78    FLOW VELOCITY(FEET/SEC.) = 6.01
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 10.00 = 3760.00 FEET.

*****
FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.890
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          9.71    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 128.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.96
AVERAGE FLOW DEPTH(FEET) = 1.00    TRAVEL TIME(MIN.) = 2.22
Tc(MIN.) = 26.18
SUBAREA AREA(ACRES) = 9.71    SUBAREA RUNOFF(CFS) = 14.77
EFFECTIVE AREA(ACRES) = 80.26    AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 80.3    PEAK FLOW RATE(CFS) = 129.68

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.00    FLOW VELOCITY(FEET/SEC.) = 4.98
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 11.00 = 4420.00 FEET.

*****
FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 510.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.824
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN

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NATURAL FAIR COVER
 "OPEN BRUSH" D 3.89 0.20 1.000 83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 132.52
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 5.01
 AVERAGE FLOW DEPTH(Feet) = 1.02 TRAVEL TIME(Min.) = 1.70
 Tc(Min.) = 27.88
 SUBAREA AREA(ACRES) = 3.89 SUBAREA RUNOFF(CFS) = 5.69
 EFFECTIVE AREA(ACRES) = 84.15 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 84.2 PEAK FLOW RATE(CFS) = 130.59

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 1.00 FLOW VELOCITY(Feet/Sec.) = 5.00
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

 FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 11.01 TO NODE 11.02 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 120.00
 ELEVATION DATA: UPSTREAM(Feet) = 100.00 DOWNSTREAM(Feet) = 99.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(Min.) = 5.375
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.630
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (Min.)
COMMERCIAL	D	0.19	0.20	0.100	75	5.38

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.79
 TOTAL AREA(ACRES) = 0.19 PEAK FLOW RATE(CFS) = 0.79

 FLOW PROCESS FROM NODE 11.02 TO NODE 11.03 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0100
 STREET LENGTH(Feet) = 330.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

 **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.22
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.35
 HALFSTREET FLOOD WIDTH(Feet) = 10.43
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.24
 PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.78
 STREET FLOW TRAVEL TIME(Min.) = 2.46 Tc(Min.) = 7.83
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.742
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	D	1.84	0.20	0.850	75
COMMERCIAL	D	0.25	0.20	0.100	75
NATURAL FAIR COVER "OPEN BRUSH"	D	0.64	0.20	1.000	83

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.816
 SUBAREA AREA(ACRES) = 2.73 SUBAREA RUNOFF(CFS) = 8.79
 EFFECTIVE AREA(ACRES) = 2.92 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.77

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TOTAL AREA(ACRES) =          2.9          PEAK FLOW RATE(CFS) =          9.43

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.40  HALFSTREET FLOOD WIDTH(FEET) = 13.55
FLOW VELOCITY(FEET/SEC.) = 2.57  DEPTH*VELOCITY(FT*FT/SEC.) = 1.04
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.03 =      450.00 FEET.

*****
FLOW PROCESS FROM NODE      11.03 TO NODE      11.04 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 490.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.41
ESTIMATED PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.43
PIPE TRAVEL TIME(MIN.) = 1.27  Tc(MIN.) = 9.10
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.04 =      940.00 FEET.

*****
FLOW PROCESS FROM NODE      11.04 TO NODE      11.04 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.10
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.436
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/  SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE        GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL          D        1.18    0.20    0.100    75
CONDOMINIUMS        D        1.15    0.20    0.350    75
CONDOMINIUMS        D        4.75    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.308
SUBAREA AREA(ACRES) = 7.08  SUBAREA RUNOFF(CFS) = 21.50
EFFECTIVE AREA(ACRES) = 10.00  AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 10.0  PEAK FLOW RATE(CFS) = 30.13

*****
FLOW PROCESS FROM NODE      11.04 TO NODE      11.05 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 400.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.75
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 30.13
PIPE TRAVEL TIME(MIN.) = 0.76  Tc(MIN.) = 9.87
LONGEST FLOWPATH FROM NODE      11.01 TO NODE      11.05 =      1340.00 FEET.

*****
FLOW PROCESS FROM NODE      11.05 TO NODE      11.05 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.87
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.283
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/  SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE        GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS        D        6.10    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.10  SUBAREA RUNOFF(CFS) = 17.64
EFFECTIVE AREA(ACRES) = 16.10  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 16.1  PEAK FLOW RATE(CFS) = 46.40

*****
FLOW PROCESS FROM NODE      11.05 TO NODE      12.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 910.00  MANNING'S N = 0.013

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DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.59
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 46.40
PIPE TRAVEL TIME(MIN.) = 1.58 Tc(MIN.) = 11.45
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 12.00 = 2250.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 46.40 11.45 3.018 0.20( 0.08) 0.41 16.1 11.01
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 12.00 = 2250.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 130.59 27.88 1.824 0.20( 0.10) 0.50 84.2 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 137.17 11.45 3.018 0.20( 0.09) 0.47 50.7 11.01
2 158.12 27.88 1.824 0.20( 0.10) 0.48 100.2 1.00
TOTAL AREA(ACRES) = 100.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 158.12 Tc(MIN.) = 27.878
EFFECTIVE AREA(ACRES) = 100.25 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 100.2
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====

*****
FLOW PROCESS FROM NODE 11.06 TO NODE 11.07 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 90.00 DOWNSTREAM(FEET) = 86.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.011
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.456
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 D 1.54 0.20 0.350 75 9.01
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 4.69
TOTAL AREA(ACRES) = 1.54 PEAK FLOW RATE(CFS) = 4.69

*****
FLOW PROCESS FROM NODE 11.07 TO NODE 11.08 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 450.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.50
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

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PIPE-FLOW(CFS) = 4.69
PIPE TRAVEL TIME(MIN.) = 1.36 Tc(MIN.) = 10.38
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.08 = 790.00 FEET.

*****
FLOW PROCESS FROM NODE 11.08 TO NODE 11.08 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 10.38
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.191
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.43 0.20 0.100 75
CONDOMINIUMS D 1.14 0.20 0.350 75
CONDOMINIUMS D 4.05 0.20 0.350 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.331
SUBAREA AREA(ACRES) = 5.62 SUBAREA RUNOFF(CFS) = 15.81
EFFECTIVE AREA(ACRES) = 7.16 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 7.2 PEAK FLOW RATE(CFS) = 20.13

*****
FLOW PROCESS FROM NODE 11.08 TO NODE 11.09 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 500.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.77
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.13
PIPE TRAVEL TIME(MIN.) = 1.07 Tc(MIN.) = 11.45
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.09 = 1290.00 FEET.

*****
FLOW PROCESS FROM NODE 11.09 TO NODE 11.09 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.45
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.018
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.41 0.20 0.100 75
CONDOMINIUMS D 1.13 0.20 0.350 75
CONDOMINIUMS D 0.62 0.20 0.350 75
CONDOMINIUMS D 0.48 0.20 0.350 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.311
SUBAREA AREA(ACRES) = 2.64 SUBAREA RUNOFF(CFS) = 7.02
EFFECTIVE AREA(ACRES) = 9.80 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 9.8 PEAK FLOW RATE(CFS) = 26.04

*****
FLOW PROCESS FROM NODE 11.09 TO NODE 11.10 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 730.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.35
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.04
PIPE TRAVEL TIME(MIN.) = 1.46 Tc(MIN.) = 12.91
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.10 = 2020.00 FEET.

*****
FLOW PROCESS FROM NODE 11.10 TO NODE 11.10 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.91
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.820
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.01	0.20	0.100	75
CONDOMINIUMS	D	2.10	0.20	0.350	75
CONDOMINIUMS	D	1.33	0.20	0.350	75
CONDOMINIUMS	D	7.17	0.20	0.350	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.328
 SUBAREA AREA(ACRES) = 11.61 SUBAREA RUNOFF(CFS) = 28.78
 EFFECTIVE AREA(ACRES) = 21.41 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
 TOTAL AREA(ACRES) = 21.4 PEAK FLOW RATE(CFS) = 53.08

FLOW PROCESS FROM NODE 11.10 TO NODE 11.11 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0100
 FLOW LENGTH(Feet) = 510.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.2 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 10.03
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 53.08
 PIPE TRAVEL TIME(Min.) = 0.85 Tc(Min.) = 13.75
 LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.11 = 2530.00 FEET.

FLOW PROCESS FROM NODE 11.11 TO NODE 11.11 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
 =====
 MAINLINE Tc(Min.) = 13.75
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.721
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.44	0.20	0.100	75
CONDOMINIUMS	D	6.60	0.20	0.350	75

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.334
 SUBAREA AREA(ACRES) = 7.04 SUBAREA RUNOFF(CFS) = 16.81
 EFFECTIVE AREA(ACRES) = 28.45 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
 TOTAL AREA(ACRES) = 28.5 PEAK FLOW RATE(CFS) = 67.97

FLOW PROCESS FROM NODE 11.11 TO NODE 12.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0100
 FLOW LENGTH(Feet) = 240.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.1 INCHES
 PIPE-FLOW VELOCITY(Feet/Sec.) = 10.63
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 67.97
 PIPE TRAVEL TIME(Min.) = 0.38 Tc(Min.) = 14.13
 LONGEST FLOWPATH FROM NODE 11.06 TO NODE 12.00 = 2770.00 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 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 (ACRES)	Ae (ACRES)	HEADWATER NODE
1	67.97	14.13	2.679	0.20(0.07)	0.33	28.5	11.06

 LONGEST FLOWPATH FROM NODE 11.06 TO NODE 12.00 = 2770.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (Min.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	137.17	11.45	3.018	0.20(0.09)	0.47	50.7	11.01
2	158.12	27.88	1.824	0.20(0.10)	0.48	100.2	1.00

 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
--------	---	----	-----------	--------	----	----	-----------

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	199.38	11.45	3.018	0.20(0.09)	0.43	73.7 11.01
2	208.56	14.13	2.679	0.20(0.09)	0.43	87.2 11.06
3	203.84	27.88	1.824	0.20(0.09)	0.45	128.7 1.00
TOTAL AREA(ACRES) =			128.7			

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 208.56 Tc(MIN.) = 14.130
EFFECTIVE AREA(ACRES) = 87.20 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 128.7
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 12

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

FLOW PROCESS FROM NODE 12.00 TO NODE 20.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(FEET) = 510.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.12
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 208.56
PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 14.60
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5440.00 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.60
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.630
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 3.58 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 3.58 SUBAREA RUNOFF(CFS) = 7.83
EFFECTIVE AREA(ACRES) = 90.78 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 132.3 PEAK FLOW RATE(CFS) = 208.56
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

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

FLOW PROCESS FROM NODE 13.00 TO NODE 14.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 370.00
ELEVATION DATA: UPSTREAM(FEET) = 102.50 DOWNSTREAM(FEET) = 100.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.373
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.380
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 3.17 0.20 0.200 75 9.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 9.53
TOTAL AREA(ACRES) = 3.17 PEAK FLOW RATE(CFS) = 9.53

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FLOW PROCESS FROM NODE      14.00 TO NODE      15.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0500
FLOW LENGTH(FEET) =  1660.00  MANNING'S N =  0.013
DEPTH OF FLOW IN  15.0 INCH PIPE IS  9.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  12.07
ESTIMATED PIPE DIAMETER(INCH) =  15.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  9.53
PIPE TRAVEL TIME(MIN.) =  2.29  Tc(MIN.) =  11.67
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      15.00 =  2030.00 FEET.

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      15.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =  11.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.986
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      B        31.84      0.30      0.200      56
PUBLIC PARK                D        3.71      0.20      0.850      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.268
SUBAREA AREA(ACRES) =  35.55  SUBAREA RUNOFF(CFS) =  93.26
EFFECTIVE AREA(ACRES) =  38.72  AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.26
TOTAL AREA(ACRES) =  38.7  PEAK FLOW RATE(CFS) =  101.67

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      16.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =  780.00
REPRESENTATIVE CHANNEL SLOPE =  0.0400
CHANNEL BASE(FEET) =  0.00  "Z" FACTOR =  2.000
MANNING'S FACTOR =  0.015  MAXIMUM DEPTH(FEET) =  3.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.887
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      D        11.64      0.20      0.200      75
NATURAL FAIR COVER
"OPEN BRUSH"              A        13.96      0.40      1.000      46
COMMERCIAL                D        2.65      0.20      0.100      75
PUBLIC PARK                A        1.60      0.40      0.850      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  137.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  18.07
AVERAGE FLOW DEPTH(FEET) =  1.95  TRAVEL TIME(MIN.) =  0.72
Tc(MIN.) =  12.38
SUBAREA AREA(ACRES) =  29.85  SUBAREA RUNOFF(CFS) =  71.57
EFFECTIVE AREA(ACRES) =  68.57  AREA-AVERAGED Fm(INCH/HR) =  0.14
AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.41
TOTAL AREA(ACRES) =  68.6  PEAK FLOW RATE(CFS) =  169.77

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  2.11  FLOW VELOCITY(FEET/SEC.) =  19.06
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      16.00 =  2810.00 FEET.

*****
FLOW PROCESS FROM NODE      16.00 TO NODE      16.60 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =  0.0050
FLOW LENGTH(FEET) =  290.00  MANNING'S N =  0.013
DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  10.14
ESTIMATED PIPE DIAMETER(INCH) =  60.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  169.77
PIPE TRAVEL TIME(MIN.) =  0.48  Tc(MIN.) =  12.86
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      16.60 =  3100.00 FEET.

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*****
FLOW PROCESS FROM NODE      16.60 TO NODE      16.60 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =    12.86
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =    2.826
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
COMMERCIAL      A      1.13      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) =    1.13      SUBAREA RUNOFF(CFS) =    2.83
EFFECTIVE AREA(ACRES) =    69.70      AREA-AVERAGED Fm(INCH/HR) =    0.13
AREA-AVERAGED Fp(INCH/HR) =    0.33      AREA-AVERAGED Ap =    0.40
TOTAL AREA(ACRES) =    69.7      PEAK FLOW RATE(CFS) =    169.77
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE      16.60 TO NODE      16.60 IS CODE =   10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      16.10 TO NODE      16.20 IS CODE =   21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =    330.00
ELEVATION DATA: UPSTREAM(FEET) =    105.50      DOWNSTREAM(FEET) =    105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    13.416
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =    2.759
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      D      1.80      0.20      0.350      75      13.42
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    0.350
SUBAREA RUNOFF(CFS) =    4.36
TOTAL AREA(ACRES) =    1.80      PEAK FLOW RATE(CFS) =    4.36

*****
FLOW PROCESS FROM NODE      16.20 TO NODE      16.30 IS CODE =   51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =    400.00
REPRESENTATIVE CHANNEL SLOPE =    0.0100
CHANNEL BASE(FEET) =    0.00      "Z" FACTOR =    1.000
MANNING'S FACTOR =    0.015      MAXIMUM DEPTH(FEET) =    1.50
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =    2.636
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
CONDOMINIUMS      B      2.42      0.30      0.350      56
COMMERCIAL      B      0.90      0.30      0.100      56
PUBLIC PARK      B      1.92      0.30      0.850      56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    0.490
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    10.23
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    5.92
AVERAGE FLOW DEPTH(FEET) =    1.32      TRAVEL TIME(MIN.) =    1.13
Tc(MIN.) =    14.54
SUBAREA AREA(ACRES) =    5.24      SUBAREA RUNOFF(CFS) =    11.74
EFFECTIVE AREA(ACRES) =    7.04      AREA-AVERAGED Fm(INCH/HR) =    0.13
AREA-AVERAGED Fp(INCH/HR) =    0.28      AREA-AVERAGED Ap =    0.45
TOTAL AREA(ACRES) =    7.0      PEAK FLOW RATE(CFS) =    15.89

==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
ALLOWABLE DEPTH).
AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

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DEPTH(FEET) = 1.50    FLOW VELOCITY(FEET/SEC.) = 7.06

==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.30 =      730.00 FEET.

*****
FLOW PROCESS FROM NODE      16.30 TO NODE      16.40 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 790.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.48
ESTIMATED PIPE DIAMETER(INCH) = 24.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.89
PIPE TRAVEL TIME(MIN.) = 1.76    Tc(MIN.) = 16.30
LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.40 =      1520.00 FEET.

*****
FLOW PROCESS FROM NODE      16.40 TO NODE      16.40 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.30
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.471
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            B        3.09    0.30    0.100    56
PUBLIC PARK           B        2.54    0.30    0.850    56
PUBLIC PARK           B        2.54    0.30    0.850    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566
SUBAREA AREA(ACRES) = 8.17    SUBAREA RUNOFF(CFS) = 16.92
EFFECTIVE AREA(ACRES) = 15.21    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.29    AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 15.2    PEAK FLOW RATE(CFS) = 31.77

*****
FLOW PROCESS FROM NODE      16.40 TO NODE      16.50 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 390.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.84
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.77
PIPE TRAVEL TIME(MIN.) = 0.74    Tc(MIN.) = 17.04
LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.50 =      1910.00 FEET.

*****
FLOW PROCESS FROM NODE      16.50 TO NODE      16.50 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.04
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.410
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        1.85    0.20    0.100    75
CONDOMINIUMS          D        2.51    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 4.36    SUBAREA RUNOFF(CFS) = 9.27
EFFECTIVE AREA(ACRES) = 19.57    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.28    AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 19.6    PEAK FLOW RATE(CFS) = 40.20

*****
FLOW PROCESS FROM NODE      16.50 TO NODE      16.60 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 950.00    MANNING'S N = 0.013

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DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.39
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.20
PIPE TRAVEL TIME(MIN.) = 1.69 Tc(MIN.) = 18.73
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.60 = 2860.00 FEET.

*****
FLOW PROCESS FROM NODE 16.60 TO NODE 16.60 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.73
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.285
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK D 2.21 0.20 0.850 75
COMMERCIAL D 2.81 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430
SUBAREA AREA(ACRES) = 5.02 SUBAREA RUNOFF(CFS) = 9.93
EFFECTIVE AREA(ACRES) = 24.59 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 24.6 PEAK FLOW RATE(CFS) = 47.92

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====
** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 47.92 18.73 2.285 0.27( 0.12) 0.45 24.6 16.10
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.50 = 2860.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 169.77 12.86 2.826 0.33( 0.13) 0.40 69.7 13.00
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.50 = 3100.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 210.92 12.86 2.826 0.32( 0.13) 0.41 86.6 13.00
2 183.55 18.73 2.285 0.31( 0.13) 0.42 94.3 16.10
TOTAL AREA(ACRES) = 94.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 210.92 Tc(MIN.) = 12.862
EFFECTIVE AREA(ACRES) = 86.59 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.31 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 94.3
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.50 = 3100.00 FEET.

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE 16.50 TO NODE 17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
FLOW LENGTH(FEET) = 1230.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 50.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.78
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 210.92
PIPE TRAVEL TIME(MIN.) = 1.90 Tc(MIN.) = 14.76
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 17.00 = 4330.00 FEET.

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 14.76
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.614
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          A        8.07    0.40    1.000    46
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        6.11    0.40    0.200    32
COMMERCIAL            A        3.62    0.40    0.100    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.542
SUBAREA AREA(ACRES) = 17.80    SUBAREA RUNOFF(CFS) = 38.39
EFFECTIVE AREA(ACRES) = 104.39    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.34    AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 112.1    PEAK FLOW RATE(CFS) = 231.84

*****
FLOW PROCESS FROM NODE    17.00 TO NODE    18.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 46.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.30
ESTIMATED PIPE DIAMETER(INCH) = 60.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 231.84
PIPE TRAVEL TIME(MIN.) = 0.31    Tc(MIN.) = 15.08
LONGEST FLOWPATH FROM NODE    13.00 TO NODE    18.00 = 4600.00 FEET.

*****
FLOW PROCESS FROM NODE    18.00 TO NODE    18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.08
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.583
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          A        2.09    0.40    1.000    46
NATURAL POOR COVER
"BARREN"              A        4.65    0.40    1.000    78
COMMERCIAL            A        2.82    0.40    0.100    32
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        13.94    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.417
SUBAREA AREA(ACRES) = 23.50    SUBAREA RUNOFF(CFS) = 51.09
EFFECTIVE AREA(ACRES) = 127.89    AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35    AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 135.6    PEAK FLOW RATE(CFS) = 280.01

*****
FLOW PROCESS FROM NODE    18.00 TO NODE    19.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 610.00
REPRESENTATIVE CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 35.00    "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) = 3.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.478
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"          A        2.68    0.40    1.000    46
RESIDENTIAL
"11+ DWELLINGS/ACRE" A        9.73    0.40    0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 293.02
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.87
AVERAGE FLOW DEPTH(FEET) = 0.90    TRAVEL TIME(MIN.) = 1.15
Tc(MIN.) = 16.22
SUBAREA AREA(ACRES) = 12.41    SUBAREA RUNOFF(CFS) = 26.01
EFFECTIVE AREA(ACRES) = 140.30    AREA-AVERAGED Fm(INCH/HR) = 0.15

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AREA-AVERAGED Fp(INCH/HR) = 0.35 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 148.0 PEAK FLOW RATE(CFS) = 293.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.90 FLOW VELOCITY(FEET/SEC.) = 8.90
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 19.00 = 5210.00 FEET.

*****
FLOW PROCESS FROM NODE 19.00 TO NODE 20.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 360.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.299
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.58 0.40 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 295.56
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.62
AVERAGE FLOW DEPTH(FEET) = 0.84 TRAVEL TIME(MIN.) = 2.29
Tc(MIN.) = 18.52
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 3.21
EFFECTIVE AREA(ACRES) = 141.88 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 149.6 PEAK FLOW RATE(CFS) = 293.95
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.84 FLOW VELOCITY(FEET/SEC.) = 2.62
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 3 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
1 293.95 18.52 2.299 0.35( 0.15) 0.42 141.9 13.00
2 256.41 24.65 1.956 0.35( 0.15) 0.42 149.6 16.10
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 199.38 11.92 2.950 0.20( 0.09) 0.45 77.3 11.01
2 208.56 14.60 2.630 0.20( 0.09) 0.45 90.8 11.06
3 204.03 28.35 1.807 0.20( 0.09) 0.46 132.3 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5440.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 445.86 11.92 2.950 0.28( 0.12) 0.44 168.6 11.01
2 475.99 14.60 2.630 0.28( 0.12) 0.43 202.6 11.06
3 501.22 18.52 2.299 0.29( 0.12) 0.44 244.5 13.00
4 461.66 24.65 1.956 0.28( 0.12) 0.44 270.7 16.10
5 439.33 28.35 1.807 0.27( 0.12) 0.44 281.9 1.00
TOTAL AREA(ACRES) = 281.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 501.22 Tc(MIN.) = 18.518
EFFECTIVE AREA(ACRES) = 244.49 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 281.9
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 3 <<<<
=====
*****

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FLOW PROCESS FROM NODE      20.00 TO NODE      21.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   570.00
REPRESENTATIVE CHANNEL SLOPE =   0.0050
CHANNEL BASE(FEET) =   130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(FEET) =   6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =   2.115
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A        11.87      0.40      0.200      32
NATURAL FAIR COVER
"OPEN BRUSH"              D         5.63      0.20      1.000      83
COMMERCIAL                A         1.56      0.40      0.100      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.428
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   518.41
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.24
AVERAGE FLOW DEPTH(FEET) =   1.18  TRAVEL TIME(MIN.) =   2.93
Tc(MIN.) =   21.45
SUBAREA AREA(ACRES) =   19.06      SUBAREA RUNOFF(CFS) =   34.36
EFFECTIVE AREA(ACRES) =   263.55  AREA-AVERAGED Fm(INCH/HR) =   0.12
AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   0.43
TOTAL AREA(ACRES) =   300.9      PEAK FLOW RATE(CFS) =   501.22
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =   1.15  FLOW VELOCITY(FEET/SEC.) =   3.21
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      21.00 =   6140.00 FEET.

*****
FLOW PROCESS FROM NODE      21.00 TO NODE      22.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00
REPRESENTATIVE CHANNEL SLOPE =   0.0050
CHANNEL BASE(FEET) =   130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(FEET) =   6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =   1.960
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                A         1.73      0.40      0.100      32
NATURAL FAIR COVER
"OPEN BRUSH"              D         4.03      0.20      1.000      83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.730
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   505.91
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.22
AVERAGE FLOW DEPTH(FEET) =   1.16  TRAVEL TIME(MIN.) =   3.10
Tc(MIN.) =   24.56
SUBAREA AREA(ACRES) =   5.76      SUBAREA RUNOFF(CFS) =   9.37
EFFECTIVE AREA(ACRES) =   269.31  AREA-AVERAGED Fm(INCH/HR) =   0.12
AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   0.44
TOTAL AREA(ACRES) =   306.7      PEAK FLOW RATE(CFS) =   501.22
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =   1.15  FLOW VELOCITY(FEET/SEC.) =   3.21
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      22.00 =   6740.00 FEET.

*****
FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   450.00
REPRESENTATIVE CHANNEL SLOPE =   0.0050
CHANNEL BASE(FEET) =   130.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035  MAXIMUM DEPTH(FEET) =   6.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =   1.862
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A         3.62      0.40      0.200      32

```

NATURAL FAIR COVER

"OPEN BRUSH" D 4.01 0.20 1.000 83
 COMMERCIAL A 1.68 0.40 0.100 32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.527
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 508.50
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.22
 AVERAGE FLOW DEPTH(FEET) = 1.16 TRAVEL TIME(MIN.) = 2.33
 T_c (MIN.) = 26.88
 SUBAREA AREA(ACRES) = 9.31 SUBAREA RUNOFF(CFS) = 14.56
 EFFECTIVE AREA(ACRES) = 278.62 AREA-AVERAGED F_m (INCH/HR) = 0.12
 AREA-AVERAGED F_p (INCH/HR) = 0.28 AREA-AVERAGED A_p = 0.44
 TOTAL AREA(ACRES) = 316.0 PEAK FLOW RATE(CFS) = 501.22
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.15 FLOW VELOCITY(FEET/SEC.) = 3.21
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 23.00 = 7190.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 316.0 T_c (MIN.) = 26.88
 EFFECTIVE AREA(ACRES) = 278.62 AREA-AVERAGED F_m (INCH/HR) = 0.12
 AREA-AVERAGED F_p (INCH/HR) = 0.28 AREA-AVERAGED A_p = 0.444
 PEAK FLOW RATE(CFS) = 501.22

** 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	445.86	20.63	2.163	0.27(0.12)	0.45	202.7	11.01
2	475.99	23.11	2.028	0.27(0.12)	0.44	236.8	11.06
3	501.22	26.88	1.862	0.28(0.12)	0.44	278.6	13.00
4	461.66	33.27	1.650	0.27(0.12)	0.45	304.8	16.10
5	439.33	37.15	1.550	0.27(0.12)	0.45	316.0	1.00

END OF RATIONAL METHOD ANALYSIS

Drainage B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2007 Advanced Engineering Software (aes)
Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P025_B.DAT
TIME/DATE OF STUDY: 09:36 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 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) = 110.00 DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.477
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.841
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.54 0.20 0.100 75 7.48
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.86
TOTAL AREA(ACRES) = 0.54 PEAK FLOW RATE(CFS) = 1.86

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.76
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.30
HALFSTREET FLOOD WIDTH(FEET) = 7.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.58
STREET FLOW TRAVEL TIME(MIN.) = 2.97 Tc(MIN.) = 10.44
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.180
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL      D      0.63      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 1.79
EFFECTIVE AREA(ACRES) = 1.17 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 3.33

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 8.34
FLOW VELOCITY(FEET/SEC.) = 2.04 DEPTH*VELOCITY(FT*FT/SEC.) = 0.64
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.21
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 9.41
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.14
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.71
STREET FLOW TRAVEL TIME(MIN.) = 3.12 Tc(MIN.) = 13.56
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.743
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL      D      0.72      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.72 SUBAREA RUNOFF(CFS) = 1.76
EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 4.63

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 9.84
FLOW VELOCITY(FEET/SEC.) = 2.19 DEPTH*VELOCITY(FT*FT/SEC.) = 0.74
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.02
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 15.04
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.71
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.17
STREET FLOW TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 16.63
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.76 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 6.76 SUBAREA RUNOFF(CFS) = 14.74
EFFECTIVE AREA(ACRES) = 8.65 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.7 PEAK FLOW RATE(CFS) = 18.87

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 18.16
FLOW VELOCITY(FEET/SEC.) = 3.00 DEPTH*VELOCITY(FT*FT/SEC.) = 1.46
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 1550.00 FEET.

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 600.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.53
HALFSTREET FLOOD WIDTH(FEET) = 20.74
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.25
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.73
STREET FLOW TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 19.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.220
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 7.46 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 7.46 SUBAREA RUNOFF(CFS) = 14.77
EFFECTIVE AREA(ACRES) = 16.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 31.89

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.56 HALFSTREET FLOOD WIDTH(FEET) = 22.38
FLOW VELOCITY(FEET/SEC.) = 3.42 DEPTH*VELOCITY(FT*FT/SEC.) = 1.92
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 2150.00 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 56.00 IS CODE = 62

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.57
HALFSTREET FLOOD WIDTH(Feet) = 22.77
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.45
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.96
STREET FLOW TRAVEL TIME(Min.) = 2.42 Tc(Min.) = 22.12
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 2.079
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 1.47 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 1.47 SUBAREA RUNOFF(CFS) = 2.72
EFFECTIVE AREA(Acres) = 17.58 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(Acres) = 17.6 PEAK FLOW RATE(CFS) = 32.58

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.57 HALFSTREET FLOOD WIDTH(Feet) = 22.54
FLOW VELOCITY(Feet/Sec.) = 3.44 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.95
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 2650.00 Feet.

FLOW PROCESS FROM NODE 56.00 TO NODE 57.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 580.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.25
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.61
HALFSTREET FLOOD WIDTH(Feet) = 25.20
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.69
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 2.26
STREET FLOW TRAVEL TIME(Min.) = 2.62 Tc(Min.) = 24.74
* 25 YEAR RAINFALL INTENSITY(Inch/Hr) = 1.951
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 12.28 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 12.28 SUBAREA RUNOFF(CFS) = 21.34
EFFECTIVE AREA(Acres) = 29.86 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(Acres) = 29.9 PEAK FLOW RATE(CFS) = 51.90

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.65 HALFSTREET FLOOD WIDTH(Feet) = 27.07
FLOW VELOCITY(Feet/Sec.) = 3.85 DEPTH*VELOCITY(Feet*Feet/Sec.) = 2.49
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 3230.00 Feet.

FLOW PROCESS FROM NODE 57.00 TO NODE 58.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 680.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00


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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 84.11
***STREET FLOWING FULL***
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.74
HALFSTREET FLOOD WIDTH(FEET) = 33.44
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.44
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.27
STREET FLOW TRAVEL TIME(MIN.) = 2.55 Tc(MIN.) = 27.29
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.846
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 29.81 0.20 0.100 75
SCHOOL D 9.91 0.20 0.600 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 39.72 SUBAREA RUNOFF(CFS) = 64.38
EFFECTIVE AREA(ACRES) = 69.58 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 69.6 PEAK FLOW RATE(CFS) = 113.45

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.80 HALFSTREET FLOOD WIDTH(FEET) = 36.44
FLOW VELOCITY(FEET/SEC.) = 4.91 DEPTH*VELOCITY(FT*FT/SEC.) = 3.90
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 680.0 FT WITH ELEVATION-DROP = 6.8 FT, IS 112.5 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 58.00
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 58.00 = 3910.00 FEET.

*****
FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 760.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.84
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 113.45
PIPE TRAVEL TIME(MIN.) = 1.07 Tc(MIN.) = 28.36
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 59.00 = 4670.00 FEET.

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 59.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 28.36
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.806
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 11.44 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.44 SUBAREA RUNOFF(CFS) = 18.39
EFFECTIVE AREA(ACRES) = 81.02 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 81.0 PEAK FLOW RATE(CFS) = 129.35

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 580.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.34
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 129.35

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PIPE TRAVEL TIME(MIN.) = 0.78    Tc(MIN.) = 29.15
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 60.00 = 5250.00 FEET.

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 29.15
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.779
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL          D        13.88    0.20    0.100    75
RESIDENTIAL
"11+ DWELLINGS/ACRE" D        4.45    0.20    0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.124
SUBAREA AREA(ACRES) = 18.33    SUBAREA RUNOFF(CFS) = 28.93
EFFECTIVE AREA(ACRES) = 99.35    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 99.4    PEAK FLOW RATE(CFS) = 156.26

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) = 940.00
REPRESENTATIVE CHANNEL SLOPE = 0.0350
CHANNEL BASE(Feet) = 15.00    "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030    MAXIMUM DEPTH(Feet) = 7.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"        D        24.16    0.20    1.000    83
CONDOMINIUMS        D        4.43    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.899
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 176.08
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 8.73
AVERAGE FLOW DEPTH(Feet) = 1.10    TRAVEL TIME(MIN.) = 1.79
Tc(MIN.) = 30.94
SUBAREA AREA(ACRES) = 28.59    SUBAREA RUNOFF(CFS) = 39.61
EFFECTIVE AREA(ACRES) = 127.94    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 127.9    PEAK FLOW RATE(CFS) = 190.59

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.15    FLOW VELOCITY(Feet/Sec.) = 8.99
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 61.00 = 6190.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 127.9    Tc(MIN.) = 30.94
EFFECTIVE AREA(ACRES) = 127.94    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.321
PEAK FLOW RATE(CFS) = 190.59
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage C

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P025_C.DAT
TIME/DATE OF STUDY: 09:37 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 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) = 108.00 DOWNSTREAM(FEET) = 106.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.003
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.693
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN" D 1.53 0.20 1.000 93 14.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 3.43
TOTAL AREA(ACRES) = 1.53 PEAK FLOW RATE(CFS) = 3.43

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.26
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.85
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.48
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.97
STREET FLOW TRAVEL TIME(MIN.) = 2.36 Tc(MIN.) = 16.36
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.466
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BAREN"              D        4.73    0.20    1.000    93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.73 SUBAREA RUNOFF(CFS) = 9.65
EFFECTIVE AREA(ACRES) = 6.26 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 6.3 PEAK FLOW RATE(CFS) = 12.77

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.43
FLOW VELOCITY(FEET/SEC.) = 2.75 DEPTH*VELOCITY(FT*FT/SEC.) = 1.21
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 360.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.02
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.77
PIPE TRAVEL TIME(MIN.) = 0.86 Tc(MIN.) = 17.21
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.00 = 1010.00 FEET.

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 17.21
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.396
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        2.81    0.20    0.100    75
CONDOMINIUMS          D        2.09    0.20    0.350    75
CONDOMINIUMS          D        3.05    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
SUBAREA AREA(ACRES) = 7.95 SUBAREA RUNOFF(CFS) = 16.77
EFFECTIVE AREA(ACRES) = 14.21 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 14.2 PEAK FLOW RATE(CFS) = 29.14

*****
FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.42
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 29.14
PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 17.71
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 84.00 = 1260.00 FEET.

*****
FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 17.71
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.358

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SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            D        0.73    0.20    0.100    75
CONDOMINIUMS         D        1.21    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.256
SUBAREA AREA(ACRES) = 1.94    SUBAREA RUNOFF(CFS) = 4.03
EFFECTIVE AREA(ACRES) = 16.15    AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 16.1    PEAK FLOW RATE(CFS) = 32.68

*****
FLOW PROCESS FROM NODE    84.00 TO NODE    85.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 180.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.88
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 32.68
PIPE TRAVEL TIME(MIN.) = 0.34    Tc(MIN.) = 18.05
LONGEST FLOWPATH FROM NODE    80.00 TO NODE    85.00 = 1440.00 FEET.

*****
FLOW PROCESS FROM NODE    85.00 TO NODE    85.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.05
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.333
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            D        0.32    0.20    0.100    75
CONDOMINIUMS         D        2.49    0.20    0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.322
SUBAREA AREA(ACRES) = 2.81    SUBAREA RUNOFF(CFS) = 5.74
EFFECTIVE AREA(ACRES) = 18.96    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 19.0    PEAK FLOW RATE(CFS) = 38.05

*****
FLOW PROCESS FROM NODE    85.00 TO NODE    86.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 340.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.04
ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.05
PIPE TRAVEL TIME(MIN.) = 0.63    Tc(MIN.) = 18.67
LONGEST FLOWPATH FROM NODE    80.00 TO NODE    86.00 = 1780.00 FEET.

*****
FLOW PROCESS FROM NODE    86.00 TO NODE    86.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.288
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS         D        3.14    0.20    0.350    75
COMMERCIAL            D        0.62    0.20    0.100    75
PUBLIC PARK          D        1.37    0.20    0.850    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.453
SUBAREA AREA(ACRES) = 5.13    SUBAREA RUNOFF(CFS) = 10.15
EFFECTIVE AREA(ACRES) = 24.09    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 24.1    PEAK FLOW RATE(CFS) = 47.44

*****
FLOW PROCESS FROM NODE    86.00 TO NODE    87.00 IS CODE = 31

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-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.61
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 47.44
PIPE TRAVEL TIME(MIN.) = 1.09 Tc(MIN.) = 19.77
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 2410.00 FEET.

*****
FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.77
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.216
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 3.51 0.20 0.350 75
COMMERCIAL D 1.12 0.20 0.100 75
NATURAL FAIR COVER
"OPEN BRUSH" D 0.43 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.06 SUBAREA RUNOFF(CFS) = 9.77
EFFECTIVE AREA(ACRES) = 29.15 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 29.1 PEAK FLOW RATE(CFS) = 55.64

*****
FLOW PROCESS FROM NODE 87.00 TO NODE 88.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.10
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 55.64
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 20.23
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 88.00 = 2690.00 FEET.

*****
FLOW PROCESS FROM NODE 88.00 TO NODE 88.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.23
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.187
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 5.34 0.20 0.350 75
COMMERCIAL D 0.48 0.20 0.100 75
CONDOMINIUMS D 2.16 0.20 0.350 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335
SUBAREA AREA(ACRES) = 7.98 SUBAREA RUNOFF(CFS) = 15.22
EFFECTIVE AREA(ACRES) = 37.13 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 37.1 PEAK FLOW RATE(CFS) = 70.11

*****
FLOW PROCESS FROM NODE 88.00 TO NODE 89.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.68
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 70.11
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 20.65
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 2960.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE      89.00 TO NODE      89.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.65
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.161
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS      D      2.41    0.20    0.350    75
COMMERCIAL        D      2.55    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.221
SUBAREA AREA(ACRES) = 4.96    SUBAREA RUNOFF(CFS) = 9.45
EFFECTIVE AREA(ACRES) = 42.09    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 42.1    PEAK FLOW RATE(CFS) = 78.71

*****
FLOW PROCESS FROM NODE      89.00 TO NODE      97.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 560.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.08
ESTIMATED PIPE DIAMETER(INCH) = 42.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 78.71
PIPE TRAVEL TIME(MIN.) = 0.84    Tc(MIN.) = 21.49
LONGEST FLOWPATH FROM NODE      80.00 TO NODE      97.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE      97.00 TO NODE      97.00 IS CODE =  10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
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) = 108.00    DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.314
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.392
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
    LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL        D      0.88    0.20    0.100    75  9.31
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.67
TOTAL AREA(ACRES) = 0.88    PEAK FLOW RATE(CFS) = 2.67

*****
FLOW PROCESS FROM NODE      91.00 TO NODE      92.00 IS CODE =  62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 260.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.11
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

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STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 9.28
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.13
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.70
STREET FLOW TRAVEL TIME(MIN.) = 2.03 Tc(MIN.) = 11.35
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.034
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              D      1.06      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 2.88
EFFECTIVE AREA(ACRES) = 1.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 5.26

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 10.43
FLOW VELOCITY(FEET/SEC.) = 2.26 DEPTH*VELOCITY(FT*FT/SEC.) = 0.79
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 92.00 = 560.00 FEET.

*****
FLOW PROCESS FROM NODE 92.00 TO NODE 93.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.62
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.26
PIPE TRAVEL TIME(MIN.) = 1.87 Tc(MIN.) = 13.21
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 93.00 = 1190.00 FEET.

*****
FLOW PROCESS FROM NODE 93.00 TO NODE 93.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.21
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.783
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS            D      5.84      0.20      0.350      75
COMMERCIAL              D      2.34      0.20      0.100      75
CONDOMINIUMS            D      8.66      0.20      0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.315
SUBAREA AREA(ACRES) = 16.84 SUBAREA RUNOFF(CFS) = 41.22
EFFECTIVE AREA(ACRES) = 18.78 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 18.8 PEAK FLOW RATE(CFS) = 46.04

*****
FLOW PROCESS FROM NODE 93.00 TO NODE 94.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.58
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 46.04
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 13.63
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 94.00 = 1430.00 FEET.

*****
FLOW PROCESS FROM NODE 94.00 TO NODE 94.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.63
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.734
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
PUBLIC PARK             D      3.80      0.20      0.850      75

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COMMERCIAL          D          0.27      0.20      0.100      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.800
SUBAREA AREA(ACRES) = 4.07      SUBAREA RUNOFF(CFS) = 9.43
EFFECTIVE AREA(ACRES) = 22.85      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20      AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 22.9      PEAK FLOW RATE(CFS) = 54.65

*****
FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 190.00      MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.07
ESTIMATED PIPE DIAMETER(INCH) = 36.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 54.65
PIPE TRAVEL TIME(MIN.) = 0.31      Tc(MIN.) = 13.95
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 1620.00 FEET.

*****
FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.95
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.699
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE              GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
COMMERCIAL              D          0.20      0.20      0.100      75
CONDOMINIUMS            D          2.24      0.20      0.350      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA(ACRES) = 2.44      SUBAREA RUNOFF(CFS) = 5.78
EFFECTIVE AREA(ACRES) = 25.29      AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20      AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 25.3      PEAK FLOW RATE(CFS) = 59.71

*****
FLOW PROCESS FROM NODE 95.00 TO NODE 96.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 310.00      MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.18
ESTIMATED PIPE DIAMETER(INCH) = 36.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 59.71
PIPE TRAVEL TIME(MIN.) = 0.51      Tc(MIN.) = 14.45
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 96.00 = 1930.00 FEET.

*****
FLOW PROCESS FROM NODE 96.00 TO NODE 96.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.45
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.645
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE              GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
PUBLIC PARK              D          5.07      0.20      0.850      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 5.07      SUBAREA RUNOFF(CFS) = 11.29
EFFECTIVE AREA(ACRES) = 30.36      AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20      AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 30.4      PEAK FLOW RATE(CFS) = 69.78

*****
FLOW PROCESS FROM NODE 96.00 TO NODE 97.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 230.00      MANNING'S N = 0.013

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DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.67
ESTIMATED PIPE DIAMETER(INCH) = 39.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 69.78
PIPE TRAVEL TIME(MIN.) = 0.36    Tc(MIN.) = 14.81
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 97.00 = 2160.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          69.78  14.81   2.609   0.20( 0.09)  0.46      30.4      90.00
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 97.00 = 2160.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          78.71  21.49   2.113   0.20( 0.08)  0.42      42.1      80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae      HEADWATER
NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
1          137.27  14.81   2.609   0.20( 0.09)  0.44      59.4      90.00
2          134.75  21.49   2.113   0.20( 0.09)  0.43      72.4      80.00
TOTAL AREA(ACRES) = 72.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 137.27    Tc(MIN.) = 14.813
EFFECTIVE AREA(ACRES) = 59.37    AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 72.4
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 98.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 280.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.69
ESTIMATED PIPE DIAMETER(INCH) = 51.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 137.27
PIPE TRAVEL TIME(MIN.) = 0.37    Tc(MIN.) = 15.18
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 98.00 = 3800.00 FEET.

*****
FLOW PROCESS FROM NODE 98.00 TO NODE 98.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.18
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.573
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"      D      22.13      0.20      1.000      83
NATURAL POOR COVER
"BARREN"      D      9.76      0.20      1.000      93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 31.89    SUBAREA RUNOFF(CFS) = 68.10
EFFECTIVE AREA(ACRES) = 91.26    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.63
TOTAL AREA(ACRES) = 104.3    PEAK FLOW RATE(CFS) = 200.88
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 104.3    TC(MIN.) = 15.18

```

EFFECTIVE AREA(ACRES) = 91.26 AREA-AVERAGED Fm(INCH/HR)= 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.634
 PEAK FLOW RATE(CFS) = 200.88

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	200.88	15.18	2.573	0.20(0.13)	0.63	91.3	90.00
2	185.08	21.87	2.092	0.20(0.12)	0.61	104.3	80.00

=====

=====

END OF RATIONAL METHOD ANALYSIS

ii. EV 2-Year Storm Event

Drainage A

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*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 13.5 Release Date: 02/06/2007 License ID 1355

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Analysis prepared by:

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-----
FILE NAME: P002_A.DAT
TIME/DATE OF STUDY: 09:37 04/09/2008
=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

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USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

```

```

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

```

ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD

```

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
  HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
  WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150

```

```

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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*****
FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 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) = 240.00
ELEVATION DATA: UPSTREAM(FEET) = 106.20 DOWNSTREAM(FEET) = 105.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.372
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.180
SUBAREA Tc AND LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.68 0.20 0.200 57 8.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 0.70
TOTAL AREA(ACRES) = 0.68 PEAK FLOW RATE(CFS) = 0.70

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*****
FLOW PROCESS FROM NODE 2.00 TO NODE 3.00 IS CODE = 62
-----

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>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 300.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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```

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.16
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.26
HALFSTREET FLOOD WIDTH(FEET) = 5.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.29
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.33
STREET FLOW TRAVEL TIME(MIN.) = 3.86 Tc(MIN.) = 12.24
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.949
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 1.13 0.20 0.200 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.13 SUBAREA RUNOFF(CFS) = 0.92
EFFECTIVE AREA(ACRES) = 1.81 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 1.48

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.28 HALFSTREET FLOOD WIDTH(FEET) = 6.34
FLOW VELOCITY(FEET/SEC.) = 1.34 DEPTH*VELOCITY(FT*FT/SEC.) = 0.37
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 540.00 FEET.

FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 260.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.70
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.97
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.48
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.48
STREET FLOW TRAVEL TIME(MIN.) = 2.93 Tc(MIN.) = 15.16
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.839
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 3.39 0.20 0.200 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 3.39 SUBAREA RUNOFF(CFS) = 2.44
EFFECTIVE AREA(ACRES) = 5.20 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.2 PEAK FLOW RATE(CFS) = 3.74

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 10.51
FLOW VELOCITY(FEET/SEC.) = 1.58 DEPTH*VELOCITY(FT*FT/SEC.) = 0.56
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 4.00 = 800.00 FEET.

FLOW PROCESS FROM NODE 4.00 TO NODE 5.00 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(FEET) = 310.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00


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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW( CFS ) = 5.84
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH( FEET ) = 0.39
HALFSTREET FLOOD WIDTH( FEET ) = 12.85
AVERAGE FLOW VELOCITY( FEET/SEC. ) = 1.75
PRODUCT OF DEPTH&VELOCITY( FT*FT/SEC. ) = 0.69
STREET FLOW TRAVEL TIME( MIN. ) = 2.95 Tc( MIN. ) = 18.11
* 2 YEAR RAINFALL INTENSITY( INCH/HR ) = 0.758
SUBAREA LOSS RATE DATA( AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 6.51 0.20 0.200 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR ) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA( ACRES ) = 6.51 SUBAREA RUNOFF( CFS ) = 4.21
EFFECTIVE AREA( ACRES ) = 11.71 AREA-AVERAGED Fm( INCH/HR ) = 0.04
AREA-AVERAGED Fp( INCH/HR ) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA( ACRES ) = 11.7 PEAK FLOW RATE( CFS ) = 7.56

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH( FEET ) = 0.42 HALFSTREET FLOOD WIDTH( FEET ) = 14.34
FLOW VELOCITY( FEET/SEC. ) = 1.86 DEPTH*VELOCITY( FT*FT/SEC. ) = 0.78
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 5.00 = 1110.00 FEET.

*****
FLOW PROCESS FROM NODE 5.00 TO NODE 6.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH( FEET ) = 440.00 CURB HEIGHT( INCHES ) = 8.0
STREET HALFWIDTH( FEET ) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW( CFS ) = 10.06
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH( FEET ) = 0.45
HALFSTREET FLOOD WIDTH( FEET ) = 16.13
AVERAGE FLOW VELOCITY( FEET/SEC. ) = 2.00
PRODUCT OF DEPTH&VELOCITY( FT*FT/SEC. ) = 0.90
STREET FLOW TRAVEL TIME( MIN. ) = 3.67 Tc( MIN. ) = 21.78
* 2 YEAR RAINFALL INTENSITY( INCH/HR ) = 0.682
SUBAREA LOSS RATE DATA( AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 8.39 0.20 0.100 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR ) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA( ACRES ) = 8.39 SUBAREA RUNOFF( CFS ) = 5.00
EFFECTIVE AREA( ACRES ) = 20.10 AREA-AVERAGED Fm( INCH/HR ) = 0.03
AREA-AVERAGED Fp( INCH/HR ) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA( ACRES ) = 20.1 PEAK FLOW RATE( CFS ) = 11.76

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH( FEET ) = 0.47 HALFSTREET FLOOD WIDTH( FEET ) = 17.23
FLOW VELOCITY( FEET/SEC. ) = 2.07 DEPTH*VELOCITY( FT*FT/SEC. ) = 0.97
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 6.00 = 1550.00 FEET.

*****
FLOW PROCESS FROM NODE 6.00 TO NODE 7.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

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REPRESENTATIVE SLOPE = 0.0050
STREET LENGTH(Feet) = 360.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.88
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.52
HALFSTREET FLOOD WIDTH(Feet) = 19.96
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.25
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.17
STREET FLOW TRAVEL TIME(MIN.) = 2.67 Tc(MIN.) = 24.45
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.638
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 18.43 0.20 0.100 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 18.43 SUBAREA RUNOFF(CFS) = 10.25
EFFECTIVE AREA(ACRES) = 38.53 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 38.5 PEAK FLOW RATE(CFS) = 21.21

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.55 HALFSTREET FLOOD WIDTH(Feet) = 21.84
FLOW VELOCITY(Feet/Sec.) = 2.38 DEPTH*VELOCITY(FT*FT/SEC.) = 1.32
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 7.00 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0200
FLOW LENGTH(Feet) = 550.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 17.2 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 10.07
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.21
PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 25.36
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 8.00 = 2460.00 FEET.

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 8.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 25.36
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.625
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 6.24 0.20 0.100 57
PUBLIC PARK D 6.35 0.20 0.850 57
COMMERCIAL D 2.47 0.20 0.100 57
NATURAL POOR COVER
"BARREN" D 3.55 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.528
SUBAREA AREA(ACRES) = 18.61 SUBAREA RUNOFF(CFS) = 8.69
EFFECTIVE AREA(ACRES) = 57.14 AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.26
TOTAL AREA(ACRES) = 57.1 PEAK FLOW RATE(CFS) = 29.45

*****
FLOW PROCESS FROM NODE 8.00 TO NODE 9.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.1000
FLOW LENGTH(Feet) = 430.00 MANNING'S N = 0.013

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DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.26
ESTIMATED PIPE DIAMETER(INCH) = 18.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 29.45
PIPE TRAVEL TIME(MIN.) = 0.35    Tc(MIN.) = 25.71
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 9.00 = 2890.00 FEET.

*****
FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 870.00
REPRESENTATIVE CHANNEL SLOPE = 0.0300
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.570
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          13.41    0.20    1.000    67
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 31.69
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.59
AVERAGE FLOW DEPTH(FEET) = 0.35    TRAVEL TIME(MIN.) = 4.04
Tc(MIN.) = 29.75
SUBAREA AREA(ACRES) = 13.41    SUBAREA RUNOFF(CFS) = 4.46
EFFECTIVE AREA(ACRES) = 70.55    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 70.6    PEAK FLOW RATE(CFS) = 31.10

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.35    FLOW VELOCITY(FEET/SEC.) = 3.54
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 10.00 = 3760.00 FEET.

*****
FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.532
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"          D          9.71    0.20    1.000    67
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 32.55
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.92
AVERAGE FLOW DEPTH(FEET) = 0.44    TRAVEL TIME(MIN.) = 3.76
Tc(MIN.) = 33.51
SUBAREA AREA(ACRES) = 9.71    SUBAREA RUNOFF(CFS) = 2.90
EFFECTIVE AREA(ACRES) = 80.26    AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 80.3    PEAK FLOW RATE(CFS) = 31.61

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.43    FLOW VELOCITY(FEET/SEC.) = 2.89
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 11.00 = 4420.00 FEET.

*****
FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 510.00
REPRESENTATIVE CHANNEL SLOPE = 0.0150
CHANNEL BASE(FEET) = 25.00    "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.035    MAXIMUM DEPTH(FEET) = 10.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.507
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN

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NATURAL FAIR COVER
 "OPEN BRUSH" D 3.89 0.20 1.000 67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 32.15
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 2.93
 AVERAGE FLOW DEPTH(Feet) = 0.43 TRAVEL TIME(MIN.) = 2.90
 T_c (MIN.) = 36.42
 SUBAREA AREA(ACRES) = 3.89 SUBAREA RUNOFF(CFS) = 1.08
 EFFECTIVE AREA(ACRES) = 84.15 AREA-AVERAGED F_m (INCH/HR) = 0.10
 AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.50
 TOTAL AREA(ACRES) = 84.2 PEAK FLOW RATE(CFS) = 31.61
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(Feet) = 0.43 FLOW VELOCITY(Feet/Sec.) = 2.89
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

 FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 11.01 TO NODE 11.02 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(Feet) = 120.00
 ELEVATION DATA: UPSTREAM(Feet) = 100.00 DOWNSTREAM(Feet) = 99.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.375
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.522
 SUBAREA T_c AND LOSS RATE DATA(AMC I):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	D	0.19	0.20	0.100	57	5.38

 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 0.26
 TOTAL AREA(ACRES) = 0.19 PEAK FLOW RATE(CFS) = 0.26

 FLOW PROCESS FROM NODE 11.02 TO NODE 11.03 IS CODE = 62

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

REPRESENTATIVE SLOPE = 0.0100
 STREET LENGTH(Feet) = 330.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.52
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(Feet) = 0.25
 HALFSTREET FLOOD WIDTH(Feet) = 4.97
 AVERAGE FLOW VELOCITY(Feet/Sec.) = 1.83
 PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.46
 STREET FLOW TRAVEL TIME(MIN.) = 3.01 T_c (MIN.) = 8.38
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.179
 SUBAREA LOSS RATE DATA(AMC I):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
PUBLIC PARK	D	1.84	0.20	0.850	57
COMMERCIAL	D	0.25	0.20	0.100	57
NATURAL FAIR COVER					
"OPEN BRUSH"	D	0.64	0.20	1.000	67

 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.816
 SUBAREA AREA(ACRES) = 2.73 SUBAREA RUNOFF(CFS) = 2.50
 EFFECTIVE AREA(ACRES) = 2.92 AREA-AVERAGED F_m (INCH/HR) = 0.15

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AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.77
TOTAL AREA(ACRES) = 2.9 PEAK FLOW RATE(CFS) = 2.69

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.29 HALFSTREET FLOOD WIDTH(Feet) = 7.41
FLOW VELOCITY(Feet/Sec.) = 1.97 DEPTH*VELOCITY(Ft*Ft/Sec.) = 0.58
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 11.03 = 450.00 FEET.

*****
FLOW PROCESS FROM NODE 11.03 TO NODE 11.04 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(Feet) = 490.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.1 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 4.78
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.69
PIPE TRAVEL TIME(MIN.) = 1.71 Tc(MIN.) = 10.09
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 11.04 = 940.00 FEET.

*****
FLOW PROCESS FROM NODE 11.04 TO NODE 11.04 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 10.09
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.060
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.18 0.20 0.100 57
CONDOMINIUMS D 1.15 0.20 0.350 57
CONDOMINIUMS D 4.75 0.20 0.350 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.308
SUBAREA AREA(ACRES) = 7.08 SUBAREA RUNOFF(CFS) = 6.36
EFFECTIVE AREA(ACRES) = 10.00 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 10.0 PEAK FLOW RATE(CFS) = 8.74

*****
FLOW PROCESS FROM NODE 11.04 TO NODE 11.05 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(Feet) = 400.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.1 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 6.36
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.74
PIPE TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 11.14
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 11.05 = 1340.00 FEET.

*****
FLOW PROCESS FROM NODE 11.05 TO NODE 11.05 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.14
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.002
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 6.10 0.20 0.350 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.10 SUBAREA RUNOFF(CFS) = 5.11
EFFECTIVE AREA(ACRES) = 16.10 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 16.1 PEAK FLOW RATE(CFS) = 13.33

*****
FLOW PROCESS FROM NODE 11.05 TO NODE 12.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100

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FLOW LENGTH(FEET) = 910.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.06
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.33
PIPE TRAVEL TIME(MIN.) = 2.15 Tc(MIN.) = 13.29
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 12.00 = 2250.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 13.33 13.29 0.905 0.20( 0.08) 0.41 16.1 11.01
LONGEST FLOWPATH FROM NODE 11.01 TO NODE 12.00 = 2250.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 31.61 36.42 0.507 0.20( 0.10) 0.50 84.2 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 36.11 13.29 0.905 0.20( 0.09) 0.47 46.8 11.01
2 38.51 36.42 0.507 0.20( 0.10) 0.48 100.2 1.00
TOTAL AREA(ACRES) = 100.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 38.51 Tc(MIN.) = 36.418
EFFECTIVE AREA(ACRES) = 100.25 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 100.2
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====

*****
FLOW PROCESS FROM NODE 11.06 TO NODE 11.07 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 90.00 DOWNSTREAM(FEET) = 86.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.011
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.131
SUBAREA Tc AND LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
CONDOMINIUMS D 1.54 0.20 0.350 57 9.01
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 1.47
TOTAL AREA(ACRES) = 1.54 PEAK FLOW RATE(CFS) = 1.47

*****
FLOW PROCESS FROM NODE 11.07 TO NODE 11.08 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 450.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 9.0 INCH PIPE IS 6.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.03

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ESTIMATED PIPE DIAMETER(INCH) = 9.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.47
PIPE TRAVEL TIME(MIN.) = 1.86    Tc(MIN.) = 10.87
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.08 = 790.00 FEET.

*****
FLOW PROCESS FROM NODE 11.08 TO NODE 11.08 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 10.87
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.016
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL          D        0.43    0.20    0.100    57
CONDOMINIUMS        D        1.14    0.20    0.350    57
CONDOMINIUMS        D        4.05    0.20    0.350    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.331
SUBAREA AREA(ACRES) = 5.62    SUBAREA RUNOFF(CFS) = 4.80
EFFECTIVE AREA(ACRES) = 7.16    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 7.2    PEAK FLOW RATE(CFS) = 6.11

*****
FLOW PROCESS FROM NODE 11.08 TO NODE 11.09 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 500.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 12.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.69
ESTIMATED PIPE DIAMETER(INCH) = 15.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.11
PIPE TRAVEL TIME(MIN.) = 1.46    Tc(MIN.) = 12.34
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.09 = 1290.00 FEET.

*****
FLOW PROCESS FROM NODE 11.09 TO NODE 11.09 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.34
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.945
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL          D        0.41    0.20    0.100    57
CONDOMINIUMS        D        1.13    0.20    0.350    57
CONDOMINIUMS        D        0.62    0.20    0.350    57
CONDOMINIUMS        D        0.48    0.20    0.350    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.311
SUBAREA AREA(ACRES) = 2.64    SUBAREA RUNOFF(CFS) = 2.10
EFFECTIVE AREA(ACRES) = 9.80    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 9.8    PEAK FLOW RATE(CFS) = 7.75

*****
FLOW PROCESS FROM NODE 11.09 TO NODE 11.10 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 730.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.23
ESTIMATED PIPE DIAMETER(INCH) = 18.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.75
PIPE TRAVEL TIME(MIN.) = 1.95    Tc(MIN.) = 14.29
LONGEST FLOWPATH FROM NODE 11.06 TO NODE 11.10 = 2020.00 FEET.

*****
FLOW PROCESS FROM NODE 11.10 TO NODE 11.10 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.29
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.868

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SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            D        1.01    0.20    0.100    57
CONDOMINIUMS          D        2.10    0.20    0.350    57
CONDOMINIUMS          D        1.33    0.20    0.350    57
CONDOMINIUMS          D        7.17    0.20    0.350    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.328
SUBAREA AREA(ACRES) = 11.61    SUBAREA RUNOFF(CFS) = 8.39
EFFECTIVE AREA(ACRES) = 21.41    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 21.4    PEAK FLOW RATE(CFS) = 15.46

*****
FLOW PROCESS FROM NODE    11.10 TO NODE    11.11 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 510.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.44
ESTIMATED PIPE DIAMETER(INCH) = 24.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.46
PIPE TRAVEL TIME(MIN.) = 1.14    Tc(MIN.) = 15.43
LONGEST FLOWPATH FROM NODE    11.06 TO NODE    11.11 = 2530.00 FEET.

*****
FLOW PROCESS FROM NODE    11.11 TO NODE    11.11 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.43
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.831
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL            D        0.44    0.20    0.100    57
CONDOMINIUMS          D        6.60    0.20    0.350    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.334
SUBAREA AREA(ACRES) = 7.04    SUBAREA RUNOFF(CFS) = 4.84
EFFECTIVE AREA(ACRES) = 28.45    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 28.5    PEAK FLOW RATE(CFS) = 19.58

*****
FLOW PROCESS FROM NODE    11.11 TO NODE    12.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 240.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.74
ESTIMATED PIPE DIAMETER(INCH) = 24.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.58
PIPE TRAVEL TIME(MIN.) = 0.52    Tc(MIN.) = 15.95
LONGEST FLOWPATH FROM NODE    11.06 TO NODE    12.00 = 2770.00 FEET.

*****
FLOW PROCESS FROM NODE    12.00 TO NODE    12.00 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    19.58    15.95    0.815    0.20( 0.07)  0.33    28.5    11.06
LONGEST FLOWPATH FROM NODE    11.06 TO NODE    12.00 = 2770.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)  (ACRES)  NODE
1    36.11    13.29    0.905    0.20( 0.09)  0.47    46.8    11.01
2    38.51    36.42    0.507    0.20( 0.10)  0.48    100.2    1.00
LONGEST FLOWPATH FROM NODE    1.00 TO NODE    12.00 = 4930.00 FEET.

** PEAK FLOW RATE TABLE **

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STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	54.38	13.29	0.905	0.20(0.08)	0.42	70.5	11.01
2	55.97	15.95	0.815	0.20(0.08)	0.42	81.4	11.06
3	50.04	36.42	0.507	0.20(0.09)	0.45	128.7	1.00
TOTAL AREA(ACRES) =			128.7				

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 55.97 Tc(MIN.) = 15.948
 EFFECTIVE AREA(ACRES) = 81.40 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 128.7
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 12.00 = 4930.00 FEET.

 FLOW PROCESS FROM NODE 12.00 TO NODE 12.00 IS CODE = 12

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

 FLOW PROCESS FROM NODE 12.00 TO NODE 20.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====
 REPRESENTATIVE SLOPE = 0.0200
 FLOW LENGTH(FEET) = 510.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.24
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 55.97
 PIPE TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 16.59
 LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5440.00 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
 =====
 MAINLINE Tc(MIN.) = 16.59
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.797
 SUBAREA LOSS RATE DATA(AMC I):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	D	3.58	0.20	1.000	67

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 3.58 SUBAREA RUNOFF(CFS) = 1.92
 EFFECTIVE AREA(ACRES) = 84.98 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.44
 TOTAL AREA(ACRES) = 132.3 PEAK FLOW RATE(CFS) = 55.97
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

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

 FLOW PROCESS FROM NODE 13.00 TO NODE 14.00 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 370.00
 ELEVATION DATA: UPSTREAM(FEET) = 102.50 DOWNSTREAM(FEET) = 100.00

 $Tc = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.373
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.106
 SUBAREA Tc AND LOSS RATE DATA(AMC I):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	D	3.17	0.20	0.200	57	9.37

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA RUNOFF(CFS) = 3.04
 TOTAL AREA(ACRES) = 3.17 PEAK FLOW RATE(CFS) = 3.04

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*****
FLOW PROCESS FROM NODE      14.00 TO NODE      15.00 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =   0.0500
FLOW LENGTH(FEET) =  1660.00  MANNING'S N =   0.013
DEPTH OF FLOW IN   9.0 INCH PIPE IS  6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.94
ESTIMATED PIPE DIAMETER(INCH) =   9.00  NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       3.04
PIPE TRAVEL TIME(MIN.) =   3.10  Tc(MIN.) =   12.47
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      15.00 =   2030.00 FEET.

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      15.00 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =   12.47
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   0.939
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    B        31.84    0.30    0.200    36
PUBLIC PARK             D         3.71    0.20    0.850    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.268
SUBAREA AREA(ACRES) =   35.55  SUBAREA RUNOFF(CFS) =   27.75
EFFECTIVE AREA(ACRES) =   38.72  AREA-AVERAGED Fm(INCH/HR) =   0.07
AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.26
TOTAL AREA(ACRES) =   38.7  PEAK FLOW RATE(CFS) =   30.31

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      16.00 IS CODE =   51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   780.00
REPRESENTATIVE CHANNEL SLOPE =   0.0400
CHANNEL BASE(FEET) =   0.00  "Z" FACTOR =   2.000
MANNING'S FACTOR =   0.015  MAXIMUM DEPTH(FEET) =   3.00
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   0.899
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D        11.64    0.20    0.200    57
NATURAL FAIR COVER
"OPEN BRUSH"           A        13.96    0.40    1.000    28
COMMERCIAL             D         2.65    0.20    0.100    57
PUBLIC PARK            A         1.60    0.40    0.850    17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.37
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.600
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   39.41
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   13.28
AVERAGE FLOW DEPTH(FEET) =   1.22  TRAVEL TIME(MIN.) =   0.98
Tc(MIN.) =   13.45
SUBAREA AREA(ACRES) =   29.85  SUBAREA RUNOFF(CFS) =   18.17
EFFECTIVE AREA(ACRES) =   68.57  AREA-AVERAGED Fm(INCH/HR) =   0.14
AREA-AVERAGED Fp(INCH/HR) =   0.33  AREA-AVERAGED Ap =   0.41
TOTAL AREA(ACRES) =   68.6  PEAK FLOW RATE(CFS) =   47.09

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =   1.31  FLOW VELOCITY(FEET/SEC.) =   13.77
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      16.00 =   2810.00 FEET.

*****
FLOW PROCESS FROM NODE      16.00 TO NODE      16.60 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE =   0.0050
FLOW LENGTH(FEET) =   290.00  MANNING'S N =   0.013
DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
ESTIMATED PIPE DIAMETER(INCH) =  39.00  NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =   47.09
PIPE TRAVEL TIME(MIN.) =   0.64  Tc(MIN.) =   14.09

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LONGEST FLOWPATH FROM NODE      13.00 TO NODE      16.60 =      3100.00 FEET.

*****
FLOW PROCESS FROM NODE      16.60 TO NODE      16.60 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =   14.09
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   0.875
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
  LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              A         1.13      0.40      0.100      17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.100
SUBAREA AREA(ACRES) =   1.13      SUBAREA RUNOFF(CFS) =   0.85
EFFECTIVE AREA(ACRES) =   69.70      AREA-AVERAGED Fm(INCH/HR) =   0.13
AREA-AVERAGED Fp(INCH/HR) =   0.33      AREA-AVERAGED Ap =   0.40
TOTAL AREA(ACRES) =   69.7      PEAK FLOW RATE(CFS) =   47.09
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE      16.60 TO NODE      16.60 IS CODE =   10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      16.10 TO NODE      16.20 IS CODE =   21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
ELEVATION DATA: UPSTREAM(FEET) =   105.50  DOWNSTREAM(FEET) =   105.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.416
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   0.900
SUBAREA Tc AND LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
  LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
CONDOMINIUMS          D         1.80      0.20      0.350      57  13.42
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.350
SUBAREA RUNOFF(CFS) =   1.34
TOTAL AREA(ACRES) =   1.80      PEAK FLOW RATE(CFS) =   1.34

*****
FLOW PROCESS FROM NODE      16.20 TO NODE      16.30 IS CODE =   51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00
REPRESENTATIVE CHANNEL SLOPE =   0.0100
CHANNEL BASE(FEET) =   0.00  "Z" FACTOR =   1.000
MANNING'S FACTOR =   0.015  MAXIMUM DEPTH(FEET) =   1.50
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   0.846
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
  LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS          B         2.42      0.30      0.350      36
COMMERCIAL            B         0.90      0.30      0.100      36
PUBLIC PARK           B         1.92      0.30      0.850      36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.490
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   3.00
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.36
AVERAGE FLOW DEPTH(FEET) =   0.83  TRAVEL TIME(MIN.) =   1.53
Tc(MIN.) =   14.94
SUBAREA AREA(ACRES) =   5.24      SUBAREA RUNOFF(CFS) =   3.30
EFFECTIVE AREA(ACRES) =   7.04      AREA-AVERAGED Fm(INCH/HR) =   0.13
AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   0.45
TOTAL AREA(ACRES) =   7.0      PEAK FLOW RATE(CFS) =   4.55

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =   0.97  FLOW VELOCITY(FEET/SEC.) =   4.82
LONGEST FLOWPATH FROM NODE      16.10 TO NODE      16.30 =   730.00 FEET.

*****
FLOW PROCESS FROM NODE      16.30 TO NODE      16.40 IS CODE =   31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 790.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.47
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.55
PIPE TRAVEL TIME(MIN.) = 2.41 Tc(MIN.) = 17.35
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.40 = 1520.00 FEET.

*****
FLOW PROCESS FROM NODE 16.40 TO NODE 16.40 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.35
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.777
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 3.09 0.30 0.100 36
PUBLIC PARK B 2.54 0.30 0.850 36
PUBLIC PARK B 2.54 0.30 0.850 36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566
SUBAREA AREA(ACRES) = 8.17 SUBAREA RUNOFF(CFS) = 4.46
EFFECTIVE AREA(ACRES) = 15.21 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.29 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 15.2 PEAK FLOW RATE(CFS) = 8.57

*****
FLOW PROCESS FROM NODE 16.40 TO NODE 16.50 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 390.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.34
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.57
PIPE TRAVEL TIME(MIN.) = 1.03 Tc(MIN.) = 18.38
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.50 = 1910.00 FEET.

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.38
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.751
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.85 0.20 0.100 57
CONDOMINIUMS D 2.51 0.20 0.350 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 4.36 SUBAREA RUNOFF(CFS) = 2.76
EFFECTIVE AREA(ACRES) = 19.57 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 19.6 PEAK FLOW RATE(CFS) = 10.99

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.60 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 950.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.82
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.99
PIPE TRAVEL TIME(MIN.) = 2.32 Tc(MIN.) = 20.70
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.60 = 2860.00 FEET.

*****
FLOW PROCESS FROM NODE 16.60 TO NODE 16.60 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.70
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.702
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK D 2.21 0.20 0.850 57
COMMERCIAL D 2.81 0.20 0.100 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.430
SUBAREA AREA(ACRES) = 5.02 SUBAREA RUNOFF(CFS) = 2.78
EFFECTIVE AREA(ACRES) = 24.59 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 24.6 PEAK FLOW RATE(CFS) = 12.90

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 12.90 20.70 0.702 0.27( 0.12) 0.45 24.6 16.10
LONGEST FLOWPATH FROM NODE 16.10 TO NODE 16.50 = 2860.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 47.09 14.09 0.875 0.33( 0.13) 0.40 69.7 13.00
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.50 = 3100.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 58.49 14.09 0.875 0.32( 0.13) 0.41 86.4 13.00
2 48.98 20.70 0.702 0.31( 0.13) 0.42 94.3 16.10
TOTAL AREA(ACRES) = 94.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 58.49 Tc(MIN.) = 14.093
EFFECTIVE AREA(ACRES) = 86.44 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.31 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 94.3
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 16.50 = 3100.00 FEET.

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 16.50 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 16.50 TO NODE 17.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0050
FLOW LENGTH(FEET) = 1230.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.90
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 58.49
PIPE TRAVEL TIME(MIN.) = 2.60 Tc(MIN.) = 16.69
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 17.00 = 4330.00 FEET.

*****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.69
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.794
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" A 8.07 0.40 1.000 28
RESIDENTIAL

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"11+ DWELLINGS/ACRE"      A      6.11      0.40      0.200      17
COMMERCIAL                 A      3.62      0.40      0.100      17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.542
SUBAREA AREA(ACRES) = 17.80      SUBAREA RUNOFF(CFS) = 9.25
EFFECTIVE AREA(ACRES) = 104.24      AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.34      AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 112.1      PEAK FLOW RATE(CFS) = 60.81

*****
FLOW PROCESS FROM NODE      17.00 TO NODE      18.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00      MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.19
ESTIMATED PIPE DIAMETER(INCH) = 36.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 60.81
PIPE TRAVEL TIME(MIN.) = 0.44      Tc(MIN.) = 17.13
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      18.00 = 4600.00 FEET.

*****
FLOW PROCESS FROM NODE      18.00 TO NODE      18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.13
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.782
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
NATURAL FAIR COVER
"OPEN BRUSH"      A      2.09      0.40      1.000      28
NATURAL POOR COVER
"BARREN"      A      4.65      0.40      1.000      61
COMMERCIAL      A      2.82      0.40      0.100      17
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A      13.94      0.40      0.200      17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.417
SUBAREA AREA(ACRES) = 23.50      SUBAREA RUNOFF(CFS) = 13.02
EFFECTIVE AREA(ACRES) = 127.74      AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35      AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 135.6      PEAK FLOW RATE(CFS) = 72.72

*****
FLOW PROCESS FROM NODE      18.00 TO NODE      19.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 610.00
REPRESENTATIVE CHANNEL SLOPE = 0.0100
CHANNEL BASE(FEET) = 35.00      "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015      MAXIMUM DEPTH(FEET) = 3.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.736
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
NATURAL FAIR COVER
"OPEN BRUSH"      A      2.68      0.40      1.000      28
RESIDENTIAL
"11+ DWELLINGS/ACRE"      A      9.73      0.40      0.200      17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.373
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 76.00
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.29
AVERAGE FLOW DEPTH(FEET) = 0.40      TRAVEL TIME(MIN.) = 1.92
Tc(MIN.) = 19.05
SUBAREA AREA(ACRES) = 12.41      SUBAREA RUNOFF(CFS) = 6.56
EFFECTIVE AREA(ACRES) = 140.15      AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35      AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 148.0      PEAK FLOW RATE(CFS) = 73.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.39      FLOW VELOCITY(FEET/SEC.) = 5.25
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      19.00 = 5210.00 FEET.

*****
FLOW PROCESS FROM NODE      19.00 TO NODE      20.00 IS CODE = 51

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-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 360.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.661
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.58 0.40 0.100 17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 74.39
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.53
AVERAGE FLOW DEPTH(FEET) = 0.37 TRAVEL TIME(MIN.) = 3.92
Tc(MIN.) = 22.98
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 0.88
EFFECTIVE AREA(ACRES) = 141.73 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.35 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 149.6 PEAK FLOW RATE(CFS) = 73.95
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 FLOW VELOCITY(FEET/SEC.) = 1.52
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11
-----
>>>>>CONFLUENCE MEMORY BANK # 3 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 73.95 22.98 0.661 0.35( 0.15) 0.42 141.7 13.00
2 62.40 30.13 0.566 0.35( 0.15) 0.42 149.6 16.10
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 54.38 13.95 0.880 0.20( 0.09) 0.45 74.1 11.01
2 55.97 16.59 0.797 0.20( 0.09) 0.44 85.0 11.06
3 50.04 37.09 0.502 0.20( 0.09) 0.46 132.3 1.00
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 20.00 = 5440.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 118.49 13.95 0.880 0.28( 0.12) 0.43 160.1 11.01
2 123.51 16.59 0.797 0.28( 0.12) 0.43 187.3 11.06
3 128.07 22.98 0.661 0.29( 0.12) 0.43 241.5 13.00
4 114.45 30.13 0.566 0.28( 0.12) 0.44 265.8 16.10
5 102.96 37.09 0.502 0.27( 0.12) 0.44 281.9 1.00
TOTAL AREA(ACRES) = 281.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 128.07 Tc(MIN.) = 22.978
EFFECTIVE AREA(ACRES) = 241.45 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 281.9
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 20.00 = 5570.00 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 12
-----
>>>>>CLEAR MEMORY BANK # 3 <<<<<
=====

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 21.00 IS CODE = 51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 570.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00

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* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.591
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE                GROUP   (ACRES)   (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A      11.87    0.40    0.200    17
NATURAL FAIR COVER
"OPEN BRUSH"            D      5.63     0.20    1.000    67
COMMERCIAL              A      1.56     0.40    0.100    17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.428
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 132.18
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.91
AVERAGE FLOW DEPTH(FEET) = 0.52 TRAVEL TIME(MIN.) = 4.97
Tc(MIN.) = 27.95
SUBAREA AREA(ACRES) = 19.06 SUBAREA RUNOFF(CFS) = 8.21
EFFECTIVE AREA(ACRES) = 260.51 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 300.9 PEAK FLOW RATE(CFS) = 128.07
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.51 FLOW VELOCITY(FEET/SEC.) = 1.90
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 21.00 = 6140.00 FEET.

*****
FLOW PROCESS FROM NODE 21.00 TO NODE 22.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 600.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.535
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE                GROUP   (ACRES)   (INCH/HR) (DECIMAL) CN
COMMERCIAL              A      1.73     0.40    0.100    17
NATURAL FAIR COVER
"OPEN BRUSH"            D      4.03     0.20    1.000    67
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.730
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 129.06
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.89
AVERAGE FLOW DEPTH(FEET) = 0.51 TRAVEL TIME(MIN.) = 5.28
Tc(MIN.) = 33.23
SUBAREA AREA(ACRES) = 5.76 SUBAREA RUNOFF(CFS) = 1.98
EFFECTIVE AREA(ACRES) = 266.27 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 306.7 PEAK FLOW RATE(CFS) = 128.07
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.51 FLOW VELOCITY(FEET/SEC.) = 1.90
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 22.00 = 6740.00 FEET.

*****
FLOW PROCESS FROM NODE 22.00 TO NODE 23.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 450.00
REPRESENTATIVE CHANNEL SLOPE = 0.0050
CHANNEL BASE(FEET) = 130.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.035 MAXIMUM DEPTH(FEET) = 6.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.502
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp      Ap      SCS
LAND USE                GROUP   (ACRES)   (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    A      3.62     0.40    0.200    17
NATURAL FAIR COVER
"OPEN BRUSH"            D      4.01     0.20    1.000    67
COMMERCIAL              A      1.68     0.40    0.100    17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 129.65
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.90
AVERAGE FLOW DEPTH(FEET) = 0.51 TRAVEL TIME(MIN.) = 3.94
Tc(MIN.) = 37.17

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SUBAREA AREA(ACRES) = 9.31 SUBAREA RUNOFF(CFS) = 3.16
 EFFECTIVE AREA(ACRES) = 275.58 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.44
 TOTAL AREA(ACRES) = 316.0 PEAK FLOW RATE(CFS) = 128.07
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.51 FLOW VELOCITY(FEET/SEC.) = 1.90
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 23.00 = 7190.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 316.0 TC(MIN.) = 37.17
 EFFECTIVE AREA(ACRES) = 275.58 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.443
 PEAK FLOW RATE(CFS) = 128.07

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	118.49	28.53	0.584	0.27(0.12)	0.45	194.3	11.01
2	123.51	30.97	0.557	0.27(0.12)	0.44	221.4	11.06
3	128.07	37.17	0.502	0.28(0.12)	0.44	275.6	13.00
4	114.45	44.94	0.450	0.27(0.12)	0.45	299.9	16.10
5	102.96	52.50	0.411	0.27(0.12)	0.45	316.0	1.00

END OF RATIONAL METHOD ANALYSIS

Drainage B

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2007 Advanced Engineering Software (aes)
Ver. 13.5 Release Date: 02/06/2007 License ID 1355

Analysis prepared by:

FILE NAME: P002_B.DAT
TIME/DATE OF STUDY: 09:38 04/09/2008
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE($\log(I; \text{IN/HR})$ vs. $\log(T_c; \text{MIN})$) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
 HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
 WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

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

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 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) = 110.00 DOWNSTREAM(FEET) = 107.00

$T_c = K * [(\text{LENGTH} ** 3.00) / (\text{ELEVATION CHANGE})] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 7.477

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.259

SUBAREA T_c AND LOSS RATE DATA(AMC I):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	D	0.54	0.20	0.100	57	7.48

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

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100

SUBAREA RUNOFF(CFS) = 0.60

TOTAL AREA(ACRES) = 0.54 PEAK FLOW RATE(CFS) = 0.60

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 62

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.018

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.90
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.20
HALFSTREET FLOOD WIDTH(Feet) = 2.00
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.17
PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 0.43
STREET FLOW TRAVEL TIME(Min.) = 2.69 Tc(Min.) = 10.16
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.056
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.63 0.20 0.100 57
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 0.59
EFFECTIVE AREA(ACRES) = 1.17 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 1.09

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.22 HALFSTREET FLOOD WIDTH(Feet) = 3.34
FLOW VELOCITY(Feet/Sec.) = 1.86 DEPTH*VELOCITY(Ft*Ft/Sec.) = 0.41
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 650.00 FEET.

*****
FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 400.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.37
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.24
HALFSTREET FLOOD WIDTH(Feet) = 4.53
AVERAGE FLOW VELOCITY(Feet/Sec.) = 1.82
PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 0.44
STREET FLOW TRAVEL TIME(Min.) = 3.67 Tc(Min.) = 13.83
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.885
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.72 0.20 0.100 57
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.72 SUBAREA RUNOFF(CFS) = 0.56
EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 1.47

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.25 HALFSTREET FLOOD WIDTH(Feet) = 4.84
FLOW VELOCITY(Feet/Sec.) = 1.82 DEPTH*VELOCITY(Ft*Ft/Sec.) = 0.45
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 1050.00 FEET.

*****
FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 500.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.74
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.32
HALFSTREET FLOOD WIDTH(Feet) = 8.84
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.10
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.67
STREET FLOW TRAVEL TIME(Min.) = 3.97 Tc(Min.) = 17.81
* 2 YEAR RAINFALL INTENSITY(Inch/Hr) = 0.765
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 6.76 0.20 0.100 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 6.76 SUBAREA RUNOFF(CFS) = 4.53
EFFECTIVE AREA(Acres) = 8.65 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(Acres) = 8.7 PEAK FLOW RATE(CFS) = 5.80

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.36 HALFSTREET FLOOD WIDTH(Feet) = 10.98
FLOW VELOCITY(Feet/Sec.) = 2.28 DEPTH*VELOCITY(Feet*Feet/Sec.) = 0.82
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 1550.00 Feet.

*****
FLOW PROCESS FROM NODE 54.00 TO NODE 55.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 600.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.02
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.39
HALFSTREET FLOOD WIDTH(Feet) = 12.70
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.46
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 0.96
STREET FLOW TRAVEL TIME(Min.) = 4.07 Tc(Min.) = 21.88
* 2 YEAR RAINFALL INTENSITY(Inch/Hr) = 0.680
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (Acres) (Inch/Hr) (Decimal) CN
COMMERCIAL D 7.46 0.20 0.100 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(Acres) = 7.46 SUBAREA RUNOFF(CFS) = 4.43
EFFECTIVE AREA(Acres) = 16.11 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(Acres) = 16.1 PEAK FLOW RATE(CFS) = 9.57

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.41 HALFSTREET FLOOD WIDTH(Feet) = 13.71
FLOW VELOCITY(Feet/Sec.) = 2.55 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.04
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 55.00 = 2150.00 Feet.

*****
FLOW PROCESS FROM NODE 55.00 TO NODE 56.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 500.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.97
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.41
HALFSTREET FLOOD WIDTH(Feet) = 13.95
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.58
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.06
STREET FLOW TRAVEL TIME(Min.) = 3.23 Tc(Min.) = 25.11
* 2 YEAR RAINFALL INTENSITY(Inch/Hr) = 0.628
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (Inch/Hr) (Decimal) CN
COMMERCIAL D 1.47 0.20 0.100 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.47 SUBAREA RUNOFF(CFS) = 0.80
EFFECTIVE AREA(ACRES) = 17.58 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 17.6 PEAK FLOW RATE(CFS) = 9.62

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.41 HALFSTREET FLOOD WIDTH(Feet) = 13.71
FLOW VELOCITY(Feet/Sec.) = 2.57 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.05
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 2650.00 FEET.

*****
FLOW PROCESS FROM NODE 56.00 TO NODE 57.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 580.00 CURB HEIGHT(Inches) = 8.0
STREET HALFWIDTH(Feet) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(Decimal) = 0.018
OUTSIDE STREET CROSSFALL(Decimal) = 0.018

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.73
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.44
HALFSTREET FLOOD WIDTH(Feet) = 15.43
AVERAGE FLOW VELOCITY(Feet/Sec.) = 2.74
PRODUCT OF DEPTH&VELOCITY(Feet*Feet/Sec.) = 1.20
STREET FLOW TRAVEL TIME(Min.) = 3.52 Tc(Min.) = 28.63
* 2 YEAR RAINFALL INTENSITY(Inch/Hr) = 0.583
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (Inch/Hr) (Decimal) CN
COMMERCIAL D 12.28 0.20 0.100 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(Inch/Hr) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 12.28 SUBAREA RUNOFF(CFS) = 6.22
EFFECTIVE AREA(ACRES) = 29.86 AREA-AVERAGED Fm(Inch/Hr) = 0.02
AREA-AVERAGED Fp(Inch/Hr) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 29.9 PEAK FLOW RATE(CFS) = 15.12

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.46 HALFSTREET FLOOD WIDTH(Feet) = 16.60
FLOW VELOCITY(Feet/Sec.) = 2.85 DEPTH*VELOCITY(Feet*Feet/Sec.) = 1.31
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 57.00 = 3230.00 FEET.

*****
FLOW PROCESS FROM NODE 57.00 TO NODE 58.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====

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```

REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(Feet) = 680.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(Feet) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.06
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.52
HALFSTREET FLOOD WIDTH(Feet) = 19.96
AVERAGE FLOW VELOCITY(Feet/Sec.) = 3.21
PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 1.66
STREET FLOW TRAVEL TIME(Min.) = 3.53 Tc(Min.) = 32.16
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.545
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 29.81 0.20 0.100 57
SCHOOL D 9.91 0.20 0.600 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.225
SUBAREA AREA(ACRES) = 39.72 SUBAREA RUNOFF(CFS) = 17.87
EFFECTIVE AREA(ACRES) = 69.58 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 69.6 PEAK FLOW RATE(CFS) = 31.98

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.56 HALFSTREET FLOOD WIDTH(Feet) = 22.38
FLOW VELOCITY(Feet/Sec.) = 3.43 DEPTH*VELOCITY(Ft*Ft/Sec.) = 1.93
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 58.00 = 3910.00 FEET.

*****
FLOW PROCESS FROM NODE 58.00 TO NODE 59.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(Feet) = 760.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.7 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 8.85
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.98
PIPE TRAVEL TIME(Min.) = 1.43 Tc(Min.) = 33.59
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 59.00 = 4670.00 FEET.

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 59.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(Min.) = 33.59
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.532
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 11.44 0.20 0.100 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 11.44 SUBAREA RUNOFF(CFS) = 5.27
EFFECTIVE AREA(ACRES) = 81.02 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.16
TOTAL AREA(ACRES) = 81.0 PEAK FLOW RATE(CFS) = 36.41

*****
FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(Feet) = 580.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.0 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 9.01
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 36.41

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```

PIPE TRAVEL TIME(MIN.) = 1.07    Tc(MIN.) = 34.67
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 60.00 = 5250.00 FEET.

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 34.67
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.522
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL              D      13.88    0.20    0.100    57
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D       4.45    0.20    0.200    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.124
SUBAREA AREA(ACRES) = 18.33    SUBAREA RUNOFF(CFS) = 8.20
EFFECTIVE AREA(ACRES) = 99.35    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 99.4    PEAK FLOW RATE(CFS) = 43.91

*****
FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
CHANNEL LENGTH THRU SUBAREA(Feet) = 940.00
REPRESENTATIVE CHANNEL SLOPE = 0.0350
CHANNEL BASE(Feet) = 15.00    "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030    MAXIMUM DEPTH(Feet) = 7.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.499
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"            D      24.16    0.20    1.000    67
CONDOMINIUMS            D       4.43    0.20    0.350    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.899
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 48.03
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 5.63
AVERAGE FLOW DEPTH(Feet) = 0.52    TRAVEL TIME(MIN.) = 2.78
Tc(MIN.) = 37.45
SUBAREA AREA(ACRES) = 28.59    SUBAREA RUNOFF(CFS) = 8.22
EFFECTIVE AREA(ACRES) = 127.94    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 127.9    PEAK FLOW RATE(CFS) = 50.11

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.53    FLOW VELOCITY(Feet/Sec.) = 5.69
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 61.00 = 6190.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 127.9    Tc(MIN.) = 37.45
EFFECTIVE AREA(ACRES) = 127.94    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.321
PEAK FLOW RATE(CFS) = 50.11
=====
END OF RATIONAL METHOD ANALYSIS

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Drainage C

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*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2007 Advanced Engineering Software (aes)
Ver. 13.5 Release Date: 02/06/2007 License ID 1355

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Analysis prepared by:

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-----
FILE NAME: P002_C.DAT
TIME/DATE OF STUDY: 09:38 04/09/2008
=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

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USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

```

```

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5740
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3810

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ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD

```

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
  HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
  WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

```

```

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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*****
FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 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) = 108.00 DOWNSTREAM(FEET) = 106.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.003
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.878
SUBAREA Tc AND LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN" D 1.53 0.20 1.000 83 14.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.93
TOTAL AREA(ACRES) = 1.53 PEAK FLOW RATE(CFS) = 0.93

```

```

*****
FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 62
-----

```

```

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

```

```

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.18
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.28
HALFSTREET FLOOD WIDTH(Feet) = 6.53
AVERAGE FLOW VELOCITY(Feet/Sec.) = 1.90
PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) = 0.53
STREET FLOW TRAVEL TIME(Min.) = 3.08 Tc(Min.) = 17.08
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.784
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"BARREN" D 4.73 0.20 1.000 83
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.73 SUBAREA RUNOFF(CFS) = 2.48
EFFECTIVE AREA(ACRES) = 6.26 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 6.3 PEAK FLOW RATE(CFS) = 3.29

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.31 HALFSTREET FLOOD WIDTH(Feet) = 8.28
FLOW VELOCITY(Feet/Sec.) = 2.04 DEPTH*VELOCITY(Ft*Ft/Sec.) = 0.63
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 650.00 FEET.

FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(Feet) = 360.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 9.5 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 4.91
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.29
PIPE TRAVEL TIME(Min.) = 1.22 Tc(Min.) = 18.30
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.00 = 1010.00 FEET.

FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81

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

MAINLINE Tc(Min.) = 18.30
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.753
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 2.81 0.20 0.100 57
CONDOMINIUMS D 2.09 0.20 0.350 57
CONDOMINIUMS D 3.05 0.20 0.350 57
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.262
SUBAREA AREA(ACRES) = 7.95 SUBAREA RUNOFF(CFS) = 5.01
EFFECTIVE AREA(ACRES) = 14.21 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 14.2 PEAK FLOW RATE(CFS) = 8.13

FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(Feet) = 250.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.4 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 6.29
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.13
PIPE TRAVEL TIME(Min.) = 0.66 Tc(Min.) = 18.97
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 84.00 = 1260.00 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.97
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.738
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      0.73    0.20    0.100    57
CONDOMINIUMS         D      1.21    0.20    0.350    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.256
SUBAREA AREA(ACRES) = 1.94    SUBAREA RUNOFF(CFS) = 1.20
EFFECTIVE AREA(ACRES) = 16.15    AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 16.1    PEAK FLOW RATE(CFS) = 9.14

*****
FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 180.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.39
ESTIMATED PIPE DIAMETER(INCH) = 18.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.14
PIPE TRAVEL TIME(MIN.) = 0.47    Tc(MIN.) = 19.43
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 1440.00 FEET.

*****
FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.43
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.728
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D      0.32    0.20    0.100    57
CONDOMINIUMS         D      2.49    0.20    0.350    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.322
SUBAREA AREA(ACRES) = 2.81    SUBAREA RUNOFF(CFS) = 1.68
EFFECTIVE AREA(ACRES) = 18.96    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 19.0    PEAK FLOW RATE(CFS) = 10.66

*****
FLOW PROCESS FROM NODE 85.00 TO NODE 86.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 340.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.78
ESTIMATED PIPE DIAMETER(INCH) = 21.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.66
PIPE TRAVEL TIME(MIN.) = 0.84    Tc(MIN.) = 20.27
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 86.00 = 1780.00 FEET.

*****
FLOW PROCESS FROM NODE 86.00 TO NODE 86.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.27
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.710
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS         D      3.14    0.20    0.350    57
COMMERCIAL            D      0.62    0.20    0.100    57
PUBLIC PARK           D      1.37    0.20    0.850    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.453
SUBAREA AREA(ACRES) = 5.13    SUBAREA RUNOFF(CFS) = 2.86
EFFECTIVE AREA(ACRES) = 24.09    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.50

```

```

TOTAL AREA(ACRES) =      24.1      PEAK FLOW RATE(CFS) =      13.23
*****
FLOW PROCESS FROM NODE      86.00 TO NODE      87.00 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.05
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.23
PIPE TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 21.76
LONGEST FLOWPATH FROM NODE      80.00 TO NODE      87.00 = 2410.00 FEET.
*****
FLOW PROCESS FROM NODE      87.00 TO NODE      87.00 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.76
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.682
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
CONDOMINIUMS      D      3.51      0.20      0.350      57
COMMERCIAL      D      1.12      0.20      0.100      57
NATURAL FAIR COVER
"OPEN BRUSH"      D      0.43      0.20      1.000      67
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.06 SUBAREA RUNOFF(CFS) = 2.79
EFFECTIVE AREA(ACRES) = 29.15 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 29.1 PEAK FLOW RATE(CFS) = 15.40
*****
FLOW PROCESS FROM NODE      87.00 TO NODE      88.00 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.43
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.40
PIPE TRAVEL TIME(MIN.) = 0.63 Tc(MIN.) = 22.39
LONGEST FLOWPATH FROM NODE      80.00 TO NODE      88.00 = 2690.00 FEET.
*****
FLOW PROCESS FROM NODE      88.00 TO NODE      88.00 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.39
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.671
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
CONDOMINIUMS      D      5.34      0.20      0.350      57
COMMERCIAL      D      0.48      0.20      0.100      57
CONDOMINIUMS      D      2.16      0.20      0.350      57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335
SUBAREA AREA(ACRES) = 7.98 SUBAREA RUNOFF(CFS) = 4.34
EFFECTIVE AREA(ACRES) = 37.13 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 37.1 PEAK FLOW RATE(CFS) = 19.45
*****
FLOW PROCESS FROM NODE      88.00 TO NODE      89.00 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.74

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ESTIMATED PIPE DIAMETER(INCH) = 24.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.45
PIPE TRAVEL TIME(MIN.) = 0.58    Tc(MIN.) = 22.97
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 89.00 = 2960.00 FEET.

*****
FLOW PROCESS FROM NODE 89.00 TO NODE 89.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.97
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.661
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS        D        2.41    0.20    0.350  57
COMMERCIAL           D        2.55    0.20    0.100  57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.221
SUBAREA AREA(ACRES) = 4.96    SUBAREA RUNOFF(CFS) = 2.75
EFFECTIVE AREA(ACRES) = 42.09    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 42.1    PEAK FLOW RATE(CFS) = 21.87

*****
FLOW PROCESS FROM NODE 89.00 TO NODE 97.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 560.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.10
ESTIMATED PIPE DIAMETER(INCH) = 27.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.87
PIPE TRAVEL TIME(MIN.) = 1.15    Tc(MIN.) = 24.12
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
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) = 108.00    DOWNSTREAM(FEET) = 107.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.314
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.110
SUBAREA Tc AND LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS    Tc
LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL           D        0.88    0.20    0.100  57    9.31
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.86
TOTAL AREA(ACRES) = 0.88    PEAK FLOW RATE(CFS) = 0.86

*****
FLOW PROCESS FROM NODE 91.00 TO NODE 92.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
STREET LENGTH(FEET) = 260.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

```

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.32
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.24
HALFSTREET FLOOD WIDTH(FEET) = 4.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.82
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.44
STREET FLOW TRAVEL TIME(MIN.) = 2.38 Tc(MIN.) = 11.70
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.974
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.06 0.20 0.100 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 0.91
EFFECTIVE AREA(ACRES) = 1.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 1.67

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.26 HALFSTREET FLOOD WIDTH(FEET) = 5.41
FLOW VELOCITY(FEET/SEC.) = 1.83 DEPTH*VELOCITY(FT*FT/SEC.) = 0.47
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 92.00 = 560.00 FEET.

FLOW PROCESS FROM NODE 92.00 TO NODE 93.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.29
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.67
PIPE TRAVEL TIME(MIN.) = 2.45 Tc(MIN.) = 14.14
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 93.00 = 1190.00 FEET.

FLOW PROCESS FROM NODE 93.00 TO NODE 93.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.14
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.873
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 5.84 0.20 0.350 57
COMMERCIAL D 2.34 0.20 0.100 57
CONDOMINIUMS D 8.66 0.20 0.350 57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.315
SUBAREA AREA(ACRES) = 16.84 SUBAREA RUNOFF(CFS) = 12.28
EFFECTIVE AREA(ACRES) = 18.78 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 18.8 PEAK FLOW RATE(CFS) = 13.77

FLOW PROCESS FROM NODE 93.00 TO NODE 94.00 IS CODE = 31

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

REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.09
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.77
PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 14.71
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 94.00 = 1430.00 FEET.

FLOW PROCESS FROM NODE 94.00 TO NODE 94.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.71
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.854

```

SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK            D        3.80    0.20    0.850    57
COMMERCIAL             D        0.27    0.20    0.100    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.800
SUBAREA AREA(ACRES) = 4.07 SUBAREA RUNOFF(CFS) = 2.54
EFFECTIVE AREA(ACRES) = 22.85 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 22.9 PEAK FLOW RATE(CFS) = 15.98

*****
FLOW PROCESS FROM NODE 94.00 TO NODE 95.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.49
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.98
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 15.13
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 95.00 = 1620.00 FEET.

*****
FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.13
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.840
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL            D        0.20    0.20    0.100    57
CONDOMINIUMS         D        2.24    0.20    0.350    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA(ACRES) = 2.44 SUBAREA RUNOFF(CFS) = 1.70
EFFECTIVE AREA(ACRES) = 25.29 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 25.3 PEAK FLOW RATE(CFS) = 17.40

*****
FLOW PROCESS FROM NODE 95.00 TO NODE 96.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 310.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.61
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.40
PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 15.81
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 96.00 = 1930.00 FEET.

*****
FLOW PROCESS FROM NODE 96.00 TO NODE 96.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.81
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.819
SUBAREA LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK            D        5.07    0.20    0.850    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 5.07 SUBAREA RUNOFF(CFS) = 2.96
EFFECTIVE AREA(ACRES) = 30.36 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 30.4 PEAK FLOW RATE(CFS) = 19.89

*****
FLOW PROCESS FROM NODE 96.00 TO NODE 97.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

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>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 230.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.76
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.89
PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 16.30
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 97.00 = 2160.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 11
-----
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
=====

** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 19.89 16.30 0.805 0.20( 0.09) 0.46 30.4 90.00
LONGEST FLOWPATH FROM NODE 90.00 TO NODE 97.00 = 2160.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 21.87 24.12 0.643 0.20( 0.08) 0.42 42.1 80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 38.96 16.30 0.805 0.20( 0.09) 0.44 58.8 90.00
2 37.24 24.12 0.643 0.20( 0.09) 0.43 72.4 80.00
TOTAL AREA(ACRES) = 72.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 38.96 Tc(MIN.) = 16.303
EFFECTIVE AREA(ACRES) = 58.81 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 72.4
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 97.00 = 3520.00 FEET.

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 97.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 97.00 TO NODE 98.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 280.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 21.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.33
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.96
PIPE TRAVEL TIME(MIN.) = 0.50 Tc(MIN.) = 16.80
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 98.00 = 3800.00 FEET.

*****
FLOW PROCESS FROM NODE 98.00 TO NODE 98.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.80
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.791
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" D 22.13 0.20 1.000 67
NATURAL POOR COVER
"BARREN" D 9.76 0.20 1.000 83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 31.89 SUBAREA RUNOFF(CFS) = 16.96
EFFECTIVE AREA(ACRES) = 90.70 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.64

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TOTAL AREA(ACRES) =      104.3      PEAK FLOW RATE(CFS) =      54.19
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =      104.3      TC(MIN.) =      16.80
EFFECTIVE AREA(ACRES) =      90.70      AREA-AVERAGED Fm(INCH/HR)=      0.13
AREA-AVERAGED Fp(INCH/HR) =      0.20      AREA-AVERAGED Ap =      0.636
PEAK FLOW RATE(CFS)    =      54.19

** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)      NODE
    1      54.19   16.80    0.791  0.20( 0.13) 0.64      90.7      90.00
    2      48.23   24.64    0.635  0.20( 0.12) 0.61     104.3      80.00
=====
=====
END OF RATIONAL METHOD ANALYSIS

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B3 Existing Condition Small Area Unit Hydrograph Calculations

a) High Confidence Events

i. Infiltration Analysis

INFILTRATION RATE CALCULATION SUMMARY
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
100-YEAR HIGH-CONFIDENCE EVENT

Existing Condition											
Node	A	B	C	D	E	F	G	H	I	J	K
Total Area (ac)	349.56	135.09	63.61	14.29	97.15	5.80	1.75	6.99	1.06	11.00	6.30
Y	0.89	0.95	0.89	0.93	0.96	0.84	0.84	0.84	0.84	0.84	0.84
Ybar	0.11	0.05	0.11	0.07	0.04	0.16	0.16	0.16	0.16	0.16	0.16
Average a_p	0.64	0.37	1.00	0.68	0.30	0.20	0.20	0.20	0.20	0.20	0.20
Total Fm (in/hr)	0.15	0.07	0.20	0.14	0.06	0.08	0.08	0.08	0.08	0.08	0.08

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
100-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA A

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 100-Year Storm Event for Non-Mountainous Area (in) = 5.63

Total Area (ac) = 349.56

ap - See Figure C-4

P24, 100-Year Storm Event for Mountainous Area (in) = 11.27

Y = 0.89

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.11**

Average ap = 0.64

Total Fm (in/hr) = **0.15**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	7.57	A	Pervious	0.76	0.002	52	9.23	1.85	0.20	0.000	0.10	0.40	0.04	0.001
					Impervious	6.81	0.019	100	0.00	0.00	1.00	0.019				
2	Urban Cover - Roadway	10%	2.65	D	Pervious	0.27	0.001	91	0.99	0.20	0.82	0.001	0.10	0.20	0.02	0.000
					Impervious	2.39	0.007	100	0.00	0.00	1.00	0.007				
3	Single Family Residential (>10 dwellings/acre)	20%	45.27	A	Pervious	9.05	0.026	52	9.23	1.85	0.20	0.005	0.20	0.40	0.08	0.010
					Impervious	36.22	0.104	100	0.00	0.00	1.00	0.104				
4	Single Family Residential (>10 dwellings/acre)	20%	31.84	B	Pervious	6.37	0.018	76	3.16	0.63	0.54	0.010	0.20	0.30	0.06	0.005
					Impervious	25.47	0.073	100	0.00	0.00	1.00	0.073				
5	Single Family Residential (>10 dwellings/acre)	20%	26.51	D	Pervious	5.30	0.015	91	0.99	0.20	0.82	0.012	0.20	0.20	0.04	0.003
					Impervious	21.21	0.061	100	0.00	0.00	1.00	0.061				
6	Commercial / Industrial	10%	31.91	D	Pervious	3.19	0.009	91	0.99	0.20	0.82	0.007	0.10	0.20	0.02	0.002
					Impervious	28.72	0.082	100	0.00	0.00	1.00	0.082				
7	Oil Operations	100%	11.89	D	Pervious	11.89	0.034	99	0.10	0.02	0.98	0.033	1.00	0.20	0.20	0.007
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				
8	Open Space / Habitat Area	100%	16.64	A	Pervious	16.64	0.048	66	5.15	1.03	0.39	0.018	1.00	0.40	0.40	0.019
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				
9	Oxbow Loop Channel	10%	6.55	A	Pervious	0.66	0.002	93	0.75	0.15	0.86	0.002	0.10	0.40	0.04	0.001
					Impervious	5.90	0.017	100	0.00	0.00	1.00	0.017				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	4.78	A	Pervious	4.78	0.014	93	0.75	0.15	0.86	0.012	1.00	0.40	0.40	0.005
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				
2	Oil Operations / Barren Area	100%	10.98	D	Pervious	10.98	0.031	93	0.75	0.15	0.86	0.027	1.00	0.20	0.20	0.006
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				
3	Open Space / Habitat Area	100%	152.97	D	Pervious	152.97	0.438	96	0.42	0.08	0.92	0.401	1.00	0.20	0.20	0.088
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				

Total Area = **349.56**

Y = **0.89**

Total F_m = **0.15**

Ybar = 1 - Y = **0.11**

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
100-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA B

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 100-Year Storm Event for Non-Mountainous Area (in) = 5.63

Total Area (ac) = 135.09

a_p - See Figure C-4

P24, 100-Year Storm Event for Mountainous Area (in) = 11.27

Y = 0.95

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.05**

Average a_p = 0.37

Total F_m (in/hr) = **0.07**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	5.35	D	Pervious	0.54	0.004	91	0.99	0.20	0.82	0.003	0.10	0.20	0.02	0.001
					Impervious	4.82	0.036	100	0.00	0.00	1.00	0.036				
2	Single Family Residential (>10 dwellings/acre)	20%	5.94	D	Pervious	1.19	0.009	91	0.99	0.20	0.82	0.007	0.20	0.20	0.04	0.002
					Impervious	4.75	0.035	100	0.00	0.00	1.00	0.035				
3	Commercial / Industrial	10%	80.09	D	Pervious	8.01	0.059	91	0.99	0.20	0.82	0.048	0.10	0.20	0.02	0.012
					Impervious	72.08	0.534	100	0.00	0.00	1.00	0.534				
4	School	60%	9.91	D	Pervious	5.95	0.044	91	0.99	0.20	0.82	0.036	0.60	0.20	0.12	0.009
					Impervious	3.96	0.029	100	0.00	0.00	1.00	0.029				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	12.82	D	Pervious	12.82	0.095	91	0.99	0.20	0.82	0.077	1.00	0.20	0.20	0.019
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				
2	Open Space / Habitat Area	100%	20.98	D	Pervious	20.98	0.155	96	0.42	0.08	0.92	0.142	1.00	0.20	0.20	0.031
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				

Total Area = **135.09**

Y = **0.95**

Total F_m = **0.07**

Ybar = 1 - Y = **0.05**

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
100-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA C

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 100-Year Storm Event for Non-Mountainous Area (in) = 5.63

Total Area (ac) = 63.61

a_p - See Figure C-4

P24, 100-Year Storm Event for Mountainous Area (in) = 11.27

Y = 0.89

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.11**

Average a_p = 1.00

Total F_m (in/hr) = **0.20**

Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	17.24	D	Pervious	17.24	0.271	91	0.99	0.20	0.82	0.221	1.00	0.20	0.20	0.054
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				
2	Open Space / Habitat Area	100%	46.37	D	Pervious	46.37	0.729	96	0.42	0.08	0.92	0.668	1.00	0.20	0.20	0.146
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				

Total Area = **63.61**

Y = **0.89**

Total F_m = **0.20**

Ybar = 1 - Y = **0.11**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA D

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 100-Year Storm Event for Non-Mountainous Area (in) = 5.63

Total Area (ac) = 14.29

a_p - See Figure C-4

P24, 100-Year Storm Event for Mountainous Area (in) = 11.27

Y = 0.93

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.07**

Average a_p = 0.68

Total F_m (in/hr) = **0.14**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	5.68	D	Pervious	1.14	0.079	91	0.99	0.20	0.82	0.065	0.20	0.20	0.04	0.016
					Impervious	4.54	0.318	100	0.00	0.00	1.00	0.318				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Open Space / Habitat Area	100%	8.61	D	Pervious	8.61	0.603	96	0.42	0.08	0.92	0.552	1.00	0.20	0.20	0.121
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				

Total Area = **14.29**

Y = **0.93**

Total F_m = **0.14**

Ybar = 1 - Y = **0.07**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA E

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 100-Year Storm Event for Non-Mountainous Area (in) = 5.63

Total Area (ac) = 97.15

ap - See Figure C-4

P24, 100-Year Storm Event for Mountainous Area (in) = 11.27

Y = 0.96

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.04**

Average ap = 0.30

Total Fm (in/hr) = **0.06**

Offsite Area																	
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m				
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	Single Family Residential (>10 dwellings/acre)	20%	44.48	D	Pervious	8.90	0.092	91	0.99	0.20	0.82	0.075	0.20	0.20	0.04	0.018	
					Impervious	35.58	0.366	100	0.00	0.00	1.00	0.366					
2	Commercial / Industrial	10%	36.05	D	Pervious	3.61	0.037	91	0.99	0.20	0.82	0.030	0.10	0.20	0.02	0.007	
					Impervious	32.45	0.334	100	0.00	0.00	1.00	0.334					
3	Open Space / Habitat Area	100%	16.62	D	Pervious	16.62	0.171	96	0.42	0.08	0.92	0.157	1.00	0.20	0.20	0.034	
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000					
Total Area =			97.15														
										Y =			0.96	Total F _m =			0.06
										Ybar = 1 - Y =			0.04				

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA F to K

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 100-Year Storm Event for Non-Mountainous Area (in) = 5.63

Total Area (ac) = 5.80

ap - See Figure C-4

P24, 100-Year Storm Event for Mountainous Area (in) = 11.27

Y = 0.84

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.16**

Average a_p = 0.20

Total F_m (in/hr) = **0.08**

Offsite Area -F																			
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m						
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)			
1	Single Family Residential (>10 dwellings/acre)	20%	5.80	A	Pervious	1.16	0.200	52	9.23	1.85	0.20	0.039	0.20	0.40	0.08	0.080			
					Impervious	4.64	0.800	100	0.00	0.00	1.00	0.800							
Total Area =				5.80	Y =								0.84	Total F _m =			0.08		
										Ybar = 1 - Y =						0.16			

Offsite Area -G																				
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m							
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)				
1	Single Family Residential (>10 dwellings/acre)	20%	1.75	A	Pervious	0.35	0.200	52	9.23	1.85	0.20	0.039	0.20	0.40	0.08	0.080				
					Impervious	1.40	0.800	100	0.00	0.00	1.00	0.800								
Total Area =				1.75	Y =								0.84	Total F _m =			0.08			
									Ybar = 1 - Y =								0.16			

Offsite Area -H																		
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m					
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)		
1	Single Family Residential (>10 dwellings/acre)	20%	6.99	A	Pervious	1.40	0.200	52	9.23	1.85	0.20	0.039	0.20	0.40	0.08	0.080		
					Impervious	5.59	0.800	100	0.00	0.00	1.00	0.800						
Total Area =				6.99					Y =				0.84	Total F _m =				0.08
									Ybar = 1 - Y =				0.16					

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA F to K

Offsite Area -I																
No.	Land Use	Pervious- ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	1.06	A	Pervious	0.21	0.200	52	9.23	1.85	0.20	0.039	0.20	0.40	0.08	0.080
					Impervious	0.85	0.800	100	0.00	0.00	1.00	0.800				

Total Area = 1.06

Y = 0.84

Total F_m = 0.08

Ybar = 1 - Y = 0.16

Offsite Area -J																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	11.00	A	Pervious	2.20	0.200	52	9.23	1.85	0.20	0.039	0.20	0.40	0.08	0.080
					Impervious	8.80	0.800	100	0.00	0.00	1.00	0.800				

Total Area = 11.00

Y = 0.84

Total F_m = 0.08

Ybar = 1 - Y = 0.16

Offsite Area -K																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	6.30	A	Pervious	1.26	0.200	52	9.23	1.85	0.20	0.039	0.20	0.40	0.08	0.080
					Impervious	5.04	0.800	100	0.00	0.00	1.00	0.800				

Total Area = 6.30

Y = 0.84

Total F_m = 0.08

Ybar = 1 - Y = 0.16

INFILTRATION RATE CALCULATION SUMMARY
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
25-YEAR HIGH-CONFIDENCE EVENT

Existing Condition											
Node	A	B	C	D	E	F	G	H	I	J	K
Total Area (ac)	349.56	135.09	63.61	14.29	97.15	5.80	1.75	6.99	1.06	11.00	6.30
Y	0.69	0.83	0.66	0.70	0.83	0.76	0.76	0.76	0.76	0.76	0.76
Ybar	0.31	0.17	0.34	0.30	0.17	0.24	0.24	0.24	0.24	0.24	0.24
Average a_p	0.64	0.37	1.00	0.68	0.30	0.20	0.20	0.20	0.20	0.20	0.20
Total Fm (in/hr)	0.15	0.07	0.20	0.14	0.06	0.08	0.08	0.08	0.08	0.08	0.08

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
25-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA A

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

CN - See Figure C-1 and C-3

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49
P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

Total Area (ac) = 349.56
Y = 0.69
Ybar = 1 - Y = **0.31**

$$F_m = a_p F_p$$

a_p - See Figure C-4
F_p - See Table C-2
Average a_p = 0.64

Total F_m (in/hr) = **0.15**

Offsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _i
										S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)	
1	9	Urban Cover - Roadway	10%	7.57	A	Pervious	0.76	0.002	32	21.25	4.25	0.00	0.000	0.10	0.40	0.04	0.001	0.002
						Impervious	6.81	0.019	98	0.20	0.04	0.95	0.018					
2	9	Urban Cover - Roadway	10%	2.65	D	Pervious	0.27	0.001	75	3.33	0.67	0.45	0.000	0.10	0.20	0.02	0.000	0.001
						Impervious	2.39	0.007	98	0.20	0.04	0.95	0.006					
3	9	Single Family Residential (>10 dwellings/acre)	20%	45.27	A	Pervious	9.05	0.026	32	21.25	4.25	0.00	0.000	0.20	0.40	0.08	0.010	0.026
						Impervious	36.22	0.104	98	0.20	0.04	0.95	0.098					
4	9	Single Family Residential (>10 dwellings/acre)	20%	31.84	B	Pervious	6.37	0.018	56	7.86	1.57	0.18	0.003	0.20	0.30	0.06	0.005	0.018
						Impervious	25.47	0.073	98	0.20	0.04	0.95	0.069					
5	9	Single Family Residential (>10 dwellings/acre)	20%	26.51	D	Pervious	5.30	0.015	75	3.33	0.67	0.45	0.007	0.20	0.20	0.04	0.003	0.015
						Impervious	21.21	0.061	98	0.20	0.04	0.95	0.057					
6	9	Commercial / Industrial	10%	31.91	D	Pervious	3.19	0.009	75	3.33	0.67	0.45	0.004	0.10	0.20	0.02	0.002	0.009
						Impervious	28.72	0.082	98	0.20	0.04	0.95	0.078					
7	1	Oil Operations	100%	11.89	D	Pervious	11.89	0.034	93	0.75	0.15	0.82	0.028	1.00	0.20	0.20	0.007	0.034
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
8	6	Open Space / Habitat Area	100%	16.64	A	Pervious	16.64	0.048	46	11.74	2.35	0.07	0.004	1.00	0.40	0.40	0.019	0.048
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
9	1	Oxbow Loop Channel	10%	6.55	A	Pervious	0.66	0.002	78	2.82	0.56	0.51	0.001	0.10	0.40	0.04	0.001	0.002
						Impervious	5.90	0.017	98	0.20	0.04	0.95	0.016					

Onsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m				a _p *A _j
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	1	Oil Operations / Barren Area	100%	4.78	A	Pervious	4.78	0.014	78	2.82	0.56	0.51	0.007	1.00	0.40	0.40	0.005	0.014
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
2	1	Oil Operations / Barren Area	100%	10.98	D	Pervious	10.98	0.031	93	0.75	0.15	0.82	0.026	1.00	0.20	0.20	0.006	0.031
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
3	6	Open Space / Habitat Area	100%	152.97	D	Pervious	152.97	0.438	83	2.05	0.41	0.61	0.265	1.00	0.20	0.20	0.088	0.438
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					

Total Area = **349.56**

Y = **0.69**

Total F_m = **0.15** **0.64**

Ybar = 1 - Y = **0.31**

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
25-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA B

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

CN - See Figure C-1 and C-3

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49
P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

Total Area (ac) = 135.09

Y = 0.83

Ybar = 1 - Y = **0.17**

$$F_m = a_p F_p$$

a_p - See Figure C-4

F_p - See Table C-2

Average a_p = 0.37

Total F_m (in/hr) = **0.07**

Offsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _j
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	9	Urban Cover - Roadway	10%	5.35	D	Pervious	0.54	0.004	75	3.33	0.67	0.45	0.002	0.10	0.20	0.02	0.001	0.004
						Impervious	4.82	0.036	98	0.20	0.04	0.95	0.034					
2	9	Single Family Residential (>10 dwellings/acre)	20%	5.94	D	Pervious	1.19	0.009	75	3.33	0.67	0.45	0.004	0.20	0.20	0.04	0.002	0.009
						Impervious	4.75	0.035	98	0.20	0.04	0.95	0.033					
3	9	Commercial / Industrial	10%	80.09	D	Pervious	8.01	0.059	75	3.33	0.67	0.45	0.027	0.10	0.20	0.02	0.012	0.059
						Impervious	72.08	0.534	98	0.20	0.04	0.95	0.506					
4	9	School	60%	9.91	D	Pervious	5.95	0.044	75	3.33	0.67	0.45	0.020	0.60	0.20	0.12	0.009	0.044
						Impervious	3.96	0.029	98	0.20	0.04	0.95	0.028					
Onsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _j
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	1	Oil Operations / Barren Area	100%	12.82	D	Pervious	12.82	0.095	93	0.75	0.15	0.82	0.078	1.00	0.20	0.20	0.019	0.095
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
2	6	Open Space / Habitat Area	100%	20.98	D	Pervious	20.98	0.155	83	2.05	0.41	0.61	0.094	1.00	0.20	0.20	0.031	0.155
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					

Total Area = **135.09**

Y = **0.83**

Total F_m = **0.07** **0.37**

Ybar = 1 - Y = **0.17**

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
25-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA C

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

CN - See Figure C-1 and C-3

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

Total Area (ac) = 63.61

Y = 0.66

Ybar = 1 - Y = **0.34**

$$F_m = a_p F_p$$

a_p - See Figure C-4

F_p - See Table C-2

Average a_p = 1.00

Total F_m (in/hr) = **0.20**

Onsite Area																							
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m				a _p *A _j					
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)						
1	1	Oil Operations / Barren Area	100%	17.24	D	Pervious	17.24	0.271	93	0.75	0.15	0.82	0.223	1.00	0.20	0.20	0.054	0.271					
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000										
2	6	Open Space / Habitat Area	100%	46.37	D	Pervious	46.37	0.729	83	2.05	0.41	0.61	0.441	1.00	0.20	0.20	0.146	0.729					
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000										
Total Area =				63.61		Y = 0.66										Total F _m =		0.20		1.00			
										Ybar = 1 - Y = 0.34													

INFILTRATION RATE CALCULATION SPREADSHEET
PROPOSED NEWPORT BANNING RANCH PROJECT
25-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA D

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

CN - See Figure C-1 and C-3

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

Total Area (ac) = 14.29

Y = 0.70

Ybar = 1 - Y = **0.30**

$$F_m = a_p F_p$$

a_p - See Figure C-4

F_p - See Table C-2

Average a_p = 0.68

Total F_m (in/hr) = **0.14**

Offsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _i
										S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)	
1	9	Single Family Residential (>10 dwellings/acre)	20%	5.68	D	Pervious	1.14	0.079	75	3.33	0.67	0.45	0.036	0.20	0.20	0.04	0.016	0.079
						Impervious	4.54	0.318	98	0.20	0.04	0.95	0.301					
Onsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _i
										S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)	
1	6	Open Space / Habitat Area	100%	8.61	D	Pervious	8.61	0.603	83	2.05	0.41	0.61	0.365	1.00	0.20	0.20	0.121	0.603
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					

Total Area = **14.29**

Y = **0.70**

Total F_m = **0.14** **0.68**

Ybar = 1 - Y = **0.30**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

25-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA E

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

4.49

Total Area (ac) = 97.15

a_p - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

8.76

Y = 0.83

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.17**

Average a_p = 0.30

Total F_m (in/hr) = **0.06**

Offsite Area																					
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m							
										S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)	a _p *A _i			
1	9	Single Family Residential (>10 dwellings/acre)	20%	44.48	D	Pervious	8.90	0.092	75	3.33	0.67	0.45	0.042	0.20	0.20	0.04	0.018	0.092			
						Impervious	35.58	0.366	98	0.20	0.04	0.95	0.347								
2	9	Commercial / Industrial	10%	36.05	D	Pervious	3.61	0.037	75	3.33	0.67	0.45	0.017	0.10	0.20	0.02	0.007	0.037			
						Impervious	32.45	0.334	98	0.20	0.04	0.95	0.316								
3	6	Open Space / Habitat Area	100%	16.62	D	Pervious	16.62	0.171	83	2.05	0.41	0.61	0.104	1.00	0.20	0.20	0.034	0.171			
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000								
Total Area =				97.15	Y = 0.83										Total F _m = 0.06				0.30		
										Y _{bar} = 1 - Y = 0.17											

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

25-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA F to K

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

Total Area (ac) = 5.80

a_p - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Y = 0.76

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.24**

Average a_p = 0.20

Total F_m (in/hr) = **0.08**

Offsite Area -F																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _j
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	9	Single Family Residential (>10 dwellings/acre)	20%	5.80	A	Pervious	1.16	0.200	32	21.25	4.25	0.00	0.000	0.20	0.40	0.08	0.080	0.200
						Impervious	4.64	0.800	98	0.20	0.04	0.95	0.758					
Total Area =				5.80	Y = 0.76										Total F _m = 0.08			0.20
										Ybar = 1 - Y = 0.24								

Offsite Area -G																			
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _j	
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)		
1	9	Single Family Residential (>10 dwellings/acre)	20%	1.75	A	Pervious	0.35	0.200	32	21.25	4.25	0.00	0.000	0.20	0.40	0.08	0.080	0.200	
						Impervious	1.40	0.800	98	0.20	0.04	0.95	0.758						
Total Area =				1.75	Y = 0.76										Total F _m = 0.08			0.20	
										Ybar = 1 - Y = 0.24									

Offsite Area -H																					
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _i			
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)				
1	9	Single Family Residential (>10 dwellings/acre)	20%	6.99	A	Pervious	1.40	0.200	32	21.25	4.25	0.00	0.000	0.20	0.40	0.08	0.080	0.200			
						Impervious	5.59	0.800	98	0.20	0.04	0.95	0.758								
Total Area =				6.99		Y = 0.76										Total F _m =		0.08		0.20	
										Ybar = 1 - Y =				0.24							

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

25-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA F to K

Offsite Area -I																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	a _p *A _j
1	9	Single Family Residential (>10 dwellings/acre)	20%	1.06	A	Pervious	0.21	0.200	32	21.25	4.25	0.00	0.000	0.20	0.40	0.08	0.080	0.200
						Impervious	0.85	0.800	98	0.20	0.04	0.95	0.758					
Total Area =				1.06					Y = 0.76				Total F _m = 0.08				0.20	
										Ybar = 1 - Y = 0.24								

Offsite Area -J																							
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _j					
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)						
1	9	Single Family Residential (>10 dwellings/acre)	20%	11.00	A	Pervious	2.20	0.200	32	21.25	4.25	0.00	0.000	0.20	0.40	0.08	0.080	0.200					
						Impervious	8.80	0.800	98	0.20	0.04	0.95	0.758										
Total Area =				11.00		Y = 0.76										Total F _m = 0.08		0.20					
										Ybar = 1 - Y = 0.24													

Offsite Area -K																			
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _j	
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)		
1	9	Single Family Residential (>10 dwellings/acre)	20%	6.30	A	Pervious	1.26	0.200	32	21.25	4.25	0.00	0.000	0.20	0.40	0.08	0.080	0.200	
						Impervious	5.04	0.800	98	0.20	0.04	0.95	0.758						
Total Area =				6.30		Y = 0.76										Total F _m = 0.08		0.20	
										Ybar = 1 - Y = 0.24									

INFILTRATION RATE CALCULATION SUMMARY
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
10-YEAR HIGH-CONFIDENCE EVENT

Existing Condition											
Node	A	B	C	D	E	F	G	H	I	J	K
Total Area (ac)	349.56	135.09	63.61	14.29	97.15	5.80	1.75	6.99	1.06	11.00	6.30
Y	0.65	0.80	0.61	0.66	0.80	0.75	0.75	0.75	0.75	0.75	0.75
Ybar	0.35	0.20	0.39	0.34	0.20	0.25	0.25	0.25	0.25	0.25	0.25
Average a_p	0.64	0.37	1.00	0.68	0.30	0.20	0.20	0.20	0.20	0.20	0.20
Total Fm (in/hr)	0.15	0.07	0.20	0.14	0.06	0.08	0.08	0.08	0.08	0.08	0.08

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
10-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA A

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 3.68

Total Area (ac) = 349.56

a_p - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 7.05

Y = 0.65

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.35**

Average a_p = 0.64

Total F_m (in/hr) = **0.15**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	7.57	A	Pervious	0.76	0.002	32	21.25	4.25	0.00	0.000	0.10	0.40	0.04	0.001
					Impervious	6.81	0.019	98	0.20	0.04	0.94	0.018				
2	Urban Cover - Roadway	10%	2.65	D	Pervious	0.27	0.001	75	3.33	0.67	0.39	0.000	0.10	0.20	0.02	0.000
					Impervious	2.39	0.007	98	0.20	0.04	0.94	0.006				
3	Single Family Residential (>10 dwellings/acre)	20%	45.27	A	Pervious	9.05	0.026	32	21.25	4.25	0.00	0.000	0.20	0.40	0.08	0.010
					Impervious	36.22	0.104	98	0.20	0.04	0.94	0.097				
4	Single Family Residential (>10 dwellings/acre)	20%	31.84	B	Pervious	6.37	0.018	56	7.86	1.57	0.12	0.002	0.20	0.30	0.06	0.005
					Impervious	25.47	0.073	98	0.20	0.04	0.94	0.068				
5	Single Family Residential (>10 dwellings/acre)	20%	26.51	D	Pervious	5.30	0.015	75	3.33	0.67	0.39	0.006	0.20	0.20	0.04	0.003
					Impervious	21.21	0.061	98	0.20	0.04	0.94	0.057				
6	Commercial / Industrial	10%	31.91	D	Pervious	3.19	0.009	75	3.33	0.67	0.39	0.004	0.10	0.20	0.02	0.002
					Impervious	28.72	0.082	98	0.20	0.04	0.94	0.077				
7	Oil Operations	100%	11.89	D	Pervious	11.89	0.034	93	0.75	0.15	0.79	0.027	1.00	0.20	0.20	0.007
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				
8	Open Space / Habitat Area	100%	16.64	A	Pervious	16.64	0.048	46	11.74	2.35	0.04	0.002	1.00	0.40	0.40	0.019
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				
9	Oxbow Loop Channel	10%	6.55	A	Pervious	0.66	0.002	78	2.82	0.56	0.44	0.001	0.10	0.40	0.04	0.001
					Impervious	5.90	0.017	98	0.20	0.04	0.94	0.016				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	4.78	A	Pervious	4.78	0.014	78	2.82	0.56	0.44	0.006	1.00	0.40	0.40	0.005
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				
2	Oil Operations / Barren Area	100%	10.98	D	Pervious	10.98	0.031	93	0.75	0.15	0.79	0.025	1.00	0.20	0.20	0.006
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				
3	Open Space / Habitat Area	100%	152.97	D	Pervious	152.97	0.438	83	2.05	0.41	0.55	0.239	1.00	0.20	0.20	0.088
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				

Total Area = **349.56**

Y = **0.65**

Total F_m = **0.15**

Ybar = 1 - Y = **0.35**

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
10-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA B

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 3.68
P24, 25-Year Storm Event for Mountainous Area (in) = 7.05

Total Area (ac) = 135.09

Y = 0.80

Ybar = 1 - Y = **0.20**

ap - See Figure C-4

Fp - See Table C-2

Average ap = 0.37

Total Fm (in/hr) = **0.07**

CN - See Figure C-1 and C-3

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	5.35	D	Pervious	0.54	0.004	75	3.33	0.67	0.39	0.002	0.10	0.20	0.02	0.001
					Impervious	4.82	0.036	98	0.20	0.04	0.94	0.033				
2	Single Family Residential (>10 dwellings/acre)	20%	5.94	D	Pervious	1.19	0.009	75	3.33	0.67	0.39	0.003	0.20	0.20	0.04	0.002
					Impervious	4.75	0.035	98	0.20	0.04	0.94	0.033				
3	Commercial / Industrial	10%	80.09	D	Pervious	8.01	0.059	75	3.33	0.67	0.39	0.023	0.10	0.20	0.02	0.012
					Impervious	72.08	0.534	98	0.20	0.04	0.94	0.500				
4	School	60%	9.91	D	Pervious	5.95	0.044	75	3.33	0.67	0.39	0.017	0.60	0.20	0.12	0.009
					Impervious	3.96	0.029	98	0.20	0.04	0.94	0.027				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	12.82	D	Pervious	12.82	0.095	93	0.75	0.15	0.79	0.075	1.00	0.20	0.20	0.019
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				
2	Open Space / Habitat Area	100%	20.98	D	Pervious	20.98	0.155	83	2.05	0.41	0.55	0.085	1.00	0.20	0.20	0.031
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				

Total Area = **135.09**

Y = **0.80**

Total F_m = **0.07**

Ybar = 1 - Y = **0.20**

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
10-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA C

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 3.68
P24, 25-Year Storm Event for Mountainous Area (in) = 7.05

Total Area (ac) = 63.61

Y = 0.61

Ybar = 1 - Y = **0.39**

a_p - See Figure C-4

F_p - See Table C-2

Average a_p = 1.00

Total F_m (in/hr) = **0.20**

CN - See Figure C-1 and C-3

Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	17.24	D	Pervious	17.24	0.271	93	0.75	0.15	0.79	0.214	1.00	0.20	0.20	0.054
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				
2	Open Space / Habitat Area	100%	46.37	D	Pervious	46.37	0.729	83	2.05	0.41	0.55	0.398	1.00	0.20	0.20	0.146
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				

Total Area = **63.61**

Y = **0.61**

Total F_m = **0.20**

Ybar = 1 - Y = **0.39**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

10-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA D

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 3.68

Total Area (ac) = 14.29

a_p - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 7.05

Y = 0.66

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.34**

Average a_p = 0.68

Total F_m (in/hr) = **0.14**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	5.68	D	Pervious	1.14	0.079	75	3.33	0.67	0.39	0.031	0.20	0.20	0.04	0.016
					Impervious	4.54	0.318	98	0.20	0.04	0.94	0.298				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Open Space / Habitat Area	100%	8.61	D	Pervious	8.61	0.603	83	2.05	0.41	0.55	0.329	1.00	0.20	0.20	0.121
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				

Total Area = **14.29**

Y = **0.66**

Total F_m = **0.14**

Ybar = 1 - Y = **0.34**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

10-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA E

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 3.68

Total Area (ac) = 97.15

ap - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 7.05

Y = 0.80

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.20**

Average ap = 0.30

Total Fm (in/hr) = **0.06**

Offsite Area																	
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	Single Family Residential (>10 dwellings/acre)	20%	44.48	D	Pervious	8.90	0.092	75	3.33	0.67	0.39	0.036	0.20	0.20	0.04	0.018	
					Impervious	35.58	0.366	98	0.20	0.04	0.94	0.343					
2	Commercial / Industrial	10%	36.05	D	Pervious	3.61	0.037	75	3.33	0.67	0.39	0.014	0.10	0.20	0.02	0.007	
					Impervious	32.45	0.334	98	0.20	0.04	0.94	0.313					
3	Open Space / Habitat Area	100%	16.62	D	Pervious	16.62	0.171	83	2.05	0.41	0.55	0.093	1.00	0.20	0.20	0.034	
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000					
Total Area =			97.15														
										Y =			0.80	Total F _m =			0.06
										Ybar = 1 - Y =			0.20				

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

10-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA F to K

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 3.68

Total Area (ac) = 5.80

ap - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 7.05

Y = 0.75

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.25**

Average ap = 0.20

Total Fm (in/hr) = **0.08**

Offsite Area -F																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	5.80	A	Pervious	1.16	0.200	32	21.25	4.25	0.00	0.001	0.20	0.40	0.08	0.080
					Impervious	4.64	0.800	98	0.20	0.04	0.94	0.749				
Total Area =			5.80					Y = 0.75				Total F _m = 0.08				
								Ybar = 1 - Y = 0.25								

Offsite Area -G																			
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m						
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)			
1	Single Family Residential (>10 dwellings/acre)	20%	1.75	A	Pervious	0.35	0.200	32	21.25	4.25	0.00	0.001	0.20	0.40	0.08	0.080			
					Impervious	1.40	0.800	98	0.20	0.04	0.94	0.749							
Total Area =				1.75	Y = 0.75								Total F _m = 0.08						
								Ybar = 1 - Y = 0.25											

Offsite Area -H																			
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m						
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)			
1	Single Family Residential (>10 dwellings/acre)	20%	6.99	A	Pervious	1.40	0.200	32	21.25	4.25	0.00	0.001	0.20	0.40	0.08	0.080			
					Impervious	5.59	0.800	98	0.20	0.04	0.94	0.749							
Total Area =			6.99	Y =								0.75	Total F _m =				0.08		
								Ybar = 1 - Y =								0.25			

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

10-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA F to K

Offsite Area -I																
No.	Land Use	Pervious- ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	1.06	A	Pervious	0.21	0.200	32	21.25	4.25	0.00	0.001	0.20	0.40	0.08	0.080
					Impervious	0.85	0.800	98	0.20	0.04	0.94	0.749				

Total Area = **1.06**

Y = **0.75**

Total F_m = **0.08**

Ybar = 1 - Y = **0.25**

Offsite Area -J																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	11.00	A	Pervious	2.20	0.200	32	21.25	4.25	0.00	0.001	0.20	0.40	0.08	0.080
					Impervious	8.80	0.800	98	0.20	0.04	0.94	0.749				

Total Area = **11.00**

Y = **0.75**

Total F_m = **0.08**

Ybar = 1 - Y = **0.25**

Offsite Area -K																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	6.30	A	Pervious	1.26	0.200	32	21.25	4.25	0.00	0.001	0.20	0.40	0.08	0.080
					Impervious	5.04	0.800	98	0.20	0.04	0.94	0.749				

Total Area = **6.30**

Y = **0.75**

Total F_m = **0.08**

Ybar = 1 - Y = **0.25**

ii. HC 100-Year Storm Event

Drainage A

SMALL AREA UNIT HYDROGRAPH MODEL

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Ver. 9.0 Release Date: 01/01/2003 License ID 1355

Analysis prepared by:

Fusco Engineering
16795 Von Karman #100, Irvine, CA 92606

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 349.60
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.150
LOW LOSS FRACTION = 0.110
TIME OF CONCENTRATION(MIN.) = 25.36
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 131.68
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 32.34

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	177.5	355.0	532.5	710.0
0.36	0.3668	24.57	.Q	.	.	.	.
0.78	1.2292	24.81	.Q	.	.	.	.
1.21	2.1061	25.39	.Q	.	.	.	.
1.63	2.9983	25.69	.Q	.	.	.	.
2.05	3.9068	26.33	.Q	.	.	.	.
2.47	4.8323	26.66	.Q	.	.	.	.
2.90	5.7758	27.36	.Q	.	.	.	.
3.32	6.7379	27.73	.Q	.	.	.	.
3.74	7.7200	28.50	.Q	.	.	.	.
4.17	8.7227	28.91	.Q	.	.	.	.
4.59	9.7478	29.78	.Q	.	.	.	.
5.01	10.7961	30.24	.Q	.	.	.	.
5.43	11.8694	31.22	.Q	.	.	.	.
5.86	12.9689	31.74	.Q	.	.	.	.
6.28	14.0968	32.85	.Q	.	.	.	.
6.70	15.2546	33.44	.Q	.	.	.	.
7.12	16.4450	34.72	.Q	.	.	.	.
7.55	17.6698	35.41	.Q	.	.	.	.
7.97	18.9325	36.89	.Q	.	.	.	.
8.39	20.2354	37.70	.Q	.	.	.	.
8.81	21.5832	39.46	.Q	.	.	.	.
9.24	22.9785	40.43	.Q	.	.	.	.
9.66	24.4279	42.56	.Q	.	.	.	.
10.08	25.9350	43.73	.Q	.	.	.	.
10.51	27.5086	46.37	.Q	.	.	.	.
10.93	29.1540	47.84	.Q	.	.	.	.
11.35	30.8841	51.21	.Q	.	.	.	.
11.77	32.7065	53.14	.Q	.	.	.	.
12.20	34.6921	60.55	.Q	.	.	.	.
12.62	37.0650	75.31	.Q	.	.	.	.
13.04	39.8132	82.03	.Q	.	.	.	.

				X100_A			
13.46	42.7499	86.11	.	Q	.	.	.
13.89	45.9372	96.38	.	Q	.	.	.
14.31	49.4211	103.09	.	Q	.	.	.
14.73	53.3554	122.17	.	Q	.	.	.
15.15	57.8636	135.95	.	Q	.	.	.
15.58	63.3405	177.63	.	Q	.	.	.
16.00	70.3328	222.72	.	Q	.	.	.
16.42	86.6200	709.81	.	.	.	Q.	.
16.85	101.7331	155.50	.	Q	.	.	.
17.27	106.4012	111.78	.	Q	.	.	.
17.69	109.9400	90.83	.	Q	.	.	.
18.11	112.8968	78.47	.	Q	.	.	.
18.54	115.2325	55.26	.	Q	.	.	.
18.96	117.0614	49.45	.	Q	.	.	.
19.38	118.7111	45.00	.	Q	.	.	.
19.80	120.2211	41.46	.	Q	.	.	.
20.23	121.6186	38.56	.	Q	.	.	.
20.65	122.9231	36.13	.	Q	.	.	.
21.07	124.1490	34.06	.	Q	.	.	.
21.49	125.3077	32.28	.	Q	.	.	.
21.92	126.4080	30.72	.	Q	.	.	.
22.34	127.4569	29.34	.	Q	.	.	.
22.76	128.4602	28.11	.	Q	.	.	.
23.19	129.4227	27.00	.	Q	.	.	.
23.61	130.3485	26.00	.	Q	.	.	.
24.03	131.2411	25.10	.	Q	.	.	.
24.45	131.6794	0.00	Q

Drainage B

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 135.10
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.070
LOW LOSS FRACTION = 0.050
TIME OF CONCENTRATION(MIN.) = 29.40
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 53.95
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 9.43

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	65.0	130.0	195.0	260.0
0.32	0.0000	0.00	Q	.	.	.	.
0.81	0.2083	10.29	.Q	.	.	.	.
1.30	0.6276	10.42	.Q	.	.	.	.
1.79	1.0556	10.72	.Q	.	.	.	.
2.28	1.4927	10.87	.Q	.	.	.	.
2.77	1.9394	11.20	.Q	.	.	.	.
3.26	2.3963	11.37	.Q	.	.	.	.
3.75	2.8641	11.74	.Q	.	.	.	.
4.24	3.3433	11.93	.Q	.	.	.	.
4.73	3.8349	12.35	.Q	.	.	.	.
5.22	4.3394	12.57	.Q	.	.	.	.
5.71	4.8583	13.05	. Q	.	.	.	.
6.20	5.3921	13.31	. Q	.	.	.	.
6.69	5.9424	13.87	. Q	.	.	.	.
7.18	6.5103	14.17	. Q	.	.	.	.
7.67	7.0977	14.84	. Q	.	.	.	.
8.16	7.7058	15.20	. Q	.	.	.	.
8.65	8.3375	16.00	. Q	.	.	.	.
9.14	8.9943	16.44	. Q	.	.	.	.

9.63	9.6802	17.43	. Q	.	.	.	.
10.12	10.3973	17.99	. Q	.	.	.	.
10.61	11.1513	19.25	. Q	.	.	.	.
11.10	11.9456	19.98	. Q	.	.	.	.
11.59	12.7887	21.66	. Q	.	.	.	.
12.08	13.6862	22.66	. Q	.	.	.	.
12.57	14.7783	31.28	. Q	.	.	.	.
13.06	16.0763	32.83	. Q	.	.	.	.
13.55	17.4851	36.75	. Q	.	.	.	.
14.04	19.0246	39.28	. Q	.	.	.	.
14.53	20.7635	46.60	. Q	.	.	.	.
15.02	22.7570	51.85	. Q	.	.	.	.
15.51	25.2380	70.68	. Q	.	.	.	.
16.00	28.3734	84.17	. Q	.	.	.	.
16.49	35.3364	259.72	.	.	.	Q.	.
16.98	41.7960	59.31	. Q	.	.	.	.
17.47	43.8560	42.43	. Q	.	.	.	.
17.96	45.4164	34.63	. Q	.	.	.	.
18.45	46.6297	25.29	. Q	.	.	.	.
18.94	47.5624	20.78	. Q	.	.	.	.
19.43	48.3595	18.59	. Q	.	.	.	.
19.92	49.0785	16.92	. Q	.	.	.	.
20.41	49.7366	15.59	. Q	.	.	.	.
20.90	50.3457	14.50	. Q	.	.	.	.
21.39	50.9142	13.58	. Q	.	.	.	.
21.88	51.4486	12.81	.Q	.	.	.	.
22.37	51.9536	12.13	.Q	.	.	.	.
22.86	52.4331	11.55	.Q	.	.	.	.
23.35	52.8902	11.03	.Q	.	.	.	.
23.84	53.3275	10.57	.Q	.	.	.	.
24.33	53.7471	10.15	.Q
24.82	53.9526	0.00	Q

Drainage C

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 63.60
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.200
LOW LOSS FRACTION = 0.110
TIME OF CONCENTRATION(MIN.) = 17.98
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 23.95
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 5.89

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	40.0	80.0	120.0	160.0
0.12	0.0216	4.45	.Q	.	.	.	.
0.42	0.1321	4.47	.Q	.	.	.	.
0.72	0.2437	4.54	.Q	.	.	.	.
1.02	0.3567	4.58	.Q	.	.	.	.
1.32	0.4711	4.66	.Q	.	.	.	.
1.62	0.5869	4.70	.Q	.	.	.	.
1.92	0.7042	4.78	.Q	.	.	.	.
2.22	0.8230	4.82	.Q	.	.	.	.
2.52	0.9435	4.91	.Q	.	.	.	.
2.81	1.0656	4.95	.Q	.	.	.	.
3.11	1.1895	5.05	.Q	.	.	.	.
3.41	1.3151	5.10	.Q	.	.	.	.
3.71	1.4426	5.20	.Q	.	.	.	.
4.01	1.5720	5.25	.Q	.	.	.	.
4.31	1.7035	5.36	.Q	.	.	.	.
4.61	1.8370	5.42	.Q	.	.	.	.
4.91	1.9727	5.54	.Q	.	.	.	.
5.21	2.1106	5.60	.Q	.	.	.	.
5.51	2.2510	5.73	.Q	.	.	.	.
5.81	2.3938	5.80	.Q	.	.	.	.
6.11	2.5392	5.94	.Q	.	.	.	.
6.41	2.6873	6.02	.Q	.	.	.	.
6.71	2.8383	6.18	.Q	.	.	.	.
7.01	2.9923	6.26	.Q	.	.	.	.
7.31	3.1495	6.43	.Q	.	.	.	.
7.61	3.3100	6.53	.Q	.	.	.	.
7.91	3.4741	6.72	.Q	.	.	.	.
8.21	3.6418	6.83	.Q	.	.	.	.
8.51	3.8136	7.05	.Q	.	.	.	.
8.81	3.9896	7.16	.Q	.	.	.	.
9.11	4.1701	7.42	.Q	.	.	.	.

				X100_C		
9. 41	4. 3555	7. 55	. Q	.	.	.
9. 71	4. 5460	7. 84	. Q	.	.	.
10. 01	4. 7420	7. 99	. Q	.	.	.
10. 31	4. 9441	8. 33	. Q	.	.	.
10. 61	5. 1527	8. 51	. Q	.	.	.
10. 91	5. 3684	8. 91	. Q	.	.	.
11. 21	5. 5917	9. 13	. Q	.	.	.
11. 51	5. 8237	9. 61	. Q	.	.	.
11. 80	6. 0649	9. 87	. Q	.	.	.
12. 10	6. 3175	10. 53	. Q	.	.	.
12. 40	6. 6154	13. 53	. Q	.	.	.
12. 70	6. 9604	14. 33	. Q	.	.	.
13. 00	7. 3209	14. 79	. Q	.	.	.
13. 30	7. 7002	15. 84	. Q	.	.	.
13. 60	8. 1001	16. 45	. Q	.	.	.
13. 90	8. 5258	17. 92	. Q	.	.	.
14. 20	8. 9807	18. 81	. Q	.	.	.
14. 50	9. 4757	21. 16	. Q	.	.	.
14. 80	10. 0178	22. 61	. Q	.	.	.
15. 10	10. 6280	26. 67	. Q	.	.	.
15. 40	11. 3258	29. 68	. Q	.	.	.
15. 70	12. 1425	36. 27	. Q	.	.	.
16. 00	13. 2067	49. 67	. Q	.	.	.
16. 30	15. 7668	157. 07	.	.	.	Q.
16. 60	18. 1141	32. 49	. Q	.	.	.
16. 90	18. 8185	24. 40	. Q	.	.	.
17. 20	19. 3677	19. 95	. Q	.	.	.
17. 50	19. 8270	17. 14	. Q	.	.	.
17. 80	20. 2286	15. 29	. Q	.	.	.
18. 10	20. 5902	13. 91	. Q	.	.	.
18. 40	20. 8882	10. 16	. Q	.	.	.
18. 70	21. 1299	9. 36	. Q	.	.	.
19. 00	21. 3536	8. 70	. Q	.	.	.
19. 30	21. 5624	8. 16	. Q	.	.	.
19. 60	21. 7586	7. 69	. Q	.	.	.
19. 90	21. 9441	7. 29	. Q	.	.	.
20. 20	22. 1202	6. 93	. Q	.	.	.
20. 49	22. 2881	6. 62	. Q	.	.	.
20. 79	22. 4486	6. 35	. Q	.	.	.
21. 09	22. 6027	6. 10	. Q	.	.	.
21. 39	22. 7509	5. 87	. Q	.	.	.
21. 69	22. 8937	5. 67	. Q	.	.	.
21. 99	23. 0317	5. 48	. Q	.	.	.
22. 29	23. 1653	5. 31	. Q	.	.	.
22. 59	23. 2947	5. 15	. Q	.	.	.
22. 89	23. 4204	5. 00	. Q	.	.	.
23. 19	23. 5426	4. 86	. Q	.	.	.
23. 49	23. 6614	4. 74	. Q	.	.	.
23. 79	23. 7773	4. 62	. Q	.	.	.
24. 09	23. 8902	4. 51	. Q	.	.	.
24. 39	23. 9460	0. 00	Q	.	.	.

Drainage D

 SMALL AREA UNIT HYDROGRAPH MODEL

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 Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 14.29
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.140
 LOW LOSS FRACTION = 0.070
 TIME OF CONCENTRATION(MIN.) = 10.27
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 100
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
 3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
 6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
 24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 5.60
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.10

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	15.0	30.0	45.0	60.0
0.08	0.0035	1.05	Q	.	.	.	.
0.25	0.0183	1.05	Q	.	.	.	.
0.42	0.0332	1.06	Q	.	.	.	.
0.59	0.0482	1.06	Q	.	.	.	.
0.77	0.0633	1.07	Q	.	.	.	.
0.94	0.0785	1.08	Q	.	.	.	.
1.11	0.0938	1.09	Q	.	.	.	.
1.28	0.1093	1.09	Q	.	.	.	.
1.45	0.1248	1.10	Q	.	.	.	.
1.62	0.1404	1.11	Q	.	.	.	.
1.79	0.1562	1.12	Q	.	.	.	.
1.96	0.1721	1.13	Q	.	.	.	.
2.14	0.1881	1.14	Q	.	.	.	.
2.31	0.2042	1.14	Q	.	.	.	.
2.48	0.2205	1.15	Q	.	.	.	.
2.65	0.2368	1.16	Q	.	.	.	.
2.82	0.2534	1.17	Q	.	.	.	.
2.99	0.2700	1.18	Q	.	.	.	.
3.16	0.2868	1.19	Q	.	.	.	.
3.33	0.3037	1.20	Q	.	.	.	.
3.50	0.3208	1.21	Q	.	.	.	.
3.68	0.3380	1.22	Q	.	.	.	.
3.85	0.3554	1.23	Q	.	.	.	.
4.02	0.3729	1.24	Q	.	.	.	.
4.19	0.3905	1.26	Q	.	.	.	.
4.36	0.4084	1.26	Q	.	.	.	.
4.53	0.4263	1.28	Q	.	.	.	.
4.70	0.4445	1.29	Q	.	.	.	.
4.87	0.4628	1.30	Q	.	.	.	.

					X100_D			
5.05	0.4813	1.31	Q	.	.	.	.	.
5.22	0.5000	1.33	Q	.	.	.	.	.
5.39	0.5189	1.34	Q	.	.	.	.	.
5.56	0.5380	1.36	Q	.	.	.	.	.
5.73	0.5572	1.37	Q	.	.	.	.	.
5.90	0.5767	1.38	Q	.	.	.	.	.
6.07	0.5963	1.39	Q	.	.	.	.	.
6.24	0.6162	1.41	Q	.	.	.	.	.
6.41	0.6363	1.43	Q	.	.	.	.	.
6.59	0.6566	1.45	Q	.	.	.	.	.
6.76	0.6771	1.46	Q	.	.	.	.	.
6.93	0.6979	1.48	Q	.	.	.	.	.
7.10	0.7189	1.49	Q	.	.	.	.	.
7.27	0.7402	1.52	.Q	.	.	.	.	.
7.44	0.7617	1.53	.Q	.	.	.	.	.
7.61	0.7835	1.55	.Q	.	.	.	.	.
7.78	0.8056	1.57	.Q	.	.	.	.	.
7.96	0.8280	1.59	.Q	.	.	.	.	.
8.13	0.8506	1.61	.Q	.	.	.	.	.
8.30	0.8736	1.64	.Q	.	.	.	.	.
8.47	0.8968	1.65	.Q	.	.	.	.	.
8.64	0.9204	1.68	.Q	.	.	.	.	.
8.81	0.9444	1.70	.Q	.	.	.	.	.
8.98	0.9687	1.73	.Q	.	.	.	.	.
9.15	0.9934	1.75	.Q	.	.	.	.	.
9.32	1.0184	1.79	.Q	.	.	.	.	.
9.50	1.0439	1.81	.Q	.	.	.	.	.
9.67	1.0697	1.85	.Q	.	.	.	.	.
9.84	1.0960	1.87	.Q	.	.	.	.	.
10.01	1.1228	1.91	.Q	.	.	.	.	.
10.18	1.1500	1.94	.Q	.	.	.	.	.
10.35	1.1777	1.98	.Q	.	.	.	.	.
10.52	1.2059	2.01	.Q	.	.	.	.	.
10.69	1.2347	2.06	.Q	.	.	.	.	.
10.86	1.2641	2.09	.Q	.	.	.	.	.
11.04	1.2940	2.15	.Q	.	.	.	.	.
11.21	1.3246	2.18	.Q	.	.	.	.	.
11.38	1.3559	2.24	.Q	.	.	.	.	.
11.55	1.3879	2.28	.Q	.	.	.	.	.
11.72	1.4206	2.35	.Q	.	.	.	.	.
11.89	1.4541	2.39	.Q	.	.	.	.	.
12.06	1.4888	2.51	.Q	.	.	.	.	.
12.23	1.5289	3.16	.Q	.	.	.	.	.
12.41	1.5743	3.26	.Q	.	.	.	.	.
12.58	1.6208	3.31	.Q	.	.	.	.	.
12.75	1.6685	3.43	.Q	.	.	.	.	.
12.92	1.7175	3.50	.Q	.	.	.	.	.
13.09	1.7679	3.63	.Q	.	.	.	.	.
13.26	1.8199	3.71	.Q	.	.	.	.	.
13.43	1.8735	3.87	.Q	.	.	.	.	.
13.60	1.9290	3.97	.Q	.	.	.	.	.
13.77	1.9865	4.17	.Q	.	.	.	.	.
13.95	2.0462	4.28	.Q	.	.	.	.	.
14.12	2.1087	4.55	.Q	.	.	.	.	.
14.29	2.1741	4.70	.Q	.	.	.	.	.
14.46	2.2430	5.04	.Q	.	.	.	.	.
14.63	2.3156	5.23	.Q	.	.	.	.	.
14.80	2.3928	5.69	.Q	.	.	.	.	.
14.97	2.4754	5.98	.Q	.	.	.	.	.
15.14	2.5649	6.69	.Q	.	.	.	.	.
15.32	2.6627	7.14	.Q	.	.	.	.	.
15.49	2.7668	7.57	.Q	.	.	.	.	.
15.66	2.8793	8.34	.Q	.	.	.	.	.
15.83	3.0223	11.87	.Q	.	.	.	.	.
16.00	3.2210	16.22	.Q	.	.	.	.	.
16.17	3.6950	50.80	.	.	.	Q	.	.
16.34	4.1228	9.68	.Q	.	.	.	.	.
16.51	4.2458	7.71	.Q	.	.	.	.	.
16.68	4.3449	6.30	.Q	.	.	.	.	.
16.86	4.4280	5.45	.Q	.	.	.	.	.
17.03	4.5009	4.86	.Q	.	.	.	.	.
17.20	4.5664	4.40	.Q	.	.	.	.	.
17.37	4.6263	4.06	.Q	.	.	.	.	.
17.54	4.6818	3.79	.Q	.	.	.	.	.
17.71	4.7338	3.56	.Q	.	.	.	.	.
17.88	4.7829	3.37	.Q	.	.	.	.	.
18.05	4.8294	3.21	.Q	.	.	.	.	.
18.23	4.8693	2.43	.Q	.	.	.	.	.
18.40	4.9029	2.31	.Q	.	.	.	.	.

				X100_D			
18.57	4.9349	2.21	.Q	.	.	.	.
18.74	4.9655	2.12	.Q	.	.	.	.
18.91	4.9948	2.03	.Q	.	.	.	.
19.08	5.0231	1.96	.Q	.	.	.	.
19.25	5.0503	1.89	.Q	.	.	.	.
19.42	5.0766	1.83	.Q	.	.	.	.
19.59	5.1021	1.77	.Q	.	.	.	.
19.77	5.1267	1.72	.Q	.	.	.	.
19.94	5.1507	1.67	.Q	.	.	.	.
20.11	5.1740	1.62	.Q	.	.	.	.
20.28	5.1966	1.58	.Q	.	.	.	.
20.45	5.2187	1.54	.Q	.	.	.	.
20.62	5.2402	1.50	.Q	.	.	.	.
20.79	5.2612	1.47	Q	.	.	.	.
20.96	5.2818	1.44	Q	.	.	.	.
21.14	5.3019	1.40	Q	.	.	.	.
21.31	5.3215	1.38	Q	.	.	.	.
21.48	5.3408	1.35	Q	.	.	.	.
21.65	5.3597	1.32	Q	.	.	.	.
21.82	5.3782	1.30	Q	.	.	.	.
21.99	5.3963	1.27	Q	.	.	.	.
22.16	5.4141	1.25	Q	.	.	.	.
22.33	5.4317	1.23	Q	.	.	.	.
22.50	5.4489	1.21	Q	.	.	.	.
22.68	5.4658	1.19	Q	.	.	.	.
22.85	5.4824	1.17	Q	.	.	.	.
23.02	5.4988	1.15	Q	.	.	.	.
23.19	5.5150	1.13	Q	.	.	.	.
23.36	5.5308	1.11	Q	.	.	.	.
23.53	5.5465	1.10	Q	.	.	.	.
23.70	5.5619	1.08	Q	.	.	.	.
23.87	5.5771	1.07	Q	.	.	.	.
24.04	5.5921	1.05	Q
24.22	5.5996	0.00	Q

Drainage E

SMALL AREA UNIT HYDROGRAPH MODEL

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Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 97.20
SOIL-LOSS RATE, F_m (INCH/HR) = 0.060
LOW LOSS FRACTION = 0.040
TIME OF CONCENTRATION(MIN.) = 26.62
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 39.43
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 6.18

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	50.0	100.0	150.0	200.0
0.03	0.0000	0.00	Q	.	.	.	.
0.47	0.1354	7.39	.Q	.	.	.	.
0.92	0.4079	7.47	.Q	.	.	.	.
1.36	0.6853	7.66	.Q	.	.	.	.
1.80	0.9679	7.76	.Q	.	.	.	.
2.25	1.2560	7.96	.Q	.	.	.	.
2.69	1.5498	8.07	.Q	.	.	.	.
3.13	1.8497	8.29	.Q	.	.	.	.
3.58	2.1559	8.41	.Q	.	.	.	.
4.02	2.4689	8.66	.Q	.	.	.	.
4.46	2.7890	8.80	.Q	.	.	.	.
4.91	3.1168	9.08	.Q	.	.	.	.
5.35	3.4525	9.23	.Q	.	.	.	.
5.80	3.7969	9.56	.Q	.	.	.	.
6.24	4.1505	9.73	.Q	.	.	.	.
6.68	4.5140	10.10	.Q	.	.	.	.
7.13	4.8880	10.30	.Q	.	.	.	.
7.57	5.2736	10.73	.Q	.	.	.	.
8.01	5.6714	10.97	.Q	.	.	.	.
8.46	6.0830	11.48	.Q	.	.	.	.
8.90	6.5091	11.76	.Q	.	.	.	.
9.35	6.9517	12.38	.Q	.	.	.	.
9.79	7.4119	12.72	.Q	.	.	.	.
10.23	7.8924	13.49	.Q	.	.	.	.
10.68	8.3949	13.92	.Q	.	.	.	.
11.12	8.9231	14.90	.Q	.	.	.	.
11.56	9.4796	15.46	.Q	.	.	.	.
12.01	10.0704	16.76	.Q	.	.	.	.
12.45	10.7423	19.89	.Q	.	.	.	.
12.89	11.5464	23.97	.Q	.	.	.	.
13.34	12.4473	25.17	.Q	.	.	.	.

					X100_E			
13.78	13.4251	28.17	.	Q	.	.	.	.
14.23	14.4936	30.11	.	Q	.	.	.	.
14.67	15.7003	35.71	.	Q	.	.	.	.
15.11	17.0835	39.74	.	Q	.	.	.	.
15.56	18.7774	52.66	.		Q	.	.	.
16.00	20.9327	64.90	.		.	Q	.	.
16.44	25.7767	199.32	.		.	.	.	Q.
16.89	30.2641	45.45	.		Q.	.	.	.
17.33	31.6957	32.63	.	Q	.	.	.	.
17.77	32.7806	26.55	.	Q	.	.	.	.
18.22	33.6877	22.93	.	Q	.	.	.	.
18.66	34.4028	16.08	.	Q	.	.	.	.
19.11	34.9613	14.39	.	Q	.	.	.	.
19.55	35.4651	13.09	.	Q	.	.	.	.
19.99	35.9262	12.06	.	Q	.	.	.	.
20.44	36.3529	11.22	.	Q	.	.	.	.
20.88	36.7513	10.51	.	Q	.	.	.	.
21.32	37.1256	9.91	.	Q	.	.	.	.
21.77	37.4795	9.39	.	Q	.	.	.	.
22.21	37.8154	8.94	.	Q	.	.	.	.
22.66	38.1357	8.53	.	Q	.	.	.	.
23.10	38.4421	8.18	.	Q	.	.	.	.
23.54	38.7360	7.86	.	Q	.	.	.	.
23.99	39.0188	7.57	.	Q	.	.	.	.
24.43	39.2920	7.34	.	Q
24.87	39.4266	0.00	Q

Drainage F

 SMALL AREA UNIT HYDROGRAPH MODEL
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Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 5.80
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.160
 TIME OF CONCENTRATION(MIN.) = 7.97
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 100
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
 3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
 6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
 24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.11
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.61

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.06	0.0000	0.00	Q	.	.	.	.
0.19	0.0021	0.38	Q	.	.	.	.
0.33	0.0063	0.39	Q	.	.	.	.
0.46	0.0106	0.39	Q	.	.	.	.
0.59	0.0149	0.39	Q	.	.	.	.
0.72	0.0192	0.39	Q	.	.	.	.
0.86	0.0235	0.39	Q	.	.	.	.
0.99	0.0278	0.40	Q	.	.	.	.
1.12	0.0322	0.40	Q	.	.	.	.
1.26	0.0366	0.40	Q	.	.	.	.
1.39	0.0410	0.40	Q	.	.	.	.
1.52	0.0454	0.41	Q	.	.	.	.
1.65	0.0499	0.41	Q	.	.	.	.
1.79	0.0544	0.41	Q	.	.	.	.
1.92	0.0589	0.41	Q	.	.	.	.
2.05	0.0635	0.42	Q	.	.	.	.
2.19	0.0681	0.42	Q	.	.	.	.
2.32	0.0727	0.42	Q	.	.	.	.
2.45	0.0773	0.42	Q	.	.	.	.
2.58	0.0819	0.43	Q	.	.	.	.
2.72	0.0866	0.43	Q	.	.	.	.
2.85	0.0913	0.43	Q	.	.	.	.
2.98	0.0961	0.43	Q	.	.	.	.
3.12	0.1009	0.44	Q	.	.	.	.
3.25	0.1057	0.44	Q	.	.	.	.
3.38	0.1105	0.44	Q	.	.	.	.
3.51	0.1154	0.44	Q	.	.	.	.
3.65	0.1203	0.45	Q	.	.	.	.
3.78	0.1252	0.45	Q	.	.	.	.
3.91	0.1302	0.45	Q	.	.	.	.

					X100_F		
4.05	0.1352	0.46	Q	.	.	.	.
4.18	0.1402	0.46	Q	.	.	.	.
4.31	0.1453	0.46	Q	.	.	.	.
4.44	0.1504	0.47	Q	.	.	.	.
4.58	0.1555	0.47	Q	.	.	.	.
4.71	0.1607	0.47	Q	.	.	.	.
4.84	0.1659	0.48	Q	.	.	.	.
4.97	0.1712	0.48	Q	.	.	.	.
5.11	0.1765	0.48	Q	.	.	.	.
5.24	0.1818	0.49	Q	.	.	.	.
5.37	0.1872	0.49	Q	.	.	.	.
5.51	0.1926	0.50	Q	.	.	.	.
5.64	0.1981	0.50	Q	.	.	.	.
5.77	0.2036	0.50	Q	.	.	.	.
5.90	0.2092	0.51	Q	.	.	.	.
6.04	0.2148	0.51	Q	.	.	.	.
6.17	0.2204	0.52	Q	.	.	.	.
6.30	0.2261	0.52	Q	.	.	.	.
6.44	0.2318	0.52	Q	.	.	.	.
6.57	0.2376	0.53	Q	.	.	.	.
6.70	0.2435	0.53	Q	.	.	.	.
6.83	0.2494	0.54	Q	.	.	.	.
6.97	0.2553	0.54	Q	.	.	.	.
7.10	0.2613	0.55	Q	.	.	.	.
7.23	0.2674	0.55	Q	.	.	.	.
7.37	0.2735	0.56	Q	.	.	.	.
7.50	0.2797	0.56	Q	.	.	.	.
7.63	0.2859	0.57	Q	.	.	.	.
7.76	0.2922	0.58	Q	.	.	.	.
7.90	0.2985	0.58	Q	.	.	.	.
8.03	0.3050	0.59	Q	.	.	.	.
8.16	0.3115	0.60	Q	.	.	.	.
8.30	0.3180	0.60	Q	.	.	.	.
8.43	0.3246	0.61	Q	.	.	.	.
8.56	0.3313	0.61	Q	.	.	.	.
8.69	0.3381	0.62	Q	.	.	.	.
8.83	0.3450	0.63	Q	.	.	.	.
8.96	0.3519	0.64	Q	.	.	.	.
9.09	0.3589	0.64	Q	.	.	.	.
9.23	0.3660	0.65	Q	.	.	.	.
9.36	0.3732	0.66	Q	.	.	.	.
9.49	0.3805	0.67	Q	.	.	.	.
9.62	0.3878	0.67	Q	.	.	.	.
9.76	0.3953	0.69	Q	.	.	.	.
9.89	0.4028	0.69	Q	.	.	.	.
10.02	0.4105	0.70	Q	.	.	.	.
10.16	0.4183	0.71	Q	.	.	.	.
10.29	0.4261	0.72	Q	.	.	.	.
10.42	0.4341	0.73	Q	.	.	.	.
10.55	0.4422	0.75	Q	.	.	.	.
10.69	0.4505	0.75	.Q	.	.	.	.
10.82	0.4588	0.77	.Q	.	.	.	.
10.95	0.4673	0.78	.Q	.	.	.	.
11.09	0.4759	0.79	.Q	.	.	.	.
11.22	0.4847	0.80	.Q	.	.	.	.
11.35	0.4936	0.82	.Q	.	.	.	.
11.48	0.5027	0.83	.Q	.	.	.	.
11.62	0.5119	0.85	.Q	.	.	.	.
11.75	0.5214	0.86	.Q	.	.	.	.
11.88	0.5310	0.89	.Q	.	.	.	.
12.02	0.5408	0.90	.Q	.	.	.	.
12.15	0.5520	1.16	.Q	.	.	.	.
12.28	0.5648	1.17	.Q	.	.	.	.
12.41	0.5778	1.20	.Q	.	.	.	.
12.55	0.5911	1.22	.Q	.	.	.	.
12.68	0.6046	1.25	.Q	.	.	.	.
12.81	0.6185	1.27	.Q	.	.	.	.
12.94	0.6326	1.31	.Q	.	.	.	.
13.08	0.6470	1.33	.Q	.	.	.	.
13.21	0.6618	1.37	.Q	.	.	.	.
13.34	0.6769	1.39	.Q	.	.	.	.
13.48	0.6925	1.44	.Q	.	.	.	.
13.61	0.7084	1.47	.Q	.	.	.	.
13.74	0.7249	1.52	.Q	.	.	.	.
13.87	0.7418	1.56	.Q	.	.	.	.
14.01	0.7592	1.63	.Q	.	.	.	.
14.14	0.7773	1.67	.Q	.	.	.	.
14.27	0.7961	1.76	.Q	.	.	.	.
14.41	0.8157	1.80	.Q	.	.	.	.

14. 54	0. 8361	1. 91	. Q	.	X100_F	.	.	.
14. 67	0. 8574	1. 97	. Q	.	.	.	.	.
14. 80	0. 8798	2. 11	. Q	.	.	.	.	.
14. 94	0. 9034	2. 19	. Q	.	.	.	.	.
15. 07	0. 9288	2. 42	. Q	.	.	.	.	.
15. 20	0. 9562	2. 57	. Q	.	.	.	.	.
15. 34	0. 9863	2. 92	. Q	.	.	.	.	.
15. 47	1. 0183	2. 92	. Q	.	.	.	.	.
15. 60	1. 0526	3. 34	. Q	.	.	.	.	.
15. 73	1. 0918	3. 81	. Q	.	.	.	.	.
15. 87	1. 1435	5. 60	. Q	.	.	.	.	.
16. 00	1. 2170	7. 80	. Q	.	.	.	.	.
16. 13	1. 3935	24. 36	.	.	.	Q	.	.
16. 27	1. 5519	4. 50	. Q	.	.	.	.	.
16. 40	1. 5929	2. 98	. Q	.	.	.	.	.
16. 53	1. 6243	2. 73	. Q	.	.	.	.	.
16. 66	1. 6519	2. 30	. Q	.	.	.	.	.
16. 80	1. 6757	2. 04	. Q	.	.	.	.	.
16. 93	1. 6971	1. 86	. Q	.	.	.	.	.
17. 06	1. 7167	1. 71	. Q	.	.	.	.	.
17. 20	1. 7348	1. 59	. Q	.	.	.	.	.
17. 33	1. 7517	1. 50	. Q	.	.	.	.	.
17. 46	1. 7677	1. 41	. Q	.	.	.	.	.
17. 59	1. 7829	1. 35	. Q	.	.	.	.	.
17. 73	1. 7973	1. 29	. Q	.	.	.	.	.
17. 86	1. 8111	1. 23	. Q	.	.	.	.	.
17. 99	1. 8244	1. 19	. Q	.	.	.	.	.
18. 13	1. 8361	0. 95	. Q	.	.	.	.	.
18. 26	1. 8462	0. 87	. Q	.	.	.	.	.
18. 39	1. 8556	0. 84	. Q	.	.	.	.	.
18. 52	1. 8647	0. 81	. Q	.	.	.	.	.
18. 66	1. 8734	0. 79	. Q	.	.	.	.	.
18. 79	1. 8819	0. 76	. Q	.	.	.	.	.
18. 92	1. 8901	0. 74	. Q	.	.	.	.	.
19. 06	1. 8981	0. 72	. Q	.	.	.	.	.
19. 19	1. 9059	0. 70	. Q	.	.	.	.	.
19. 32	1. 9135	0. 68	. Q	.	.	.	.	.
19. 45	1. 9208	0. 66	. Q	.	.	.	.	.
19. 59	1. 9280	0. 65	. Q	.	.	.	.	.
19. 72	1. 9350	0. 63	. Q	.	.	.	.	.
19. 85	1. 9419	0. 62	. Q	.	.	.	.	.
19. 98	1. 9486	0. 60	. Q	.	.	.	.	.
20. 12	1. 9551	0. 59	. Q	.	.	.	.	.
20. 25	1. 9616	0. 58	. Q	.	.	.	.	.
20. 38	1. 9679	0. 57	. Q	.	.	.	.	.
20. 52	1. 9740	0. 56	. Q	.	.	.	.	.
20. 65	1. 9801	0. 55	. Q	.	.	.	.	.
20. 78	1. 9860	0. 54	. Q	.	.	.	.	.
20. 91	1. 9919	0. 53	. Q	.	.	.	.	.
21. 05	1. 9976	0. 52	. Q	.	.	.	.	.
21. 18	2. 0033	0. 51	. Q	.	.	.	.	.
21. 31	2. 0088	0. 50	. Q	.	.	.	.	.
21. 45	2. 0143	0. 49	. Q	.	.	.	.	.
21. 58	2. 0197	0. 49	. Q	.	.	.	.	.
21. 71	2. 0250	0. 48	. Q	.	.	.	.	.
21. 84	2. 0302	0. 47	. Q	.	.	.	.	.
21. 98	2. 0353	0. 47	. Q	.	.	.	.	.
22. 11	2. 0404	0. 46	. Q	.	.	.	.	.
22. 24	2. 0454	0. 45	. Q	.	.	.	.	.
22. 38	2. 0503	0. 45	. Q	.	.	.	.	.
22. 51	2. 0552	0. 44	. Q	.	.	.	.	.
22. 64	2. 0600	0. 44	. Q	.	.	.	.	.
22. 77	2. 0647	0. 43	. Q	.	.	.	.	.
22. 91	2. 0694	0. 42	. Q	.	.	.	.	.
23. 04	2. 0741	0. 42	. Q	.	.	.	.	.
23. 17	2. 0786	0. 41	. Q	.	.	.	.	.
23. 31	2. 0832	0. 41	. Q	.	.	.	.	.
23. 44	2. 0876	0. 40	. Q	.	.	.	.	.
23. 57	2. 0920	0. 40	. Q	.	.	.	.	.
23. 70	2. 0964	0. 40	. Q	.	.	.	.	.
23. 84	2. 1007	0. 39	. Q	.	.	.	.	.
23. 97	2. 1050	0. 39	. Q	.	.	.	.	.
24. 10	2. 1092	0. 38	. Q
24. 24	2. 1113	0. 00	. Q

Drainage G

 SMALL AREA UNIT HYDROGRAPH MODEL
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Analysis prepared by:

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 LOW LOSS FRACTION = 0.160
 TIME OF CONCENTRATION(MIN.) = 8.11
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
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 6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
 24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.66
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.19

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.05	0.0000	0.00	Q	.	.	.	.
0.19	0.0007	0.12	Q	.	.	.	.
0.32	0.0020	0.12	Q	.	.	.	.
0.46	0.0033	0.12	Q	.	.	.	.
0.59	0.0047	0.12	Q	.	.	.	.
0.73	0.0061	0.12	Q	.	.	.	.
0.86	0.0074	0.12	Q	.	.	.	.
1.00	0.0088	0.12	Q	.	.	.	.
1.13	0.0102	0.12	Q	.	.	.	.
1.27	0.0116	0.12	Q	.	.	.	.
1.40	0.0129	0.13	Q	.	.	.	.
1.54	0.0144	0.13	Q	.	.	.	.
1.67	0.0158	0.13	Q	.	.	.	.
1.81	0.0172	0.13	Q	.	.	.	.
1.94	0.0186	0.13	Q	.	.	.	.
2.08	0.0201	0.13	Q	.	.	.	.
2.21	0.0215	0.13	Q	.	.	.	.
2.35	0.0230	0.13	Q	.	.	.	.
2.48	0.0244	0.13	Q	.	.	.	.
2.62	0.0259	0.13	Q	.	.	.	.
2.75	0.0274	0.13	Q	.	.	.	.
2.89	0.0289	0.13	Q	.	.	.	.
3.02	0.0304	0.13	Q	.	.	.	.
3.16	0.0319	0.14	Q	.	.	.	.
3.29	0.0334	0.14	Q	.	.	.	.
3.43	0.0349	0.14	Q	.	.	.	.
3.56	0.0365	0.14	Q	.	.	.	.
3.70	0.0380	0.14	Q	.	.	.	.
3.84	0.0396	0.14	Q	.	.	.	.
3.97	0.0412	0.14	Q	.	.	.	.

				X100_G			
4. 11	0. 0427	0. 14	Q	.	.	.	.
4. 24	0. 0443	0. 14	Q	.	.	.	.
4. 38	0. 0459	0. 14	Q	.	.	.	.
4. 51	0. 0476	0. 15	Q	.	.	.	.
4. 65	0. 0492	0. 15	Q	.	.	.	.
4. 78	0. 0508	0. 15	Q	.	.	.	.
4. 92	0. 0525	0. 15	Q	.	.	.	.
5. 05	0. 0542	0. 15	Q	.	.	.	.
5. 19	0. 0558	0. 15	Q	.	.	.	.
5. 32	0. 0575	0. 15	Q	.	.	.	.
5. 46	0. 0592	0. 15	Q	.	.	.	.
5. 59	0. 0610	0. 15	Q	.	.	.	.
5. 73	0. 0627	0. 16	Q	.	.	.	.
5. 86	0. 0644	0. 16	Q	.	.	.	.
6. 00	0. 0662	0. 16	Q	.	.	.	.
6. 13	0. 0680	0. 16	Q	.	.	.	.
6. 27	0. 0698	0. 16	Q	.	.	.	.
6. 40	0. 0716	0. 16	Q	.	.	.	.
6. 54	0. 0734	0. 16	Q	.	.	.	.
6. 67	0. 0753	0. 17	Q	.	.	.	.
6. 81	0. 0771	0. 17	Q	.	.	.	.
6. 94	0. 0790	0. 17	Q	.	.	.	.
7. 08	0. 0809	0. 17	Q	.	.	.	.
7. 21	0. 0828	0. 17	Q	.	.	.	.
7. 35	0. 0847	0. 17	Q	.	.	.	.
7. 48	0. 0867	0. 18	Q	.	.	.	.
7. 62	0. 0886	0. 18	Q	.	.	.	.
7. 75	0. 0906	0. 18	Q	.	.	.	.
7. 89	0. 0926	0. 18	Q	.	.	.	.
8. 03	0. 0946	0. 18	Q	.	.	.	.
8. 16	0. 0967	0. 18	Q	.	.	.	.
8. 30	0. 0988	0. 19	Q	.	.	.	.
8. 43	0. 1009	0. 19	Q	.	.	.	.
8. 57	0. 1030	0. 19	Q	.	.	.	.
8. 70	0. 1051	0. 19	Q	.	.	.	.
8. 84	0. 1073	0. 20	Q	.	.	.	.
8. 97	0. 1095	0. 20	Q	.	.	.	.
9. 11	0. 1117	0. 20	Q	.	.	.	.
9. 24	0. 1139	0. 20	Q	.	.	.	.
9. 38	0. 1162	0. 21	Q	.	.	.	.
9. 51	0. 1185	0. 21	Q	.	.	.	.
9. 65	0. 1208	0. 21	Q	.	.	.	.
9. 78	0. 1232	0. 21	Q	.	.	.	.
9. 92	0. 1256	0. 22	Q	.	.	.	.
10. 05	0. 1280	0. 22	Q	.	.	.	.
10. 19	0. 1305	0. 22	Q	.	.	.	.
10. 32	0. 1330	0. 22	Q	.	.	.	.
10. 46	0. 1355	0. 23	Q	.	.	.	.
10. 59	0. 1381	0. 23	Q	.	.	.	.
10. 73	0. 1407	0. 24	Q	.	.	.	.
10. 86	0. 1433	0. 24	Q	.	.	.	.
11. 00	0. 1460	0. 24	Q	.	.	.	.
11. 13	0. 1488	0. 25	Q	.	.	.	.
11. 27	0. 1515	0. 25	.Q	.	.	.	.
11. 40	0. 1544	0. 26	.Q	.	.	.	.
11. 54	0. 1573	0. 26	.Q	.	.	.	.
11. 67	0. 1602	0. 26	.Q	.	.	.	.
11. 81	0. 1632	0. 27	.Q	.	.	.	.
11. 95	0. 1663	0. 28	.Q	.	.	.	.
12. 08	0. 1695	0. 31	.Q	.	.	.	.
12. 22	0. 1733	0. 36	.Q	.	.	.	.
12. 35	0. 1774	0. 37	.Q	.	.	.	.
12. 49	0. 1815	0. 37	.Q	.	.	.	.
12. 62	0. 1858	0. 38	.Q	.	.	.	.
12. 76	0. 1901	0. 39	.Q	.	.	.	.
12. 89	0. 1945	0. 40	.Q	.	.	.	.
13. 03	0. 1990	0. 41	.Q	.	.	.	.
13. 16	0. 2036	0. 42	.Q	.	.	.	.
13. 30	0. 2084	0. 43	.Q	.	.	.	.
13. 43	0. 2132	0. 44	.Q	.	.	.	.
13. 57	0. 2182	0. 45	.Q	.	.	.	.
13. 70	0. 2234	0. 47	.Q	.	.	.	.
13. 84	0. 2287	0. 48	.Q	.	.	.	.
13. 97	0. 2341	0. 50	.Q	.	.	.	.
14. 11	0. 2398	0. 51	. Q	.	.	.	.
14. 24	0. 2457	0. 54	. Q	.	.	.	.
14. 38	0. 2518	0. 55	. Q	.	.	.	.
14. 51	0. 2582	0. 59	. Q	.	.	.	.
14. 65	0. 2648	0. 61	. Q	.	.	.	.

					X100_G		
14. 78	0. 2718	0. 65	. Q	.	.	.	.
14. 92	0. 2792	0. 67	. Q	.	.	.	.
15. 05	0. 2872	0. 74	. Q	.	.	.	.
15. 19	0. 2957	0. 79	. Q	.	.	.	.
15. 32	0. 3051	0. 90	. Q	.	.	.	.
15. 46	0. 3152	0. 91	. Q	.	.	.	.
15. 59	0. 3260	1. 02	. Q	.	.	.	.
15. 73	0. 3383	1. 17	. Q	.	.	.	.
15. 86	0. 3544	1. 72	. Q	.	.	.	.
16. 00	0. 3774	2. 39	. Q.	.	.	.	.
16. 14	0. 4325	7. 48	.	.	Q.	.	.
16. 27	0. 4820	1. 38	. Q	.	.	.	.
16. 41	0. 4948	0. 92	. Q	.	.	.	.
16. 54	0. 5046	0. 84	. Q	.	.	.	.
16. 68	0. 5133	0. 71	. Q	.	.	.	.
16. 81	0. 5207	0. 63	. Q	.	.	.	.
16. 95	0. 5274	0. 57	. Q	.	.	.	.
17. 08	0. 5335	0. 53	. Q	.	.	.	.
17. 22	0. 5392	0. 49	. Q	.	.	.	.
17. 35	0. 5445	0. 46	. Q	.	.	.	.
17. 49	0. 5495	0. 44	. Q	.	.	.	.
17. 62	0. 5542	0. 41	. Q	.	.	.	.
17. 76	0. 5588	0. 40	. Q	.	.	.	.
17. 89	0. 5631	0. 38	. Q	.	.	.	.
18. 03	0. 5672	0. 36	. Q	.	.	.	.
18. 16	0. 5708	0. 28	. Q	.	.	.	.
18. 30	0. 5739	0. 27	. Q	.	.	.	.
18. 43	0. 5768	0. 26	. Q	.	.	.	.
18. 57	0. 5797	0. 25	Q	.	.	.	.
18. 70	0. 5824	0. 24	Q	.	.	.	.
18. 84	0. 5851	0. 23	Q	.	.	.	.
18. 97	0. 5876	0. 23	Q	.	.	.	.
19. 11	0. 5901	0. 22	Q	.	.	.	.
19. 24	0. 5926	0. 21	Q	.	.	.	.
19. 38	0. 5949	0. 21	Q	.	.	.	.
19. 51	0. 5972	0. 20	Q	.	.	.	.
19. 65	0. 5995	0. 20	Q	.	.	.	.
19. 78	0. 6017	0. 19	Q	.	.	.	.
19. 92	0. 6038	0. 19	Q	.	.	.	.
20. 06	0. 6059	0. 19	Q	.	.	.	.
20. 19	0. 6079	0. 18	Q	.	.	.	.
20. 33	0. 6099	0. 18	Q	.	.	.	.
20. 46	0. 6119	0. 17	Q	.	.	.	.
20. 60	0. 6138	0. 17	Q	.	.	.	.
20. 73	0. 6157	0. 17	Q	.	.	.	.
20. 87	0. 6176	0. 16	Q	.	.	.	.
21. 00	0. 6194	0. 16	Q	.	.	.	.
21. 14	0. 6212	0. 16	Q	.	.	.	.
21. 27	0. 6230	0. 16	Q	.	.	.	.
21. 41	0. 6247	0. 15	Q	.	.	.	.
21. 54	0. 6264	0. 15	Q	.	.	.	.
21. 68	0. 6281	0. 15	Q	.	.	.	.
21. 81	0. 6297	0. 15	Q	.	.	.	.
21. 95	0. 6314	0. 14	Q	.	.	.	.
22. 08	0. 6330	0. 14	Q	.	.	.	.
22. 22	0. 6346	0. 14	Q	.	.	.	.
22. 35	0. 6361	0. 14	Q	.	.	.	.
22. 49	0. 6377	0. 14	Q	.	.	.	.
22. 62	0. 6392	0. 14	Q	.	.	.	.
22. 76	0. 6407	0. 13	Q	.	.	.	.
22. 89	0. 6422	0. 13	Q	.	.	.	.
23. 03	0. 6436	0. 13	Q	.	.	.	.
23. 16	0. 6451	0. 13	Q	.	.	.	.
23. 30	0. 6465	0. 13	Q	.	.	.	.
23. 43	0. 6479	0. 13	Q	.	.	.	.
23. 57	0. 6493	0. 12	Q	.	.	.	.
23. 70	0. 6507	0. 12	Q	.	.	.	.
23. 84	0. 6521	0. 12	Q	.	.	.	.
23. 97	0. 6534	0. 12	Q	.	.	.	.
24. 11	0. 6547	0. 12	Q
24. 25	0. 6554	0. 00	Q

Drainage H

 SMALL AREA UNIT HYDROGRAPH MODEL
 =====

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 Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 7.00
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.160
 TIME OF CONCENTRATION(MIN.) = 8.07
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 100
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
 3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
 6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
 24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.55
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.73

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.13	0.0026	0.46	Q	.	.	.	.
0.26	0.0077	0.47	Q	.	.	.	.
0.40	0.0129	0.47	Q	.	.	.	.
0.53	0.0181	0.47	Q	.	.	.	.
0.67	0.0234	0.47	Q	.	.	.	.
0.80	0.0286	0.48	Q	.	.	.	.
0.94	0.0339	0.48	Q	.	.	.	.
1.07	0.0393	0.48	Q	.	.	.	.
1.21	0.0446	0.48	Q	.	.	.	.
1.34	0.0500	0.49	Q	.	.	.	.
1.47	0.0554	0.49	Q	.	.	.	.
1.61	0.0609	0.49	Q	.	.	.	.
1.74	0.0663	0.49	Q	.	.	.	.
1.88	0.0719	0.50	Q	.	.	.	.
2.01	0.0774	0.50	Q	.	.	.	.
2.15	0.0830	0.50	Q	.	.	.	.
2.28	0.0886	0.51	Q	.	.	.	.
2.42	0.0942	0.51	Q	.	.	.	.
2.55	0.0999	0.51	Q	.	.	.	.
2.68	0.1056	0.52	Q	.	.	.	.
2.82	0.1114	0.52	Q	.	.	.	.
2.95	0.1172	0.52	Q	.	.	.	.
3.09	0.1230	0.53	Q	.	.	.	.
3.22	0.1289	0.53	Q	.	.	.	.
3.36	0.1348	0.53	Q	.	.	.	.
3.49	0.1407	0.54	Q	.	.	.	.
3.63	0.1467	0.54	Q	.	.	.	.
3.76	0.1527	0.54	Q	.	.	.	.
3.90	0.1588	0.55	Q	.	.	.	.
4.03	0.1649	0.55	Q	.	.	.	.

				X100_H			
4. 16	0. 1710	0. 55	Q	.	.	.	.
4. 30	0. 1772	0. 56	Q	.	.	.	.
4. 43	0. 1835	0. 56	Q	.	.	.	.
4. 57	0. 1898	0. 57	Q	.	.	.	.
4. 70	0. 1961	0. 57	Q	.	.	.	.
4. 84	0. 2025	0. 58	Q	.	.	.	.
4. 97	0. 2089	0. 58	Q	.	.	.	.
5. 11	0. 2154	0. 59	Q	.	.	.	.
5. 24	0. 2219	0. 59	Q	.	.	.	.
5. 37	0. 2285	0. 59	Q	.	.	.	.
5. 51	0. 2351	0. 60	Q	.	.	.	.
5. 64	0. 2418	0. 60	Q	.	.	.	.
5. 78	0. 2485	0. 61	Q	.	.	.	.
5. 91	0. 2553	0. 61	Q	.	.	.	.
6. 05	0. 2621	0. 62	Q	.	.	.	.
6. 18	0. 2690	0. 62	Q	.	.	.	.
6. 32	0. 2760	0. 63	Q	.	.	.	.
6. 45	0. 2830	0. 64	Q	.	.	.	.
6. 59	0. 2901	0. 64	Q	.	.	.	.
6. 72	0. 2972	0. 65	Q	.	.	.	.
6. 85	0. 3045	0. 65	Q	.	.	.	.
6. 99	0. 3117	0. 66	Q	.	.	.	.
7. 12	0. 3191	0. 66	Q	.	.	.	.
7. 26	0. 3265	0. 67	Q	.	.	.	.
7. 39	0. 3340	0. 68	Q	.	.	.	.
7. 53	0. 3415	0. 68	Q	.	.	.	.
7. 66	0. 3492	0. 69	Q	.	.	.	.
7. 80	0. 3569	0. 70	Q	.	.	.	.
7. 93	0. 3647	0. 70	Q	.	.	.	.
8. 06	0. 3725	0. 71	Q	.	.	.	.
8. 20	0. 3805	0. 72	Q	.	.	.	.
8. 33	0. 3885	0. 73	Q	.	.	.	.
8. 47	0. 3966	0. 73	Q	.	.	.	.
8. 60	0. 4049	0. 74	Q	.	.	.	.
8. 74	0. 4132	0. 75	.Q	.	.	.	.
8. 87	0. 4216	0. 76	.Q	.	.	.	.
9. 01	0. 4301	0. 77	.Q	.	.	.	.
9. 14	0. 4387	0. 78	.Q	.	.	.	.
9. 27	0. 4474	0. 79	.Q	.	.	.	.
9. 41	0. 4562	0. 80	.Q	.	.	.	.
9. 54	0. 4651	0. 81	.Q	.	.	.	.
9. 68	0. 4742	0. 82	.Q	.	.	.	.
9. 81	0. 4833	0. 83	.Q	.	.	.	.
9. 95	0. 4926	0. 84	.Q	.	.	.	.
10. 08	0. 5020	0. 85	.Q	.	.	.	.
10. 22	0. 5116	0. 87	.Q	.	.	.	.
10. 35	0. 5213	0. 88	.Q	.	.	.	.
10. 49	0. 5311	0. 89	.Q	.	.	.	.
10. 62	0. 5411	0. 90	.Q	.	.	.	.
10. 75	0. 5512	0. 92	.Q	.	.	.	.
10. 89	0. 5615	0. 93	.Q	.	.	.	.
11. 02	0. 5720	0. 95	.Q	.	.	.	.
11. 16	0. 5826	0. 96	.Q	.	.	.	.
11. 29	0. 5934	0. 98	.Q	.	.	.	.
11. 43	0. 6044	1. 00	.Q	.	.	.	.
11. 56	0. 6156	1. 02	.Q	.	.	.	.
11. 70	0. 6270	1. 03	.Q	.	.	.	.
11. 83	0. 6387	1. 06	.Q	.	.	.	.
11. 97	0. 6506	1. 08	.Q	.	.	.	.
12. 10	0. 6636	1. 28	.Q	.	.	.	.
12. 23	0. 6785	1. 40	.Q	.	.	.	.
12. 37	0. 6943	1. 44	.Q	.	.	.	.
12. 50	0. 7104	1. 46	.Q	.	.	.	.
12. 64	0. 7269	1. 50	.Q	.	.	.	.
12. 77	0. 7437	1. 52	. Q	.	.	.	.
12. 91	0. 7608	1. 56	. Q	.	.	.	.
13. 04	0. 7783	1. 59	. Q	.	.	.	.
13. 18	0. 7963	1. 64	. Q	.	.	.	.
13. 31	0. 8147	1. 67	. Q	.	.	.	.
13. 44	0. 8335	1. 73	. Q	.	.	.	.
13. 58	0. 8529	1. 76	. Q	.	.	.	.
13. 71	0. 8728	1. 83	. Q	.	.	.	.
13. 85	0. 8934	1. 87	. Q	.	.	.	.
13. 98	0. 9146	1. 95	. Q	.	.	.	.
14. 12	0. 9365	2. 00	. Q	.	.	.	.
14. 25	0. 9593	2. 11	. Q	.	.	.	.
14. 39	0. 9831	2. 16	. Q	.	.	.	.
14. 52	1. 0078	2. 29	. Q	.	.	.	.
14. 65	1. 0337	2. 36	. Q	.	.	.	.

14.79	1.0609	2.53	.	Q	.	X100_H	.	.	.
14.92	1.0896	2.63	.	Q	.	.	.	.	.
15.06	1.1203	2.90	.	Q	.	.	.	.	.
15.19	1.1535	3.07	.	Q	.	.	.	.	.
15.33	1.1901	3.50	.	Q	.	.	.	.	.
15.46	1.2292	3.54	.	Q	.	.	.	.	.
15.60	1.2710	3.99	.	Q	.	.	.	.	.
15.73	1.3186	4.56	.	Q	.	.	.	.	.
15.87	1.3812	6.70	.	Q	.	.	.	.	.
16.00	1.4703	9.34	.	.	Q	.	.	.	.
16.13	1.6843	29.18	.	.	.	.	.	Q	.
16.27	1.8765	5.39	.	Q	.	.	.	.	.
16.40	1.9262	3.57	.	Q	.	.	.	.	.
16.54	1.9642	3.27	.	Q	.	.	.	.	.
16.67	1.9977	2.76	.	Q	.	.	.	.	.
16.81	2.0266	2.44	.	Q	.	.	.	.	.
16.94	2.0526	2.22	.	Q	.	.	.	.	.
17.08	2.0764	2.05	.	Q	.	.	.	.	.
17.21	2.0984	1.91	.	Q	.	.	.	.	.
17.34	2.1189	1.79	.	Q	.	.	.	.	.
17.48	2.1383	1.70	.	Q	.	.	.	.	.
17.61	2.1567	1.61	.	Q	.	.	.	.	.
17.75	2.1743	1.54	.	Q	.	.	.	.	.
17.88	2.1910	1.48	.	Q	.	.	.	.	.
18.02	2.2072	1.42	.	Q	.	.	.	.	.
18.15	2.2211	1.09	.	Q	.	.	.	.	.
18.29	2.2330	1.05	.	Q	.	.	.	.	.
18.42	2.2444	1.01	.	Q	.	.	.	.	.
18.56	2.2554	0.97	.	Q	.	.	.	.	.
18.69	2.2661	0.94	.	Q	.	.	.	.	.
18.82	2.2764	0.91	.	Q	.	.	.	.	.
18.96	2.2863	0.88	.	Q	.	.	.	.	.
19.09	2.2960	0.86	.	Q	.	.	.	.	.
19.23	2.3054	0.84	.	Q	.	.	.	.	.
19.36	2.3146	0.81	.	Q	.	.	.	.	.
19.50	2.3235	0.79	.	Q	.	.	.	.	.
19.63	2.3322	0.77	.	Q	.	.	.	.	.
19.77	2.3407	0.76	.	Q	.	.	.	.	.
19.90	2.3491	0.74	.	Q	.	.	.	.	.
20.03	2.3572	0.72	.	Q	.	.	.	.	.
20.17	2.3651	0.71	.	Q	.	.	.	.	.
20.30	2.3729	0.69	.	Q	.	.	.	.	.
20.44	2.3806	0.68	.	Q	.	.	.	.	.
20.57	2.3880	0.67	.	Q	.	.	.	.	.
20.71	2.3954	0.65	.	Q	.	.	.	.	.
20.84	2.4026	0.64	.	Q	.	.	.	.	.
20.98	2.4097	0.63	.	Q	.	.	.	.	.
21.11	2.4166	0.62	.	Q	.	.	.	.	.
21.25	2.4235	0.61	.	Q	.	.	.	.	.
21.38	2.4302	0.60	.	Q	.	.	.	.	.
21.51	2.4368	0.59	.	Q	.	.	.	.	.
21.65	2.4434	0.58	.	Q	.	.	.	.	.
21.78	2.4498	0.57	.	Q	.	.	.	.	.
21.92	2.4561	0.57	.	Q	.	.	.	.	.
22.05	2.4624	0.56	.	Q	.	.	.	.	.
22.19	2.4685	0.55	.	Q	.	.	.	.	.
22.32	2.4746	0.54	.	Q	.	.	.	.	.
22.46	2.4806	0.53	.	Q	.	.	.	.	.
22.59	2.4865	0.53	.	Q	.	.	.	.	.
22.73	2.4923	0.52	.	Q	.	.	.	.	.
22.86	2.4980	0.51	.	Q	.	.	.	.	.
22.99	2.5037	0.51	.	Q	.	.	.	.	.
23.13	2.5093	0.50	.	Q	.	.	.	.	.
23.26	2.5149	0.50	.	Q	.	.	.	.	.
23.40	2.5204	0.49	.	Q	.	.	.	.	.
23.53	2.5258	0.48	.	Q	.	.	.	.	.
23.67	2.5311	0.48	.	Q	.	.	.	.	.
23.80	2.5364	0.47	.	Q	.	.	.	.	.
23.94	2.5417	0.47	.	Q	.	.	.	.	.
24.07	2.5469	0.46	.	Q
24.20	2.5494	0.00	.	Q

Drainage I

 SMALL AREA UNIT HYDROGRAPH MODEL
 =====

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Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 1.10
 SOIL-LOSS RATE, F_m , (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.160
 TIME OF CONCENTRATION(MIN.) = 9.54
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 100
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
 3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
 6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
 24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.40
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.12

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.10	0.0000	0.00	Q	.	.	.	.
0.26	0.0005	0.07	Q	.	.	.	.
0.42	0.0014	0.07	Q	.	.	.	.
0.58	0.0024	0.07	Q	.	.	.	.
0.74	0.0034	0.07	Q	.	.	.	.
0.90	0.0044	0.07	Q	.	.	.	.
1.05	0.0054	0.08	Q	.	.	.	.
1.21	0.0063	0.08	Q	.	.	.	.
1.37	0.0073	0.08	Q	.	.	.	.
1.53	0.0084	0.08	Q	.	.	.	.
1.69	0.0094	0.08	Q	.	.	.	.
1.85	0.0104	0.08	Q	.	.	.	.
2.01	0.0114	0.08	Q	.	.	.	.
2.17	0.0125	0.08	Q	.	.	.	.
2.33	0.0135	0.08	Q	.	.	.	.
2.49	0.0146	0.08	Q	.	.	.	.
2.64	0.0156	0.08	Q	.	.	.	.
2.80	0.0167	0.08	Q	.	.	.	.
2.96	0.0177	0.08	Q	.	.	.	.
3.12	0.0188	0.08	Q	.	.	.	.
3.28	0.0199	0.08	Q	.	.	.	.
3.44	0.0210	0.08	Q	.	.	.	.
3.60	0.0221	0.08	Q	.	.	.	.
3.76	0.0232	0.09	Q	.	.	.	.
3.92	0.0244	0.09	Q	.	.	.	.
4.07	0.0255	0.09	Q	.	.	.	.
4.23	0.0267	0.09	Q	.	.	.	.
4.39	0.0278	0.09	Q	.	.	.	.
4.55	0.0290	0.09	Q	.	.	.	.
4.71	0.0301	0.09	Q	.	.	.	.
4.87	0.0313	0.09	Q	.	.	.	.

					X100_I			
5. 03	0. 0325	0. 09	Q	.	.	.	.	.
5. 19	0. 0337	0. 09	Q	.	.	.	.	.
5. 35	0. 0349	0. 09	Q	.	.	.	.	.
5. 51	0. 0362	0. 09	Q	.	.	.	.	.
5. 66	0. 0374	0. 09	Q	.	.	.	.	.
5. 82	0. 0387	0. 10	Q	.	.	.	.	.
5. 98	0. 0399	0. 10	Q	.	.	.	.	.
6. 14	0. 0412	0. 10	Q	.	.	.	.	.
6. 30	0. 0425	0. 10	Q	.	.	.	.	.
6. 46	0. 0438	0. 10	Q	.	.	.	.	.
6. 62	0. 0451	0. 10	Q	.	.	.	.	.
6. 78	0. 0464	0. 10	Q	.	.	.	.	.
6. 94	0. 0478	0. 10	Q	.	.	.	.	.
7. 10	0. 0491	0. 10	Q	.	.	.	.	.
7. 25	0. 0505	0. 11	Q	.	.	.	.	.
7. 41	0. 0519	0. 11	Q	.	.	.	.	.
7. 57	0. 0533	0. 11	Q	.	.	.	.	.
7. 73	0. 0547	0. 11	Q	.	.	.	.	.
7. 89	0. 0562	0. 11	Q	.	.	.	.	.
8. 05	0. 0576	0. 11	Q	.	.	.	.	.
8. 21	0. 0591	0. 11	Q	.	.	.	.	.
8. 37	0. 0606	0. 11	Q	.	.	.	.	.
8. 53	0. 0621	0. 12	Q	.	.	.	.	.
8. 69	0. 0636	0. 12	Q	.	.	.	.	.
8. 85	0. 0652	0. 12	Q	.	.	.	.	.
9. 00	0. 0668	0. 12	Q	.	.	.	.	.
9. 16	0. 0684	0. 12	Q	.	.	.	.	.
9. 32	0. 0700	0. 12	Q	.	.	.	.	.
9. 48	0. 0716	0. 13	Q	.	.	.	.	.
9. 64	0. 0733	0. 13	Q	.	.	.	.	.
9. 80	0. 0750	0. 13	Q	.	.	.	.	.
9. 96	0. 0767	0. 13	Q	.	.	.	.	.
10. 12	0. 0785	0. 13	Q	.	.	.	.	.
10. 28	0. 0802	0. 14	Q	.	.	.	.	.
10. 43	0. 0821	0. 14	Q	.	.	.	.	.
10. 59	0. 0839	0. 14	Q	.	.	.	.	.
10. 75	0. 0858	0. 14	Q	.	.	.	.	.
10. 91	0. 0877	0. 15	Q	.	.	.	.	.
11. 07	0. 0896	0. 15	Q	.	.	.	.	.
11. 23	0. 0916	0. 15	Q	.	.	.	.	.
11. 39	0. 0936	0. 16	Q	.	.	.	.	.
11. 55	0. 0957	0. 16	Q	.	.	.	.	.
11. 71	0. 0978	0. 16	Q	.	.	.	.	.
11. 87	0. 1000	0. 17	Q	.	.	.	.	.
12. 02	0. 1022	0. 17	Q	.	.	.	.	.
12. 18	0. 1047	0. 21	Q	.	.	.	.	.
12. 34	0. 1075	0. 22	Q	.	.	.	.	.
12. 50	0. 1105	0. 23	Q	.	.	.	.	.
12. 66	0. 1136	0. 24	Q	.	.	.	.	.
12. 82	0. 1167	0. 24	Q	.	.	.	.	.
12. 98	0. 1199	0. 25	Q	.	.	.	.	.
13. 14	0. 1232	0. 25	.Q	.	.	.	.	.
13. 30	0. 1266	0. 26	.Q	.	.	.	.	.
13. 46	0. 1301	0. 27	.Q	.	.	.	.	.
13. 62	0. 1337	0. 28	.Q	.	.	.	.	.
13. 77	0. 1374	0. 29	.Q	.	.	.	.	.
13. 93	0. 1412	0. 30	.Q	.	.	.	.	.
14. 09	0. 1453	0. 31	.Q	.	.	.	.	.
14. 25	0. 1495	0. 33	.Q	.	.	.	.	.
14. 41	0. 1539	0. 34	.Q	.	.	.	.	.
14. 57	0. 1585	0. 36	.Q	.	.	.	.	.
14. 73	0. 1634	0. 38	.Q	.	.	.	.	.
14. 89	0. 1685	0. 41	.Q	.	.	.	.	.
15. 05	0. 1741	0. 44	.Q	.	.	.	.	.
15. 20	0. 1802	0. 50	.Q	.	.	.	.	.
15. 36	0. 1870	0. 54	. Q	.	.	.	.	.
15. 52	0. 1942	0. 56	. Q	.	.	.	.	.
15. 68	0. 2021	0. 64	. Q	.	.	.	.	.
15. 84	0. 2126	0. 95	. Q	.	.	.	.	.
16. 00	0. 2275	1. 32	. Q	.	.	.	.	.
16. 16	0. 2634	4. 15	. Q	.	Q	.	.	.
16. 32	0. 2957	0. 76	. Q	.	.	.	.	.
16. 48	0. 3043	0. 56	. Q	.	.	.	.	.
16. 64	0. 3110	0. 46	.Q	.	.	.	.	.
16. 80	0. 3167	0. 39	.Q	.	.	.	.	.
16. 95	0. 3216	0. 35	.Q	.	.	.	.	.
17. 11	0. 3260	0. 32	.Q	.	.	.	.	.
17. 27	0. 3300	0. 29	.Q	.	.	.	.	.
17. 43	0. 3337	0. 27	.Q	.	.	.	.	.

				X100_I			
17. 59	0. 3372	0. 26	. Q	.	.	.	.
17. 75	0. 3405	0. 24	Q	.	.	.	.
17. 91	0. 3437	0. 23	Q	.	.	.	.
18. 07	0. 3466	0. 22	Q	.	.	.	.
18. 23	0. 3492	0. 17	Q	.	.	.	.
18. 39	0. 3514	0. 16	Q	.	.	.	.
18. 54	0. 3534	0. 15	Q	.	.	.	.
18. 70	0. 3554	0. 15	Q	.	.	.	.
18. 86	0. 3573	0. 14	Q	.	.	.	.
19. 02	0. 3592	0. 14	Q	.	.	.	.
19. 18	0. 3610	0. 13	Q	.	.	.	.
19. 34	0. 3627	0. 13	Q	.	.	.	.
19. 50	0. 3643	0. 13	Q	.	.	.	.
19. 66	0. 3660	0. 12	Q	.	.	.	.
19. 82	0. 3675	0. 12	Q	.	.	.	.
19. 98	0. 3691	0. 12	Q	.	.	.	.
20. 13	0. 3706	0. 11	Q	.	.	.	.
20. 29	0. 3720	0. 11	Q	.	.	.	.
20. 45	0. 3734	0. 11	Q	.	.	.	.
20. 61	0. 3748	0. 10	Q	.	.	.	.
20. 77	0. 3762	0. 10	Q	.	.	.	.
20. 93	0. 3775	0. 10	Q	.	.	.	.
21. 09	0. 3788	0. 10	Q	.	.	.	.
21. 25	0. 3801	0. 10	Q	.	.	.	.
21. 41	0. 3814	0. 09	Q	.	.	.	.
21. 57	0. 3826	0. 09	Q	.	.	.	.
21. 72	0. 3838	0. 09	Q	.	.	.	.
21. 88	0. 3850	0. 09	Q	.	.	.	.
22. 04	0. 3861	0. 09	Q	.	.	.	.
22. 20	0. 3873	0. 09	Q	.	.	.	.
22. 36	0. 3884	0. 09	Q	.	.	.	.
22. 52	0. 3895	0. 08	Q	.	.	.	.
22. 68	0. 3906	0. 08	Q	.	.	.	.
22. 84	0. 3917	0. 08	Q	.	.	.	.
23. 00	0. 3927	0. 08	Q	.	.	.	.
23. 16	0. 3938	0. 08	Q	.	.	.	.
23. 31	0. 3948	0. 08	Q	.	.	.	.
23. 47	0. 3958	0. 08	Q	.	.	.	.
23. 63	0. 3968	0. 08	Q	.	.	.	.
23. 79	0. 3978	0. 07	Q	.	.	.	.
23. 95	0. 3988	0. 07	Q	.	.	.	.
24. 11	0. 3997	0. 07	Q
24. 27	0. 4002	0. 00	Q

Drainage J

 SMALL AREA UNIT HYDROGRAPH MODEL
 =====

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Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 11.00
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.160
 TIME OF CONCENTRATION(MIN.) = 13.39
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 100
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
 3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
 6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
 24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 4.01
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.16

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.16	0.0047	0.73	Q	.	.	.	.
0.38	0.0181	0.73	Q	.	.	.	.
0.60	0.0317	0.74	Q	.	.	.	.
0.82	0.0454	0.74	Q	.	.	.	.
1.05	0.0592	0.75	Q	.	.	.	.
1.27	0.0731	0.76	Q	.	.	.	.
1.49	0.0872	0.77	Q	.	.	.	.
1.72	0.1014	0.77	Q	.	.	.	.
1.94	0.1157	0.78	Q	.	.	.	.
2.16	0.1302	0.79	Q	.	.	.	.
2.39	0.1448	0.80	Q	.	.	.	.
2.61	0.1596	0.80	Q	.	.	.	.
2.83	0.1745	0.82	Q	.	.	.	.
3.06	0.1896	0.82	Q	.	.	.	.
3.28	0.2049	0.83	Q	.	.	.	.
3.50	0.2203	0.84	Q	.	.	.	.
3.73	0.2359	0.85	Q	.	.	.	.
3.95	0.2516	0.86	Q	.	.	.	.
4.17	0.2676	0.87	Q	.	.	.	.
4.40	0.2837	0.88	Q	.	.	.	.
4.62	0.3000	0.89	Q	.	.	.	.
4.84	0.3165	0.90	Q	.	.	.	.
5.06	0.3333	0.91	Q	.	.	.	.
5.29	0.3502	0.92	Q	.	.	.	.
5.51	0.3674	0.94	Q	.	.	.	.
5.73	0.3848	0.95	Q	.	.	.	.
5.96	0.4024	0.96	Q	.	.	.	.
6.18	0.4202	0.97	Q	.	.	.	.
6.40	0.4384	0.99	Q	.	.	.	.
6.63	0.4567	1.00	.Q	.	.	.	.
6.85	0.4754	1.02	.Q	.	.	.	.

				X100_J		
7.07	0.4943	1.03	.Q	.	.	.
7.30	0.5135	1.05	.Q	.	.	.
7.52	0.5331	1.06	.Q	.	.	.
7.74	0.5529	1.09	.Q	.	.	.
7.97	0.5731	1.10	.Q	.	.	.
8.19	0.5936	1.13	.Q	.	.	.
8.41	0.6145	1.14	.Q	.	.	.
8.64	0.6358	1.17	.Q	.	.	.
8.86	0.6574	1.18	.Q	.	.	.
9.08	0.6795	1.21	.Q	.	.	.
9.30	0.7021	1.23	.Q	.	.	.
9.53	0.7251	1.26	.Q	.	.	.
9.75	0.7485	1.28	.Q	.	.	.
9.97	0.7725	1.32	.Q	.	.	.
10.20	0.7971	1.34	.Q	.	.	.
10.42	0.8222	1.38	.Q	.	.	.
10.64	0.8479	1.41	.Q	.	.	.
10.87	0.8743	1.46	.Q	.	.	.
11.09	0.9015	1.48	.Q	.	.	.
11.31	0.9293	1.54	.Q	.	.	.
11.54	0.9580	1.57	.Q	.	.	.
11.76	0.9876	1.64	.Q	.	.	.
11.98	1.0181	1.67	.Q	.	.	.
12.21	1.0532	2.14	.Q	.	.	.
12.43	1.0937	2.24	.Q	.	.	.
12.65	1.1359	2.34	.Q	.	.	.
12.88	1.1795	2.39	.Q	.	.	.
13.10	1.2248	2.52	.Q	.	.	.
13.32	1.2718	2.58	.Q	.	.	.
13.55	1.3209	2.74	.Q	.	.	.
13.77	1.3722	2.82	.Q	.	.	.
13.99	1.4261	3.03	.Q	.	.	.
14.21	1.4831	3.15	.Q	.	.	.
14.44	1.5438	3.44	.Q	.	.	.
14.66	1.6088	3.61	.Q	.	.	.
14.88	1.6794	4.04	.Q	.	.	.
15.11	1.7567	4.35	.Q	.	.	.
15.33	1.8453	5.27	.Q	.	.	.
15.55	1.9450	5.55	.Q	.	.	.
15.78	2.0663	7.60	.Q	.	.	.
16.00	2.2350	10.70	.Q	.	.	.
16.22	2.6458	33.86	.	.	Q	.
16.45	3.0140	6.06	.Q	.	.	.
16.67	3.1138	4.75	.Q	.	.	.
16.89	3.1927	3.81	.Q	.	.	.
17.12	3.2581	3.29	.Q	.	.	.
17.34	3.3154	2.92	.Q	.	.	.
17.56	3.3668	2.66	.Q	.	.	.
17.79	3.4139	2.45	.Q	.	.	.
18.01	3.4577	2.29	.Q	.	.	.
18.23	3.4945	1.71	.Q	.	.	.
18.45	3.5251	1.60	.Q	.	.	.
18.68	3.5538	1.51	.Q	.	.	.
18.90	3.5809	1.43	.Q	.	.	.
19.12	3.6067	1.36	.Q	.	.	.
19.35	3.6312	1.30	.Q	.	.	.
19.57	3.6547	1.25	.Q	.	.	.
19.79	3.6772	1.20	.Q	.	.	.
20.02	3.6989	1.15	.Q	.	.	.
20.24	3.7198	1.11	.Q	.	.	.
20.46	3.7400	1.08	.Q	.	.	.
20.69	3.7595	1.04	.Q	.	.	.
20.91	3.7785	1.01	.Q	.	.	.
21.13	3.7968	0.98	.Q	.	.	.
21.36	3.8147	0.96	.Q	.	.	.
21.58	3.8321	0.93	.Q	.	.	.
21.80	3.8490	0.91	.Q	.	.	.
22.03	3.8656	0.89	.Q	.	.	.
22.25	3.8817	0.86	.Q	.	.	.
22.47	3.8975	0.85	.Q	.	.	.
22.69	3.9129	0.83	.Q	.	.	.
22.92	3.9280	0.81	.Q	.	.	.
23.14	3.9427	0.79	.Q	.	.	.
23.36	3.9572	0.78	.Q	.	.	.
23.59	3.9714	0.76	.Q	.	.	.
23.81	3.9854	0.75	.Q	.	.	.
24.03	3.9991	0.74	.Q	.	.	.
24.26	4.0058	0.00	.Q	.	.	.

Drainage K

 SMALL AREA UNIT HYDROGRAPH MODEL
 =====

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Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 6.30
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.160
 TIME OF CONCENTRATION(MIN.) = 11.17
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 100
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
 3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
 6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
 24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.29
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.66

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.18	0.0030	0.42	Q	.	.	.	.
0.36	0.0095	0.42	Q	.	.	.	.
0.55	0.0159	0.42	Q	.	.	.	.
0.73	0.0225	0.43	Q	.	.	.	.
0.92	0.0290	0.43	Q	.	.	.	.
1.11	0.0357	0.43	Q	.	.	.	.
1.29	0.0423	0.44	Q	.	.	.	.
1.48	0.0491	0.44	Q	.	.	.	.
1.67	0.0559	0.44	Q	.	.	.	.
1.85	0.0627	0.45	Q	.	.	.	.
2.04	0.0696	0.45	Q	.	.	.	.
2.22	0.0765	0.45	Q	.	.	.	.
2.41	0.0836	0.46	Q	.	.	.	.
2.60	0.0906	0.46	Q	.	.	.	.
2.78	0.0978	0.47	Q	.	.	.	.
2.97	0.1050	0.47	Q	.	.	.	.
3.15	0.1122	0.47	Q	.	.	.	.
3.34	0.1195	0.48	Q	.	.	.	.
3.53	0.1269	0.48	Q	.	.	.	.
3.71	0.1344	0.49	Q	.	.	.	.
3.90	0.1419	0.49	Q	.	.	.	.
4.09	0.1495	0.50	Q	.	.	.	.
4.27	0.1572	0.50	Q	.	.	.	.
4.46	0.1650	0.51	Q	.	.	.	.
4.64	0.1728	0.51	Q	.	.	.	.
4.83	0.1807	0.52	Q	.	.	.	.
5.02	0.1887	0.52	Q	.	.	.	.
5.20	0.1968	0.53	Q	.	.	.	.
5.39	0.2049	0.53	Q	.	.	.	.
5.57	0.2132	0.54	Q	.	.	.	.

				X100_K			
5. 76	0. 2215	0. 55	Q	.	.	.	.
5. 95	0. 2300	0. 55	Q	.	.	.	.
6. 13	0. 2385	0. 56	Q	.	.	.	.
6. 32	0. 2471	0. 56	Q	.	.	.	.
6. 51	0. 2559	0. 57	Q	.	.	.	.
6. 69	0. 2647	0. 58	Q	.	.	.	.
6. 88	0. 2737	0. 59	Q	.	.	.	.
7. 06	0. 2827	0. 59	Q	.	.	.	.
7. 25	0. 2919	0. 60	Q	.	.	.	.
7. 44	0. 3012	0. 61	Q	.	.	.	.
7. 62	0. 3107	0. 62	Q	.	.	.	.
7. 81	0. 3202	0. 62	Q	.	.	.	.
7. 99	0. 3299	0. 64	Q	.	.	.	.
8. 18	0. 3398	0. 64	Q	.	.	.	.
8. 37	0. 3498	0. 66	Q	.	.	.	.
8. 55	0. 3599	0. 66	Q	.	.	.	.
8. 74	0. 3702	0. 68	Q	.	.	.	.
8. 93	0. 3806	0. 68	Q	.	.	.	.
9. 11	0. 3913	0. 70	Q	.	.	.	.
9. 30	0. 4021	0. 71	Q	.	.	.	.
9. 48	0. 4130	0. 72	Q	.	.	.	.
9. 67	0. 4242	0. 73	Q	.	.	.	.
9. 86	0. 4356	0. 75	Q	.	.	.	.
10. 04	0. 4472	0. 76	.Q	.	.	.	.
10. 23	0. 4590	0. 78	.Q	.	.	.	.
10. 41	0. 4711	0. 79	.Q	.	.	.	.
10. 60	0. 4834	0. 81	.Q	.	.	.	.
10. 79	0. 4960	0. 82	.Q	.	.	.	.
10. 97	0. 5088	0. 85	.Q	.	.	.	.
11. 16	0. 5220	0. 86	.Q	.	.	.	.
11. 35	0. 5354	0. 89	.Q	.	.	.	.
11. 53	0. 5492	0. 90	.Q	.	.	.	.
11. 72	0. 5633	0. 93	.Q	.	.	.	.
11. 90	0. 5778	0. 95	.Q	.	.	.	.
12. 09	0. 5932	1. 05	.Q	.	.	.	.
12. 28	0. 6110	1. 26	.Q	.	.	.	.
12. 46	0. 6307	1. 31	.Q	.	.	.	.
12. 65	0. 6510	1. 33	.Q	.	.	.	.
12. 84	0. 6719	1. 38	.Q	.	.	.	.
13. 02	0. 6934	1. 41	.Q	.	.	.	.
13. 21	0. 7157	1. 48	.Q	.	.	.	.
13. 39	0. 7386	1. 51	. Q	.	.	.	.
13. 58	0. 7624	1. 59	. Q	.	.	.	.
13. 77	0. 7872	1. 63	. Q	.	.	.	.
13. 95	0. 8130	1. 73	. Q	.	.	.	.
14. 14	0. 8400	1. 78	. Q	.	.	.	.
14. 32	0. 8685	1. 92	. Q	.	.	.	.
14. 51	0. 8985	1. 99	. Q	.	.	.	.
14. 70	0. 9305	2. 17	. Q	.	.	.	.
14. 88	0. 9647	2. 28	. Q	.	.	.	.
15. 07	1. 0021	2. 58	. Q	.	.	.	.
15. 26	1. 0433	2. 79	. Q	.	.	.	.
15. 44	1. 0893	3. 19	. Q	.	.	.	.
15. 63	1. 1393	3. 31	. Q	.	.	.	.
15. 81	1. 2024	4. 90	. Q	.	.	.	.
16. 00	1. 2929	6. 86	. Q	.	.	.	.
16. 19	1. 5121	21. 62	.	.	Q	.	.
16. 37	1. 7085	3. 92	. Q	.	.	.	.
16. 56	1. 7620	3. 04	. Q	.	.	.	.
16. 74	1. 8039	2. 40	. Q	.	.	.	.
16. 93	1. 8384	2. 07	. Q	.	.	.	.
17. 12	1. 8686	1. 85	. Q	.	.	.	.
17. 30	1. 8957	1. 68	. Q	.	.	.	.
17. 49	1. 9205	1. 55	. Q	.	.	.	.
17. 68	1. 9435	1. 44	. Q	.	.	.	.
17. 86	1. 9650	1. 36	. Q	.	.	.	.
18. 05	1. 9853	1. 28	. Q	.	.	.	.
18. 23	2. 0027	0. 97	. Q	.	.	.	.
18. 42	2. 0172	0. 92	. Q	.	.	.	.
18. 61	2. 0310	0. 87	. Q	.	.	.	.
18. 79	2. 0441	0. 83	. Q	.	.	.	.
18. 98	2. 0567	0. 80	. Q	.	.	.	.
19. 16	2. 0688	0. 77	. Q	.	.	.	.
19. 35	2. 0804	0. 74	Q	.	.	.	.
19. 54	2. 0916	0. 71	Q	.	.	.	.
19. 72	2. 1024	0. 69	Q	.	.	.	.
19. 91	2. 1128	0. 67	Q	.	.	.	.
20. 10	2. 1230	0. 65	Q	.	.	.	.
20. 28	2. 1328	0. 63	Q	.	.	.	.

				X100_K			
20. 47	2. 1424	0. 61	Q	.	.	.	.
20. 65	2. 1517	0. 60	Q	.	.	.	.
20. 84	2. 1607	0. 58	Q	.	.	.	.
21. 03	2. 1696	0. 57	Q	.	.	.	.
21. 21	2. 1782	0. 55	Q	.	.	.	.
21. 40	2. 1867	0. 54	Q	.	.	.	.
21. 58	2. 1949	0. 53	Q	.	.	.	.
21. 77	2. 2030	0. 52	Q	.	.	.	.
21. 96	2. 2109	0. 51	Q	.	.	.	.
22. 14	2. 2187	0. 50	Q	.	.	.	.
22. 33	2. 2263	0. 49	Q	.	.	.	.
22. 52	2. 2337	0. 48	Q	.	.	.	.
22. 70	2. 2411	0. 47	Q	.	.	.	.
22. 89	2. 2483	0. 46	Q	.	.	.	.
23. 07	2. 2553	0. 46	Q	.	.	.	.
23. 26	2. 2623	0. 45	Q	.	.	.	.
23. 45	2. 2691	0. 44	Q	.	.	.	.
23. 63	2. 2758	0. 43	Q	.	.	.	.
23. 82	2. 2825	0. 43	Q	.	.	.	.
24. 01	2. 2890	0. 42	Q	.	.	.	.
24. 19	2. 2922	0. 00	Q

iii. HC 25-Year Storm Event

Drainage A

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 349.60
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.150
LOW LOSS FRACTION = 0.310
TIME OF CONCENTRATION(MIN.) = 26.85
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 86.12
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 44.68

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	135.0	270.0	405.0	540.0
0.34	0.2071	14.85	.Q	.	.	.	.
0.78	0.7590	14.99	.Q	.	.	.	.
1.23	1.3205	15.37	.Q	.	.	.	.
1.68	1.8925	15.57	.Q	.	.	.	.
2.13	2.4759	15.98	.Q	.	.	.	.
2.57	3.0709	16.20	.Q	.	.	.	.
3.02	3.6784	16.66	.Q	.	.	.	.
3.47	4.2990	16.90	.Q	.	.	.	.
3.92	4.9335	17.41	.Q	.	.	.	.
4.36	5.5825	17.69	.Q	.	.	.	.
4.81	6.2472	18.26	.Q	.	.	.	.
5.26	6.9284	18.57	.Q	.	.	.	.
5.71	7.6274	19.23	.Q	.	.	.	.
6.15	8.3452	19.58	.Q	.	.	.	.
6.60	9.0834	20.34	.Q	.	.	.	.
7.05	9.8433	20.75	.Q	.	.	.	.
7.50	10.6270	21.63	.Q	.	.	.	.
7.94	11.4359	22.11	.Q	.	.	.	.
8.39	12.2731	23.16	.Q	.	.	.	.

8.84	13.1403	23.73	.Q	.	.	.	.
9.29	14.0414	25.00	.Q	.	.	.	.
9.73	14.9789	25.70	.Q	.	.	.	.
10.18	15.9584	27.27	. Q	.	.	.	.
10.63	16.9831	28.15	. Q	.	.	.	.
11.08	18.0612	30.15	. Q	.	.	.	.
11.52	19.1977	31.30	. Q	.	.	.	.
11.97	20.4050	33.99	. Q	.	.	.	.
12.42	21.7786	40.30	. Q	.	.	.	.
12.87	23.4708	51.21	. Q	.	.	.	.
13.32	25.4105	53.68	. Q	.	.	.	.
13.76	27.5108	59.90	. Q	.	.	.	.
14.21	29.8004	63.92	. Q	.	.	.	.
14.66	32.3547	74.21	. Q	.	.	.	.
15.10	35.2522	82.48	. Q	.	.	.	.
15.55	38.8080	109.80	. Q	.	.	.	.
16.00	43.4845	143.09	. Q	.	.	.	.
16.45	56.0379	535.78	.	.	.	Q.	.
16.90	67.6872	94.20	. Q	.	.	.	.
17.34	70.6907	68.23	. Q	.	.	.	.
17.79	72.9980	56.54	. Q	.	.	.	.
18.24	74.9505	49.05	. Q	.	.	.	.
18.68	76.4597	32.57	. Q	.	.	.	.
19.13	77.6003	29.11	. Q	.	.	.	.
19.58	78.6278	26.45	.Q	.	.	.	.
20.03	79.5671	24.35	.Q	.	.	.	.
20.48	80.4356	22.62	.Q	.	.	.	.
20.92	81.2456	21.18	.Q	.	.	.	.
21.37	82.0062	19.95	.Q	.	.	.	.
21.82	82.7245	18.89	.Q	.	.	.	.
22.27	83.4062	17.97	.Q	.	.	.	.
22.71	84.0556	17.15	.Q	.	.	.	.
23.16	84.6764	16.42	.Q	.	.	.	.
23.61	85.2717	15.77	.Q	.	.	.	.
24.06	85.8440	15.18	.Q
24.50	86.1247	0.00	Q

Drainage B

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 135.10
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.070
LOW LOSS FRACTION = 0.170
TIME OF CONCENTRATION(MIN.) = 30.94
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 38.91
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 11.64

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	50.0	100.0	150.0	200.0
0.01	0.0000	0.00	Q	.	.	.	.
0.53	0.1471	6.90	.Q	.	.	.	.
1.05	0.4449	7.08	.Q	.	.	.	.
1.56	0.7487	7.18	.Q	.	.	.	.
2.08	1.0592	7.40	.Q	.	.	.	.
2.59	1.3769	7.51	.Q	.	.	.	.
3.11	1.7023	7.76	.Q	.	.	.	.
3.62	2.0357	7.89	.Q	.	.	.	.
4.14	2.3779	8.17	.Q	.	.	.	.
4.66	2.7292	8.32	.Q	.	.	.	.
5.17	3.0906	8.64	.Q	.	.	.	.
5.69	3.4625	8.81	.Q	.	.	.	.
6.20	3.8461	9.19	.Q	.	.	.	.
6.72	4.2421	9.39	.Q	.	.	.	.
7.23	4.6519	9.84	.Q	.	.	.	.
7.75	5.0763	10.08	. Q	.	.	.	.
8.27	5.5174	10.62	. Q	.	.	.	.
8.78	5.9763	10.92	. Q	.	.	.	.
9.30	6.4558	11.58	. Q	.	.	.	.

9.81	6.9573	11.96	. Q	.	.	.	.
10.33	7.4851	12.81	. Q	.	.	.	.
10.84	8.0414	13.30	. Q	.	.	.	.
11.36	8.6323	14.44	. Q	.	.	.	.
11.87	9.2619	15.11	. Q	.	.	.	.
12.39	10.0135	20.16	. Q	.	.	.	.
12.91	10.9372	23.19	. Q	.	.	.	.
13.42	11.9827	25.87	. Q	.	.	.	.
13.94	13.1223	27.61	. Q	.	.	.	.
14.45	14.3947	32.10	. Q	.	.	.	.
14.97	15.8372	35.60	. Q	.	.	.	.
15.48	17.6626	50.07	. Q	.	.	.	.
16.00	19.9858	58.96	. .Q	.	.	.	.
16.52	25.4866	199.19	. .	.	.	. Q.	.
17.03	30.5973	40.65	. Q	.	.	.	.
17.55	32.0972	29.74	. Q	.	.	.	.
18.06	33.2513	24.42	. Q	.	.	.	.
18.58	34.1098	15.87	. Q	.	.	.	.
19.09	34.7427	13.84	. Q	.	.	.	.
19.61	35.3010	12.36	. Q	.	.	.	.
20.13	35.8039	11.24	. Q	.	.	.	.
20.64	36.2637	10.34	. Q	.	.	.	.
21.16	36.6889	9.61	.Q	.	.	.	.
21.67	37.0853	9.00	.Q	.	.	.	.
22.19	37.4576	8.48	.Q	.	.	.	.
22.70	37.8092	8.03	.Q	.	.	.	.
23.22	38.1429	7.63	.Q	.	.	.	.
23.73	38.4608	7.29	.Q	.	.	.	.
24.25	38.7647	6.98	.Q
24.77	38.9133	0.00	Q

Drainage C

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 63.60
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.200
LOW LOSS FRACTION = 0.340
TIME OF CONCENTRATION(MIN.) = 18.31
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 14.98
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 8.82

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	32.5	65.0	97.5	130.0
0.13	0.0000	0.00	Q	.	.	.	.
0.44	0.0328	2.60	Q	.	.	.	.
0.74	0.0986	2.62	Q	.	.	.	.
1.05	0.1652	2.66	Q	.	.	.	.
1.35	0.2327	2.69	Q	.	.	.	.
1.66	0.3011	2.73	Q	.	.	.	.
1.96	0.3703	2.76	Q	.	.	.	.
2.27	0.4406	2.81	Q	.	.	.	.
2.57	0.5118	2.84	Q	.	.	.	.
2.88	0.5840	2.89	Q	.	.	.	.
3.18	0.6573	2.92	Q	.	.	.	.
3.49	0.7317	2.98	Q	.	.	.	.
3.79	0.8072	3.01	Q	.	.	.	.
4.10	0.8839	3.07	Q	.	.	.	.
4.40	0.9619	3.11	Q	.	.	.	.
4.71	1.0411	3.18	Q	.	.	.	.
5.01	1.1217	3.21	Q	.	.	.	.
5.32	1.2037	3.29	.Q	.	.	.	.
5.62	1.2871	3.33	.Q	.	.	.	.

5.93	1.3721	3.41	.Q	.	.	.	.
6.23	1.4587	3.46	.Q	.	.	.	.
6.54	1.5470	3.55	.Q	.	.	.	.
6.85	1.6371	3.60	.Q	.	.	.	.
7.15	1.7290	3.70	.Q	.	.	.	.
7.46	1.8230	3.75	.Q	.	.	.	.
7.76	1.9190	3.87	.Q	.	.	.	.
8.07	2.0172	3.93	.Q	.	.	.	.
8.37	2.1179	4.05	.Q	.	.	.	.
8.68	2.2210	4.12	.Q	.	.	.	.
8.98	2.3268	4.27	.Q	.	.	.	.
9.29	2.4354	4.35	.Q	.	.	.	.
9.59	2.5472	4.52	.Q	.	.	.	.
9.90	2.6622	4.61	.Q	.	.	.	.
10.20	2.7808	4.80	.Q	.	.	.	.
10.51	2.9033	4.91	.Q	.	.	.	.
10.81	3.0300	5.14	.Q	.	.	.	.
11.12	3.1612	5.27	.Q	.	.	.	.
11.42	3.2976	5.55	.Q	.	.	.	.
11.73	3.4395	5.70	.Q	.	.	.	.
12.03	3.5878	6.05	.Q	.	.	.	.
12.34	3.7597	7.58	. Q	.	.	.	.
12.64	3.9656	8.74	. Q	.	.	.	.
12.95	4.1895	9.01	. Q	.	.	.	.
13.25	4.4246	9.64	. Q	.	.	.	.
13.56	4.6722	10.00	. Q	.	.	.	.
13.86	4.9353	10.86	. Q	.	.	.	.
14.17	5.2159	11.39	. Q	.	.	.	.
14.47	5.5178	12.56	. Q	.	.	.	.
14.78	5.8452	13.41	. Q	.	.	.	.
15.08	6.2133	15.78	. Q	.	.	.	.
15.39	6.6336	17.54	. Q	.	.	.	.
15.69	7.1157	20.69	. Q	.	.	.	.
16.00	7.8009	33.64	.	Q	.	.	.
16.31	9.7419	120.28	.	.	.	Q	.
16.61	11.5001	19.14	. Q	.	.	.	.
16.92	11.9238	14.45	. Q	.	.	.	.
17.22	12.2558	11.87	. Q	.	.	.	.
17.53	12.5367	10.41	. Q	.	.	.	.
17.83	12.7852	9.31	. Q	.	.	.	.
18.14	13.0097	8.49	. Q	.	.	.	.
18.44	13.1909	5.87	.Q	.	.	.	.
18.75	13.3331	5.40	.Q	.	.	.	.
19.05	13.4645	5.02	.Q	.	.	.	.
19.36	13.5871	4.70	.Q	.	.	.	.
19.66	13.7022	4.43	.Q	.	.	.	.
19.97	13.8110	4.19	.Q	.	.	.	.
20.27	13.9141	3.99	.Q	.	.	.	.
20.58	14.0124	3.81	.Q	.	.	.	.
20.88	14.1064	3.65	.Q	.	.	.	.
21.19	14.1965	3.50	.Q	.	.	.	.
21.49	14.2832	3.37	.Q	.	.	.	.
21.80	14.3666	3.25	.Q	.	.	.	.
22.10	14.4472	3.14	Q	.	.	.	.
22.41	14.5252	3.04	Q	.	.	.	.
22.71	14.6007	2.95	Q	.	.	.	.
23.02	14.6740	2.86	Q	.	.	.	.
23.32	14.7453	2.78	Q	.	.	.	.
23.63	14.8146	2.71	Q	.	.	.	.
23.93	14.8821	2.64	Q	.	.	.	.
24.24	14.9479	2.58	Q	.	.	.	.
24.54	14.9805	0.00	Q	.	.	.	.

Drainage D

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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 Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 14.29
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.140
 LOW LOSS FRACTION = 0.300
 TIME OF CONCENTRATION(MIN.) = 10.60
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 3.56
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.78

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.10	0.0000	0.00	Q	.	.	.	.
0.28	0.0045	0.62	Q	.	.	.	.
0.45	0.0135	0.62	Q	.	.	.	.
0.63	0.0226	0.63	Q	.	.	.	.
0.81	0.0318	0.63	Q	.	.	.	.
0.98	0.0410	0.64	Q	.	.	.	.
1.16	0.0503	0.64	Q	.	.	.	.
1.34	0.0597	0.65	Q	.	.	.	.
1.51	0.0692	0.65	Q	.	.	.	.
1.69	0.0787	0.66	Q	.	.	.	.
1.87	0.0883	0.66	Q	.	.	.	.
2.04	0.0979	0.67	Q	.	.	.	.
2.22	0.1077	0.67	Q	.	.	.	.
2.40	0.1175	0.68	Q	.	.	.	.
2.57	0.1274	0.68	Q	.	.	.	.
2.75	0.1374	0.69	Q	.	.	.	.
2.93	0.1475	0.69	Q	.	.	.	.
3.10	0.1576	0.70	Q	.	.	.	.
3.28	0.1678	0.70	Q	.	.	.	.
3.46	0.1782	0.71	Q	.	.	.	.
3.63	0.1886	0.72	Q	.	.	.	.
3.81	0.1991	0.72	Q	.	.	.	.
3.99	0.2097	0.73	Q	.	.	.	.
4.16	0.2205	0.74	Q	.	.	.	.
4.34	0.2313	0.74	Q	.	.	.	.
4.52	0.2422	0.75	Q	.	.	.	.
4.69	0.2532	0.76	Q	.	.	.	.
4.87	0.2643	0.77	Q	.	.	.	.
5.05	0.2756	0.77	Q	.	.	.	.
5.22	0.2869	0.78	Q	.	.	.	.

5. 40	0. 2984	0. 79	Q	.	X025_D	.	.
5. 58	0. 3100	0. 80	Q	.	.	.	.
5. 75	0. 3217	0. 81	Q	.	.	.	.
5. 93	0. 3336	0. 82	Q	.	.	.	.
6. 11	0. 3456	0. 82	Q	.	.	.	.
6. 28	0. 3577	0. 84	Q	.	.	.	.
6. 46	0. 3699	0. 84	Q	.	.	.	.
6. 64	0. 3823	0. 86	Q	.	.	.	.
6. 81	0. 3949	0. 86	Q	.	.	.	.
6. 99	0. 4076	0. 88	Q	.	.	.	.
7. 17	0. 4204	0. 88	Q	.	.	.	.
7. 34	0. 4334	0. 90	Q	.	.	.	.
7. 52	0. 4466	0. 91	Q	.	.	.	.
7. 70	0. 4599	0. 92	Q	.	.	.	.
7. 87	0. 4735	0. 93	Q	.	.	.	.
8. 05	0. 4872	0. 95	Q	.	.	.	.
8. 23	0. 5011	0. 96	Q	.	.	.	.
8. 40	0. 5152	0. 98	Q	.	.	.	.
8. 58	0. 5295	0. 99	Q	.	.	.	.
8. 76	0. 5440	1. 00	.Q	.	.	.	.
8. 93	0. 5588	1. 02	.Q	.	.	.	.
9. 11	0. 5738	1. 04	.Q	.	.	.	.
9. 29	0. 5890	1. 05	.Q	.	.	.	.
9. 46	0. 6045	1. 07	.Q	.	.	.	.
9. 64	0. 6202	1. 08	.Q	.	.	.	.
9. 82	0. 6362	1. 11	.Q	.	.	.	.
9. 99	0. 6525	1. 12	.Q	.	.	.	.
10. 17	0. 6691	1. 15	.Q	.	.	.	.
10. 35	0. 6860	1. 17	.Q	.	.	.	.
10. 52	0. 7033	1. 20	.Q	.	.	.	.
10. 70	0. 7209	1. 21	.Q	.	.	.	.
10. 88	0. 7388	1. 25	.Q	.	.	.	.
11. 05	0. 7572	1. 27	.Q	.	.	.	.
11. 23	0. 7759	1. 30	.Q	.	.	.	.
11. 41	0. 7951	1. 32	.Q	.	.	.	.
11. 58	0. 8147	1. 37	.Q	.	.	.	.
11. 76	0. 8349	1. 39	.Q	.	.	.	.
11. 94	0. 8555	1. 44	.Q	.	.	.	.
12. 11	0. 8768	1. 47	.Q	.	.	.	.
12. 29	0. 9021	2. 01	. Q	.	.	.	.
12. 47	0. 9316	2. 04	. Q	.	.	.	.
12. 64	0. 9619	2. 11	. Q	.	.	.	.
12. 82	0. 9930	2. 15	. Q	.	.	.	.
13. 00	1. 0249	2. 23	. Q	.	.	.	.
13. 17	1. 0578	2. 27	. Q	.	.	.	.
13. 35	1. 0918	2. 37	. Q	.	.	.	.
13. 53	1. 1268	2. 43	. Q	.	.	.	.
13. 70	1. 1631	2. 55	. Q	.	.	.	.
13. 88	1. 2008	2. 61	. Q	.	.	.	.
14. 06	1. 2400	2. 76	. Q	.	.	.	.
14. 23	1. 2808	2. 81	. Q	.	.	.	.
14. 41	1. 3233	3. 01	. Q	.	.	.	.
14. 59	1. 3681	3. 13	. Q	.	.	.	.
14. 76	1. 4157	3. 40	. Q	.	.	.	.
14. 94	1. 4666	3. 57	. Q	.	.	.	.
15. 12	1. 5217	3. 98	. Q	.	.	.	.
15. 29	1. 5820	4. 28	. Q	.	.	.	.
15. 47	1. 6471	4. 63	. Q	.	.	.	.
15. 65	1. 7177	5. 04	. Q	.	.	.	.
15. 82	1. 8169	8. 56	. Q	.	.	.	.
16. 00	1. 9695	12. 34	. Q	.	.	.	.
16. 18	2. 3409	38. 54	. Q	.	.	.	.
16. 35	2. 6672	6. 16	. Q	.	.	.	.
16. 53	2. 7469	4. 75	. Q	.	.	.	.
16. 71	2. 8090	3. 76	. Q	.	.	.	.
16. 88	2. 8602	3. 25	. Q	.	.	.	.
17. 06	2. 9052	2. 91	. Q	.	.	.	.
17. 24	2. 9460	2. 69	. Q	.	.	.	.
17. 41	2. 9838	2. 48	. Q	.	.	.	.
17. 59	3. 0189	2. 32	. Q	.	.	.	.
17. 77	3. 0518	2. 19	. Q	.	.	.	.
17. 94	3. 0829	2. 07	. Q	.	.	.	.
18. 12	3. 1123	1. 96	.Q	.	.	.	.
18. 30	3. 1369	1. 41	.Q	.	.	.	.
18. 47	3. 1571	1. 35	.Q	.	.	.	.
18. 65	3. 1763	1. 28	.Q	.	.	.	.
18. 83	3. 1946	1. 23	.Q	.	.	.	.
19. 00	3. 2122	1. 18	.Q	.	.	.	.
19. 18	3. 2292	1. 14	.Q	.	.	.	.

				X025_D			
19.36	3.2455	1.10	.Q	.	.	.	.
19.53	3.2612	1.06	.Q	.	.	.	.
19.71	3.2764	1.03	.Q	.	.	.	.
19.89	3.2912	0.99	Q	.	.	.	.
20.06	3.3055	0.97	Q	.	.	.	.
20.24	3.3194	0.94	Q	.	.	.	.
20.42	3.3329	0.91	Q	.	.	.	.
20.59	3.3461	0.89	Q	.	.	.	.
20.77	3.3590	0.87	Q	.	.	.	.
20.95	3.3715	0.85	Q	.	.	.	.
21.12	3.3838	0.83	Q	.	.	.	.
21.30	3.3957	0.81	Q	.	.	.	.
21.48	3.4075	0.79	Q	.	.	.	.
21.65	3.4189	0.78	Q	.	.	.	.
21.83	3.4302	0.76	Q	.	.	.	.
22.01	3.4412	0.75	Q	.	.	.	.
22.18	3.4520	0.73	Q	.	.	.	.
22.36	3.4626	0.72	Q	.	.	.	.
22.54	3.4731	0.71	Q	.	.	.	.
22.71	3.4833	0.70	Q	.	.	.	.
22.89	3.4934	0.68	Q	.	.	.	.
23.07	3.5033	0.67	Q	.	.	.	.
23.24	3.5130	0.66	Q	.	.	.	.
23.42	3.5226	0.65	Q	.	.	.	.
23.60	3.5321	0.64	Q	.	.	.	.
23.77	3.5414	0.63	Q	.	.	.	.
23.95	3.5505	0.62	Q	.	.	.	.
24.13	3.5596	0.61	Q	.	.	.	.
24.30	3.5641	0.00	Q	.	.	.	.

Drainage E

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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 Ver. 9.0 Release Date: 01/01/2003 License ID 1355

Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 97.20
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.060
 LOW LOSS FRACTION = 0.170
 TIME OF CONCENTRATION(MIN.) = 27.94
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 28.13
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 8.23

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	40.0	80.0	120.0	160.0
0.17	0.0000	0.00	Q	.	.	.	.
0.63	0.0964	5.01	.Q	.	.	.	.
1.10	0.2906	5.08	.Q	.	.	.	.
1.56	0.4885	5.21	.Q	.	.	.	.
2.03	0.6904	5.28	.Q	.	.	.	.
2.50	0.8966	5.43	.Q	.	.	.	.
2.96	1.1071	5.51	.Q	.	.	.	.
3.43	1.3224	5.68	.Q	.	.	.	.
3.89	1.5427	5.77	.Q	.	.	.	.
4.36	1.7682	5.96	.Q	.	.	.	.
4.82	1.9994	6.06	.Q	.	.	.	.
5.29	2.2366	6.27	.Q	.	.	.	.
5.76	2.4801	6.39	.Q	.	.	.	.
6.22	2.7306	6.63	.Q	.	.	.	.
6.69	2.9885	6.77	.Q	.	.	.	.
7.15	3.2544	7.05	.Q	.	.	.	.
7.62	3.5289	7.21	.Q	.	.	.	.
8.08	3.8130	7.55	.Q	.	.	.	.
8.55	4.1072	7.74	.Q	.	.	.	.
9.01	4.4130	8.15	.Q	.	.	.	.
9.48	4.7311	8.38	.Q	.	.	.	.
9.95	5.0635	8.89	.Q	.	.	.	.
10.41	5.4112	9.18	.Q	.	.	.	.
10.88	5.7770	9.83	.Q	.	.	.	.
11.34	6.1627	10.21	.Q	.	.	.	.
11.81	6.5724	11.08	.Q	.	.	.	.
12.27	7.0088	11.60	.Q	.	.	.	.
12.74	7.5548	16.78	.Q	.	.	.	.
13.21	8.2161	17.59	.Q	.	.	.	.
13.67	8.9322	19.62	.Q	.	.	.	.

14.14	9.7127	20.94	.	Q	.	X025_E	.	.	.
14.60	10.5834	24.31	.	Q	.	.	.	.	.
15.07	11.5765	27.30	.	Q	.	.	.	.	.
15.53	12.8353	38.12	.	.	Q.	.	.	.	.
16.00	14.4581	46.22	.	.	.Q	.	.	.	.
16.47	18.2959	153.22	.	.	.	.	.	Q	.
16.93	21.8586	31.92	.	.	Q	.	.	.	.
17.40	22.9044	22.43	.	Q	.	.	.	.	.
17.86	23.6924	18.52	.	Q	.	.	.	.	.
18.33	24.3494	15.62	.	Q	.	.	.	.	.
18.79	24.8545	10.62	.	Q	.	.	.	.	.
19.26	25.2415	9.49	.	Q	.	.	.	.	.
19.73	25.5901	8.63	.	Q	.	.	.	.	.
20.19	25.9089	7.94	.	Q	.	.	.	.	.
20.66	26.2036	7.38	.	Q	.	.	.	.	.
21.12	26.4784	6.91	.	Q	.	.	.	.	.
21.59	26.7365	6.51	.	Q	.	.	.	.	.
22.05	26.9802	6.16	.	Q	.	.	.	.	.
22.52	27.2115	5.86	.	Q	.	.	.	.	.
22.98	27.4319	5.59	.	Q	.	.	.	.	.
23.45	27.6426	5.36	.	Q	.	.	.	.	.
23.92	27.8446	5.14	.	Q	.	.	.	.	.
24.38	28.0390	4.96	.	Q	.	.	.	.	.
24.85	28.1346	0.00	Q	.	.	.	.	.	.

Drainage F

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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 Ver. 9.0 Release Date: 01/01/2003 License ID 1355

Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 5.80
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.240
 TIME OF CONCENTRATION(MIN.) = 7.97
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.57
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.60

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.06	0.0000	0.00	Q	.	.	.	.
0.19	0.0015	0.27	Q	.	.	.	.
0.33	0.0045	0.27	Q	.	.	.	.
0.46	0.0075	0.27	Q	.	.	.	.
0.59	0.0105	0.28	Q	.	.	.	.
0.72	0.0135	0.28	Q	.	.	.	.
0.86	0.0166	0.28	Q	.	.	.	.
0.99	0.0196	0.28	Q	.	.	.	.
1.12	0.0227	0.28	Q	.	.	.	.
1.26	0.0258	0.28	Q	.	.	.	.
1.39	0.0290	0.28	Q	.	.	.	.
1.52	0.0321	0.29	Q	.	.	.	.
1.65	0.0352	0.29	Q	.	.	.	.
1.79	0.0384	0.29	Q	.	.	.	.
1.92	0.0416	0.29	Q	.	.	.	.
2.05	0.0448	0.29	Q	.	.	.	.
2.19	0.0481	0.29	Q	.	.	.	.
2.32	0.0513	0.30	Q	.	.	.	.
2.45	0.0546	0.30	Q	.	.	.	.
2.58	0.0579	0.30	Q	.	.	.	.
2.72	0.0612	0.30	Q	.	.	.	.
2.85	0.0645	0.30	Q	.	.	.	.
2.98	0.0679	0.31	Q	.	.	.	.
3.12	0.0712	0.31	Q	.	.	.	.
3.25	0.0746	0.31	Q	.	.	.	.
3.38	0.0781	0.31	Q	.	.	.	.
3.51	0.0815	0.31	Q	.	.	.	.
3.65	0.0850	0.32	Q	.	.	.	.
3.78	0.0885	0.32	Q	.	.	.	.
3.91	0.0920	0.32	Q	.	.	.	.

					X025_F		
4. 05	0. 0955	0. 32	Q	.	.	.	.
4. 18	0. 0991	0. 33	Q	.	.	.	.
4. 31	0. 1027	0. 33	Q	.	.	.	.
4. 44	0. 1063	0. 33	Q	.	.	.	.
4. 58	0. 1099	0. 33	Q	.	.	.	.
4. 71	0. 1136	0. 34	Q	.	.	.	.
4. 84	0. 1173	0. 34	Q	.	.	.	.
4. 97	0. 1210	0. 34	Q	.	.	.	.
5. 11	0. 1248	0. 34	Q	.	.	.	.
5. 24	0. 1285	0. 35	Q	.	.	.	.
5. 37	0. 1324	0. 35	Q	.	.	.	.
5. 51	0. 1362	0. 35	Q	.	.	.	.
5. 64	0. 1401	0. 35	Q	.	.	.	.
5. 77	0. 1440	0. 36	Q	.	.	.	.
5. 90	0. 1479	0. 36	Q	.	.	.	.
6. 04	0. 1519	0. 36	Q	.	.	.	.
6. 17	0. 1559	0. 37	Q	.	.	.	.
6. 30	0. 1599	0. 37	Q	.	.	.	.
6. 44	0. 1640	0. 37	Q	.	.	.	.
6. 57	0. 1681	0. 38	Q	.	.	.	.
6. 70	0. 1722	0. 38	Q	.	.	.	.
6. 83	0. 1764	0. 38	Q	.	.	.	.
6. 97	0. 1806	0. 39	Q	.	.	.	.
7. 10	0. 1849	0. 39	Q	.	.	.	.
7. 23	0. 1892	0. 39	Q	.	.	.	.
7. 37	0. 1935	0. 40	Q	.	.	.	.
7. 50	0. 1979	0. 40	Q	.	.	.	.
7. 63	0. 2023	0. 41	Q	.	.	.	.
7. 76	0. 2068	0. 41	Q	.	.	.	.
7. 90	0. 2113	0. 41	Q	.	.	.	.
8. 03	0. 2158	0. 42	Q	.	.	.	.
8. 16	0. 2204	0. 42	Q	.	.	.	.
8. 30	0. 2251	0. 43	Q	.	.	.	.
8. 43	0. 2298	0. 43	Q	.	.	.	.
8. 56	0. 2345	0. 43	Q	.	.	.	.
8. 69	0. 2394	0. 44	Q	.	.	.	.
8. 83	0. 2442	0. 44	Q	.	.	.	.
8. 96	0. 2491	0. 45	Q	.	.	.	.
9. 09	0. 2541	0. 46	Q	.	.	.	.
9. 23	0. 2592	0. 46	Q	.	.	.	.
9. 36	0. 2643	0. 47	Q	.	.	.	.
9. 49	0. 2694	0. 47	Q	.	.	.	.
9. 62	0. 2747	0. 48	Q	.	.	.	.
9. 76	0. 2800	0. 49	Q	.	.	.	.
9. 89	0. 2854	0. 49	Q	.	.	.	.
10. 02	0. 2908	0. 50	.Q	.	.	.	.
10. 16	0. 2963	0. 51	.Q	.	.	.	.
10. 29	0. 3019	0. 52	.Q	.	.	.	.
10. 42	0. 3076	0. 52	.Q	.	.	.	.
10. 55	0. 3134	0. 53	.Q	.	.	.	.
10. 69	0. 3192	0. 54	.Q	.	.	.	.
10. 82	0. 3252	0. 55	.Q	.	.	.	.
10. 95	0. 3312	0. 55	.Q	.	.	.	.
11. 09	0. 3374	0. 57	.Q	.	.	.	.
11. 22	0. 3436	0. 57	.Q	.	.	.	.
11. 35	0. 3500	0. 59	.Q	.	.	.	.
11. 48	0. 3565	0. 59	.Q	.	.	.	.
11. 62	0. 3631	0. 61	.Q	.	.	.	.
11. 75	0. 3698	0. 62	.Q	.	.	.	.
11. 88	0. 3766	0. 63	.Q	.	.	.	.
12. 02	0. 3836	0. 64	.Q	.	.	.	.
12. 15	0. 3919	0. 87	.Q	.	.	.	.
12. 28	0. 4015	0. 88	.Q	.	.	.	.
12. 41	0. 4113	0. 90	.Q	.	.	.	.
12. 55	0. 4213	0. 91	.Q	.	.	.	.
12. 68	0. 4315	0. 94	.Q	.	.	.	.
12. 81	0. 4418	0. 95	.Q	.	.	.	.
12. 94	0. 4524	0. 98	.Q	.	.	.	.
13. 08	0. 4633	0. 99	.Q	.	.	.	.
13. 21	0. 4743	1. 02	. Q	.	.	.	.
13. 34	0. 4857	1. 04	. Q	.	.	.	.
13. 48	0. 4973	1. 08	. Q	.	.	.	.
13. 61	0. 5092	1. 10	. Q	.	.	.	.
13. 74	0. 5215	1. 14	. Q	.	.	.	.
13. 87	0. 5341	1. 16	. Q	.	.	.	.
14. 01	0. 5472	1. 21	. Q	.	.	.	.
14. 14	0. 5606	1. 23	. Q	.	.	.	.
14. 27	0. 5744	1. 28	. Q	.	.	.	.
14. 41	0. 5887	1. 32	. Q	.	.	.	.

					X025_F			
14.54	0.6037	1.42	.	Q	.	.	.	.
14.67	0.6196	1.48	.	Q	.	.	.	.
14.80	0.6365	1.61	.	Q	.	.	.	.
14.94	0.6546	1.69	.	Q	.	.	.	.
15.07	0.6742	1.87	.	Q	.	.	.	.
15.20	0.6953	1.98	.	Q	.	.	.	.
15.34	0.7186	2.26	.	Q	.	.	.	.
15.47	0.7432	2.21	.	Q	.	.	.	.
15.60	0.7691	2.50	.	Q	.	.	.	.
15.73	0.7986	2.88	.	Q	.	.	.	.
15.87	0.8395	4.58	.	.	Q.	.	.	.
16.00	0.8994	6.33	.	.	.	Q	.	.
16.13	1.0375	18.82	.	.	.	.	Q	.
16.27	1.1607	3.63	.	.	Q	.	.	.
16.40	1.1929	2.22	.	Q	.	.	.	.
16.53	1.2167	2.11	.	Q	.	.	.	.
16.66	1.2380	1.77	.	Q	.	.	.	.
16.80	1.2562	1.54	.	Q	.	.	.	.
16.93	1.2721	1.37	.	Q	.	.	.	.
17.06	1.2865	1.25	.	Q	.	.	.	.
17.20	1.2999	1.19	.	Q	.	.	.	.
17.33	1.3126	1.12	.	Q	.	.	.	.
17.46	1.3245	1.06	.	Q	.	.	.	.
17.59	1.3359	1.01	.	Q	.	.	.	.
17.73	1.3467	0.96	.	Q	.	.	.	.
17.86	1.3571	0.93	.	Q	.	.	.	.
17.99	1.3670	0.89	.	Q	.	.	.	.
18.13	1.3757	0.69	.	Q	.	.	.	.
18.26	1.3829	0.62	.	Q	.	.	.	.
18.39	1.3896	0.60	.	Q	.	.	.	.
18.52	1.3961	0.58	.	Q	.	.	.	.
18.66	1.4023	0.56	.	Q	.	.	.	.
18.79	1.4084	0.54	.	Q	.	.	.	.
18.92	1.4142	0.53	.	Q	.	.	.	.
19.06	1.4199	0.51	.	Q	.	.	.	.
19.19	1.4255	0.50	.	Q	.	.	.	.
19.32	1.4308	0.48	.	Q	.	.	.	.
19.45	1.4361	0.47	.	Q	.	.	.	.
19.59	1.4412	0.46	.	Q	.	.	.	.
19.72	1.4461	0.45	.	Q	.	.	.	.
19.85	1.4510	0.44	.	Q	.	.	.	.
19.98	1.4558	0.43	.	Q	.	.	.	.
20.12	1.4604	0.42	.	Q	.	.	.	.
20.25	1.4650	0.41	.	Q	.	.	.	.
20.38	1.4695	0.40	.	Q	.	.	.	.
20.52	1.4738	0.39	.	Q	.	.	.	.
20.65	1.4781	0.39	.	Q	.	.	.	.
20.78	1.4823	0.38	.	Q	.	.	.	.
20.91	1.4865	0.37	.	Q	.	.	.	.
21.05	1.4906	0.37	.	Q	.	.	.	.
21.18	1.4946	0.36	.	Q	.	.	.	.
21.31	1.4985	0.36	.	Q	.	.	.	.
21.45	1.5024	0.35	.	Q	.	.	.	.
21.58	1.5062	0.34	.	Q	.	.	.	.
21.71	1.5099	0.34	.	Q	.	.	.	.
21.84	1.5136	0.33	.	Q	.	.	.	.
21.98	1.5173	0.33	.	Q	.	.	.	.
22.11	1.5208	0.32	.	Q	.	.	.	.
22.24	1.5244	0.32	.	Q	.	.	.	.
22.38	1.5279	0.32	.	Q	.	.	.	.
22.51	1.5313	0.31	.	Q	.	.	.	.
22.64	1.5347	0.31	.	Q	.	.	.	.
22.77	1.5381	0.30	.	Q	.	.	.	.
22.91	1.5414	0.30	.	Q	.	.	.	.
23.04	1.5447	0.30	.	Q	.	.	.	.
23.17	1.5479	0.29	.	Q	.	.	.	.
23.31	1.5511	0.29	.	Q	.	.	.	.
23.44	1.5542	0.29	.	Q	.	.	.	.
23.57	1.5574	0.28	.	Q	.	.	.	.
23.70	1.5604	0.28	.	Q	.	.	.	.
23.84	1.5635	0.28	.	Q	.	.	.	.
23.97	1.5665	0.27	.	Q	.	.	.	.
24.10	1.5695	0.27	.	Q	.	.	.	.
24.24	1.5710	0.00	.	Q	.	.	.	.

Drainage G

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 1.80
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.240
 TIME OF CONCENTRATION(MIN.) = 8.11
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.49
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.19

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.05	0.0000	0.00	Q	.	.	.	.
0.19	0.0005	0.08	Q	.	.	.	.
0.32	0.0014	0.08	Q	.	.	.	.
0.46	0.0024	0.09	Q	.	.	.	.
0.59	0.0033	0.09	Q	.	.	.	.
0.73	0.0043	0.09	Q	.	.	.	.
0.86	0.0052	0.09	Q	.	.	.	.
1.00	0.0062	0.09	Q	.	.	.	.
1.13	0.0072	0.09	Q	.	.	.	.
1.27	0.0082	0.09	Q	.	.	.	.
1.40	0.0091	0.09	Q	.	.	.	.
1.54	0.0101	0.09	Q	.	.	.	.
1.67	0.0111	0.09	Q	.	.	.	.
1.81	0.0121	0.09	Q	.	.	.	.
1.94	0.0131	0.09	Q	.	.	.	.
2.08	0.0142	0.09	Q	.	.	.	.
2.21	0.0152	0.09	Q	.	.	.	.
2.35	0.0162	0.09	Q	.	.	.	.
2.48	0.0172	0.09	Q	.	.	.	.
2.62	0.0183	0.09	Q	.	.	.	.
2.75	0.0193	0.09	Q	.	.	.	.
2.89	0.0204	0.09	Q	.	.	.	.
3.02	0.0214	0.10	Q	.	.	.	.
3.16	0.0225	0.10	Q	.	.	.	.
3.29	0.0236	0.10	Q	.	.	.	.
3.43	0.0247	0.10	Q	.	.	.	.
3.56	0.0258	0.10	Q	.	.	.	.
3.70	0.0269	0.10	Q	.	.	.	.
3.84	0.0280	0.10	Q	.	.	.	.
3.97	0.0291	0.10	Q	.	.	.	.

					X025_G		
4. 11	0. 0302	0. 10	Q	.	.	.	.
4. 24	0. 0313	0. 10	Q	.	.	.	.
4. 38	0. 0325	0. 10	Q	.	.	.	.
4. 51	0. 0336	0. 10	Q	.	.	.	.
4. 65	0. 0348	0. 10	Q	.	.	.	.
4. 78	0. 0359	0. 10	Q	.	.	.	.
4. 92	0. 0371	0. 11	Q	.	.	.	.
5. 05	0. 0383	0. 11	Q	.	.	.	.
5. 19	0. 0395	0. 11	Q	.	.	.	.
5. 32	0. 0407	0. 11	Q	.	.	.	.
5. 46	0. 0419	0. 11	Q	.	.	.	.
5. 59	0. 0431	0. 11	Q	.	.	.	.
5. 73	0. 0443	0. 11	Q	.	.	.	.
5. 86	0. 0456	0. 11	Q	.	.	.	.
6. 00	0. 0468	0. 11	Q	.	.	.	.
6. 13	0. 0481	0. 11	Q	.	.	.	.
6. 27	0. 0493	0. 11	Q	.	.	.	.
6. 40	0. 0506	0. 12	Q	.	.	.	.
6. 54	0. 0519	0. 12	Q	.	.	.	.
6. 67	0. 0532	0. 12	Q	.	.	.	.
6. 81	0. 0545	0. 12	Q	.	.	.	.
6. 94	0. 0559	0. 12	Q	.	.	.	.
7. 08	0. 0572	0. 12	Q	.	.	.	.
7. 21	0. 0586	0. 12	Q	.	.	.	.
7. 35	0. 0599	0. 12	Q	.	.	.	.
7. 48	0. 0613	0. 12	Q	.	.	.	.
7. 62	0. 0627	0. 13	Q	.	.	.	.
7. 75	0. 0641	0. 13	Q	.	.	.	.
7. 89	0. 0655	0. 13	Q	.	.	.	.
8. 03	0. 0670	0. 13	Q	.	.	.	.
8. 16	0. 0684	0. 13	Q	.	.	.	.
8. 30	0. 0699	0. 13	Q	.	.	.	.
8. 43	0. 0714	0. 13	Q	.	.	.	.
8. 57	0. 0729	0. 14	Q	.	.	.	.
8. 70	0. 0744	0. 14	Q	.	.	.	.
8. 84	0. 0759	0. 14	Q	.	.	.	.
8. 97	0. 0775	0. 14	Q	.	.	.	.
9. 11	0. 0791	0. 14	Q	.	.	.	.
9. 24	0. 0807	0. 14	Q	.	.	.	.
9. 38	0. 0823	0. 15	Q	.	.	.	.
9. 51	0. 0839	0. 15	Q	.	.	.	.
9. 65	0. 0856	0. 15	Q	.	.	.	.
9. 78	0. 0873	0. 15	Q	.	.	.	.
9. 92	0. 0890	0. 15	Q	.	.	.	.
10. 05	0. 0907	0. 16	Q	.	.	.	.
10. 19	0. 0924	0. 16	Q	.	.	.	.
10. 32	0. 0942	0. 16	Q	.	.	.	.
10. 46	0. 0960	0. 16	Q	.	.	.	.
10. 59	0. 0978	0. 16	Q	.	.	.	.
10. 73	0. 0997	0. 17	Q	.	.	.	.
10. 86	0. 1016	0. 17	Q	.	.	.	.
11. 00	0. 1035	0. 17	Q	.	.	.	.
11. 13	0. 1055	0. 18	Q	.	.	.	.
11. 27	0. 1074	0. 18	Q	.	.	.	.
11. 40	0. 1095	0. 18	Q	.	.	.	.
11. 54	0. 1115	0. 19	Q	.	.	.	.
11. 67	0. 1136	0. 19	Q	.	.	.	.
11. 81	0. 1158	0. 19	Q	.	.	.	.
11. 95	0. 1179	0. 20	Q	.	.	.	.
12. 08	0. 1203	0. 23	Q	.	.	.	.
12. 22	0. 1231	0. 27	.Q	.	.	.	.
12. 35	0. 1262	0. 28	.Q	.	.	.	.
12. 49	0. 1293	0. 28	.Q	.	.	.	.
12. 62	0. 1325	0. 29	.Q	.	.	.	.
12. 76	0. 1357	0. 29	.Q	.	.	.	.
12. 89	0. 1390	0. 30	.Q	.	.	.	.
13. 03	0. 1424	0. 31	.Q	.	.	.	.
13. 16	0. 1459	0. 32	.Q	.	.	.	.
13. 30	0. 1494	0. 32	.Q	.	.	.	.
13. 43	0. 1531	0. 33	.Q	.	.	.	.
13. 57	0. 1568	0. 34	.Q	.	.	.	.
13. 70	0. 1607	0. 35	.Q	.	.	.	.
13. 84	0. 1646	0. 36	.Q	.	.	.	.
13. 97	0. 1687	0. 37	.Q	.	.	.	.
14. 11	0. 1729	0. 38	.Q	.	.	.	.
14. 24	0. 1772	0. 40	.Q	.	.	.	.
14. 38	0. 1817	0. 41	.Q	.	.	.	.
14. 51	0. 1864	0. 44	.Q	.	.	.	.
14. 65	0. 1914	0. 45	.Q	.	.	.	.

					X025_G			
14.78	0.1966	0.49	.Q	.	.	.	.	.
14.92	0.2023	0.52	.Q	.	.	.	.	.
15.05	0.2084	0.57	.Q	.	.	.	.	.
15.19	0.2150	0.61	.Q	.	.	.	.	.
15.32	0.2223	0.70	.Q	.	.	.	.	.
15.46	0.2301	0.70	.Q	.	.	.	.	.
15.59	0.2382	0.77	.Q	.	.	.	.	.
15.73	0.2474	0.88	.Q	.	.	.	.	.
15.86	0.2602	1.41	.Q	.	.	.	.	.
16.00	0.2789	1.94	.Q	.	.	.	.	.
16.14	0.3221	5.78	.	.	Q	.	.	.
16.27	0.3606	1.11	.Q	.	.	.	.	.
16.41	0.3706	0.68	.Q	.	.	.	.	.
16.54	0.3780	0.65	.Q	.	.	.	.	.
16.68	0.3847	0.54	.Q	.	.	.	.	.
16.81	0.3903	0.47	.Q	.	.	.	.	.
16.95	0.3953	0.42	.Q	.	.	.	.	.
17.08	0.3998	0.39	.Q	.	.	.	.	.
17.22	0.4040	0.36	.Q	.	.	.	.	.
17.35	0.4080	0.34	.Q	.	.	.	.	.
17.49	0.4117	0.33	.Q	.	.	.	.	.
17.62	0.4153	0.31	.Q	.	.	.	.	.
17.76	0.4186	0.30	.Q	.	.	.	.	.
17.89	0.4219	0.28	.Q	.	.	.	.	.
18.03	0.4250	0.27	.Q	.	.	.	.	.
18.16	0.4277	0.20	Q	.	.	.	.	.
18.30	0.4298	0.19	Q	.	.	.	.	.
18.43	0.4319	0.18	Q	.	.	.	.	.
18.57	0.4340	0.18	Q	.	.	.	.	.
18.70	0.4359	0.17	Q	.	.	.	.	.
18.84	0.4378	0.17	Q	.	.	.	.	.
18.97	0.4396	0.16	Q	.	.	.	.	.
19.11	0.4414	0.16	Q	.	.	.	.	.
19.24	0.4431	0.15	Q	.	.	.	.	.
19.38	0.4448	0.15	Q	.	.	.	.	.
19.51	0.4465	0.14	Q	.	.	.	.	.
19.65	0.4480	0.14	Q	.	.	.	.	.
19.78	0.4496	0.14	Q	.	.	.	.	.
19.92	0.4511	0.13	Q	.	.	.	.	.
20.06	0.4526	0.13	Q	.	.	.	.	.
20.19	0.4541	0.13	Q	.	.	.	.	.
20.33	0.4555	0.13	Q	.	.	.	.	.
20.46	0.4569	0.12	Q	.	.	.	.	.
20.60	0.4583	0.12	Q	.	.	.	.	.
20.73	0.4596	0.12	Q	.	.	.	.	.
20.87	0.4609	0.12	Q	.	.	.	.	.
21.00	0.4622	0.11	Q	.	.	.	.	.
21.14	0.4635	0.11	Q	.	.	.	.	.
21.27	0.4647	0.11	Q	.	.	.	.	.
21.41	0.4660	0.11	Q	.	.	.	.	.
21.54	0.4672	0.11	Q	.	.	.	.	.
21.68	0.4684	0.11	Q	.	.	.	.	.
21.81	0.4695	0.10	Q	.	.	.	.	.
21.95	0.4707	0.10	Q	.	.	.	.	.
22.08	0.4718	0.10	Q	.	.	.	.	.
22.22	0.4729	0.10	Q	.	.	.	.	.
22.35	0.4740	0.10	Q	.	.	.	.	.
22.49	0.4751	0.10	Q	.	.	.	.	.
22.62	0.4762	0.10	Q	.	.	.	.	.
22.76	0.4773	0.09	Q	.	.	.	.	.
22.89	0.4783	0.09	Q	.	.	.	.	.
23.03	0.4793	0.09	Q	.	.	.	.	.
23.16	0.4804	0.09	Q	.	.	.	.	.
23.30	0.4814	0.09	Q	.	.	.	.	.
23.43	0.4824	0.09	Q	.	.	.	.	.
23.57	0.4834	0.09	Q	.	.	.	.	.
23.70	0.4843	0.09	Q	.	.	.	.	.
23.84	0.4853	0.09	Q	.	.	.	.	.
23.97	0.4863	0.08	Q	.	.	.	.	.
24.11	0.4872	0.08	Q	.	.	.	.	.
24.25	0.4877	0.00	Q	.	.	.	.	.

Drainage H

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 7.00
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.240
 TIME OF CONCENTRATION(MIN.) = 8.31
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.90
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.72

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.07	0.0010	0.33	Q	.	.	.	.
0.21	0.0047	0.33	Q	.	.	.	.
0.35	0.0085	0.33	Q	.	.	.	.
0.49	0.0123	0.33	Q	.	.	.	.
0.63	0.0161	0.33	Q	.	.	.	.
0.76	0.0199	0.33	Q	.	.	.	.
0.90	0.0237	0.34	Q	.	.	.	.
1.04	0.0276	0.34	Q	.	.	.	.
1.18	0.0315	0.34	Q	.	.	.	.
1.32	0.0354	0.34	Q	.	.	.	.
1.46	0.0393	0.35	Q	.	.	.	.
1.60	0.0433	0.35	Q	.	.	.	.
1.73	0.0473	0.35	Q	.	.	.	.
1.87	0.0513	0.35	Q	.	.	.	.
2.01	0.0553	0.35	Q	.	.	.	.
2.15	0.0594	0.36	Q	.	.	.	.
2.29	0.0635	0.36	Q	.	.	.	.
2.43	0.0676	0.36	Q	.	.	.	.
2.57	0.0717	0.36	Q	.	.	.	.
2.70	0.0759	0.36	Q	.	.	.	.
2.84	0.0801	0.37	Q	.	.	.	.
2.98	0.0843	0.37	Q	.	.	.	.
3.12	0.0885	0.37	Q	.	.	.	.
3.26	0.0928	0.37	Q	.	.	.	.
3.40	0.0971	0.38	Q	.	.	.	.
3.53	0.1015	0.38	Q	.	.	.	.
3.67	0.1058	0.38	Q	.	.	.	.
3.81	0.1102	0.39	Q	.	.	.	.
3.95	0.1146	0.39	Q	.	.	.	.
4.09	0.1191	0.39	Q	.	.	.	.

				X025_H		
4. 23	0. 1236	0. 39	Q	.	.	.
4. 37	0. 1281	0. 40	Q	.	.	.
4. 50	0. 1327	0. 40	Q	.	.	.
4. 64	0. 1373	0. 40	Q	.	.	.
4. 78	0. 1419	0. 41	Q	.	.	.
4. 92	0. 1466	0. 41	Q	.	.	.
5. 06	0. 1513	0. 41	Q	.	.	.
5. 20	0. 1560	0. 42	Q	.	.	.
5. 34	0. 1608	0. 42	Q	.	.	.
5. 47	0. 1656	0. 42	Q	.	.	.
5. 61	0. 1705	0. 43	Q	.	.	.
5. 75	0. 1754	0. 43	Q	.	.	.
5. 89	0. 1803	0. 43	Q	.	.	.
6. 03	0. 1853	0. 44	Q	.	.	.
6. 17	0. 1904	0. 44	Q	.	.	.
6. 30	0. 1954	0. 44	Q	.	.	.
6. 44	0. 2005	0. 45	Q	.	.	.
6. 58	0. 2057	0. 45	Q	.	.	.
6. 72	0. 2109	0. 46	Q	.	.	.
6. 86	0. 2162	0. 46	Q	.	.	.
7. 00	0. 2215	0. 47	Q	.	.	.
7. 14	0. 2269	0. 47	Q	.	.	.
7. 27	0. 2323	0. 48	Q	.	.	.
7. 41	0. 2378	0. 48	Q	.	.	.
7. 55	0. 2433	0. 49	Q	.	.	.
7. 69	0. 2489	0. 49	Q	.	.	.
7. 83	0. 2545	0. 50	Q	.	.	.
7. 97	0. 2602	0. 50	Q	.	.	.
8. 11	0. 2660	0. 51	Q	.	.	.
8. 24	0. 2718	0. 51	Q	.	.	.
8. 38	0. 2777	0. 52	Q	.	.	.
8. 52	0. 2837	0. 52	Q	.	.	.
8. 66	0. 2897	0. 53	Q	.	.	.
8. 80	0. 2958	0. 54	Q	.	.	.
8. 94	0. 3020	0. 54	Q	.	.	.
9. 07	0. 3082	0. 55	Q	.	.	.
9. 21	0. 3146	0. 56	Q	.	.	.
9. 35	0. 3210	0. 56	Q	.	.	.
9. 49	0. 3275	0. 57	Q	.	.	.
9. 63	0. 3341	0. 58	Q	.	.	.
9. 77	0. 3408	0. 59	Q	.	.	.
9. 91	0. 3475	0. 59	Q	.	.	.
10. 04	0. 3544	0. 61	Q	.	.	.
10. 18	0. 3614	0. 61	Q	.	.	.
10. 32	0. 3684	0. 62	Q	.	.	.
10. 46	0. 3756	0. 63	Q	.	.	.
10. 60	0. 3829	0. 64	Q	.	.	.
10. 74	0. 3903	0. 65	Q	.	.	.
10. 88	0. 3978	0. 67	Q	.	.	.
11. 01	0. 4055	0. 67	Q	.	.	.
11. 15	0. 4133	0. 69	Q	.	.	.
11. 29	0. 4212	0. 70	Q	.	.	.
11. 43	0. 4293	0. 71	Q	.	.	.
11. 57	0. 4375	0. 72	Q	.	.	.
11. 71	0. 4459	0. 74	Q	.	.	.
11. 85	0. 4545	0. 75	.Q	.	.	.
11. 98	0. 4632	0. 77	.Q	.	.	.
12. 12	0. 4726	0. 87	.Q	.	.	.
12. 26	0. 4837	1. 07	.Q	.	.	.
12. 40	0. 4960	1. 08	.Q	.	.	.
12. 54	0. 5085	1. 11	.Q	.	.	.
12. 68	0. 5213	1. 12	.Q	.	.	.
12. 81	0. 5343	1. 16	.Q	.	.	.
12. 95	0. 5477	1. 17	.Q	.	.	.
13. 09	0. 5613	1. 21	.Q	.	.	.
13. 23	0. 5753	1. 23	.Q	.	.	.
13. 37	0. 5896	1. 27	.Q	.	.	.
13. 51	0. 6043	1. 30	.Q	.	.	.
13. 65	0. 6194	1. 35	.Q	.	.	.
13. 78	0. 6349	1. 37	.Q	.	.	.
13. 92	0. 6510	1. 43	.Q	.	.	.
14. 06	0. 6676	1. 46	.Q	.	.	.
14. 20	0. 6846	1. 52	. Q	.	.	.
14. 34	0. 7022	1. 56	. Q	.	.	.
14. 48	0. 7207	1. 66	. Q	.	.	.
14. 62	0. 7401	1. 73	. Q	.	.	.
14. 75	0. 7608	1. 89	. Q	.	.	.
14. 89	0. 7830	1. 98	. Q	.	.	.
15. 03	0. 8069	2. 20	. Q	.	.	.

					X025_H			
15. 17	0. 8328	2. 33	.	Q	.	.	.	.
15. 31	0. 8614	2. 66	.	Q	.	.	.	.
15. 45	0. 8925	2. 76	.	Q	.	.	.	.
15. 58	0. 9250	2. 93	.	Q	.	.	.	.
15. 72	0. 9611	3. 37	.	Q	.	.	.	.
15. 86	1. 0112	5. 38	.		Q	.	.	.
16. 00	1. 0847	7. 45	.		Q.	.	.	.
16. 14	1. 2542	22. 18	.			Q.	.	.
16. 28	1. 4053	4. 22	.	Q	.	.	.	.
16. 42	1. 4443	2. 60	.	Q	.	.	.	.
16. 55	1. 4734	2. 48	.	Q	.	.	.	.
16. 69	1. 4996	2. 08	.	Q	.	.	.	.
16. 83	1. 5218	1. 81	.	Q	.	.	.	.
16. 97	1. 5414	1. 60	.	Q	.	.	.	.
17. 11	1. 5590	1. 49	.	Q	.	.	.	.
17. 25	1. 5756	1. 40	.	Q	.	.	.	.
17. 39	1. 5911	1. 32	.	Q	.	.	.	.
17. 52	1. 6058	1. 25	.	Q	.	.	.	.
17. 66	1. 6198	1. 19	.	Q	.	.	.	.
17. 80	1. 6331	1. 14	.	Q	.	.	.	.
17. 94	1. 6459	1. 09	.	Q	.	.	.	.
18. 08	1. 6582	1. 05	.	Q	.	.	.	.
18. 22	1. 6686	0. 76	.	Q	.	.	.	.
18. 35	1. 6772	0. 73	Q	.	.	.	.	.
18. 49	1. 6854	0. 71	Q	.	.	.	.	.
18. 63	1. 6934	0. 68	Q	.	.	.	.	.
18. 77	1. 7010	0. 66	Q	.	.	.	.	.
18. 91	1. 7084	0. 64	Q	.	.	.	.	.
19. 05	1. 7156	0. 62	Q	.	.	.	.	.
19. 19	1. 7226	0. 60	Q	.	.	.	.	.
19. 32	1. 7293	0. 58	Q	.	.	.	.	.
19. 46	1. 7359	0. 57	Q	.	.	.	.	.
19. 60	1. 7423	0. 55	Q	.	.	.	.	.
19. 74	1. 7486	0. 54	Q	.	.	.	.	.
19. 88	1. 7547	0. 53	Q	.	.	.	.	.
20. 02	1. 7607	0. 52	Q	.	.	.	.	.
20. 16	1. 7665	0. 50	Q	.	.	.	.	.
20. 29	1. 7722	0. 49	Q	.	.	.	.	.
20. 43	1. 7778	0. 48	Q	.	.	.	.	.
20. 57	1. 7833	0. 47	Q	.	.	.	.	.
20. 71	1. 7886	0. 46	Q	.	.	.	.	.
20. 85	1. 7939	0. 46	Q	.	.	.	.	.
20. 99	1. 7991	0. 45	Q	.	.	.	.	.
21. 12	1. 8041	0. 44	Q	.	.	.	.	.
21. 26	1. 8091	0. 43	Q	.	.	.	.	.
21. 40	1. 8140	0. 42	Q	.	.	.	.	.
21. 54	1. 8188	0. 42	Q	.	.	.	.	.
21. 68	1. 8236	0. 41	Q	.	.	.	.	.
21. 82	1. 8283	0. 40	Q	.	.	.	.	.
21. 96	1. 8328	0. 40	Q	.	.	.	.	.
22. 09	1. 8374	0. 39	Q	.	.	.	.	.
22. 23	1. 8418	0. 39	Q	.	.	.	.	.
22. 37	1. 8462	0. 38	Q	.	.	.	.	.
22. 51	1. 8506	0. 38	Q	.	.	.	.	.
22. 65	1. 8548	0. 37	Q	.	.	.	.	.
22. 79	1. 8591	0. 37	Q	.	.	.	.	.
22. 92	1. 8632	0. 36	Q	.	.	.	.	.
23. 06	1. 8673	0. 36	Q	.	.	.	.	.
23. 20	1. 8714	0. 35	Q	.	.	.	.	.
23. 34	1. 8754	0. 35	Q	.	.	.	.	.
23. 48	1. 8794	0. 34	Q	.	.	.	.	.
23. 62	1. 8833	0. 34	Q	.	.	.	.	.
23. 76	1. 8872	0. 34	Q	.	.	.	.	.
23. 89	1. 8910	0. 33	Q	.	.	.	.	.
24. 03	1. 8948	0. 33	Q	.	.	.	.	.
24. 17	1. 8966	0. 00	Q	.	.	.	.	.

Drainage I

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

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 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 1.10
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.240
 TIME OF CONCENTRATION(MIN.) = 9.62
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.30
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.11

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.13	0.0003	0.05	Q	.	.	.	.
0.29	0.0010	0.05	Q	.	.	.	.
0.45	0.0016	0.05	Q	.	.	.	.
0.61	0.0023	0.05	Q	.	.	.	.
0.77	0.0030	0.05	Q	.	.	.	.
0.93	0.0037	0.05	Q	.	.	.	.
1.09	0.0044	0.05	Q	.	.	.	.
1.25	0.0051	0.05	Q	.	.	.	.
1.41	0.0058	0.05	Q	.	.	.	.
1.57	0.0066	0.05	Q	.	.	.	.
1.73	0.0073	0.05	Q	.	.	.	.
1.89	0.0080	0.06	Q	.	.	.	.
2.05	0.0088	0.06	Q	.	.	.	.
2.21	0.0095	0.06	Q	.	.	.	.
2.37	0.0102	0.06	Q	.	.	.	.
2.53	0.0110	0.06	Q	.	.	.	.
2.69	0.0117	0.06	Q	.	.	.	.
2.85	0.0125	0.06	Q	.	.	.	.
3.01	0.0133	0.06	Q	.	.	.	.
3.17	0.0140	0.06	Q	.	.	.	.
3.33	0.0148	0.06	Q	.	.	.	.
3.49	0.0156	0.06	Q	.	.	.	.
3.65	0.0164	0.06	Q	.	.	.	.
3.81	0.0172	0.06	Q	.	.	.	.
3.98	0.0180	0.06	Q	.	.	.	.
4.14	0.0188	0.06	Q	.	.	.	.
4.30	0.0196	0.06	Q	.	.	.	.
4.46	0.0205	0.06	Q	.	.	.	.
4.62	0.0213	0.06	Q	.	.	.	.
4.78	0.0221	0.06	Q	.	.	.	.

					X025_I		
4. 94	0. 0230	0. 06	Q	.	.	.	.
5. 10	0. 0238	0. 06	Q	.	.	.	.
5. 26	0. 0247	0. 07	Q	.	.	.	.
5. 42	0. 0256	0. 07	Q	.	.	.	.
5. 58	0. 0265	0. 07	Q	.	.	.	.
5. 74	0. 0274	0. 07	Q	.	.	.	.
5. 90	0. 0283	0. 07	Q	.	.	.	.
6. 06	0. 0292	0. 07	Q	.	.	.	.
6. 22	0. 0301	0. 07	Q	.	.	.	.
6. 38	0. 0310	0. 07	Q	.	.	.	.
6. 54	0. 0319	0. 07	Q	.	.	.	.
6. 70	0. 0329	0. 07	Q	.	.	.	.
6. 86	0. 0338	0. 07	Q	.	.	.	.
7. 02	0. 0348	0. 07	Q	.	.	.	.
7. 18	0. 0358	0. 07	Q	.	.	.	.
7. 34	0. 0368	0. 07	Q	.	.	.	.
7. 50	0. 0378	0. 08	Q	.	.	.	.
7. 66	0. 0388	0. 08	Q	.	.	.	.
7. 82	0. 0398	0. 08	Q	.	.	.	.
7. 98	0. 0408	0. 08	Q	.	.	.	.
8. 14	0. 0419	0. 08	Q	.	.	.	.
8. 30	0. 0430	0. 08	Q	.	.	.	.
8. 46	0. 0440	0. 08	Q	.	.	.	.
8. 62	0. 0451	0. 08	Q	.	.	.	.
8. 78	0. 0462	0. 08	Q	.	.	.	.
8. 95	0. 0474	0. 09	Q	.	.	.	.
9. 11	0. 0485	0. 09	Q	.	.	.	.
9. 27	0. 0496	0. 09	Q	.	.	.	.
9. 43	0. 0508	0. 09	Q	.	.	.	.
9. 59	0. 0520	0. 09	Q	.	.	.	.
9. 75	0. 0532	0. 09	Q	.	.	.	.
9. 91	0. 0544	0. 09	Q	.	.	.	.
10. 07	0. 0557	0. 10	Q	.	.	.	.
10. 23	0. 0570	0. 10	Q	.	.	.	.
10. 39	0. 0583	0. 10	Q	.	.	.	.
10. 55	0. 0596	0. 10	Q	.	.	.	.
10. 71	0. 0609	0. 10	Q	.	.	.	.
10. 87	0. 0623	0. 10	Q	.	.	.	.
11. 03	0. 0637	0. 11	Q	.	.	.	.
11. 19	0. 0651	0. 11	Q	.	.	.	.
11. 35	0. 0665	0. 11	Q	.	.	.	.
11. 51	0. 0680	0. 11	Q	.	.	.	.
11. 67	0. 0695	0. 12	Q	.	.	.	.
11. 83	0. 0711	0. 12	Q	.	.	.	.
11. 99	0. 0727	0. 12	Q	.	.	.	.
12. 15	0. 0744	0. 14	Q	.	.	.	.
12. 31	0. 0764	0. 17	Q	.	.	.	.
12. 47	0. 0787	0. 17	Q	.	.	.	.
12. 63	0. 0810	0. 18	Q	.	.	.	.
12. 79	0. 0833	0. 18	Q	.	.	.	.
12. 95	0. 0858	0. 19	Q	.	.	.	.
13. 11	0. 0882	0. 19	Q	.	.	.	.
13. 27	0. 0908	0. 20	Q	.	.	.	.
13. 43	0. 0934	0. 20	Q	.	.	.	.
13. 60	0. 0961	0. 21	Q	.	.	.	.
13. 76	0. 0989	0. 21	Q	.	.	.	.
13. 92	0. 1018	0. 22	Q	.	.	.	.
14. 08	0. 1048	0. 23	Q	.	.	.	.
14. 24	0. 1079	0. 24	Q	.	.	.	.
14. 40	0. 1111	0. 25	Q	.	.	.	.
14. 56	0. 1146	0. 27	.Q	.	.	.	.
14. 72	0. 1182	0. 28	.Q	.	.	.	.
14. 88	0. 1222	0. 31	.Q	.	.	.	.
15. 04	0. 1265	0. 33	.Q	.	.	.	.
15. 20	0. 1312	0. 38	.Q	.	.	.	.
15. 36	0. 1365	0. 41	.Q	.	.	.	.
15. 52	0. 1420	0. 42	.Q	.	.	.	.
15. 68	0. 1479	0. 48	.Q	.	.	.	.
15. 84	0. 1562	0. 77	. Q	.	.	.	.
16. 00	0. 1684	1. 07	. Q	.	.	.	.
16. 16	0. 1967	3. 20	. Q	.	.	.	.
16. 32	0. 2217	0. 58	. Q	.	.	.	.
16. 48	0. 2284	0. 43	.Q	.	.	.	.
16. 64	0. 2336	0. 36	.Q	.	.	.	.
16. 80	0. 2379	0. 30	.Q	.	.	.	.
16. 96	0. 2416	0. 26	.Q	.	.	.	.
17. 12	0. 2449	0. 23	Q	.	.	.	.
17. 28	0. 2479	0. 22	Q	.	.	.	.
17. 44	0. 2507	0. 20	Q	.	.	.	.

				X025_I			
17. 60	0. 2533	0. 19	Q	.	.	.	.
17. 76	0. 2558	0. 18	Q	.	.	.	.
17. 92	0. 2581	0. 17	Q	.	.	.	.
18. 08	0. 2604	0. 17	Q	.	.	.	.
18. 24	0. 2623	0. 12	Q	.	.	.	.
18. 41	0. 2638	0. 11	Q	.	.	.	.
18. 57	0. 2653	0. 11	Q	.	.	.	.
18. 73	0. 2667	0. 10	Q	.	.	.	.
18. 89	0. 2681	0. 10	Q	.	.	.	.
19. 05	0. 2694	0. 10	Q	.	.	.	.
19. 21	0. 2707	0. 09	Q	.	.	.	.
19. 37	0. 2719	0. 09	Q	.	.	.	.
19. 53	0. 2731	0. 09	Q	.	.	.	.
19. 69	0. 2742	0. 09	Q	.	.	.	.
19. 85	0. 2754	0. 08	Q	.	.	.	.
20. 01	0. 2765	0. 08	Q	.	.	.	.
20. 17	0. 2775	0. 08	Q	.	.	.	.
20. 33	0. 2786	0. 08	Q	.	.	.	.
20. 49	0. 2796	0. 08	Q	.	.	.	.
20. 65	0. 2806	0. 07	Q	.	.	.	.
20. 81	0. 2815	0. 07	Q	.	.	.	.
20. 97	0. 2825	0. 07	Q	.	.	.	.
21. 13	0. 2834	0. 07	Q	.	.	.	.
21. 29	0. 2843	0. 07	Q	.	.	.	.
21. 45	0. 2852	0. 07	Q	.	.	.	.
21. 61	0. 2861	0. 07	Q	.	.	.	.
21. 77	0. 2869	0. 06	Q	.	.	.	.
21. 93	0. 2878	0. 06	Q	.	.	.	.
22. 09	0. 2886	0. 06	Q	.	.	.	.
22. 25	0. 2894	0. 06	Q	.	.	.	.
22. 41	0. 2902	0. 06	Q	.	.	.	.
22. 57	0. 2910	0. 06	Q	.	.	.	.
22. 73	0. 2918	0. 06	Q	.	.	.	.
22. 89	0. 2925	0. 06	Q	.	.	.	.
23. 05	0. 2933	0. 06	Q	.	.	.	.
23. 22	0. 2940	0. 06	Q	.	.	.	.
23. 38	0. 2947	0. 05	Q	.	.	.	.
23. 54	0. 2955	0. 05	Q	.	.	.	.
23. 70	0. 2962	0. 05	Q	.	.	.	.
23. 86	0. 2969	0. 05	Q	.	.	.	.
24. 02	0. 2976	0. 05	Q	.	.	.	.
24. 18	0. 2979	0. 00	Q	.	.	.	.

Drainage J

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 11.00
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.240
 TIME OF CONCENTRATION(MIN.) = 13.68
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.98
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.13

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.04	0.0000	0.00	Q	.	.	.	.
0.27	0.0049	0.52	Q	.	.	.	.
0.50	0.0146	0.52	Q	.	.	.	.
0.72	0.0244	0.52	Q	.	.	.	.
0.95	0.0343	0.53	Q	.	.	.	.
1.18	0.0443	0.53	Q	.	.	.	.
1.41	0.0545	0.54	Q	.	.	.	.
1.64	0.0647	0.55	Q	.	.	.	.
1.86	0.0750	0.55	Q	.	.	.	.
2.09	0.0854	0.56	Q	.	.	.	.
2.32	0.0959	0.56	Q	.	.	.	.
2.55	0.1065	0.57	Q	.	.	.	.
2.78	0.1173	0.57	Q	.	.	.	.
3.00	0.1282	0.58	Q	.	.	.	.
3.23	0.1391	0.59	Q	.	.	.	.
3.46	0.1503	0.59	Q	.	.	.	.
3.69	0.1615	0.60	Q	.	.	.	.
3.92	0.1729	0.61	Q	.	.	.	.
4.14	0.1844	0.61	Q	.	.	.	.
4.37	0.1960	0.62	Q	.	.	.	.
4.60	0.2078	0.63	Q	.	.	.	.
4.83	0.2197	0.64	Q	.	.	.	.
5.06	0.2318	0.64	Q	.	.	.	.
5.28	0.2441	0.66	Q	.	.	.	.
5.51	0.2565	0.66	Q	.	.	.	.
5.74	0.2690	0.67	Q	.	.	.	.
5.97	0.2818	0.68	Q	.	.	.	.
6.20	0.2947	0.69	Q	.	.	.	.
6.42	0.3079	0.70	Q	.	.	.	.
6.65	0.3212	0.71	Q	.	.	.	.

					X025_J			
6.88	0.3347	0.72	Q	.	.	.	.	.
7.11	0.3485	0.74	Q	.	.	.	.	.
7.34	0.3624	0.74	Q	.	.	.	.	.
7.56	0.3766	0.76	.Q	.	.	.	.	.
7.79	0.3910	0.77	.Q	.	.	.	.	.
8.02	0.4057	0.79	.Q	.	.	.	.	.
8.25	0.4207	0.80	.Q	.	.	.	.	.
8.48	0.4359	0.82	.Q	.	.	.	.	.
8.70	0.4514	0.83	.Q	.	.	.	.	.
8.93	0.4672	0.85	.Q	.	.	.	.	.
9.16	0.4833	0.86	.Q	.	.	.	.	.
9.39	0.4998	0.89	.Q	.	.	.	.	.
9.62	0.5166	0.90	.Q	.	.	.	.	.
9.84	0.5338	0.93	.Q	.	.	.	.	.
10.07	0.5514	0.94	.Q	.	.	.	.	.
10.30	0.5694	0.97	.Q	.	.	.	.	.
10.53	0.5879	0.99	.Q	.	.	.	.	.
10.76	0.6069	1.02	.Q	.	.	.	.	.
10.98	0.6263	1.04	.Q	.	.	.	.	.
11.21	0.6463	1.08	.Q	.	.	.	.	.
11.44	0.6669	1.10	.Q	.	.	.	.	.
11.67	0.6882	1.15	.Q	.	.	.	.	.
11.90	0.7101	1.18	.Q	.	.	.	.	.
12.12	0.7340	1.36	.Q	.	.	.	.	.
12.35	0.7625	1.67	.Q	.	.	.	.	.
12.58	0.7946	1.74	.Q	.	.	.	.	.
12.81	0.8277	1.78	.Q	.	.	.	.	.
13.04	0.8620	1.87	.Q	.	.	.	.	.
13.26	0.8976	1.91	.Q	.	.	.	.	.
13.49	0.9347	2.02	.Q	.	.	.	.	.
13.72	0.9735	2.09	.Q	.	.	.	.	.
13.95	1.0141	2.23	.Q	.	.	.	.	.
14.18	1.0569	2.31	.Q	.	.	.	.	.
14.40	1.1021	2.49	.Q	.	.	.	.	.
14.63	1.1504	2.64	.Q	.	.	.	.	.
14.86	1.2039	3.04	.Q	.	.	.	.	.
15.09	1.2637	3.30	.Q	.	.	.	.	.
15.32	1.3327	4.03	.Q	.	.	.	.	.
15.54	1.4106	4.24	.Q	.	.	.	.	.
15.77	1.5049	5.77	.Q	.	.	.	.	.
16.00	1.6405	8.63	.Q	.	.	.	.	.
16.23	1.9676	26.08	.Q	.	.	.	.	.
16.46	2.2554	4.47	.Q	.	.	.	.	.
16.68	2.3316	3.62	.Q	.	.	.	.	.
16.91	2.3923	2.82	.Q	.	.	.	.	.
17.14	2.4414	2.38	.Q	.	.	.	.	.
17.37	2.4841	2.16	.Q	.	.	.	.	.
17.60	2.5229	1.97	.Q	.	.	.	.	.
17.82	2.5586	1.82	.Q	.	.	.	.	.
18.05	2.5918	1.70	.Q	.	.	.	.	.
18.28	2.6191	1.20	.Q	.	.	.	.	.
18.51	2.6411	1.13	.Q	.	.	.	.	.
18.74	2.6617	1.06	.Q	.	.	.	.	.
18.96	2.6812	1.01	.Q	.	.	.	.	.
19.19	2.6997	0.96	.Q	.	.	.	.	.
19.42	2.7173	0.91	.Q	.	.	.	.	.
19.65	2.7341	0.87	.Q	.	.	.	.	.
19.88	2.7502	0.84	.Q	.	.	.	.	.
20.10	2.7658	0.81	.Q	.	.	.	.	.
20.33	2.7807	0.78	.Q	.	.	.	.	.
20.56	2.7951	0.75	.Q	.	.	.	.	.
20.79	2.8091	0.73	Q	.	.	.	.	.
21.02	2.8226	0.71	Q	.	.	.	.	.
21.24	2.8358	0.69	Q	.	.	.	.	.
21.47	2.8485	0.67	Q	.	.	.	.	.
21.70	2.8609	0.65	Q	.	.	.	.	.
21.93	2.8730	0.63	Q	.	.	.	.	.
22.16	2.8848	0.62	Q	.	.	.	.	.
22.38	2.8963	0.60	Q	.	.	.	.	.
22.61	2.9076	0.59	Q	.	.	.	.	.
22.84	2.9185	0.58	Q	.	.	.	.	.
23.07	2.9293	0.56	Q	.	.	.	.	.
23.30	2.9398	0.55	Q	.	.	.	.	.
23.52	2.9501	0.54	Q	.	.	.	.	.
23.75	2.9602	0.53	Q	.	.	.	.	.
23.98	2.9702	0.52	Q	.	.	.	.	.
24.21	2.9799	0.51	Q	.	.	.	.	.
24.44	2.9847	0.00	Q	.	.	.	.	.

Drainage K

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 6.30
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.240
 TIME OF CONCENTRATION(MIN.) = 11.30
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.71
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.65

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.18	0.0023	0.29	Q	.	.	.	.
0.37	0.0069	0.30	Q	.	.	.	.
0.56	0.0115	0.30	Q	.	.	.	.
0.74	0.0162	0.30	Q	.	.	.	.
0.93	0.0209	0.30	Q	.	.	.	.
1.12	0.0256	0.31	Q	.	.	.	.
1.31	0.0304	0.31	Q	.	.	.	.
1.50	0.0352	0.31	Q	.	.	.	.
1.69	0.0400	0.31	Q	.	.	.	.
1.87	0.0449	0.32	Q	.	.	.	.
2.06	0.0499	0.32	Q	.	.	.	.
2.25	0.0548	0.32	Q	.	.	.	.
2.44	0.0599	0.32	Q	.	.	.	.
2.63	0.0649	0.33	Q	.	.	.	.
2.82	0.0700	0.33	Q	.	.	.	.
3.00	0.0752	0.33	Q	.	.	.	.
3.19	0.0804	0.34	Q	.	.	.	.
3.38	0.0856	0.34	Q	.	.	.	.
3.57	0.0909	0.34	Q	.	.	.	.
3.76	0.0963	0.35	Q	.	.	.	.
3.95	0.1017	0.35	Q	.	.	.	.
4.13	0.1071	0.35	Q	.	.	.	.
4.32	0.1126	0.36	Q	.	.	.	.
4.51	0.1182	0.36	Q	.	.	.	.
4.70	0.1238	0.36	Q	.	.	.	.
4.89	0.1295	0.37	Q	.	.	.	.
5.08	0.1353	0.37	Q	.	.	.	.
5.26	0.1411	0.38	Q	.	.	.	.
5.45	0.1469	0.38	Q	.	.	.	.
5.64	0.1529	0.38	Q	.	.	.	.

5. 83	0. 1589	0. 39	Q	.	X025_K	.	.
6. 02	0. 1649	0. 39	Q	.	.	.	.
6. 21	0. 1711	0. 40	Q	.	.	.	.
6. 39	0. 1773	0. 40	Q	.	.	.	.
6. 58	0. 1836	0. 41	Q	.	.	.	.
6. 77	0. 1900	0. 41	Q	.	.	.	.
6. 96	0. 1964	0. 42	Q	.	.	.	.
7. 15	0. 2030	0. 42	Q	.	.	.	.
7. 34	0. 2096	0. 43	Q	.	.	.	.
7. 53	0. 2163	0. 44	Q	.	.	.	.
7. 71	0. 2231	0. 44	Q	.	.	.	.
7. 90	0. 2300	0. 45	Q	.	.	.	.
8. 09	0. 2371	0. 45	Q	.	.	.	.
8. 28	0. 2442	0. 46	Q	.	.	.	.
8. 47	0. 2514	0. 47	Q	.	.	.	.
8. 65	0. 2587	0. 48	Q	.	.	.	.
8. 84	0. 2662	0. 48	Q	.	.	.	.
9. 03	0. 2738	0. 49	Q	.	.	.	.
9. 22	0. 2815	0. 50	Q	.	.	.	.
9. 41	0. 2893	0. 51	.Q	.	.	.	.
9. 60	0. 2973	0. 52	.Q	.	.	.	.
9. 78	0. 3054	0. 53	.Q	.	.	.	.
9. 97	0. 3137	0. 54	.Q	.	.	.	.
10. 16	0. 3222	0. 55	.Q	.	.	.	.
10. 35	0. 3308	0. 56	.Q	.	.	.	.
10. 54	0. 3396	0. 57	.Q	.	.	.	.
10. 73	0. 3486	0. 58	.Q	.	.	.	.
10. 91	0. 3578	0. 60	.Q	.	.	.	.
11. 10	0. 3672	0. 61	.Q	.	.	.	.
11. 29	0. 3768	0. 63	.Q	.	.	.	.
11. 48	0. 3867	0. 64	.Q	.	.	.	.
11. 67	0. 3968	0. 66	.Q	.	.	.	.
11. 86	0. 4072	0. 67	.Q	.	.	.	.
12. 05	0. 4179	0. 70	.Q	.	.	.	.
12. 23	0. 4304	0. 91	.Q	.	.	.	.
12. 42	0. 4451	0. 98	.Q	.	.	.	.
12. 61	0. 4605	0. 99	.Q	.	.	.	.
12. 80	0. 4762	1. 03	. Q	.	.	.	.
12. 99	0. 4925	1. 05	. Q	.	.	.	.
13. 18	0. 5092	1. 10	. Q	.	.	.	.
13. 36	0. 5265	1. 12	. Q	.	.	.	.
13. 55	0. 5444	1. 18	. Q	.	.	.	.
13. 74	0. 5630	1. 21	. Q	.	.	.	.
13. 93	0. 5824	1. 28	. Q	.	.	.	.
14. 12	0. 6026	1. 32	. Q	.	.	.	.
14. 30	0. 6238	1. 39	. Q	.	.	.	.
14. 49	0. 6459	1. 45	. Q	.	.	.	.
14. 68	0. 6698	1. 62	. Q	.	.	.	.
14. 87	0. 6957	1. 72	. Q	.	.	.	.
15. 06	0. 7244	1. 97	. Q	.	.	.	.
15. 25	0. 7564	2. 14	. Q	.	.	.	.
15. 43	0. 7921	2. 45	. Q	.	.	.	.
15. 62	0. 8302	2. 45	. Q	.	.	.	.
15. 81	0. 8796	3. 89	. Q	.	.	.	.
16. 00	0. 9532	5. 56	. Q	.	.	.	.
16. 19	1. 1264	16. 70	.	.	.	Q	.
16. 38	1. 2791	2. 92	. Q	.	.	.	.
16. 57	1. 3201	2. 34	. Q	.	.	.	.
16. 75	1. 3526	1. 84	. Q	.	.	.	.
16. 94	1. 3788	1. 53	. Q	.	.	.	.
17. 13	1. 4011	1. 35	. Q	.	.	.	.
17. 32	1. 4213	1. 24	. Q	.	.	.	.
17. 51	1. 4399	1. 15	. Q	.	.	.	.
17. 69	1. 4573	1. 08	. Q	.	.	.	.
17. 88	1. 4735	1. 01	. Q	.	.	.	.
18. 07	1. 4889	0. 96	.Q	.	.	.	.
18. 26	1. 5017	0. 69	.Q	.	.	.	.
18. 45	1. 5121	0. 65	.Q	.	.	.	.
18. 64	1. 5220	0. 62	.Q	.	.	.	.
18. 83	1. 5314	0. 59	.Q	.	.	.	.
19. 01	1. 5403	0. 57	.Q	.	.	.	.
19. 20	1. 5490	0. 54	.Q	.	.	.	.
19. 39	1. 5573	0. 52	.Q	.	.	.	.
19. 58	1. 5652	0. 50	.Q	.	.	.	.
19. 77	1. 5730	0. 49	Q	.	.	.	.
19. 95	1. 5804	0. 47	Q	.	.	.	.
20. 14	1. 5876	0. 46	Q	.	.	.	.
20. 33	1. 5947	0. 44	Q	.	.	.	.
20. 52	1. 6015	0. 43	Q	.	.	.	.

X025_K				
20.71	1.6081	0.42	Q	.
20.90	1.6146	0.41	Q	.
21.08	1.6209	0.40	Q	.
21.27	1.6270	0.39	Q	.
21.46	1.6330	0.38	Q	.
21.65	1.6389	0.37	Q	.
21.84	1.6446	0.37	Q	.
22.03	1.6502	0.36	Q	.
22.22	1.6557	0.35	Q	.
22.40	1.6611	0.34	Q	.
22.59	1.6664	0.34	Q	.
22.78	1.6716	0.33	Q	.
22.97	1.6768	0.33	Q	.
23.16	1.6818	0.32	Q	.
23.34	1.6867	0.31	Q	.
23.53	1.6916	0.31	Q	.
23.72	1.6963	0.30	Q	.
23.91	1.7010	0.30	Q	.
24.10	1.7057	0.29	Q	.
24.29	1.7080	0.00	Q	.

iv. HC 10-Year Storm Event

Drainage A

SMALL AREA UNIT HYDROGRAPH MODEL

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Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 349.60
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.150
LOW LOSS FRACTION = 0.350
TIME OF CONCENTRATION(MIN.) = 28.15
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 67.35
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 39.86

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	107.5	215.0	322.5	430.0
0.05	0.0000	0.00	Q	.	.	.	.
0.52	0.2275	11.73	.Q	.	.	.	.
0.99	0.6852	11.88	.Q	.	.	.	.
1.46	1.1520	12.19	.Q	.	.	.	.
1.93	1.6279	12.36	.Q	.	.	.	.
2.39	2.1138	12.70	.Q	.	.	.	.
2.86	2.6099	12.89	.Q	.	.	.	.
3.33	3.1171	13.27	.Q	.	.	.	.
3.80	3.6357	13.48	.Q	.	.	.	.
4.27	4.1668	13.92	.Q	.	.	.	.
4.74	4.7109	14.15	.Q	.	.	.	.
5.21	5.2690	14.64	.Q	.	.	.	.
5.68	5.8420	14.91	.Q	.	.	.	.
6.15	6.4311	15.48	.Q	.	.	.	.
6.62	7.0373	15.79	.Q	.	.	.	.
7.09	7.6623	16.45	.Q	.	.	.	.
7.56	8.3072	16.81	.Q	.	.	.	.
8.02	8.9744	17.60	.Q	.	.	.	.
8.49	9.6652	18.03	.Q	.	.	.	.

8.96	10.3828	18.98	.Q	.	.	.	.
9.43	11.1290	19.51	.Q	.	.	.	.
9.90	11.9082	20.68	.Q	.	.	.	.
10.37	12.7231	21.35	.Q	.	.	.	.
10.84	13.5799	22.85	. Q	.	.	.	.
11.31	14.4826	23.71	. Q	.	.	.	.
11.78	15.4410	25.72	. Q	.	.	.	.
12.25	16.4612	26.90	. Q	.	.	.	.
12.72	17.7036	37.18	. Q	.	.	.	.
13.18	19.1810	39.02	. Q	.	.	.	.
13.65	20.7842	43.67	. Q	.	.	.	.
14.12	22.5358	46.68	. Q	.	.	.	.
14.59	24.5093	55.11	. Q	.	.	.	.
15.06	26.7670	61.34	. Q	.	.	.	.
15.53	29.5533	82.38	. Q	.	.	.	.
16.00	33.1616	103.74	. Q.	.	.	.	.
16.47	43.3728	422.96	.	.	.	.	Q.
16.94	52.9334	70.18	. Q	.	.	.	.
17.41	55.2710	50.39	. Q	.	.	.	.
17.88	57.0459	41.16	. Q	.	.	.	.
18.35	58.5035	34.03	. Q	.	.	.	.
18.82	59.6414	24.66	. Q	.	.	.	.
19.28	60.5473	22.06	. Q	.	.	.	.
19.75	61.3642	20.07	.Q	.	.	.	.
20.22	62.1119	18.49	.Q	.	.	.	.
20.69	62.8037	17.19	.Q	.	.	.	.
21.16	63.4495	16.11	.Q	.	.	.	.
21.63	64.0562	15.19	.Q	.	.	.	.
22.10	64.6297	14.39	.Q	.	.	.	.
22.57	65.1741	13.69	.Q	.	.	.	.
23.04	65.6931	13.08	.Q	.	.	.	.
23.51	66.1895	12.53	.Q	.	.	.	.
23.98	66.6656	12.03	.Q	.	.	.	.
24.44	67.1248	11.65	.Q
24.91	67.3506	0.00	Q

Drainage B

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 135.10
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.070
LOW LOSS FRACTION = 0.200
TIME OF CONCENTRATION(MIN.) = 32.10
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 30.86
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 10.57

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	40.0	80.0	120.0	160.0
0.49	0.1116	5.57	.Q	.	.	.	.
1.02	0.3595	5.64	.Q	.	.	.	.
1.56	0.6127	5.81	.Q	.	.	.	.
2.09	0.8717	5.90	.Q	.	.	.	.
2.63	1.1370	6.09	.Q	.	.	.	.
3.16	1.4086	6.20	.Q	.	.	.	.
3.70	1.6874	6.41	.Q	.	.	.	.
4.23	1.9735	6.53	.Q	.	.	.	.
4.77	2.2677	6.78	.Q	.	.	.	.
5.30	2.5704	6.91	.Q	.	.	.	.
5.84	2.8825	7.20	.Q	.	.	.	.
6.37	3.2046	7.36	.Q	.	.	.	.
6.91	3.5377	7.71	.Q	.	.	.	.
7.44	3.8827	7.90	.Q	.	.	.	.
7.98	4.2410	8.31	. Q	.	.	.	.
8.51	4.6137	8.54	. Q	.	.	.	.
9.05	5.0028	9.06	. Q	.	.	.	.
9.58	5.4097	9.35	. Q	.	.	.	.
10.12	5.8376	10.01	. Q	.	.	.	.

10.65	6.2884	10.38	. Q	.	.	.	.
11.19	6.7669	11.26	. Q	.	.	.	.
11.72	7.2764	11.78	. Q	.	.	.	.
12.26	7.8415	13.78	. Q	.	.	.	.
12.79	8.5289	17.31	. Q	.	.	.	.
13.32	9.3397	19.37	. Q	.	.	.	.
13.86	10.2257	20.71	. Q	.	.	.	.
14.40	11.2238	24.44	. Q	.	.	.	.
14.93	12.3656	27.21	. Q	.	.	.	.
15.47	13.8104	38.15	. Q.	.	.	.	.
16.00	15.6758	46.23	. .Q	.	.	.	.
16.53	20.2264	159.61	. .	.	.	Q.	.
17.07	24.4433	31.13	. Q	.	.	.	.
17.61	25.6255	22.35	. Q	.	.	.	.
18.14	26.5232	18.26	. Q	.	.	.	.
18.67	27.2002	12.37	. Q	.	.	.	.
19.21	27.7123	10.80	. Q	.	.	.	.
19.74	28.1647	9.66	. Q	.	.	.	.
20.28	28.5727	8.79	. Q	.	.	.	.
20.82	28.9460	8.10	. Q	.	.	.	.
21.35	29.2915	7.53	.Q	.	.	.	.
21.89	29.6140	7.06	.Q	.	.	.	.
22.42	29.9170	6.65	.Q	.	.	.	.
22.95	30.2033	6.30	.Q	.	.	.	.
23.49	30.4752	6.00	.Q	.	.	.	.
24.02	30.7344	5.73	.Q
24.56	30.8610	0.00	Q

Drainage C

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 63.60
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.200
LOW LOSS FRACTION = 0.390
TIME OF CONCENTRATION(MIN.) = 18.57
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 11.50
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 8.01

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	25.0	50.0	75.0	100.0
0.22	0.0177	1.99	Q	.	.	.	.
0.53	0.0688	2.00	Q	.	.	.	.
0.83	0.1205	2.04	Q	.	.	.	.
1.14	0.1728	2.05	Q	.	.	.	.
1.45	0.2259	2.09	Q	.	.	.	.
1.76	0.2796	2.11	Q	.	.	.	.
2.07	0.3340	2.15	Q	.	.	.	.
2.38	0.3892	2.17	Q	.	.	.	.
2.69	0.4452	2.21	Q	.	.	.	.
3.00	0.5020	2.23	Q	.	.	.	.
3.31	0.5596	2.28	Q	.	.	.	.
3.62	0.6181	2.30	Q	.	.	.	.
3.93	0.6776	2.35	Q	.	.	.	.
4.24	0.7379	2.37	Q	.	.	.	.
4.55	0.7993	2.42	Q	.	.	.	.
4.86	0.8616	2.45	Q	.	.	.	.
5.17	0.9251	2.51	.Q	.	.	.	.
5.48	0.9896	2.54	.Q	.	.	.	.
5.79	1.0554	2.60	.Q	.	.	.	.

6.10	1.1224	2.63	.Q	.	.	.	.
6.41	1.1906	2.70	.Q	.	.	.	.
6.72	1.2603	2.74	.Q	.	.	.	.
7.02	1.3314	2.82	.Q	.	.	.	.
7.33	1.4040	2.86	.Q	.	.	.	.
7.64	1.4782	2.94	.Q	.	.	.	.
7.95	1.5540	2.99	.Q	.	.	.	.
8.26	1.6317	3.09	.Q	.	.	.	.
8.57	1.7113	3.14	.Q	.	.	.	.
8.88	1.7930	3.25	.Q	.	.	.	.
9.19	1.8768	3.31	.Q	.	.	.	.
9.50	1.9630	3.43	.Q	.	.	.	.
9.81	2.0517	3.50	.Q	.	.	.	.
10.12	2.1431	3.65	.Q	.	.	.	.
10.43	2.2375	3.73	.Q	.	.	.	.
10.74	2.3351	3.90	.Q	.	.	.	.
11.05	2.4362	4.00	.Q	.	.	.	.
11.36	2.5412	4.21	.Q	.	.	.	.
11.67	2.6503	4.33	.Q	.	.	.	.
11.98	2.7643	4.59	.Q	.	.	.	.
12.29	2.8897	5.22	. Q	.	.	.	.
12.60	3.0374	6.33	. Q	.	.	.	.
12.90	3.2020	6.54	. Q	.	.	.	.
13.21	3.3751	7.00	. Q	.	.	.	.
13.52	3.5576	7.27	. Q	.	.	.	.
13.83	3.7519	7.92	. Q	.	.	.	.
14.14	3.9595	8.31	. Q	.	.	.	.
14.45	4.1848	9.31	. Q	.	.	.	.
14.76	4.4310	9.95	. Q	.	.	.	.
15.07	4.7084	11.74	. Q	.	.	.	.
15.38	5.0255	13.06	. Q	.	.	.	.
15.69	5.3918	15.57	. Q	.	.	.	.
16.00	5.9062	24.65	. Q.	.	.	.	.
16.31	7.4682	97.48	.	.	.	Q	.
16.62	8.8993	14.42	. Q	.	.	.	.
16.93	9.2209	10.74	. Q	.	.	.	.
17.24	9.4704	8.77	. Q	.	.	.	.
17.55	9.6794	7.57	. Q	.	.	.	.
17.86	9.8627	6.76	. Q	.	.	.	.
18.17	10.0278	6.15	. Q	.	.	.	.
18.48	10.1634	4.45	.Q	.	.	.	.
18.79	10.2727	4.10	.Q	.	.	.	.
19.09	10.3740	3.81	.Q	.	.	.	.
19.40	10.4684	3.57	.Q	.	.	.	.
19.71	10.5572	3.37	.Q	.	.	.	.
20.02	10.6411	3.19	.Q	.	.	.	.
20.33	10.7208	3.04	.Q	.	.	.	.
20.64	10.7967	2.90	.Q	.	.	.	.
20.95	10.8693	2.78	.Q	.	.	.	.
21.26	10.9390	2.67	.Q	.	.	.	.
21.57	11.0060	2.57	.Q	.	.	.	.
21.88	11.0706	2.48	Q	.	.	.	.
22.19	11.1330	2.40	Q	.	.	.	.
22.50	11.1933	2.32	Q	.	.	.	.
22.81	11.2518	2.25	Q	.	.	.	.
23.12	11.3086	2.19	Q	.	.	.	.
23.43	11.3639	2.13	Q	.	.	.	.
23.74	11.4176	2.07	Q	.	.	.	.
24.05	11.4699	2.02	Q	.	.	.	.
24.36	11.4958	0.00	Q	.	.	.	.

Drainage D

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 14.29
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.140
 LOW LOSS FRACTION = 0.340
 TIME OF CONCENTRATION(MIN.) = 10.86
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 10
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
 24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.78
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.60

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.07	0.0000	0.00	Q	.	.	.	.
0.25	0.0036	0.49	Q	.	.	.	.
0.43	0.0109	0.49	Q	.	.	.	.
0.62	0.0182	0.49	Q	.	.	.	.
0.80	0.0256	0.50	Q	.	.	.	.
0.98	0.0331	0.50	Q	.	.	.	.
1.16	0.0406	0.50	Q	.	.	.	.
1.34	0.0481	0.51	Q	.	.	.	.
1.52	0.0557	0.51	Q	.	.	.	.
1.70	0.0634	0.52	Q	.	.	.	.
1.88	0.0711	0.52	Q	.	.	.	.
2.06	0.0789	0.52	Q	.	.	.	.
2.24	0.0868	0.53	Q	.	.	.	.
2.43	0.0947	0.53	Q	.	.	.	.
2.61	0.1027	0.54	Q	.	.	.	.
2.79	0.1108	0.54	Q	.	.	.	.
2.97	0.1189	0.54	Q	.	.	.	.
3.15	0.1271	0.55	Q	.	.	.	.
3.33	0.1354	0.55	Q	.	.	.	.
3.51	0.1437	0.56	Q	.	.	.	.
3.69	0.1521	0.56	Q	.	.	.	.
3.87	0.1606	0.57	Q	.	.	.	.
4.05	0.1692	0.57	Q	.	.	.	.
4.24	0.1779	0.58	Q	.	.	.	.
4.42	0.1866	0.59	Q	.	.	.	.
4.60	0.1954	0.59	Q	.	.	.	.
4.78	0.2043	0.60	Q	.	.	.	.
4.96	0.2133	0.61	Q	.	.	.	.
5.14	0.2224	0.61	Q	.	.	.	.
5.32	0.2316	0.62	Q	.	.	.	.

				X010_D			
5. 50	0. 2409	0. 62	Q	.	.	.	.
5. 68	0. 2503	0. 63	Q	.	.	.	.
5. 86	0. 2598	0. 64	Q	.	.	.	.
6. 05	0. 2694	0. 65	Q	.	.	.	.
6. 23	0. 2791	0. 65	Q	.	.	.	.
6. 41	0. 2889	0. 66	Q	.	.	.	.
6. 59	0. 2988	0. 67	Q	.	.	.	.
6. 77	0. 3088	0. 68	Q	.	.	.	.
6. 95	0. 3190	0. 68	Q	.	.	.	.
7. 13	0. 3293	0. 69	Q	.	.	.	.
7. 31	0. 3397	0. 70	Q	.	.	.	.
7. 49	0. 3503	0. 71	Q	.	.	.	.
7. 67	0. 3610	0. 72	Q	.	.	.	.
7. 86	0. 3718	0. 73	Q	.	.	.	.
8. 04	0. 3828	0. 74	Q	.	.	.	.
8. 22	0. 3940	0. 75	Q	.	.	.	.
8. 40	0. 4053	0. 76	Q	.	.	.	.
8. 58	0. 4168	0. 78	Q	.	.	.	.
8. 76	0. 4284	0. 78	Q	.	.	.	.
8. 94	0. 4403	0. 80	Q	.	.	.	.
9. 12	0. 4523	0. 81	Q	.	.	.	.
9. 30	0. 4645	0. 83	Q	.	.	.	.
9. 48	0. 4770	0. 84	Q	.	.	.	.
9. 66	0. 4896	0. 85	Q	.	.	.	.
9. 85	0. 5025	0. 86	Q	.	.	.	.
10. 03	0. 5156	0. 89	Q	.	.	.	.
10. 21	0. 5289	0. 90	Q	.	.	.	.
10. 39	0. 5425	0. 92	Q	.	.	.	.
10. 57	0. 5564	0. 93	Q	.	.	.	.
10. 75	0. 5705	0. 96	Q	.	.	.	.
10. 93	0. 5850	0. 97	Q	.	.	.	.
11. 11	0. 5998	1. 00	.Q	.	.	.	.
11. 29	0. 6149	1. 02	.Q	.	.	.	.
11. 48	0. 6304	1. 05	.Q	.	.	.	.
11. 66	0. 6462	1. 07	.Q	.	.	.	.
11. 84	0. 6625	1. 11	.Q	.	.	.	.
12. 02	0. 6792	1. 13	.Q	.	.	.	.
12. 20	0. 6986	1. 47	.Q	.	.	.	.
12. 38	0. 7209	1. 50	.Q	.	.	.	.
12. 56	0. 7437	1. 55	.Q	.	.	.	.
12. 74	0. 7671	1. 58	.Q	.	.	.	.
12. 92	0. 7912	1. 64	.Q	.	.	.	.
13. 10	0. 8160	1. 68	.Q	.	.	.	.
13. 28	0. 8417	1. 75	.Q	.	.	.	.
13. 47	0. 8681	1. 79	.Q	.	.	.	.
13. 65	0. 8956	1. 88	.Q	.	.	.	.
13. 83	0. 9242	1. 93	.Q	.	.	.	.
14. 01	0. 9539	2. 05	. Q	.	.	.	.
14. 19	0. 9851	2. 11	. Q	.	.	.	.
14. 37	1. 0178	2. 26	. Q	.	.	.	.
14. 55	1. 0524	2. 35	. Q	.	.	.	.
14. 73	1. 0891	2. 56	. Q	.	.	.	.
14. 91	1. 1284	2. 69	. Q	.	.	.	.
15. 10	1. 1710	3. 01	. Q	.	.	.	.
15. 28	1. 2175	3. 22	. Q	.	.	.	.
15. 46	1. 2678	3. 50	. Q	.	.	.	.
15. 64	1. 3219	3. 74	. Q	.	.	.	.
15. 82	1. 3977	6. 39	. Q	.	.	.	.
16. 00	1. 5162	9. 46	. Q.	.	.	.	.
16. 18	1. 8235	31. 63	.	.	.	.Q	.
16. 36	2. 0948	4. 65	. Q	.	.	.	.
16. 54	2. 1555	3. 47	. Q	.	.	.	.
16. 72	2. 2027	2. 84	. Q	.	.	.	.
16. 91	2. 2422	2. 45	. Q	.	.	.	.
17. 09	2. 2769	2. 19	. Q	.	.	.	.
17. 27	2. 3081	1. 99	.Q	.	.	.	.
17. 45	2. 3367	1. 84	.Q	.	.	.	.
17. 63	2. 3632	1. 71	.Q	.	.	.	.
17. 81	2. 3881	1. 61	.Q	.	.	.	.
17. 99	2. 4115	1. 52	.Q	.	.	.	.
18. 17	2. 4319	1. 19	.Q	.	.	.	.
18. 35	2. 4489	1. 09	.Q	.	.	.	.
18. 53	2. 4648	1. 03	.Q	.	.	.	.
18. 72	2. 4799	0. 99	Q	.	.	.	.
18. 90	2. 4944	0. 95	Q	.	.	.	.
19. 08	2. 5082	0. 91	Q	.	.	.	.
19. 26	2. 5216	0. 88	Q	.	.	.	.
19. 44	2. 5345	0. 84	Q	.	.	.	.
19. 62	2. 5469	0. 82	Q	.	.	.	.

				X010_D			
19. 80	2. 5589	0. 79	Q	.	.	.	.
19. 98	2. 5706	0. 77	Q	.	.	.	.
20. 16	2. 5819	0. 75	Q	.	.	.	.
20. 34	2. 5929	0. 73	Q	.	.	.	.
20. 52	2. 6036	0. 71	Q	.	.	.	.
20. 71	2. 6140	0. 69	Q	.	.	.	.
20. 89	2. 6242	0. 67	Q	.	.	.	.
21. 07	2. 6341	0. 66	Q	.	.	.	.
21. 25	2. 6438	0. 64	Q	.	.	.	.
21. 43	2. 6533	0. 63	Q	.	.	.	.
21. 61	2. 6626	0. 61	Q	.	.	.	.
21. 79	2. 6717	0. 60	Q	.	.	.	.
21. 97	2. 6806	0. 59	Q	.	.	.	.
22. 15	2. 6893	0. 58	Q	.	.	.	.
22. 33	2. 6979	0. 57	Q	.	.	.	.
22. 52	2. 7063	0. 56	Q	.	.	.	.
22. 70	2. 7146	0. 55	Q	.	.	.	.
22. 88	2. 7227	0. 54	Q	.	.	.	.
23. 06	2. 7307	0. 53	Q	.	.	.	.
23. 24	2. 7386	0. 52	Q	.	.	.	.
23. 42	2. 7463	0. 51	Q	.	.	.	.
23. 60	2. 7539	0. 51	Q	.	.	.	.
23. 78	2. 7614	0. 50	Q	.	.	.	.
23. 96	2. 7688	0. 49	Q	.	.	.	.
24. 14	2. 7761	0. 48	Q	.	.	.	.
24. 33	2. 7797	0. 00	Q	.	.	.	.

Drainage E

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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 Ver. 9.0 Release Date: 01/01/2003 License ID 1355

Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 97.20
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.060
 LOW LOSS FRACTION = 0.200
 TIME OF CONCENTRATION(MIN.) = 29.02
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 10
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
 24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 22.38
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 7.43

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	32.5	65.0	97.5	130.0
0.04	0.0000	0.00	Q	.	.	.	.
0.52	0.0799	4.00	.Q	.	.	.	.
1.01	0.2416	4.09	.Q	.	.	.	.
1.49	0.4063	4.15	.Q	.	.	.	.
1.97	0.5745	4.26	.Q	.	.	.	.
2.46	0.7462	4.33	.Q	.	.	.	.
2.94	0.9217	4.46	.Q	.	.	.	.
3.42	1.1012	4.53	.Q	.	.	.	.
3.91	1.2850	4.67	.Q	.	.	.	.
4.39	1.4733	4.75	.Q	.	.	.	.
4.88	1.6665	4.92	.Q	.	.	.	.
5.36	1.8647	5.01	.Q	.	.	.	.
5.84	2.0686	5.20	.Q	.	.	.	.
6.33	2.2784	5.30	.Q	.	.	.	.
6.81	2.4947	5.52	.Q	.	.	.	.
7.29	2.7179	5.64	.Q	.	.	.	.
7.78	2.9488	5.91	.Q	.	.	.	.
8.26	3.1879	6.05	.Q	.	.	.	.
8.74	3.4362	6.37	.Q	.	.	.	.
9.23	3.6945	6.55	.Q	.	.	.	.
9.71	3.9642	6.94	.Q	.	.	.	.
10.20	4.2462	7.17	.Q	.	.	.	.
10.68	4.5427	7.67	.Q	.	.	.	.
11.16	4.8551	7.96	.Q	.	.	.	.
11.65	5.1868	8.63	.Q	.	.	.	.
12.13	5.5398	9.03	.Q	.	.	.	.
12.61	5.9706	12.52	.Q	.	.	.	.
13.10	6.4834	13.14	.Q	.	.	.	.
13.58	7.0399	14.70	.Q	.	.	.	.
14.07	7.6479	15.72	.Q	.	.	.	.

14.55	8.3329	18.56	.	Q	.	X010_E	.	.	.
15.03	9.1165	20.65	.	Q	.	.	.	.	.
15.52	10.1245	29.78	.	.	Q.	.	.	.	.
16.00	11.4368	35.88	.	.	.Q	.	.	.	.
16.48	14.6159	123.18	.	.	.	.	Q	.	.
16.97	17.5632	24.29	.	Q	.	.	.	.	.
17.45	18.3877	16.97	.	Q	.	.	.	.	.
17.93	19.0038	13.86	.	Q	.	.	.	.	.
18.42	19.4905	10.50	.	Q	.	.	.	.	.
18.90	19.8657	8.28	.	Q	.	.	.	.	.
19.39	20.1793	7.41	.	Q	.	.	.	.	.
19.87	20.4620	6.74	.	Q	.	.	.	.	.
20.35	20.7207	6.21	.	Q	.	.	.	.	.
20.84	20.9602	5.77	.	Q	.	.	.	.	.
21.32	21.1836	5.41	.	Q	.	.	.	.	.
21.80	21.3936	5.10	.	Q	.	.	.	.	.
22.29	21.5921	4.83	.	Q	.	.	.	.	.
22.77	21.7805	4.60	.	Q	.	.	.	.	.
23.26	21.9601	4.39	.	Q	.	.	.	.	.
23.74	22.1319	4.21	.	Q	.	.	.	.	.
24.22	22.2967	4.04	.	Q	.	.	.	.	.
24.71	22.3774	0.00	Q	.	.	.	.	.	.

Drainage F

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 5.80
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.250
 TIME OF CONCENTRATION(MIN.) = 7.97
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 10
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
 24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.26
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.51

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.06	0.0000	0.00	Q	.	.	.	.
0.19	0.0012	0.22	Q	.	.	.	.
0.33	0.0037	0.22	Q	.	.	.	.
0.46	0.0062	0.23	Q	.	.	.	.
0.59	0.0086	0.23	Q	.	.	.	.
0.72	0.0111	0.23	Q	.	.	.	.
0.86	0.0137	0.23	Q	.	.	.	.
0.99	0.0162	0.23	Q	.	.	.	.
1.12	0.0187	0.23	Q	.	.	.	.
1.26	0.0213	0.23	Q	.	.	.	.
1.39	0.0239	0.23	Q	.	.	.	.
1.52	0.0264	0.24	Q	.	.	.	.
1.65	0.0290	0.24	Q	.	.	.	.
1.79	0.0317	0.24	Q	.	.	.	.
1.92	0.0343	0.24	Q	.	.	.	.
2.05	0.0369	0.24	Q	.	.	.	.
2.19	0.0396	0.24	Q	.	.	.	.
2.32	0.0423	0.24	Q	.	.	.	.
2.45	0.0450	0.25	Q	.	.	.	.
2.58	0.0477	0.25	Q	.	.	.	.
2.72	0.0504	0.25	Q	.	.	.	.
2.85	0.0531	0.25	Q	.	.	.	.
2.98	0.0559	0.25	Q	.	.	.	.
3.12	0.0587	0.25	Q	.	.	.	.
3.25	0.0615	0.26	Q	.	.	.	.
3.38	0.0643	0.26	Q	.	.	.	.
3.51	0.0671	0.26	Q	.	.	.	.
3.65	0.0700	0.26	Q	.	.	.	.
3.78	0.0728	0.26	Q	.	.	.	.
3.91	0.0757	0.26	Q	.	.	.	.

					X010_F		
4. 05	0. 0786	0. 27	Q	.	.	.	.
4. 18	0. 0816	0. 27	Q	.	.	.	.
4. 31	0. 0845	0. 27	Q	.	.	.	.
4. 44	0. 0875	0. 27	Q	.	.	.	.
4. 58	0. 0905	0. 27	Q	.	.	.	.
4. 71	0. 0935	0. 28	Q	.	.	.	.
4. 84	0. 0965	0. 28	Q	.	.	.	.
4. 97	0. 0996	0. 28	Q	.	.	.	.
5. 11	0. 1027	0. 28	Q	.	.	.	.
5. 24	0. 1058	0. 28	Q	.	.	.	.
5. 37	0. 1089	0. 29	Q	.	.	.	.
5. 51	0. 1121	0. 29	Q	.	.	.	.
5. 64	0. 1153	0. 29	Q	.	.	.	.
5. 77	0. 1185	0. 29	Q	.	.	.	.
5. 90	0. 1217	0. 30	Q	.	.	.	.
6. 04	0. 1250	0. 30	Q	.	.	.	.
6. 17	0. 1282	0. 30	Q	.	.	.	.
6. 30	0. 1316	0. 30	Q	.	.	.	.
6. 44	0. 1349	0. 31	Q	.	.	.	.
6. 57	0. 1383	0. 31	Q	.	.	.	.
6. 70	0. 1417	0. 31	Q	.	.	.	.
6. 83	0. 1451	0. 31	Q	.	.	.	.
6. 97	0. 1486	0. 32	Q	.	.	.	.
7. 10	0. 1521	0. 32	Q	.	.	.	.
7. 23	0. 1556	0. 32	Q	.	.	.	.
7. 37	0. 1591	0. 33	Q	.	.	.	.
7. 50	0. 1627	0. 33	Q	.	.	.	.
7. 63	0. 1664	0. 33	Q	.	.	.	.
7. 76	0. 1700	0. 33	Q	.	.	.	.
7. 90	0. 1737	0. 34	Q	.	.	.	.
8. 03	0. 1775	0. 34	Q	.	.	.	.
8. 16	0. 1812	0. 35	Q	.	.	.	.
8. 30	0. 1851	0. 35	Q	.	.	.	.
8. 43	0. 1889	0. 35	Q	.	.	.	.
8. 56	0. 1928	0. 36	Q	.	.	.	.
8. 69	0. 1968	0. 36	Q	.	.	.	.
8. 83	0. 2008	0. 36	Q	.	.	.	.
8. 96	0. 2048	0. 37	Q	.	.	.	.
9. 09	0. 2089	0. 37	Q	.	.	.	.
9. 23	0. 2130	0. 38	Q	.	.	.	.
9. 36	0. 2172	0. 38	Q	.	.	.	.
9. 49	0. 2214	0. 39	Q	.	.	.	.
9. 62	0. 2257	0. 39	Q	.	.	.	.
9. 76	0. 2300	0. 40	Q	.	.	.	.
9. 89	0. 2344	0. 40	Q	.	.	.	.
10. 02	0. 2389	0. 41	Q	.	.	.	.
10. 16	0. 2434	0. 41	Q	.	.	.	.
10. 29	0. 2480	0. 42	Q	.	.	.	.
10. 42	0. 2527	0. 43	Q	.	.	.	.
10. 55	0. 2574	0. 43	Q	.	.	.	.
10. 69	0. 2622	0. 44	Q	.	.	.	.
10. 82	0. 2670	0. 45	Q	.	.	.	.
10. 95	0. 2720	0. 45	Q	.	.	.	.
11. 09	0. 2770	0. 46	Q	.	.	.	.
11. 22	0. 2821	0. 47	Q	.	.	.	.
11. 35	0. 2873	0. 48	Q	.	.	.	.
11. 48	0. 2926	0. 48	Q	.	.	.	.
11. 62	0. 2980	0. 50	Q	.	.	.	.
11. 75	0. 3035	0. 50	.Q	.	.	.	.
11. 88	0. 3091	0. 52	.Q	.	.	.	.
12. 02	0. 3148	0. 52	.Q	.	.	.	.
12. 15	0. 3214	0. 68	.Q	.	.	.	.
12. 28	0. 3289	0. 69	.Q	.	.	.	.
12. 41	0. 3365	0. 70	.Q	.	.	.	.
12. 55	0. 3443	0. 71	.Q	.	.	.	.
12. 68	0. 3522	0. 73	.Q	.	.	.	.
12. 81	0. 3603	0. 74	.Q	.	.	.	.
12. 94	0. 3686	0. 76	.Q	.	.	.	.
13. 08	0. 3770	0. 78	.Q	.	.	.	.
13. 21	0. 3857	0. 80	.Q	.	.	.	.
13. 34	0. 3945	0. 81	.Q	.	.	.	.
13. 48	0. 4036	0. 84	.Q	.	.	.	.
13. 61	0. 4130	0. 86	.Q	.	.	.	.
13. 74	0. 4226	0. 89	.Q	.	.	.	.
13. 87	0. 4325	0. 91	.Q	.	.	.	.
14. 01	0. 4427	0. 95	.Q	.	.	.	.
14. 14	0. 4533	0. 97	.Q	.	.	.	.
14. 27	0. 4643	1. 02	. Q	.	.	.	.
14. 41	0. 4757	1. 05	. Q	.	.	.	.

					X010_F			
14. 54	0. 4876	1. 11	. Q	.	.	.	.	.
14. 67	0. 5000	1. 15	. Q	.	.	.	.	.
14. 80	0. 5130	1. 23	. Q	.	.	.	.	.
14. 94	0. 5269	1. 29	. Q	.	.	.	.	.
15. 07	0. 5418	1. 44	. Q	.	.	.	.	.
15. 20	0. 5581	1. 53	. Q	.	.	.	.	.
15. 34	0. 5762	1. 76	. Q	.	.	.	.	.
15. 47	0. 5954	1. 73	. Q	.	.	.	.	.
15. 60	0. 6158	1. 98	. Q	.	.	.	.	.
15. 73	0. 6392	2. 29	. Q	.	.	.	.	.
15. 87	0. 6715	3. 60	. Q	.	.	.	.	.
16. 00	0. 7190	5. 05	. Q	.	.	.	.	.
16. 13	0. 8336	15. 82	.	.	.	. Q	.	.
16. 27	0. 9361	2. 84	. Q	.	.	.	.	.
16. 40	0. 9613	1. 75	. Q	.	.	.	.	.
16. 53	0. 9799	1. 64	. Q	.	.	.	.	.
16. 66	0. 9963	1. 36	. Q	.	.	.	.	.
16. 80	1. 0103	1. 19	. Q	.	.	.	.	.
16. 93	1. 0228	1. 08	. Q	.	.	.	.	.
17. 06	1. 0342	1. 00	. Q	.	.	.	.	.
17. 20	1. 0448	0. 93	. Q	.	.	.	.	.
17. 33	1. 0547	0. 88	. Q	.	.	.	.	.
17. 46	1. 0641	0. 83	. Q	.	.	.	.	.
17. 59	1. 0729	0. 79	. Q	.	.	.	.	.
17. 73	1. 0814	0. 75	. Q	.	.	.	.	.
17. 86	1. 0895	0. 72	. Q	.	.	.	.	.
17. 99	1. 0973	0. 69	. Q	.	.	.	.	.
18. 13	1. 1041	0. 55	. Q	.	.	.	.	.
18. 26	1. 1100	0. 51	. Q	.	.	.	.	.
18. 39	1. 1154	0. 49	. Q	.	.	.	.	.
18. 52	1. 1207	0. 47	. Q	.	.	.	.	.
18. 66	1. 1258	0. 46	. Q	.	.	.	.	.
18. 79	1. 1308	0. 44	. Q	.	.	.	.	.
18. 92	1. 1356	0. 43	. Q	.	.	.	.	.
19. 06	1. 1402	0. 42	. Q	.	.	.	.	.
19. 19	1. 1448	0. 41	. Q	.	.	.	.	.
19. 32	1. 1492	0. 40	. Q	.	.	.	.	.
19. 45	1. 1535	0. 39	. Q	.	.	.	.	.
19. 59	1. 1576	0. 38	. Q	.	.	.	.	.
19. 72	1. 1617	0. 37	. Q	.	.	.	.	.
19. 85	1. 1657	0. 36	. Q	.	.	.	.	.
19. 98	1. 1696	0. 35	. Q	.	.	.	.	.
20. 12	1. 1734	0. 34	. Q	.	.	.	.	.
20. 25	1. 1772	0. 34	. Q	.	.	.	.	.
20. 38	1. 1808	0. 33	. Q	.	.	.	.	.
20. 52	1. 1844	0. 32	. Q	.	.	.	.	.
20. 65	1. 1880	0. 32	. Q	.	.	.	.	.
20. 78	1. 1914	0. 31	. Q	.	.	.	.	.
20. 91	1. 1948	0. 31	. Q	.	.	.	.	.
21. 05	1. 1982	0. 30	. Q	.	.	.	.	.
21. 18	1. 2014	0. 30	. Q	.	.	.	.	.
21. 31	1. 2047	0. 29	. Q	.	.	.	.	.
21. 45	1. 2079	0. 29	. Q	.	.	.	.	.
21. 58	1. 2110	0. 28	. Q	.	.	.	.	.
21. 71	1. 2141	0. 28	. Q	.	.	.	.	.
21. 84	1. 2171	0. 27	. Q	.	.	.	.	.
21. 98	1. 2201	0. 27	. Q	.	.	.	.	.
22. 11	1. 2231	0. 27	. Q	.	.	.	.	.
22. 24	1. 2260	0. 26	. Q	.	.	.	.	.
22. 38	1. 2288	0. 26	. Q	.	.	.	.	.
22. 51	1. 2317	0. 26	. Q	.	.	.	.	.
22. 64	1. 2345	0. 25	. Q	.	.	.	.	.
22. 77	1. 2372	0. 25	. Q	.	.	.	.	.
22. 91	1. 2399	0. 25	. Q	.	.	.	.	.
23. 04	1. 2426	0. 24	. Q	.	.	.	.	.
23. 17	1. 2453	0. 24	. Q	.	.	.	.	.
23. 31	1. 2479	0. 24	. Q	.	.	.	.	.
23. 44	1. 2505	0. 24	. Q	.	.	.	.	.
23. 57	1. 2531	0. 23	. Q	.	.	.	.	.
23. 70	1. 2556	0. 23	. Q	.	.	.	.	.
23. 84	1. 2582	0. 23	. Q	.	.	.	.	.
23. 97	1. 2606	0. 23	. Q	.	.	.	.	.
24. 10	1. 2631	0. 22	. Q	.	.	.	.	.
24. 24	1. 2643	0. 00	. Q	.	.	.	.	.

Drainage G

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 1.80
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.250
 TIME OF CONCENTRATION(MIN.) = 8.11
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 10
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
 24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.39
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.16

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.05	0.0000	0.00	Q	.	.	.	.
0.19	0.0004	0.07	Q	.	.	.	.
0.32	0.0012	0.07	Q	.	.	.	.
0.46	0.0019	0.07	Q	.	.	.	.
0.59	0.0027	0.07	Q	.	.	.	.
0.73	0.0035	0.07	Q	.	.	.	.
0.86	0.0043	0.07	Q	.	.	.	.
1.00	0.0051	0.07	Q	.	.	.	.
1.13	0.0059	0.07	Q	.	.	.	.
1.27	0.0067	0.07	Q	.	.	.	.
1.40	0.0075	0.07	Q	.	.	.	.
1.54	0.0083	0.07	Q	.	.	.	.
1.67	0.0092	0.07	Q	.	.	.	.
1.81	0.0100	0.07	Q	.	.	.	.
1.94	0.0108	0.07	Q	.	.	.	.
2.08	0.0117	0.08	Q	.	.	.	.
2.21	0.0125	0.08	Q	.	.	.	.
2.35	0.0134	0.08	Q	.	.	.	.
2.48	0.0142	0.08	Q	.	.	.	.
2.62	0.0151	0.08	Q	.	.	.	.
2.75	0.0159	0.08	Q	.	.	.	.
2.89	0.0168	0.08	Q	.	.	.	.
3.02	0.0177	0.08	Q	.	.	.	.
3.16	0.0185	0.08	Q	.	.	.	.
3.29	0.0194	0.08	Q	.	.	.	.
3.43	0.0203	0.08	Q	.	.	.	.
3.56	0.0212	0.08	Q	.	.	.	.
3.70	0.0221	0.08	Q	.	.	.	.
3.84	0.0230	0.08	Q	.	.	.	.
3.97	0.0239	0.08	Q	.	.	.	.

				X010_G		
14.78	0.1585	0.38	.Q	.	.	.
14.92	0.1628	0.39	.Q	.	.	.
15.05	0.1675	0.44	.Q	.	.	.
15.19	0.1726	0.47	.Q	.	.	.
15.32	0.1782	0.54	.Q	.	.	.
15.46	0.1843	0.54	.Q	.	.	.
15.59	0.1907	0.61	.Q	.	.	.
15.73	0.1980	0.70	.Q	.	.	.
15.86	0.2081	1.10	.Q	.	.	.
16.00	0.2230	1.55	.Q	.	.	.
16.14	0.2588	4.86	.	.Q.	.	.
16.27	0.2908	0.87	.Q	.	.	.
16.41	0.2986	0.54	.Q	.	.	.
16.54	0.3044	0.50	.Q	.	.	.
16.68	0.3096	0.42	.Q	.	.	.
16.81	0.3139	0.37	.Q	.	.	.
16.95	0.3178	0.33	.Q	.	.	.
17.08	0.3214	0.31	.Q	.	.	.
17.22	0.3247	0.29	.Q	.	.	.
17.35	0.3278	0.27	.Q	.	.	.
17.49	0.3307	0.25	.Q	.	.	.
17.62	0.3335	0.24	.Q	.	.	.
17.76	0.3362	0.23	.Q	.	.	.
17.89	0.3387	0.22	.Q	.	.	.
18.03	0.3411	0.21	.Q	.	.	.
18.16	0.3432	0.16	.Q	.	.	.
18.30	0.3450	0.16	.Q	.	.	.
18.43	0.3467	0.15	.Q	.	.	.
18.57	0.3484	0.15	.Q	.	.	.
18.70	0.3500	0.14	.Q	.	.	.
18.84	0.3515	0.14	.Q	.	.	.
18.97	0.3530	0.13	.Q	.	.	.
19.11	0.3545	0.13	.Q	.	.	.
19.24	0.3559	0.12	.Q	.	.	.
19.38	0.3573	0.12	.Q	.	.	.
19.51	0.3586	0.12	.Q	.	.	.
19.65	0.3599	0.12	.Q	.	.	.
19.78	0.3612	0.11	.Q	.	.	.
19.92	0.3624	0.11	.Q	.	.	.
20.06	0.3637	0.11	.Q	.	.	.
20.19	0.3648	0.11	.Q	.	.	.
20.33	0.3660	0.10	.Q	.	.	.
20.46	0.3672	0.10	.Q	.	.	.
20.60	0.3683	0.10	.Q	.	.	.
20.73	0.3694	0.10	.Q	.	.	.
20.87	0.3705	0.10	.Q	.	.	.
21.00	0.3715	0.09	.Q	.	.	.
21.14	0.3726	0.09	.Q	.	.	.
21.27	0.3736	0.09	.Q	.	.	.
21.41	0.3746	0.09	.Q	.	.	.
21.54	0.3756	0.09	.Q	.	.	.
21.68	0.3766	0.09	.Q	.	.	.
21.81	0.3775	0.09	.Q	.	.	.
21.95	0.3785	0.08	.Q	.	.	.
22.08	0.3794	0.08	.Q	.	.	.
22.22	0.3803	0.08	.Q	.	.	.
22.35	0.3813	0.08	.Q	.	.	.
22.49	0.3821	0.08	.Q	.	.	.
22.62	0.3830	0.08	.Q	.	.	.
22.76	0.3839	0.08	.Q	.	.	.
22.89	0.3848	0.08	.Q	.	.	.
23.03	0.3856	0.08	.Q	.	.	.
23.16	0.3865	0.07	.Q	.	.	.
23.30	0.3873	0.07	.Q	.	.	.
23.43	0.3881	0.07	.Q	.	.	.
23.57	0.3889	0.07	.Q	.	.	.
23.70	0.3897	0.07	.Q	.	.	.
23.84	0.3905	0.07	.Q	.	.	.
23.97	0.3913	0.07	.Q	.	.	.
24.11	0.3921	0.07	.Q	.	.	.
24.25	0.3925	0.00	.Q	.	.	.

Drainage H

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 7.00
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.250
 TIME OF CONCENTRATION(MIN.) = 8.42
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 10
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
 24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.53
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.62

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.00	0.0000	0.00	Q	.	.	.	.
0.14	0.0016	0.27	Q	.	.	.	.
0.28	0.0047	0.27	Q	.	.	.	.
0.42	0.0078	0.27	Q	.	.	.	.
0.56	0.0110	0.27	Q	.	.	.	.
0.70	0.0142	0.28	Q	.	.	.	.
0.84	0.0174	0.28	Q	.	.	.	.
0.98	0.0206	0.28	Q	.	.	.	.
1.12	0.0238	0.28	Q	.	.	.	.
1.26	0.0271	0.28	Q	.	.	.	.
1.41	0.0304	0.28	Q	.	.	.	.
1.55	0.0337	0.29	Q	.	.	.	.
1.69	0.0370	0.29	Q	.	.	.	.
1.83	0.0403	0.29	Q	.	.	.	.
1.97	0.0437	0.29	Q	.	.	.	.
2.11	0.0471	0.29	Q	.	.	.	.
2.25	0.0505	0.29	Q	.	.	.	.
2.39	0.0539	0.30	Q	.	.	.	.
2.53	0.0573	0.30	Q	.	.	.	.
2.67	0.0608	0.30	Q	.	.	.	.
2.81	0.0643	0.30	Q	.	.	.	.
2.95	0.0678	0.30	Q	.	.	.	.
3.09	0.0713	0.31	Q	.	.	.	.
3.23	0.0749	0.31	Q	.	.	.	.
3.37	0.0785	0.31	Q	.	.	.	.
3.51	0.0821	0.31	Q	.	.	.	.
3.65	0.0857	0.31	Q	.	.	.	.
3.79	0.0894	0.32	Q	.	.	.	.
3.93	0.0931	0.32	Q	.	.	.	.
4.07	0.0968	0.32	Q	.	.	.	.

					X010_H		
4. 21	0. 1005	0. 32	Q	.	.	.	.
4. 35	0. 1043	0. 33	Q	.	.	.	.
4. 49	0. 1081	0. 33	Q	.	.	.	.
4. 63	0. 1119	0. 33	Q	.	.	.	.
4. 77	0. 1158	0. 33	Q	.	.	.	.
4. 91	0. 1197	0. 34	Q	.	.	.	.
5. 05	0. 1236	0. 34	Q	.	.	.	.
5. 19	0. 1275	0. 34	Q	.	.	.	.
5. 33	0. 1315	0. 34	Q	.	.	.	.
5. 47	0. 1355	0. 35	Q	.	.	.	.
5. 62	0. 1396	0. 35	Q	.	.	.	.
5. 76	0. 1437	0. 35	Q	.	.	.	.
5. 90	0. 1478	0. 36	Q	.	.	.	.
6. 04	0. 1519	0. 36	Q	.	.	.	.
6. 18	0. 1561	0. 36	Q	.	.	.	.
6. 32	0. 1603	0. 37	Q	.	.	.	.
6. 46	0. 1646	0. 37	Q	.	.	.	.
6. 60	0. 1689	0. 37	Q	.	.	.	.
6. 74	0. 1733	0. 38	Q	.	.	.	.
6. 88	0. 1776	0. 38	Q	.	.	.	.
7. 02	0. 1821	0. 38	Q	.	.	.	.
7. 16	0. 1865	0. 39	Q	.	.	.	.
7. 30	0. 1910	0. 39	Q	.	.	.	.
7. 44	0. 1956	0. 40	Q	.	.	.	.
7. 58	0. 2002	0. 40	Q	.	.	.	.
7. 72	0. 2049	0. 40	Q	.	.	.	.
7. 86	0. 2096	0. 41	Q	.	.	.	.
8. 00	0. 2143	0. 41	Q	.	.	.	.
8. 14	0. 2191	0. 42	Q	.	.	.	.
8. 28	0. 2240	0. 42	Q	.	.	.	.
8. 42	0. 2289	0. 43	Q	.	.	.	.
8. 56	0. 2339	0. 43	Q	.	.	.	.
8. 70	0. 2389	0. 44	Q	.	.	.	.
8. 84	0. 2440	0. 44	Q	.	.	.	.
8. 98	0. 2491	0. 45	Q	.	.	.	.
9. 12	0. 2544	0. 45	Q	.	.	.	.
9. 26	0. 2596	0. 46	Q	.	.	.	.
9. 40	0. 2650	0. 47	Q	.	.	.	.
9. 54	0. 2704	0. 47	Q	.	.	.	.
9. 68	0. 2759	0. 48	Q	.	.	.	.
9. 83	0. 2815	0. 48	Q	.	.	.	.
9. 97	0. 2871	0. 49	Q	.	.	.	.
10. 11	0. 2928	0. 50	Q	.	.	.	.
10. 25	0. 2987	0. 51	.Q	.	.	.	.
10. 39	0. 3046	0. 51	.Q	.	.	.	.
10. 53	0. 3106	0. 52	.Q	.	.	.	.
10. 67	0. 3166	0. 53	.Q	.	.	.	.
10. 81	0. 3228	0. 54	.Q	.	.	.	.
10. 95	0. 3291	0. 55	.Q	.	.	.	.
11. 09	0. 3355	0. 56	.Q	.	.	.	.
11. 23	0. 3420	0. 57	.Q	.	.	.	.
11. 37	0. 3487	0. 58	.Q	.	.	.	.
11. 51	0. 3554	0. 59	.Q	.	.	.	.
11. 65	0. 3623	0. 60	.Q	.	.	.	.
11. 79	0. 3694	0. 61	.Q	.	.	.	.
11. 93	0. 3765	0. 63	.Q	.	.	.	.
12. 07	0. 3839	0. 64	.Q	.	.	.	.
12. 21	0. 3923	0. 82	.Q	.	.	.	.
12. 35	0. 4020	0. 84	.Q	.	.	.	.
12. 49	0. 4118	0. 86	.Q	.	.	.	.
12. 63	0. 4218	0. 87	.Q	.	.	.	.
12. 77	0. 4320	0. 90	.Q	.	.	.	.
12. 91	0. 4425	0. 91	.Q	.	.	.	.
13. 05	0. 4532	0. 94	.Q	.	.	.	.
13. 19	0. 4642	0. 95	.Q	.	.	.	.
13. 33	0. 4755	0. 99	.Q	.	.	.	.
13. 47	0. 4871	1. 01	. Q	.	.	.	.
13. 61	0. 4990	1. 05	. Q	.	.	.	.
13. 75	0. 5112	1. 07	. Q	.	.	.	.
13. 90	0. 5239	1. 12	. Q	.	.	.	.
14. 04	0. 5370	1. 14	. Q	.	.	.	.
14. 18	0. 5506	1. 20	. Q	.	.	.	.
14. 32	0. 5647	1. 23	. Q	.	.	.	.
14. 46	0. 5794	1. 31	. Q	.	.	.	.
14. 60	0. 5948	1. 35	. Q	.	.	.	.
14. 74	0. 6110	1. 44	. Q	.	.	.	.
14. 88	0. 6280	1. 50	. Q	.	.	.	.
15. 02	0. 6464	1. 67	. Q	.	.	.	.
15. 16	0. 6664	1. 78	. Q	.	.	.	.

					X010_H			
15. 30	0. 6887	2. 05	.	Q	.	.	.	.
15. 44	0. 7132	2. 18	.	Q	.	.	.	.
15. 58	0. 7391	2. 30	.	Q	.	.	.	.
15. 72	0. 7678	2. 66	.	Q	.	.	.	.
15. 86	0. 8075	4. 19	.	.	Q	.	.	.
16. 00	0. 8660	5. 89	.	.	.	Q	.	.
16. 14	1. 0073	18. 48	.	.	.	.	Q	.
16. 28	1. 1335	3. 27	.	.	Q	.	.	.
16. 42	1. 1642	2. 03	.	.	Q	.	.	.
16. 56	1. 1870	1. 91	.	.	Q	.	.	.
16. 70	1. 2072	1. 58	.	.	Q	.	.	.
16. 84	1. 2245	1. 39	.	.	Q	.	.	.
16. 98	1. 2399	1. 27	.	.	Q	.	.	.
17. 12	1. 2540	1. 17	.	.	Q	.	.	.
17. 26	1. 2671	1. 09	.	.	Q	.	.	.
17. 40	1. 2794	1. 03	.	.	Q	.	.	.
17. 54	1. 2910	0. 97	.	.	Q	.	.	.
17. 68	1. 3020	0. 92	.	.	Q	.	.	.
17. 82	1. 3125	0. 88	.	.	Q	.	.	.
17. 96	1. 3225	0. 85	.	.	Q	.	.	.
18. 11	1. 3319	0. 77	.	.	Q	.	.	.
18. 25	1. 3400	0. 62	.	.	Q	.	.	.
18. 39	1. 3470	0. 59	.	.	Q	.	.	.
18. 53	1. 3538	0. 57	.	.	Q	.	.	.
18. 67	1. 3603	0. 55	.	.	Q	.	.	.
18. 81	1. 3666	0. 53	.	.	Q	.	.	.
18. 95	1. 3727	0. 52	.	.	Q	.	.	.
19. 09	1. 3786	0. 50	.	.	Q	.	.	.
19. 23	1. 3843	0. 49	.	.	Q	.	.	.
19. 37	1. 3899	0. 47	.	.	Q	.	.	.
19. 51	1. 3953	0. 46	.	.	Q	.	.	.
19. 65	1. 4006	0. 45	.	.	Q	.	.	.
19. 79	1. 4057	0. 44	.	.	Q	.	.	.
19. 93	1. 4108	0. 43	.	.	Q	.	.	.
20. 07	1. 4157	0. 42	.	.	Q	.	.	.
20. 21	1. 4205	0. 41	.	.	Q	.	.	.
20. 35	1. 4252	0. 40	.	.	Q	.	.	.
20. 49	1. 4298	0. 39	.	.	Q	.	.	.
20. 63	1. 4343	0. 39	.	.	Q	.	.	.
20. 77	1. 4387	0. 38	.	.	Q	.	.	.
20. 91	1. 4431	0. 37	.	.	Q	.	.	.
21. 05	1. 4473	0. 36	.	.	Q	.	.	.
21. 19	1. 4515	0. 36	.	.	Q	.	.	.
21. 33	1. 4556	0. 35	.	.	Q	.	.	.
21. 47	1. 4597	0. 35	.	.	Q	.	.	.
21. 61	1. 4637	0. 34	.	.	Q	.	.	.
21. 75	1. 4676	0. 34	.	.	Q	.	.	.
21. 89	1. 4714	0. 33	.	.	Q	.	.	.
22. 03	1. 4752	0. 33	.	.	Q	.	.	.
22. 17	1. 4790	0. 32	.	.	Q	.	.	.
22. 32	1. 4827	0. 32	.	.	Q	.	.	.
22. 46	1. 4863	0. 31	.	.	Q	.	.	.
22. 60	1. 4899	0. 31	.	.	Q	.	.	.
22. 74	1. 4934	0. 30	.	.	Q	.	.	.
22. 88	1. 4969	0. 30	.	.	Q	.	.	.
23. 02	1. 5004	0. 30	.	.	Q	.	.	.
23. 16	1. 5038	0. 29	.	.	Q	.	.	.
23. 30	1. 5071	0. 29	.	.	Q	.	.	.
23. 44	1. 5104	0. 28	.	.	Q	.	.	.
23. 58	1. 5137	0. 28	.	.	Q	.	.	.
23. 72	1. 5169	0. 28	.	.	Q	.	.	.
23. 86	1. 5201	0. 27	.	.	Q	.	.	.
24. 00	1. 5233	0. 27	.	.	Q	.	.	.
24. 14	1. 5264	0. 27	.	.	Q	.	.	.
24. 28	1. 5280	0. 00	.	.	Q	.	.	.

Drainage I

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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 Ver. 9.0 Release Date: 01/01/2003 License ID 1355

Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 1.10
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.250
 TIME OF CONCENTRATION(MIN.) = 9.63
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 10
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
 24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.24
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.10

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.11	0.0002	0.04	Q	.	.	.	.
0.27	0.0008	0.04	Q	.	.	.	.
0.43	0.0013	0.04	Q	.	.	.	.
0.59	0.0019	0.04	Q	.	.	.	.
0.75	0.0025	0.04	Q	.	.	.	.
0.91	0.0030	0.04	Q	.	.	.	.
1.07	0.0036	0.04	Q	.	.	.	.
1.23	0.0042	0.04	Q	.	.	.	.
1.39	0.0048	0.04	Q	.	.	.	.
1.55	0.0054	0.04	Q	.	.	.	.
1.72	0.0060	0.05	Q	.	.	.	.
1.88	0.0066	0.05	Q	.	.	.	.
2.04	0.0072	0.05	Q	.	.	.	.
2.20	0.0078	0.05	Q	.	.	.	.
2.36	0.0084	0.05	Q	.	.	.	.
2.52	0.0090	0.05	Q	.	.	.	.
2.68	0.0096	0.05	Q	.	.	.	.
2.84	0.0103	0.05	Q	.	.	.	.
3.00	0.0109	0.05	Q	.	.	.	.
3.16	0.0115	0.05	Q	.	.	.	.
3.32	0.0122	0.05	Q	.	.	.	.
3.48	0.0128	0.05	Q	.	.	.	.
3.64	0.0135	0.05	Q	.	.	.	.
3.80	0.0141	0.05	Q	.	.	.	.
3.96	0.0148	0.05	Q	.	.	.	.
4.12	0.0155	0.05	Q	.	.	.	.
4.28	0.0161	0.05	Q	.	.	.	.
4.44	0.0168	0.05	Q	.	.	.	.
4.60	0.0175	0.05	Q	.	.	.	.
4.76	0.0182	0.05	Q	.	.	.	.

				X010_I			
4. 93	0. 0189	0. 05	Q	.	.	.	.
5. 09	0. 0196	0. 05	Q	.	.	.	.
5. 25	0. 0203	0. 05	Q	.	.	.	.
5. 41	0. 0210	0. 05	Q	.	.	.	.
5. 57	0. 0218	0. 05	Q	.	.	.	.
5. 73	0. 0225	0. 06	Q	.	.	.	.
5. 89	0. 0232	0. 06	Q	.	.	.	.
6. 05	0. 0240	0. 06	Q	.	.	.	.
6. 21	0. 0247	0. 06	Q	.	.	.	.
6. 37	0. 0255	0. 06	Q	.	.	.	.
6. 53	0. 0263	0. 06	Q	.	.	.	.
6. 69	0. 0270	0. 06	Q	.	.	.	.
6. 85	0. 0278	0. 06	Q	.	.	.	.
7. 01	0. 0286	0. 06	Q	.	.	.	.
7. 17	0. 0294	0. 06	Q	.	.	.	.
7. 33	0. 0302	0. 06	Q	.	.	.	.
7. 49	0. 0310	0. 06	Q	.	.	.	.
7. 65	0. 0319	0. 06	Q	.	.	.	.
7. 81	0. 0327	0. 06	Q	.	.	.	.
7. 97	0. 0336	0. 06	Q	.	.	.	.
8. 14	0. 0344	0. 07	Q	.	.	.	.
8. 30	0. 0353	0. 07	Q	.	.	.	.
8. 46	0. 0362	0. 07	Q	.	.	.	.
8. 62	0. 0371	0. 07	Q	.	.	.	.
8. 78	0. 0380	0. 07	Q	.	.	.	.
8. 94	0. 0389	0. 07	Q	.	.	.	.
9. 10	0. 0398	0. 07	Q	.	.	.	.
9. 26	0. 0408	0. 07	Q	.	.	.	.
9. 42	0. 0417	0. 07	Q	.	.	.	.
9. 58	0. 0427	0. 07	Q	.	.	.	.
9. 74	0. 0437	0. 08	Q	.	.	.	.
9. 90	0. 0447	0. 08	Q	.	.	.	.
10. 06	0. 0457	0. 08	Q	.	.	.	.
10. 22	0. 0468	0. 08	Q	.	.	.	.
10. 38	0. 0478	0. 08	Q	.	.	.	.
10. 54	0. 0489	0. 08	Q	.	.	.	.
10. 70	0. 0500	0. 08	Q	.	.	.	.
10. 86	0. 0511	0. 08	Q	.	.	.	.
11. 02	0. 0523	0. 09	Q	.	.	.	.
11. 18	0. 0534	0. 09	Q	.	.	.	.
11. 35	0. 0546	0. 09	Q	.	.	.	.
11. 51	0. 0558	0. 09	Q	.	.	.	.
11. 67	0. 0571	0. 09	Q	.	.	.	.
11. 83	0. 0583	0. 10	Q	.	.	.	.
11. 99	0. 0596	0. 10	Q	.	.	.	.
12. 15	0. 0610	0. 11	Q	.	.	.	.
12. 31	0. 0626	0. 13	Q	.	.	.	.
12. 47	0. 0644	0. 13	Q	.	.	.	.
12. 63	0. 0662	0. 14	Q	.	.	.	.
12. 79	0. 0680	0. 14	Q	.	.	.	.
12. 95	0. 0699	0. 14	Q	.	.	.	.
13. 11	0. 0718	0. 15	Q	.	.	.	.
13. 27	0. 0738	0. 15	Q	.	.	.	.
13. 43	0. 0759	0. 16	Q	.	.	.	.
13. 59	0. 0780	0. 16	Q	.	.	.	.
13. 75	0. 0802	0. 17	Q	.	.	.	.
13. 91	0. 0824	0. 18	Q	.	.	.	.
14. 07	0. 0848	0. 18	Q	.	.	.	.
14. 23	0. 0873	0. 19	Q	.	.	.	.
14. 40	0. 0898	0. 20	Q	.	.	.	.
14. 56	0. 0926	0. 21	Q	.	.	.	.
14. 72	0. 0954	0. 22	Q	.	.	.	.
14. 88	0. 0985	0. 24	Q	.	.	.	.
15. 04	0. 1017	0. 26	.Q	.	.	.	.
15. 20	0. 1054	0. 29	.Q	.	.	.	.
15. 36	0. 1095	0. 32	.Q	.	.	.	.
15. 52	0. 1138	0. 33	.Q	.	.	.	.
15. 68	0. 1184	0. 38	.Q	.	.	.	.
15. 84	0. 1249	0. 60	. Q	.	.	.	.
16. 00	0. 1346	0. 85	. Q	.	.	.	.
16. 16	0. 1580	2. 68	. Q	.	.	.	.
16. 32	0. 1788	0. 46	.Q	.	.	.	.
16. 48	0. 1841	0. 34	.Q	.	.	.	.
16. 64	0. 1881	0. 27	.Q	.	.	.	.
16. 80	0. 1915	0. 23	Q	.	.	.	.
16. 96	0. 1943	0. 20	Q	.	.	.	.
17. 12	0. 1969	0. 19	Q	.	.	.	.
17. 28	0. 1993	0. 17	Q	.	.	.	.
17. 44	0. 2015	0. 16	Q	.	.	.	.

				X010_I			
17. 61	0. 2035	0. 15	Q	.	.	.	.
17. 77	0. 2055	0. 14	Q	.	.	.	.
17. 93	0. 2073	0. 14	Q	.	.	.	.
18. 09	0. 2091	0. 13	Q	.	.	.	.
18. 25	0. 2106	0. 10	Q	.	.	.	.
18. 41	0. 2118	0. 09	Q	.	.	.	.
18. 57	0. 2130	0. 09	Q	.	.	.	.
18. 73	0. 2142	0. 09	Q	.	.	.	.
18. 89	0. 2153	0. 08	Q	.	.	.	.
19. 05	0. 2164	0. 08	Q	.	.	.	.
19. 21	0. 2174	0. 08	Q	.	.	.	.
19. 37	0. 2184	0. 07	Q	.	.	.	.
19. 53	0. 2194	0. 07	Q	.	.	.	.
19. 69	0. 2204	0. 07	Q	.	.	.	.
19. 85	0. 2213	0. 07	Q	.	.	.	.
20. 01	0. 2222	0. 07	Q	.	.	.	.
20. 17	0. 2230	0. 06	Q	.	.	.	.
20. 33	0. 2239	0. 06	Q	.	.	.	.
20. 49	0. 2247	0. 06	Q	.	.	.	.
20. 65	0. 2255	0. 06	Q	.	.	.	.
20. 82	0. 2263	0. 06	Q	.	.	.	.
20. 98	0. 2271	0. 06	Q	.	.	.	.
21. 14	0. 2279	0. 06	Q	.	.	.	.
21. 30	0. 2286	0. 06	Q	.	.	.	.
21. 46	0. 2293	0. 05	Q	.	.	.	.
21. 62	0. 2301	0. 05	Q	.	.	.	.
21. 78	0. 2308	0. 05	Q	.	.	.	.
21. 94	0. 2315	0. 05	Q	.	.	.	.
22. 10	0. 2321	0. 05	Q	.	.	.	.
22. 26	0. 2328	0. 05	Q	.	.	.	.
22. 42	0. 2335	0. 05	Q	.	.	.	.
22. 58	0. 2341	0. 05	Q	.	.	.	.
22. 74	0. 2347	0. 05	Q	.	.	.	.
22. 90	0. 2354	0. 05	Q	.	.	.	.
23. 06	0. 2360	0. 05	Q	.	.	.	.
23. 22	0. 2366	0. 05	Q	.	.	.	.
23. 38	0. 2372	0. 04	Q	.	.	.	.
23. 54	0. 2378	0. 04	Q	.	.	.	.
23. 70	0. 2384	0. 04	Q	.	.	.	.
23. 86	0. 2390	0. 04	Q	.	.	.	.
24. 02	0. 2395	0. 04	Q	.	.	.	.
24. 19	0. 2398	0. 00	Q	.	.	.	.

Drainage J

					X010_G			
4. 11	0. 0249	0. 08	Q	.	.	.	.	.
4. 24	0. 0258	0. 08	Q	.	.	.	.	.
4. 38	0. 0267	0. 08	Q	.	.	.	.	.
4. 51	0. 0277	0. 08	Q	.	.	.	.	.
4. 65	0. 0286	0. 09	Q	.	.	.	.	.
4. 78	0. 0296	0. 09	Q	.	.	.	.	.
4. 92	0. 0305	0. 09	Q	.	.	.	.	.
5. 05	0. 0315	0. 09	Q	.	.	.	.	.
5. 19	0. 0325	0. 09	Q	.	.	.	.	.
5. 32	0. 0335	0. 09	Q	.	.	.	.	.
5. 46	0. 0345	0. 09	Q	.	.	.	.	.
5. 59	0. 0355	0. 09	Q	.	.	.	.	.
5. 73	0. 0365	0. 09	Q	.	.	.	.	.
5. 86	0. 0375	0. 09	Q	.	.	.	.	.
6. 00	0. 0385	0. 09	Q	.	.	.	.	.
6. 13	0. 0396	0. 09	Q	.	.	.	.	.
6. 27	0. 0406	0. 09	Q	.	.	.	.	.
6. 40	0. 0417	0. 09	Q	.	.	.	.	.
6. 54	0. 0427	0. 10	Q	.	.	.	.	.
6. 67	0. 0438	0. 10	Q	.	.	.	.	.
6. 81	0. 0449	0. 10	Q	.	.	.	.	.
6. 94	0. 0460	0. 10	Q	.	.	.	.	.
7. 08	0. 0471	0. 10	Q	.	.	.	.	.
7. 21	0. 0482	0. 10	Q	.	.	.	.	.
7. 35	0. 0493	0. 10	Q	.	.	.	.	.
7. 48	0. 0504	0. 10	Q	.	.	.	.	.
7. 62	0. 0516	0. 10	Q	.	.	.	.	.
7. 75	0. 0527	0. 10	Q	.	.	.	.	.
7. 89	0. 0539	0. 10	Q	.	.	.	.	.
8. 03	0. 0551	0. 11	Q	.	.	.	.	.
8. 16	0. 0563	0. 11	Q	.	.	.	.	.
8. 30	0. 0575	0. 11	Q	.	.	.	.	.
8. 43	0. 0587	0. 11	Q	.	.	.	.	.
8. 57	0. 0599	0. 11	Q	.	.	.	.	.
8. 70	0. 0612	0. 11	Q	.	.	.	.	.
8. 84	0. 0624	0. 11	Q	.	.	.	.	.
8. 97	0. 0637	0. 11	Q	.	.	.	.	.
9. 11	0. 0650	0. 12	Q	.	.	.	.	.
9. 24	0. 0663	0. 12	Q	.	.	.	.	.
9. 38	0. 0676	0. 12	Q	.	.	.	.	.
9. 51	0. 0690	0. 12	Q	.	.	.	.	.
9. 65	0. 0703	0. 12	Q	.	.	.	.	.
9. 78	0. 0717	0. 12	Q	.	.	.	.	.
9. 92	0. 0731	0. 13	Q	.	.	.	.	.
10. 05	0. 0745	0. 13	Q	.	.	.	.	.
10. 19	0. 0759	0. 13	Q	.	.	.	.	.
10. 32	0. 0774	0. 13	Q	.	.	.	.	.
10. 46	0. 0789	0. 13	Q	.	.	.	.	.
10. 59	0. 0804	0. 13	Q	.	.	.	.	.
10. 73	0. 0819	0. 14	Q	.	.	.	.	.
10. 86	0. 0834	0. 14	Q	.	.	.	.	.
11. 00	0. 0850	0. 14	Q	.	.	.	.	.
11. 13	0. 0866	0. 14	Q	.	.	.	.	.
11. 27	0. 0882	0. 15	Q	.	.	.	.	.
11. 40	0. 0899	0. 15	Q	.	.	.	.	.
11. 54	0. 0915	0. 15	Q	.	.	.	.	.
11. 67	0. 0933	0. 15	Q	.	.	.	.	.
11. 81	0. 0950	0. 16	Q	.	.	.	.	.
11. 95	0. 0968	0. 16	Q	.	.	.	.	.
12. 08	0. 0987	0. 18	Q	.	.	.	.	.
12. 22	0. 1009	0. 21	Q	.	.	.	.	.
12. 35	0. 1033	0. 22	Q	.	.	.	.	.
12. 49	0. 1057	0. 22	Q	.	.	.	.	.
12. 62	0. 1082	0. 23	Q	.	.	.	.	.
12. 76	0. 1107	0. 23	Q	.	.	.	.	.
12. 89	0. 1133	0. 24	Q	.	.	.	.	.
13. 03	0. 1160	0. 24	Q	.	.	.	.	.
13. 16	0. 1187	0. 25	Q	.	.	.	.	.
13. 30	0. 1214	0. 25	.Q	.	.	.	.	.
13. 43	0. 1243	0. 26	.Q	.	.	.	.	.
13. 57	0. 1272	0. 26	.Q	.	.	.	.	.
13. 70	0. 1302	0. 27	.Q	.	.	.	.	.
13. 84	0. 1333	0. 28	.Q	.	.	.	.	.
13. 97	0. 1365	0. 29	.Q	.	.	.	.	.
14. 11	0. 1398	0. 30	.Q	.	.	.	.	.
14. 24	0. 1433	0. 31	.Q	.	.	.	.	.
14. 38	0. 1468	0. 32	.Q	.	.	.	.	.
14. 51	0. 1505	0. 34	.Q	.	.	.	.	.
14. 65	0. 1544	0. 35	.Q	.	.	.	.	.

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 11.00
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.250
 TIME OF CONCENTRATION(MIN.) = 13.89
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 10
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
 24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.40
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.97

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.03	0.0000	0.00	Q	.	.	.	.
0.26	0.0040	0.42	Q	.	.	.	.
0.49	0.0122	0.43	Q	.	.	.	.
0.72	0.0204	0.43	Q	.	.	.	.
0.95	0.0287	0.44	Q	.	.	.	.
1.18	0.0371	0.44	Q	.	.	.	.
1.42	0.0455	0.44	Q	.	.	.	.
1.65	0.0541	0.45	Q	.	.	.	.
1.88	0.0627	0.45	Q	.	.	.	.
2.11	0.0714	0.46	Q	.	.	.	.
2.34	0.0802	0.46	Q	.	.	.	.
2.57	0.0891	0.47	Q	.	.	.	.
2.80	0.0981	0.47	Q	.	.	.	.
3.04	0.1072	0.48	Q	.	.	.	.
3.27	0.1164	0.48	Q	.	.	.	.
3.50	0.1257	0.49	Q	.	.	.	.
3.73	0.1351	0.50	Q	.	.	.	.
3.96	0.1446	0.50	Q	.	.	.	.
4.19	0.1542	0.51	Q	.	.	.	.
4.42	0.1640	0.51	Q	.	.	.	.
4.66	0.1739	0.52	Q	.	.	.	.
4.89	0.1839	0.52	Q	.	.	.	.
5.12	0.1940	0.53	Q	.	.	.	.
5.35	0.2042	0.54	Q	.	.	.	.
5.58	0.2146	0.55	Q	.	.	.	.
5.81	0.2252	0.55	Q	.	.	.	.
6.05	0.2359	0.56	Q	.	.	.	.
6.28	0.2467	0.57	Q	.	.	.	.
6.51	0.2577	0.58	Q	.	.	.	.
6.74	0.2689	0.59	Q	.	.	.	.

					X010_J			
6. 97	0. 2802	0. 60	Q	.	.	.	.	.
7. 20	0. 2917	0. 61	Q	.	.	.	.	.
7. 43	0. 3035	0. 62	Q	.	.	.	.	.
7. 67	0. 3154	0. 63	Q	.	.	.	.	.
7. 90	0. 3275	0. 64	Q	.	.	.	.	.
8. 13	0. 3398	0. 65	Q	.	.	.	.	.
8. 36	0. 3524	0. 66	Q	.	.	.	.	.
8. 59	0. 3651	0. 67	Q	.	.	.	.	.
8. 82	0. 3782	0. 69	Q	.	.	.	.	.
9. 05	0. 3915	0. 70	Q	.	.	.	.	.
9. 29	0. 4050	0. 72	Q	.	.	.	.	.
9. 52	0. 4189	0. 73	Q	.	.	.	.	.
9. 75	0. 4331	0. 75	.Q	.	.	.	.	.
9. 98	0. 4476	0. 76	.Q	.	.	.	.	.
10. 21	0. 4624	0. 79	.Q	.	.	.	.	.
10. 44	0. 4776	0. 80	.Q	.	.	.	.	.
10. 68	0. 4932	0. 83	.Q	.	.	.	.	.
10. 91	0. 5092	0. 84	.Q	.	.	.	.	.
11. 14	0. 5256	0. 88	.Q	.	.	.	.	.
11. 37	0. 5426	0. 89	.Q	.	.	.	.	.
11. 60	0. 5600	0. 93	.Q	.	.	.	.	.
11. 83	0. 5781	0. 95	.Q	.	.	.	.	.
12. 06	0. 5967	1. 00	.Q	.	.	.	.	.
12. 30	0. 6183	1. 26	.Q	.	.	.	.	.
12. 53	0. 6433	1. 34	.Q	.	.	.	.	.
12. 76	0. 6693	1. 38	.Q	.	.	.	.	.
12. 99	0. 6963	1. 44	.Q	.	.	.	.	.
13. 22	0. 7243	1. 48	.Q	.	.	.	.	.
13. 45	0. 7535	1. 57	. Q	.	.	.	.	.
13. 68	0. 7840	1. 62	. Q	.	.	.	.	.
13. 92	0. 8162	1. 74	. Q	.	.	.	.	.
14. 15	0. 8501	1. 80	. Q	.	.	.	.	.
14. 38	0. 8861	1. 97	. Q	.	.	.	.	.
14. 61	0. 9247	2. 06	. Q	.	.	.	.	.
14. 84	0. 9665	2. 31	. Q	.	.	.	.	.
15. 07	1. 0125	2. 50	. Q	.	.	.	.	.
15. 31	1. 0660	3. 09	. Q	.	.	.	.	.
15. 54	1. 1273	3. 32	. Q	.	.	.	.	.
15. 77	1. 2022	4. 51	. Q	.	.	.	.	.
16. 00	1. 3096	6. 72	. Q	.	.	.	.	.
16. 23	1. 5797	21. 51	.	.	Q	.	.	.
16. 46	1. 8188	3. 49	. Q	.	.	.	.	.
16. 69	1. 8786	2. 76	. Q	.	.	.	.	.
16. 93	1. 9258	2. 18	. Q	.	.	.	.	.
17. 16	1. 9646	1. 88	. Q	.	.	.	.	.
17. 39	1. 9987	1. 68	. Q	.	.	.	.	.
17. 62	2. 0293	1. 53	. Q	.	.	.	.	.
17. 85	2. 0574	1. 41	.Q	.	.	.	.	.
18. 08	2. 0834	1. 31	.Q	.	.	.	.	.
18. 32	2. 1053	0. 97	.Q	.	.	.	.	.
18. 55	2. 1233	0. 91	.Q	.	.	.	.	.
18. 78	2. 1403	0. 86	.Q	.	.	.	.	.
19. 01	2. 1563	0. 81	.Q	.	.	.	.	.
19. 24	2. 1715	0. 78	.Q	.	.	.	.	.
19. 47	2. 1860	0. 74	Q	.	.	.	.	.
19. 70	2. 1999	0. 71	Q	.	.	.	.	.
19. 94	2. 2132	0. 68	Q	.	.	.	.	.
20. 17	2. 2260	0. 66	Q	.	.	.	.	.
20. 40	2. 2383	0. 63	Q	.	.	.	.	.
20. 63	2. 2502	0. 61	Q	.	.	.	.	.
20. 86	2. 2617	0. 59	Q	.	.	.	.	.
21. 09	2. 2729	0. 58	Q	.	.	.	.	.
21. 32	2. 2838	0. 56	Q	.	.	.	.	.
21. 56	2. 2943	0. 54	Q	.	.	.	.	.
21. 79	2. 3046	0. 53	Q	.	.	.	.	.
22. 02	2. 3146	0. 52	Q	.	.	.	.	.
22. 25	2. 3243	0. 50	Q	.	.	.	.	.
22. 48	2. 3338	0. 49	Q	.	.	.	.	.
22. 71	2. 3431	0. 48	Q	.	.	.	.	.
22. 94	2. 3522	0. 47	Q	.	.	.	.	.
23. 18	2. 3611	0. 46	Q	.	.	.	.	.
23. 41	2. 3698	0. 45	Q	.	.	.	.	.
23. 64	2. 3784	0. 44	Q	.	.	.	.	.
23. 87	2. 3867	0. 43	Q	.	.	.	.	.
24. 10	2. 3950	0. 43	Q	.	.	.	.	.
24. 33	2. 3990	0. 00	Q	.	.	.	.	.

Drainage K

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 6.30
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.080
 LOW LOSS FRACTION = 0.250
 TIME OF CONCENTRATION(MIN.) = 11.39
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 10
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
 24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.37
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.56

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.05	0.0000	0.00	Q	.	.	.	.
0.24	0.0019	0.24	Q	.	.	.	.
0.43	0.0057	0.24	Q	.	.	.	.
0.62	0.0096	0.25	Q	.	.	.	.
0.81	0.0135	0.25	Q	.	.	.	.
1.00	0.0174	0.25	Q	.	.	.	.
1.19	0.0213	0.25	Q	.	.	.	.
1.38	0.0253	0.25	Q	.	.	.	.
1.57	0.0293	0.26	Q	.	.	.	.
1.76	0.0333	0.26	Q	.	.	.	.
1.95	0.0374	0.26	Q	.	.	.	.
2.14	0.0415	0.26	Q	.	.	.	.
2.33	0.0457	0.26	Q	.	.	.	.
2.52	0.0499	0.27	Q	.	.	.	.
2.71	0.0541	0.27	Q	.	.	.	.
2.90	0.0583	0.27	Q	.	.	.	.
3.09	0.0626	0.27	Q	.	.	.	.
3.28	0.0669	0.28	Q	.	.	.	.
3.47	0.0713	0.28	Q	.	.	.	.
3.66	0.0757	0.28	Q	.	.	.	.
3.85	0.0802	0.28	Q	.	.	.	.
4.04	0.0847	0.29	Q	.	.	.	.
4.23	0.0892	0.29	Q	.	.	.	.
4.42	0.0938	0.29	Q	.	.	.	.
4.61	0.0985	0.30	Q	.	.	.	.
4.80	0.1031	0.30	Q	.	.	.	.
4.99	0.1079	0.30	Q	.	.	.	.
5.18	0.1127	0.31	Q	.	.	.	.
5.37	0.1175	0.31	Q	.	.	.	.
5.56	0.1224	0.31	Q	.	.	.	.

5.75	0.1273	0.32	Q	.	X010_K	.	.
5.94	0.1323	0.32	Q	.	.	.	.
6.13	0.1374	0.32	Q	.	.	.	.
6.32	0.1425	0.33	Q	.	.	.	.
6.51	0.1477	0.33	Q	.	.	.	.
6.70	0.1530	0.34	Q	.	.	.	.
6.89	0.1583	0.34	Q	.	.	.	.
7.08	0.1637	0.35	Q	.	.	.	.
7.27	0.1691	0.35	Q	.	.	.	.
7.46	0.1747	0.36	Q	.	.	.	.
7.65	0.1803	0.36	Q	.	.	.	.
7.84	0.1859	0.37	Q	.	.	.	.
8.03	0.1917	0.37	Q	.	.	.	.
8.22	0.1976	0.38	Q	.	.	.	.
8.41	0.2035	0.38	Q	.	.	.	.
8.60	0.2096	0.39	Q	.	.	.	.
8.79	0.2157	0.39	Q	.	.	.	.
8.98	0.2219	0.40	Q	.	.	.	.
9.17	0.2283	0.41	Q	.	.	.	.
9.36	0.2347	0.42	Q	.	.	.	.
9.55	0.2413	0.42	Q	.	.	.	.
9.74	0.2479	0.43	Q	.	.	.	.
9.93	0.2547	0.44	Q	.	.	.	.
10.12	0.2617	0.45	Q	.	.	.	.
10.30	0.2687	0.45	Q	.	.	.	.
10.49	0.2760	0.47	Q	.	.	.	.
10.68	0.2833	0.47	Q	.	.	.	.
10.87	0.2909	0.49	Q	.	.	.	.
11.06	0.2986	0.50	Q	.	.	.	.
11.25	0.3065	0.51	.Q	.	.	.	.
11.44	0.3146	0.52	.Q	.	.	.	.
11.63	0.3229	0.54	.Q	.	.	.	.
11.82	0.3314	0.55	.Q	.	.	.	.
12.01	0.3401	0.57	.Q	.	.	.	.
12.20	0.3499	0.67	.Q	.	.	.	.
12.39	0.3611	0.76	.Q	.	.	.	.
12.58	0.3731	0.77	.Q	.	.	.	.
12.77	0.3854	0.80	.Q	.	.	.	.
12.96	0.3981	0.82	.Q	.	.	.	.
13.15	0.4113	0.86	.Q	.	.	.	.
13.34	0.4249	0.88	.Q	.	.	.	.
13.53	0.4389	0.92	.Q	.	.	.	.
13.72	0.4536	0.94	.Q	.	.	.	.
13.91	0.4688	1.00	.Q	.	.	.	.
14.10	0.4847	1.03	.Q	.	.	.	.
14.29	0.5015	1.11	.Q	.	.	.	.
14.48	0.5192	1.15	.Q	.	.	.	.
14.67	0.5380	1.25	.Q	.	.	.	.
14.86	0.5582	1.31	.Q	.	.	.	.
15.05	0.5803	1.51	.Q	.	.	.	.
15.24	0.6050	1.64	.Q	.	.	.	.
15.43	0.6329	1.92	.Q	.	.	.	.
15.62	0.6630	1.92	.Q	.	.	.	.
15.81	0.7018	3.04	.Q	.	.	.	.
16.00	0.7600	4.37	.Q	.	.	.	.
16.19	0.9032	13.88	.	.	Q	.	.
16.38	1.0302	2.31	.Q	.	.	.	.
16.57	1.0625	1.81	.Q	.	.	.	.
16.76	1.0876	1.39	.Q	.	.	.	.
16.95	1.1079	1.20	.Q	.	.	.	.
17.14	1.1257	1.07	.Q	.	.	.	.
17.33	1.1416	0.97	.Q	.	.	.	.
17.52	1.1563	0.90	.Q	.	.	.	.
17.71	1.1699	0.84	.Q	.	.	.	.
17.90	1.1826	0.79	.Q	.	.	.	.
18.09	1.1946	0.74	.Q	.	.	.	.
18.28	1.2048	0.56	.Q	.	.	.	.
18.47	1.2134	0.53	.Q	.	.	.	.
18.66	1.2215	0.50	.Q	.	.	.	.
18.85	1.2292	0.48	Q	.	.	.	.
19.04	1.2366	0.46	Q	.	.	.	.
19.23	1.2436	0.44	Q	.	.	.	.
19.42	1.2504	0.43	Q	.	.	.	.
19.61	1.2570	0.41	Q	.	.	.	.
19.80	1.2633	0.40	Q	.	.	.	.
19.99	1.2695	0.38	Q	.	.	.	.
20.18	1.2754	0.37	Q	.	.	.	.
20.37	1.2812	0.36	Q	.	.	.	.
20.56	1.2868	0.35	Q	.	.	.	.

X010_K				
20.75	1.2923	0.34	Q	.
20.94	1.2976	0.33	Q	.
21.13	1.3028	0.33	Q	.
21.32	1.3078	0.32	Q	.
21.51	1.3128	0.31	Q	.
21.69	1.3176	0.30	Q	.
21.88	1.3223	0.30	Q	.
22.07	1.3270	0.29	Q	.
22.26	1.3315	0.29	Q	.
22.45	1.3360	0.28	Q	.
22.64	1.3403	0.28	Q	.
22.83	1.3446	0.27	Q	.
23.02	1.3489	0.27	Q	.
23.21	1.3530	0.26	Q	.
23.40	1.3571	0.26	Q	.
23.59	1.3611	0.25	Q	.
23.78	1.3650	0.25	Q	.
23.97	1.3689	0.25	Q	.
24.16	1.3727	0.24	Q	.
24.35	1.3746	0.00	Q	.

b) Expected Value (50% Confidence) Events

i. Infiltration Analysis

INFILTRATION RATE CALCULATION SUMMARY
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
100-YEAR EXPECTED VALUE EVENT

Existing Condition											
Node	A	B	C	D	E	F	G	H	I	J	K
Total Area (ac)	349.56	135.09	63.61	14.29	97.15	5.80	1.75	6.99	1.06	11.00	6.30
Y	0.69	0.83	0.66	0.70	0.83	0.76	0.76	0.76	0.76	0.76	0.76
Ybar	0.31	0.17	0.34	0.30	0.17	0.24	0.24	0.24	0.24	0.24	0.24
Average a_p	0.64	0.37	1.00	0.68	0.30	0.20	0.20	0.20	0.20	0.20	0.20
Total Fm (in/hr)	0.19	0.11	0.30	0.20	0.09	0.06	0.06	0.06	0.06	0.06	0.06

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
100-YEAR EXPECTED VALUE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA A

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

Total Area (ac) = 349.56

ap - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Y = 0.69

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.31**

Average ap = 0.64

Total Fm (in/hr) = **0.19**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	7.57	A	Pervious	0.76	0.002	32	21.25	4.25	0.00	0.000	0.10	0.30	0.03	0.001
					Impervious	6.81	0.019	98	0.20	0.04	0.95	0.018				
2	Urban Cover - Roadway	10%	2.65	D	Pervious	0.27	0.001	75	3.33	0.67	0.45	0.000	0.10	0.30	0.03	0.000
					Impervious	2.39	0.007	98	0.20	0.04	0.95	0.006				
3	Single Family Residential (>10 dwellings/acre)	20%	45.27	A	Pervious	9.05	0.026	32	21.25	4.25	0.00	0.000	0.20	0.30	0.06	0.008
					Impervious	36.22	0.104	98	0.20	0.04	0.95	0.098				
4	Single Family Residential (>10 dwellings/acre)	20%	31.84	B	Pervious	6.37	0.018	56	7.86	1.57	0.18	0.003	0.20	0.30	0.06	0.005
					Impervious	25.47	0.073	98	0.20	0.04	0.95	0.069				
5	Single Family Residential (>10 dwellings/acre)	20%	26.51	D	Pervious	5.30	0.015	75	3.33	0.67	0.45	0.007	0.20	0.30	0.06	0.005
					Impervious	21.21	0.061	98	0.20	0.04	0.95	0.057				
6	Commercial / Industrial	10%	31.91	D	Pervious	3.19	0.009	75	3.33	0.67	0.45	0.004	0.10	0.30	0.03	0.003
					Impervious	28.72	0.082	98	0.20	0.04	0.95	0.078				
7	Oil Operations	100%	11.89	D	Pervious	11.89	0.034	93	0.75	0.15	0.82	0.028	1.00	0.30	0.30	0.010
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				
8	Open Space / Habitat Area	100%	16.64	A	Pervious	16.64	0.048	46	11.74	2.35	0.07	0.004	1.00	0.30	0.30	0.014
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				
9	Oxbow Loop Channel	10%	6.55	A	Pervious	0.66	0.002	78	2.82	0.56	0.51	0.001	0.10	0.30	0.03	0.001
					Impervious	5.90	0.017	98	0.20	0.04	0.95	0.016				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	4.78	A	Pervious	4.78	0.014	78	2.82	0.56	0.51	0.007	1.00	0.30	0.30	0.004
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				
2	Oil Operations / Barren Area	100%	10.98	D	Pervious	10.98	0.031	93	0.75	0.15	0.82	0.026	1.00	0.30	0.30	0.009
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				
3	Open Space / Habitat Area	100%	152.97	D	Pervious	152.97	0.438	83	2.05	0.41	0.61	0.265	1.00	0.30	0.30	0.131
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				

Total Area = **349.56**

Y = **0.69**

Total F_m = **0.19**

Ybar = 1 - Y = **0.31**

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
100-YEAR EXPECTED VALUE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA B

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

Total Area (ac) = 135.09

a_p - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Y = 0.83

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.17**

Average a_p = 0.37

Total F_m (in/hr) = **0.11**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	5.35	D	Pervious	0.54	0.004	75	3.33	0.67	0.45	0.002	0.10	0.30	0.03	0.001
					Impervious	4.82	0.036	98	0.20	0.04	0.95	0.034				
2	Single Family Residential (>10 dwellings/acre)	20%	5.94	D	Pervious	1.19	0.009	75	3.33	0.67	0.45	0.004	0.20	0.30	0.06	0.003
					Impervious	4.75	0.035	98	0.20	0.04	0.95	0.033				
3	Commercial / Industrial	10%	80.09	D	Pervious	8.01	0.059	75	3.33	0.67	0.45	0.027	0.10	0.30	0.03	0.018
					Impervious	72.08	0.534	98	0.20	0.04	0.95	0.506				
4	School	60%	9.91	D	Pervious	5.95	0.044	75	3.33	0.67	0.45	0.020	0.60	0.30	0.18	0.013
					Impervious	3.96	0.029	98	0.20	0.04	0.95	0.028				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	12.82	D	Pervious	12.82	0.095	93	0.75	0.15	0.82	0.078	1.00	0.30	0.30	0.028
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				
2	Open Space / Habitat Area	100%	20.98	D	Pervious	20.98	0.155	83	2.05	0.41	0.61	0.094	1.00	0.30	0.30	0.047
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				

Total Area = **135.09**

Y = **0.83**

Total F_m = **0.11**

Ybar = 1 - Y = **0.17**

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
100-YEAR EXPECTED VALUE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA C

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49
P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Total Area (ac) = 63.61

Y = 0.66

Ybar = 1 - Y = **0.34**

ap - See Figure C-4

Fp - See Table C-2

Average a_p = 1.00

Total F_m (in/hr) = **0.30**

CN - See Figure C-1 and C-3

Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	17.24	D	Pervious	17.24	0.271	93	0.75	0.15	0.82	0.223	1.00	0.30	0.30	0.081
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				
2	Open Space / Habitat Area	100%	46.37	D	Pervious	46.37	0.729	83	2.05	0.41	0.61	0.441	1.00	0.30	0.30	0.219
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				

Total Area = **63.61**

Y = **0.66**

Total F_m = **0.30**

Ybar = 1 - Y = **0.34**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA D

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

Total Area (ac) = 14.29

a_p - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Y = 0.70

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.30**

Average a_p = 0.68

Total F_m (in/hr) = **0.20**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	5.68	D	Pervious	1.14	0.079	75	3.33	0.67	0.45	0.036	0.20	0.30	0.06	0.024
					Impervious	4.54	0.318	98	0.20	0.04	0.95	0.301				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Open Space / Habitat Area	100%	8.61	D	Pervious	8.61	0.603	83	2.05	0.41	0.61	0.365	1.00	0.30	0.30	0.181
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				

Total Area = **14.29**

Y = **0.70**

Total F_m = **0.20**

Ybar = 1 - Y = **0.30**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA E

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

Total Area (ac) = 97.15

ap - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Y = 0.83

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.17**

Average ap = 0.30

Total Fm (in/hr) = **0.09**

Offsite Area																	
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	Single Family Residential (>10 dwellings/acre)	20%	44.48	D	Pervious	8.90	0.092	75	3.33	0.67	0.45	0.042	0.20	0.30	0.06	0.027	
					Impervious	35.58	0.366	98	0.20	0.04	0.95	0.347					
2	Commercial / Industrial	10%	36.05	D	Pervious	3.61	0.037	75	3.33	0.67	0.45	0.017	0.10	0.30	0.03	0.011	
					Impervious	32.45	0.334	98	0.20	0.04	0.95	0.316					
3	Open Space / Habitat Area	100%	16.62	D	Pervious	16.62	0.171	83	2.05	0.41	0.61	0.104	1.00	0.30	0.30	0.051	
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
Total Area =			97.15	Y = 0.83										Total F _m = 0.09			
										Ybar = 1 - Y = 0.17							

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA F to K

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

Total Area (ac) = 5.80

ap - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Y = 0.76

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.24**

Average ap = 0.20

Total Fm (in/hr) = **0.06**

Offsite Area -F																		
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m					
									S	I _a	Y _i	Y _i *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)		
1	Single Family Residential (>10 dwellings/acre)	20%	5.80	A	Pervious	1.16	0.200	32	21.25	4.25	0.00	0.000	0.20	0.30	0.06	0.060		
					Impervious	4.64	0.800	98	0.20	0.04	0.95	0.758						
Total Area =				5.80	Y =								0.76	Total F _m =			0.06	
										Ybar = 1 - Y =				0.24				

Offsite Area -G																			
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m						
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)			
1	Single Family Residential (>10 dwellings/acre)	20%	1.75	A	Pervious	0.35	0.200	32	21.25	4.25	0.00	0.000	0.20	0.30	0.06	0.060			
					Impervious	1.40	0.800	98	0.20	0.04	0.95	0.758							
Total Area =				1.75	Y =								0.76	Total F _m =			0.06		
										Ybar = 1 - Y =						0.24			

Offsite Area -H																				
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m							
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)				
1	Single Family Residential (>10 dwellings/acre)	20%	6.99	A	Pervious	1.40	0.200	32	21.25	4.25	0.00	0.000	0.20	0.30	0.06	0.060				
					Impervious	5.59	0.800	98	0.20	0.04	0.95	0.758								
Total Area =			6.99	Y =							0.76	Total F _m =				0.06				
									Ybar = 1 - Y =							0.24				

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA F to K

Offsite Area -I																
No.	Land Use	Pervious- ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	1.06	A	Pervious	0.21	0.200	32	21.25	4.25	0.00	0.000	0.20	0.30	0.06	0.060
					Impervious	0.85	0.800	98	0.20	0.04	0.95	0.758				

Total Area = **1.06**

Y = **0.76**

Total F_m = **0.06**

Ybar = 1 - Y = **0.24**

Offsite Area -J																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	11.00	A	Pervious	2.20	0.200	32	21.25	4.25	0.00	0.000	0.20	0.30	0.06	0.060
					Impervious	8.80	0.800	98	0.20	0.04	0.95	0.758				

Total Area = **11.00**

Y = **0.76**

Total F_m = **0.06**

Ybar = 1 - Y = **0.24**

Offsite Area -K																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	6.30	A	Pervious	1.26	0.200	32	21.25	4.25	0.00	0.000	0.20	0.30	0.06	0.060
					Impervious	5.04	0.800	98	0.20	0.04	0.95	0.758				

Total Area = **6.30**

Y = **0.76**

Total F_m = **0.06**

Ybar = 1 - Y = **0.24**

INFILTRATION RATE CALCULATION SUMMARY
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
2-YEAR EXPECTED VALUE EVENT

Existing Condition											
Node	A	B	C	D	E	F	G	H	I	J	K
Total Area (ac)	349.56	135.09	63.61	14.29	97.15	5.80	1.75	6.99	1.06	11.00	6.30
Y	0.46	0.64	0.33	0.42	0.65	0.74	0.74	0.74	0.74	0.74	0.74
Ybar	0.54	0.36	0.67	0.58	0.35	0.26	0.26	0.26	0.26	0.26	0.26
Average a_p	0.64	0.37	1.00	0.68	0.30	0.20	0.20	0.20	0.20	0.20	0.20
Total Fm (in/hr)	0.38	0.22	0.60	0.41	0.18	0.12	0.12	0.12	0.12	0.12	0.12

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
2-YEAR EXPECTED VALUE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA A

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 2-Year Storm Event for Non-Mountainous Area (in) = 1.44

Total Area (ac) = 349.56

ap - See Figure C-4

P24, 2-Year Storm Event for Mountainous Area (in) = 2.67

Y = 0.46

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.54**

Average ap = 0.64

Total Fm (in/hr) = **0.38**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	7.57	A	Pervious	0.76	0.002	32	21.25	4.25	0.30	0.001	0.10	0.60	0.06	0.001
					Impervious	6.81	0.019	98	0.20	0.04	0.85	0.017				
2	Urban Cover - Roadway	10%	2.65	D	Pervious	0.27	0.001	75	3.33	0.67	0.10	0.000	0.10	0.60	0.06	0.000
					Impervious	2.39	0.007	98	0.20	0.04	0.85	0.006				
3	Single Family Residential (>10 dwellings/acre)	20%	45.27	A	Pervious	9.05	0.026	32	21.25	4.25	0.30	0.008	0.20	0.60	0.12	0.016
					Impervious	36.22	0.104	98	0.20	0.04	0.85	0.088				
4	Single Family Residential (>10 dwellings/acre)	20%	31.84	B	Pervious	6.37	0.018	56	7.86	1.57	0.00	0.000	0.20	0.60	0.12	0.011
					Impervious	25.47	0.073	98	0.20	0.04	0.85	0.062				
5	Single Family Residential (>10 dwellings/acre)	20%	26.51	D	Pervious	5.30	0.015	75	3.33	0.67	0.10	0.002	0.20	0.60	0.12	0.009
					Impervious	21.21	0.061	98	0.20	0.04	0.85	0.051				
6	Commercial / Industrial	10%	31.91	D	Pervious	3.19	0.009	75	3.33	0.67	0.10	0.001	0.10	0.60	0.06	0.005
					Impervious	28.72	0.082	98	0.20	0.04	0.85	0.070				
7	Oil Operations	100%	11.89	D	Pervious	11.89	0.034	93	0.75	0.15	0.56	0.019	1.00	0.60	0.60	0.020
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000				
8	Open Space / Habitat Area	100%	16.64	A	Pervious	16.64	0.048	46	11.74	2.35	0.05	0.003	1.00	0.60	0.60	0.029
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000				
9	Oxbow Loop Channel	10%	6.55	A	Pervious	0.66	0.002	78	2.82	0.56	0.14	0.000	0.10	0.60	0.06	0.001
					Impervious	5.90	0.017	98	0.20	0.04	0.85	0.014				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	4.78	A	Pervious	4.78	0.014	78	2.82	0.56	0.14	0.002	1.00	0.60	0.60	0.008
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000				
2	Oil Operations / Barren Area	100%	10.98	D	Pervious	10.98	0.031	93	0.75	0.15	0.56	0.018	1.00	0.60	0.60	0.019
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000				
3	Open Space / Habitat Area	100%	152.97	D	Pervious	152.97	0.438	83	2.05	0.41	0.24	0.104	1.00	0.60	0.60	0.263
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000				

Total Area = **349.56**

Y = **0.46**

Total F_m = **0.38**

Ybar = 1 - Y = **0.54**

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
2-YEAR EXPECTED VALUE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA B

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 2-Year Storm Event for Non-Mountainous Area (in) = 1.44

Total Area (ac) = 135.09

a_p - See Figure C-4

P24, 2-Year Storm Event for Mountainous Area (in) = 2.67

Y = 0.64

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.36**

Average a_p = 0.37

Total F_m (in/hr) = **0.22**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	5.35	D	Pervious	0.54	0.004	75	3.33	0.67	0.10	0.000	0.10	0.60	0.06	0.002
					Impervious	4.82	0.036	98	0.20	0.04	0.85	0.030				
2	Single Family Residential (>10 dwellings/acre)	20%	5.94	D	Pervious	1.19	0.009	75	3.33	0.67	0.10	0.001	0.20	0.60	0.12	0.005
					Impervious	4.75	0.035	98	0.20	0.04	0.85	0.030				
3	Commercial / Industrial	10%	80.09	D	Pervious	8.01	0.059	75	3.33	0.67	0.10	0.006	0.10	0.60	0.06	0.036
					Impervious	72.08	0.534	98	0.20	0.04	0.85	0.452				
4	School	60%	9.91	D	Pervious	5.95	0.044	75	3.33	0.67	0.10	0.004	0.60	0.60	0.36	0.026
					Impervious	3.96	0.029	98	0.20	0.04	0.85	0.025				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	12.82	D	Pervious	12.82	0.095	93	0.75	0.15	0.56	0.054	1.00	0.60	0.60	0.057
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000				
2	Open Space / Habitat Area	100%	20.98	D	Pervious	20.98	0.155	83	2.05	0.41	0.24	0.037	1.00	0.60	0.60	0.093
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000				

Total Area = **135.09**

Y = **0.64**

Total F_m = **0.22**

Ybar = 1 - Y = **0.36**

INFILTRATION RATE CALCULATION SPREADSHEET
NEWPORT BANNING RANCH PROJECT - EXISTING CONDITION
2-YEAR EXPECTED VALUE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA C

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 2-Year Storm Event for Non-Mountainous Area (in) = 1.44
P24, 2-Year Storm Event for Mountainous Area (in) = 2.67

Total Area (ac) = 63.61

a_p - See Figure C-4

Y = 0.33

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.67**

Average a_p = 1.00

Total F_m (in/hr) = **0.60**

Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Oil Operations / Barren Area	100%	17.24	D	Pervious	17.24	0.271	93	0.75	0.15	0.56	0.153	1.00	0.60	0.60	0.163
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000				
2	Open Space / Habitat Area	100%	46.37	D	Pervious	46.37	0.729	83	2.05	0.41	0.24	0.174	1.00	0.60	0.60	0.437
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000				

Total Area = **63.61**

Y = **0.33**

Total F_m = **0.60**

Ybar = 1 - Y = **0.67**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

2-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA D

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 2-Year Storm Event for Non-Mountainous Area (in) = 1.44

Total Area (ac) = 14.29

a_p - See Figure C-4

P24, 2-Year Storm Event for Mountainous Area (in) = 2.67

Y = 0.42

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.58**

Average a_p = 0.68

Total F_m (in/hr) = **0.41**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	5.68	D	Pervious	1.14	0.079	75	3.33	0.67	0.10	0.008	0.20	0.60	0.12	0.048
					Impervious	4.54	0.318	98	0.20	0.04	0.85	0.269				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Open Space / Habitat Area	100%	8.61	D	Pervious	8.61	0.603	83	2.05	0.41	0.24	0.144	1.00	0.60	0.60	0.362
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000				

Total Area = **14.29**

Y = **0.42**

Total F_m = **0.41**

Ybar = 1 - Y = **0.58**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

2-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA E

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 2-Year Storm Event for Non-Mountainous Area (in) = 1.44

Total Area (ac) = 97.15

ap - See Figure C-4

P24, 2-Year Storm Event for Mountainous Area (in) = 2.67

Y = 0.65

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.35**

Average ap = 0.30

Total Fm (in/hr) = **0.18**

Offsite Area																	
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	Single Family Residential (>10 dwellings/acre)	20%	44.48	D	Pervious	8.90	0.092	75	3.33	0.67	0.10	0.009	0.20	0.60	0.12	0.055	
					Impervious	35.58	0.366	98	0.20	0.04	0.85	0.310					
2	Commercial / Industrial	10%	36.05	D	Pervious	3.61	0.037	75	3.33	0.67	0.10	0.004	0.10	0.60	0.06	0.022	
					Impervious	32.45	0.334	98	0.20	0.04	0.85	0.283					
3	Open Space / Habitat Area	100%	16.62	D	Pervious	16.62	0.171	83	2.05	0.41	0.24	0.041	1.00	0.60	0.60	0.103	
					Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000					
Total Area =			97.15	Y = 0.65										Total F _m = 0.18			
										Ybar = 1 - Y = 0.35							

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

2-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA F to K

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 2-Year Storm Event for Non-Mountainous Area (in) = 1.44

Total Area (ac) = 5.80

a_p - See Figure C-4

P24, 2-Year Storm Event for Mountainous Area (in) = 2.67

Y = 0.74

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.26**

Average a_p = 0.20

Total F_m (in/hr) = **0.12**

Offsite Area -F																		
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m					
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)		
1	Single Family Residential (>10 dwellings/acre)	20%	5.80	A	Pervious	1.16	0.200	32	21.25	4.25	0.30	0.060	0.20	0.60	0.12	0.120		
					Impervious	4.64	0.800	98	0.20	0.04	0.85	0.678						
Total Area =			5.80	Y = 0.74										Total F _m = 0.12				
										Ybar = 1 - Y = 0.26								

Offsite Area -G																	
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	Single Family Residential (>10 dwellings/acre)	20%	1.75	A	Pervious	0.35	0.200	32	21.25	4.25	0.30	0.060	0.20	0.60	0.12	0.120	
					Impervious	1.40	0.800	98	0.20	0.04	0.85	0.678					
Total Area =				1.75	Y = 0.74								Total F _m = 0.12				
										Ybar = 1 - Y = 0.26							

Offsite Area -H																	
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	Single Family Residential (>10 dwellings/acre)	20%	6.99	A	Pervious	1.40	0.200	32	21.25	4.25	0.30	0.060	0.20	0.60	0.12	0.120	
					Impervious	5.59	0.800	98	0.20	0.04	0.85	0.678					
Total Area =				6.99	Y = 0.74								Total F _m = 0.12				
										Ybar = 1 - Y = 0.26							

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

2-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA F to K

Offsite Area -I																
No.	Land Use	Pervious- ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	1.06	A	Pervious	0.21	0.200	32	21.25	4.25	0.30	0.060	0.20	0.60	0.12	0.120
					Impervious	0.85	0.800	98	0.20	0.04	0.85	0.678				

Total Area = 1.06

Y = 0.74

Total F_m = 0.12

Ybar = 1 - Y = 0.26

Offsite Area -J																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	11.00	A	Pervious	2.20	0.200	32	21.25	4.25	0.30	0.060	0.20	0.60	0.12	0.120
					Impervious	8.80	0.800	98	0.20	0.04	0.85	0.678				

Total Area = 11.00

Y = 0.74

Total F_m = 0.12

Ybar = 1 - Y = 0.26

Offsite Area -K																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (>10 dwellings/acre)	20%	6.30	A	Pervious	1.26	0.200	32	21.25	4.25	0.30	0.060	0.20	0.60	0.12	0.120
					Impervious	5.04	0.800	98	0.20	0.04	0.85	0.678				

Total Area = 6.30

Y = 0.74

Total F_m = 0.12

Ybar = 1 - Y = 0.26

ii. EV 100-Year Storm Event

Drainage A

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 349.60
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.190
LOW LOSS FRACTION = 0.310
TIME OF CONCENTRATION(MIN.) = 26.83
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 85.15
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 45.66

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	132.5	265.0	397.5	530.0
0.35	0.2143	14.85	.Q	.	.	.	.
0.80	0.7659	15.00	.Q	.	.	.	.
1.24	1.3273	15.38	.Q	.	.	.	.
1.69	1.8992	15.57	.Q	.	.	.	.
2.14	2.4824	15.99	.Q	.	.	.	.
2.59	3.0772	16.21	.Q	.	.	.	.
3.03	3.6846	16.66	.Q	.	.	.	.
3.48	4.3050	16.91	.Q	.	.	.	.
3.93	4.9393	17.42	.Q	.	.	.	.
4.37	5.5881	17.69	.Q	.	.	.	.
4.82	6.2527	18.27	.Q	.	.	.	.
5.27	6.9337	18.58	.Q	.	.	.	.
5.72	7.6325	19.24	.Q	.	.	.	.
6.16	8.3501	19.59	.Q	.	.	.	.
6.61	9.0881	20.35	.Q	.	.	.	.
7.06	9.8478	20.76	.Q	.	.	.	.
7.50	10.6313	21.64	.Q	.	.	.	.
7.95	11.4400	22.12	.Q	.	.	.	.
8.40	12.2770	23.17	.Q	.	.	.	.

8.85	13.1439	23.74	.Q	.	.	.	.
9.29	14.0448	25.01	.Q	.	.	.	.
9.74	14.9820	25.71	.Q	.	.	.	.
10.19	15.9612	27.28	. Q	.	.	.	.
10.63	16.9857	28.16	. Q	.	.	.	.
11.08	18.0635	30.17	. Q	.	.	.	.
11.53	19.1997	31.32	. Q	.	.	.	.
11.98	20.4067	34.00	. Q	.	.	.	.
12.42	21.7820	40.43	. Q	.	.	.	.
12.87	23.4758	51.23	. Q	.	.	.	.
13.32	25.4148	53.70	. Q	.	.	.	.
13.76	27.5143	59.92	. Q	.	.	.	.
14.21	29.8031	63.94	. Q	.	.	.	.
14.66	32.3565	74.24	. Q	.	.	.	.
15.11	35.2530	82.52	. Q	.	.	.	.
15.55	38.7797	108.34	. Q	.	.	.	.
16.00	43.2090	131.37	. Q.	.	.	.	.
16.45	55.3085	523.44	.	.	.	Q.	.
16.89	66.7217	94.23	. Q	.	.	.	.
17.34	69.7241	68.25	. Q	.	.	.	.
17.79	72.0304	56.56	. Q	.	.	.	.
18.24	73.9822	49.06	. Q	.	.	.	.
18.68	75.4910	32.59	. Q	.	.	.	.
19.13	76.6313	29.12	. Q	.	.	.	.
19.58	77.6584	26.47	.Q	.	.	.	.
20.02	78.5975	24.36	.Q	.	.	.	.
20.47	79.4658	22.63	.Q	.	.	.	.
20.92	80.2755	21.19	.Q	.	.	.	.
21.37	81.0359	19.96	.Q	.	.	.	.
21.81	81.7540	18.90	.Q	.	.	.	.
22.26	82.4355	17.98	.Q	.	.	.	.
22.71	83.0847	17.16	.Q	.	.	.	.
23.15	83.7054	16.43	.Q	.	.	.	.
23.60	84.3006	15.78	.Q	.	.	.	.
24.05	84.8727	15.19	.Q
24.50	85.1534	0.00	Q

Drainage B

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 135.10
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.110
LOW LOSS FRACTION = 0.170
TIME OF CONCENTRATION(MIN.) = 30.93
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 38.51
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 12.04

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	50.0	100.0	150.0	200.0
0.02	0.0000	0.00	Q	.	.	.	.
0.53	0.1470	6.90	.Q	.	.	.	.
1.05	0.4448	7.08	.Q	.	.	.	.
1.57	0.7485	7.18	.Q	.	.	.	.
2.08	1.0591	7.40	.Q	.	.	.	.
2.60	1.3767	7.51	.Q	.	.	.	.
3.11	1.7021	7.76	.Q	.	.	.	.
3.63	2.0355	7.89	.Q	.	.	.	.
4.14	2.3776	8.17	.Q	.	.	.	.
4.66	2.7289	8.32	.Q	.	.	.	.
5.17	3.0902	8.64	.Q	.	.	.	.
5.69	3.4621	8.82	.Q	.	.	.	.
6.21	3.8456	9.19	.Q	.	.	.	.
6.72	4.2416	9.39	.Q	.	.	.	.
7.24	4.6513	9.84	.Q	.	.	.	.
7.75	5.0757	10.08	. Q	.	.	.	.
8.27	5.5168	10.62	. Q	.	.	.	.
8.78	5.9756	10.92	. Q	.	.	.	.
9.30	6.4550	11.58	. Q	.	.	.	.

9.81	6.9565	11.96	. Q	.	.	.	.
10.33	7.4842	12.81	. Q	.	.	.	.
10.85	8.0404	13.30	. Q	.	.	.	.
11.36	8.6313	14.44	. Q	.	.	.	.
11.88	9.2608	15.11	. Q	.	.	.	.
12.39	10.0127	20.19	. Q	.	.	.	.
12.91	10.9368	23.19	. Q	.	.	.	.
13.42	11.9820	25.88	. Q	.	.	.	.
13.94	13.1215	27.61	. Q	.	.	.	.
14.45	14.3936	32.11	. Q	.	.	.	.
14.97	15.8359	35.60	. Q	.	.	.	.
15.48	17.6302	48.63	. Q.	.	.	.	.
16.00	19.8591	56.01	. .Q	.	.	.	.
16.52	25.1924	194.37	. .	.	.	Q	.
17.03	30.1989	40.66	. Q	.	.	.	.
17.55	31.6986	29.74	. Q	.	.	.	.
18.06	32.8525	24.43	. Q	.	.	.	.
18.58	33.7109	15.87	. Q	.	.	.	.
19.09	34.3437	13.84	. Q	.	.	.	.
19.61	34.9020	12.37	. Q	.	.	.	.
20.12	35.4048	11.24	. Q	.	.	.	.
20.64	35.8646	10.34	. Q	.	.	.	.
21.16	36.2896	9.61	.Q	.	.	.	.
21.67	36.6860	9.00	.Q	.	.	.	.
22.19	37.0583	8.48	.Q	.	.	.	.
22.70	37.4099	8.03	.Q	.	.	.	.
23.22	37.7435	7.63	.Q	.	.	.	.
23.73	38.0613	7.29	.Q	.	.	.	.
24.25	38.3652	6.98	.Q
24.76	38.5138	0.00	Q

Drainage C

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 63.60
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.300
LOW LOSS FRACTION = 0.340
TIME OF CONCENTRATION(MIN.) = 18.32
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 14.74
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 9.06

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	30.0	60.0	90.0	120.0
0.12	0.0000	0.00	Q	.	.	.	.
0.43	0.0328	2.60	Q	.	.	.	.
0.73	0.0986	2.62	Q	.	.	.	.
1.04	0.1652	2.66	Q	.	.	.	.
1.34	0.2327	2.69	Q	.	.	.	.
1.65	0.3011	2.73	Q	.	.	.	.
1.95	0.3704	2.76	Q	.	.	.	.
2.26	0.4407	2.81	Q	.	.	.	.
2.57	0.5119	2.84	Q	.	.	.	.
2.87	0.5841	2.89	Q	.	.	.	.
3.18	0.6574	2.92	Q	.	.	.	.
3.48	0.7318	2.98	Q	.	.	.	.
3.79	0.8074	3.01	.Q	.	.	.	.
4.09	0.8841	3.07	.Q	.	.	.	.
4.40	0.9621	3.11	.Q	.	.	.	.
4.70	1.0413	3.18	.Q	.	.	.	.
5.01	1.1219	3.21	.Q	.	.	.	.
5.31	1.2039	3.29	.Q	.	.	.	.
5.62	1.2874	3.33	.Q	.	.	.	.

5.92	1.3724	3.41	.Q	.	.	.	.
6.23	1.4590	3.45	.Q	.	.	.	.
6.53	1.5473	3.55	.Q	.	.	.	.
6.84	1.6374	3.59	.Q	.	.	.	.
7.15	1.7294	3.70	.Q	.	.	.	.
7.45	1.8233	3.75	.Q	.	.	.	.
7.76	1.9194	3.86	.Q	.	.	.	.
8.06	2.0176	3.92	.Q	.	.	.	.
8.37	2.1183	4.05	.Q	.	.	.	.
8.67	2.2214	4.12	.Q	.	.	.	.
8.98	2.3272	4.27	.Q	.	.	.	.
9.28	2.4359	4.35	.Q	.	.	.	.
9.59	2.5477	4.51	.Q	.	.	.	.
9.89	2.6627	4.60	.Q	.	.	.	.
10.20	2.7813	4.80	.Q	.	.	.	.
10.50	2.9038	4.91	.Q	.	.	.	.
10.81	3.0306	5.14	.Q	.	.	.	.
11.11	3.1618	5.27	.Q	.	.	.	.
11.42	3.2983	5.55	.Q	.	.	.	.
11.73	3.4402	5.70	.Q	.	.	.	.
12.03	3.5885	6.05	. Q	.	.	.	.
12.34	3.7602	7.56	. Q	.	.	.	.
12.64	3.9658	8.74	. Q	.	.	.	.
12.95	4.1898	9.01	. Q	.	.	.	.
13.25	4.4250	9.63	. Q	.	.	.	.
13.56	4.6726	10.00	. Q	.	.	.	.
13.86	4.9358	10.86	. Q	.	.	.	.
14.17	5.2165	11.39	. Q	.	.	.	.
14.47	5.5185	12.55	. Q	.	.	.	.
14.78	5.8460	13.40	. Q	.	.	.	.
15.08	6.2142	15.78	. Q	.	.	.	.
15.39	6.6345	17.54	. Q	.	.	.	.
15.69	7.1167	20.68	. Q	.	.	.	.
16.00	7.7531	29.75	. Q.	.	.	.	.
16.31	9.5733	114.52	.	.	.	Q	.
16.61	11.2598	19.14	. Q	.	.	.	.
16.92	11.6836	14.45	. Q	.	.	.	.
17.22	12.0157	11.87	. Q	.	.	.	.
17.53	12.2966	10.40	. Q	.	.	.	.
17.83	12.5453	9.31	. Q	.	.	.	.
18.14	12.7698	8.49	. Q	.	.	.	.
18.44	12.9510	5.87	.Q	.	.	.	.
18.75	13.0932	5.40	.Q	.	.	.	.
19.05	13.2247	5.02	.Q	.	.	.	.
19.36	13.3473	4.70	.Q	.	.	.	.
19.66	13.4625	4.43	.Q	.	.	.	.
19.97	13.5712	4.19	.Q	.	.	.	.
20.27	13.6744	3.99	.Q	.	.	.	.
20.58	13.7728	3.81	.Q	.	.	.	.
20.89	13.8668	3.64	.Q	.	.	.	.
21.19	13.9569	3.50	.Q	.	.	.	.
21.50	14.0435	3.37	.Q	.	.	.	.
21.80	14.1270	3.25	.Q	.	.	.	.
22.11	14.2076	3.14	.Q	.	.	.	.
22.41	14.2856	3.04	.Q	.	.	.	.
22.72	14.3612	2.95	Q	.	.	.	.
23.02	14.4345	2.86	Q	.	.	.	.
23.33	14.5057	2.78	Q	.	.	.	.
23.63	14.5751	2.71	Q	.	.	.	.
23.94	14.6426	2.64	Q	.	.	.	.
24.24	14.7084	2.58	Q	.	.	.	.
24.55	14.7410	0.00	Q	.	.	.	.

Drainage D

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 14.29
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.200
 LOW LOSS FRACTION = 0.300
 TIME OF CONCENTRATION(MIN.) = 10.60
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 3.51
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.83

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.10	0.0000	0.00	Q	.	.	.	.
0.28	0.0045	0.62	Q	.	.	.	.
0.45	0.0135	0.62	Q	.	.	.	.
0.63	0.0226	0.63	Q	.	.	.	.
0.81	0.0318	0.63	Q	.	.	.	.
0.98	0.0410	0.64	Q	.	.	.	.
1.16	0.0503	0.64	Q	.	.	.	.
1.34	0.0597	0.65	Q	.	.	.	.
1.51	0.0692	0.65	Q	.	.	.	.
1.69	0.0787	0.66	Q	.	.	.	.
1.87	0.0883	0.66	Q	.	.	.	.
2.04	0.0979	0.67	Q	.	.	.	.
2.22	0.1077	0.67	Q	.	.	.	.
2.40	0.1175	0.68	Q	.	.	.	.
2.57	0.1274	0.68	Q	.	.	.	.
2.75	0.1374	0.69	Q	.	.	.	.
2.93	0.1475	0.69	Q	.	.	.	.
3.10	0.1576	0.70	Q	.	.	.	.
3.28	0.1678	0.70	Q	.	.	.	.
3.46	0.1782	0.71	Q	.	.	.	.
3.63	0.1886	0.72	Q	.	.	.	.
3.81	0.1991	0.72	Q	.	.	.	.
3.99	0.2097	0.73	Q	.	.	.	.
4.16	0.2205	0.74	Q	.	.	.	.
4.34	0.2313	0.74	Q	.	.	.	.
4.52	0.2422	0.75	Q	.	.	.	.
4.69	0.2532	0.76	Q	.	.	.	.
4.87	0.2643	0.77	Q	.	.	.	.
5.05	0.2756	0.77	Q	.	.	.	.
5.22	0.2869	0.78	Q	.	.	.	.

					X100EV_D				
5.40	0.2984	0.79	Q	.	.	.	.	.	.
5.58	0.3100	0.80	Q	.	.	.	.	.	.
5.75	0.3217	0.81	Q	.	.	.	.	.	.
5.93	0.3336	0.82	Q	.	.	.	.	.	.
6.11	0.3456	0.82	Q	.	.	.	.	.	.
6.28	0.3577	0.84	Q	.	.	.	.	.	.
6.46	0.3699	0.84	Q	.	.	.	.	.	.
6.64	0.3823	0.86	Q	.	.	.	.	.	.
6.81	0.3949	0.86	Q	.	.	.	.	.	.
6.99	0.4076	0.88	Q	.	.	.	.	.	.
7.17	0.4204	0.88	Q	.	.	.	.	.	.
7.34	0.4334	0.90	Q	.	.	.	.	.	.
7.52	0.4466	0.91	Q	.	.	.	.	.	.
7.70	0.4599	0.92	Q	.	.	.	.	.	.
7.87	0.4735	0.93	Q	.	.	.	.	.	.
8.05	0.4872	0.95	Q	.	.	.	.	.	.
8.23	0.5011	0.96	Q	.	.	.	.	.	.
8.40	0.5152	0.98	Q	.	.	.	.	.	.
8.58	0.5295	0.99	Q	.	.	.	.	.	.
8.76	0.5440	1.00	.Q	.	.	.	.	.	.
8.93	0.5588	1.02	.Q	.	.	.	.	.	.
9.11	0.5738	1.04	.Q	.	.	.	.	.	.
9.29	0.5890	1.05	.Q	.	.	.	.	.	.
9.46	0.6045	1.07	.Q	.	.	.	.	.	.
9.64	0.6202	1.08	.Q	.	.	.	.	.	.
9.82	0.6362	1.11	.Q	.	.	.	.	.	.
9.99	0.6525	1.12	.Q	.	.	.	.	.	.
10.17	0.6691	1.15	.Q	.	.	.	.	.	.
10.35	0.6860	1.17	.Q	.	.	.	.	.	.
10.52	0.7033	1.20	.Q	.	.	.	.	.	.
10.70	0.7209	1.21	.Q	.	.	.	.	.	.
10.88	0.7388	1.25	.Q	.	.	.	.	.	.
11.05	0.7572	1.27	.Q	.	.	.	.	.	.
11.23	0.7759	1.30	.Q	.	.	.	.	.	.
11.41	0.7951	1.32	.Q	.	.	.	.	.	.
11.58	0.8147	1.37	.Q	.	.	.	.	.	.
11.76	0.8349	1.39	.Q	.	.	.	.	.	.
11.94	0.8555	1.44	.Q	.	.	.	.	.	.
12.11	0.8768	1.47	.Q	.	.	.	.	.	.
12.29	0.9021	2.01	.Q	.	.	.	.	.	.
12.47	0.9316	2.04	.Q	.	.	.	.	.	.
12.64	0.9619	2.11	.Q	.	.	.	.	.	.
12.82	0.9930	2.15	.Q	.	.	.	.	.	.
13.00	1.0249	2.23	.Q	.	.	.	.	.	.
13.17	1.0578	2.27	.Q	.	.	.	.	.	.
13.35	1.0918	2.37	.Q	.	.	.	.	.	.
13.53	1.1268	2.43	.Q	.	.	.	.	.	.
13.70	1.1631	2.55	.Q	.	.	.	.	.	.
13.88	1.2008	2.61	.Q	.	.	.	.	.	.
14.06	1.2400	2.76	.Q	.	.	.	.	.	.
14.23	1.2808	2.81	.Q	.	.	.	.	.	.
14.41	1.3233	3.01	.Q	.	.	.	.	.	.
14.59	1.3681	3.13	.Q	.	.	.	.	.	.
14.76	1.4157	3.40	.Q	.	.	.	.	.	.
14.94	1.4666	3.57	.Q	.	.	.	.	.	.
15.12	1.5217	3.98	.Q	.	.	.	.	.	.
15.29	1.5818	4.25	.Q	.	.	.	.	.	.
15.47	1.6458	4.50	.Q	.	.	.	.	.	.
15.65	1.7136	4.79	.Q	.	.	.	.	.	.
15.82	1.8054	7.78	.Q	.	.	.	.	.	.
16.00	1.9467	11.57	.Q	.	.	.	.	.	.
16.18	2.3069	37.76	.	.	.	.	.	.	.
16.35	2.6232	5.57	.Q	.	.	.	.	.	.
16.53	2.6974	4.59	.Q	.	.	.	.	.	.
16.71	2.7583	3.76	.Q	.	.	.	.	.	.
16.88	2.8095	3.25	.Q	.	.	.	.	.	.
17.06	2.8545	2.91	.Q	.	.	.	.	.	.
17.24	2.8953	2.69	.Q	.	.	.	.	.	.
17.41	2.9331	2.48	.Q	.	.	.	.	.	.
17.59	2.9682	2.32	.Q	.	.	.	.	.	.
17.77	3.0011	2.19	.Q	.	.	.	.	.	.
17.94	3.0322	2.07	.Q	.	.	.	.	.	.
18.12	3.0616	1.96	.Q	.	.	.	.	.	.
18.30	3.0862	1.41	.Q	.	.	.	.	.	.
18.47	3.1064	1.35	.Q	.	.	.	.	.	.
18.65	3.1256	1.28	.Q	.	.	.	.	.	.
18.83	3.1439	1.23	.Q	.	.	.	.	.	.
19.00	3.1615	1.18	.Q	.	.	.	.	.	.
19.18	3.1785	1.14	.Q	.	.	.	.	.	.

				X100EV_D			
19.36	3.1948	1.10	.Q	.	.	.	.
19.53	3.2105	1.06	.Q	.	.	.	.
19.71	3.2257	1.03	.Q	.	.	.	.
19.89	3.2405	0.99	Q	.	.	.	.
20.06	3.2548	0.97	Q	.	.	.	.
20.24	3.2687	0.94	Q	.	.	.	.
20.42	3.2822	0.91	Q	.	.	.	.
20.59	3.2954	0.89	Q	.	.	.	.
20.77	3.3083	0.87	Q	.	.	.	.
20.95	3.3208	0.85	Q	.	.	.	.
21.12	3.3331	0.83	Q	.	.	.	.
21.30	3.3450	0.81	Q	.	.	.	.
21.48	3.3568	0.79	Q	.	.	.	.
21.65	3.3682	0.78	Q	.	.	.	.
21.83	3.3795	0.76	Q	.	.	.	.
22.01	3.3905	0.75	Q	.	.	.	.
22.18	3.4013	0.73	Q	.	.	.	.
22.36	3.4119	0.72	Q	.	.	.	.
22.54	3.4224	0.71	Q	.	.	.	.
22.71	3.4326	0.70	Q	.	.	.	.
22.89	3.4427	0.68	Q	.	.	.	.
23.07	3.4526	0.67	Q	.	.	.	.
23.24	3.4623	0.66	Q	.	.	.	.
23.42	3.4719	0.65	Q	.	.	.	.
23.60	3.4814	0.64	Q	.	.	.	.
23.77	3.4907	0.63	Q	.	.	.	.
23.95	3.4998	0.62	Q	.	.	.	.
24.13	3.5089	0.61	Q
24.30	3.5134	0.00	Q

Drainage E

SMALL AREA UNIT HYDROGRAPH MODEL

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Ver. 9.0 Release Date: 01/01/2003 License ID 1355

Analysis prepared by:

Fusco Engineering
16795 Von Karman #100, Irvine, CA 92606

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 97.20
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.090
LOW LOSS FRACTION = 0.170
TIME OF CONCENTRATION(MIN.) = 27.94
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 27.80
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 8.57

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	40.0	80.0	120.0	160.0
0.17	0.0000	0.00	Q	.	.	.	.
0.63	0.0964	5.01	.Q	.	.	.	.
1.10	0.2906	5.08	.Q	.	.	.	.
1.56	0.4885	5.21	.Q	.	.	.	.
2.03	0.6904	5.28	.Q	.	.	.	.
2.50	0.8966	5.43	.Q	.	.	.	.
2.96	1.1071	5.51	.Q	.	.	.	.
3.43	1.3224	5.68	.Q	.	.	.	.
3.89	1.5427	5.77	.Q	.	.	.	.
4.36	1.7682	5.96	.Q	.	.	.	.
4.82	1.9994	6.06	.Q	.	.	.	.
5.29	2.2366	6.27	.Q	.	.	.	.
5.76	2.4801	6.39	.Q	.	.	.	.
6.22	2.7306	6.63	.Q	.	.	.	.
6.69	2.9885	6.77	.Q	.	.	.	.
7.15	3.2544	7.05	.Q	.	.	.	.
7.62	3.5289	7.21	.Q	.	.	.	.
8.08	3.8130	7.55	.Q	.	.	.	.
8.55	4.1072	7.74	.Q	.	.	.	.
9.01	4.4130	8.15	.Q	.	.	.	.
9.48	4.7311	8.38	.Q	.	.	.	.
9.95	5.0635	8.89	.Q	.	.	.	.
10.41	5.4112	9.18	.Q	.	.	.	.
10.88	5.7770	9.83	.Q	.	.	.	.
11.34	6.1627	10.21	.Q	.	.	.	.
11.81	6.5724	11.08	.Q	.	.	.	.
12.27	7.0088	11.60	.Q	.	.	.	.
12.74	7.5548	16.78	.Q	.	.	.	.
13.21	8.2161	17.59	.Q	.	.	.	.
13.67	8.9322	19.62	.Q	.	.	.	.
14.14	9.7127	20.94	.Q	.	.	.	.

			X100EV_E			
14.60	10.5834	24.31	.	Q	.	.
15.07	11.5710	27.02	.	Q	.	.
15.53	12.7835	35.99	.	.	Q	.
16.00	14.3149	43.59	.	.	Q	.
16.47	18.0517	150.60	.	.	.	Q
16.93	21.5433	30.85	.	Q	.	.
17.40	22.5685	22.43	.	Q	.	.
17.86	23.3565	18.52	.	Q	.	.
18.33	24.0136	15.62	.	Q	.	.
18.79	24.5186	10.62	.	Q	.	.
19.26	24.9056	9.49	.	Q	.	.
19.73	25.2542	8.63	.	Q	.	.
20.19	25.5730	7.94	.	Q	.	.
20.66	25.8677	7.38	.	Q	.	.
21.12	26.1425	6.91	.	Q	.	.
21.59	26.4006	6.51	.	Q	.	.
22.05	26.6444	6.16	.	Q	.	.
22.52	26.8757	5.86	.	Q	.	.
22.98	27.0960	5.59	.	Q	.	.
23.45	27.3067	5.36	.	Q	.	.
23.92	27.5087	5.14	.	Q	.	.
24.38	27.7032	4.96	.	Q	.	.
24.85	27.7987	0.00	Q	.	.	.

Drainage F

 SMALL AREA UNIT HYDROGRAPH MODEL
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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 5.80
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.060
 LOW LOSS FRACTION = 0.240
 TIME OF CONCENTRATION(MIN.) = 7.97
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.60
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.57

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.06	0.0000	0.00	Q	.	.	.	.
0.19	0.0015	0.27	Q	.	.	.	.
0.33	0.0045	0.27	Q	.	.	.	.
0.46	0.0075	0.27	Q	.	.	.	.
0.59	0.0105	0.28	Q	.	.	.	.
0.72	0.0135	0.28	Q	.	.	.	.
0.86	0.0166	0.28	Q	.	.	.	.
0.99	0.0196	0.28	Q	.	.	.	.
1.12	0.0227	0.28	Q	.	.	.	.
1.26	0.0258	0.28	Q	.	.	.	.
1.39	0.0290	0.28	Q	.	.	.	.
1.52	0.0321	0.29	Q	.	.	.	.
1.65	0.0352	0.29	Q	.	.	.	.
1.79	0.0384	0.29	Q	.	.	.	.
1.92	0.0416	0.29	Q	.	.	.	.
2.05	0.0448	0.29	Q	.	.	.	.
2.19	0.0481	0.29	Q	.	.	.	.
2.32	0.0513	0.30	Q	.	.	.	.
2.45	0.0546	0.30	Q	.	.	.	.
2.58	0.0579	0.30	Q	.	.	.	.
2.72	0.0612	0.30	Q	.	.	.	.
2.85	0.0645	0.30	Q	.	.	.	.
2.98	0.0679	0.31	Q	.	.	.	.
3.12	0.0712	0.31	Q	.	.	.	.
3.25	0.0746	0.31	Q	.	.	.	.
3.38	0.0781	0.31	Q	.	.	.	.
3.51	0.0815	0.31	Q	.	.	.	.
3.65	0.0850	0.32	Q	.	.	.	.
3.78	0.0885	0.32	Q	.	.	.	.
3.91	0.0920	0.32	Q	.	.	.	.
4.05	0.0955	0.32	Q	.	.	.	.

					X100EV_F				
4. 18	0. 0991	0. 33	Q	.	.	.	.	.	.
4. 31	0. 1027	0. 33	Q	.	.	.	.	.	.
4. 44	0. 1063	0. 33	Q	.	.	.	.	.	.
4. 58	0. 1099	0. 33	Q	.	.	.	.	.	.
4. 71	0. 1136	0. 34	Q	.	.	.	.	.	.
4. 84	0. 1173	0. 34	Q	.	.	.	.	.	.
4. 97	0. 1210	0. 34	Q	.	.	.	.	.	.
5. 11	0. 1248	0. 34	Q	.	.	.	.	.	.
5. 24	0. 1285	0. 35	Q	.	.	.	.	.	.
5. 37	0. 1324	0. 35	Q	.	.	.	.	.	.
5. 51	0. 1362	0. 35	Q	.	.	.	.	.	.
5. 64	0. 1401	0. 35	Q	.	.	.	.	.	.
5. 77	0. 1440	0. 36	Q	.	.	.	.	.	.
5. 90	0. 1479	0. 36	Q	.	.	.	.	.	.
6. 04	0. 1519	0. 36	Q	.	.	.	.	.	.
6. 17	0. 1559	0. 37	Q	.	.	.	.	.	.
6. 30	0. 1599	0. 37	Q	.	.	.	.	.	.
6. 44	0. 1640	0. 37	Q	.	.	.	.	.	.
6. 57	0. 1681	0. 38	Q	.	.	.	.	.	.
6. 70	0. 1722	0. 38	Q	.	.	.	.	.	.
6. 83	0. 1764	0. 38	Q	.	.	.	.	.	.
6. 97	0. 1806	0. 39	Q	.	.	.	.	.	.
7. 10	0. 1849	0. 39	Q	.	.	.	.	.	.
7. 23	0. 1892	0. 39	Q	.	.	.	.	.	.
7. 37	0. 1935	0. 40	Q	.	.	.	.	.	.
7. 50	0. 1979	0. 40	Q	.	.	.	.	.	.
7. 63	0. 2023	0. 41	Q	.	.	.	.	.	.
7. 76	0. 2068	0. 41	Q	.	.	.	.	.	.
7. 90	0. 2113	0. 41	Q	.	.	.	.	.	.
8. 03	0. 2158	0. 42	Q	.	.	.	.	.	.
8. 16	0. 2204	0. 42	Q	.	.	.	.	.	.
8. 30	0. 2251	0. 43	Q	.	.	.	.	.	.
8. 43	0. 2298	0. 43	Q	.	.	.	.	.	.
8. 56	0. 2345	0. 43	Q	.	.	.	.	.	.
8. 69	0. 2394	0. 44	Q	.	.	.	.	.	.
8. 83	0. 2442	0. 44	Q	.	.	.	.	.	.
8. 96	0. 2491	0. 45	Q	.	.	.	.	.	.
9. 09	0. 2541	0. 46	Q	.	.	.	.	.	.
9. 23	0. 2592	0. 46	Q	.	.	.	.	.	.
9. 36	0. 2643	0. 47	Q	.	.	.	.	.	.
9. 49	0. 2694	0. 47	Q	.	.	.	.	.	.
9. 62	0. 2747	0. 48	Q	.	.	.	.	.	.
9. 76	0. 2800	0. 49	Q	.	.	.	.	.	.
9. 89	0. 2854	0. 49	Q	.	.	.	.	.	.
10. 02	0. 2908	0. 50	.Q	.	.	.	.	.	.
10. 16	0. 2963	0. 51	.Q	.	.	.	.	.	.
10. 29	0. 3019	0. 52	.Q	.	.	.	.	.	.
10. 42	0. 3076	0. 52	.Q	.	.	.	.	.	.
10. 55	0. 3134	0. 53	.Q	.	.	.	.	.	.
10. 69	0. 3192	0. 54	.Q	.	.	.	.	.	.
10. 82	0. 3252	0. 55	.Q	.	.	.	.	.	.
10. 95	0. 3312	0. 55	.Q	.	.	.	.	.	.
11. 09	0. 3374	0. 57	.Q	.	.	.	.	.	.
11. 22	0. 3436	0. 57	.Q	.	.	.	.	.	.
11. 35	0. 3500	0. 59	.Q	.	.	.	.	.	.
11. 48	0. 3565	0. 59	.Q	.	.	.	.	.	.
11. 62	0. 3631	0. 61	.Q	.	.	.	.	.	.
11. 75	0. 3698	0. 62	.Q	.	.	.	.	.	.
11. 88	0. 3766	0. 63	.Q	.	.	.	.	.	.
12. 02	0. 3836	0. 64	.Q	.	.	.	.	.	.
12. 15	0. 3919	0. 87	.Q	.	.	.	.	.	.
12. 28	0. 4015	0. 88	.Q	.	.	.	.	.	.
12. 41	0. 4113	0. 90	.Q	.	.	.	.	.	.
12. 55	0. 4213	0. 91	.Q	.	.	.	.	.	.
12. 68	0. 4315	0. 94	.Q	.	.	.	.	.	.
12. 81	0. 4418	0. 95	.Q	.	.	.	.	.	.
12. 94	0. 4524	0. 98	.Q	.	.	.	.	.	.
13. 08	0. 4633	0. 99	.Q	.	.	.	.	.	.
13. 21	0. 4744	1. 04	. Q	.	.	.	.	.	.
13. 34	0. 4859	1. 06	. Q	.	.	.	.	.	.
13. 48	0. 4978	1. 10	. Q	.	.	.	.	.	.
13. 61	0. 5100	1. 13	. Q	.	.	.	.	.	.
13. 74	0. 5227	1. 19	. Q	.	.	.	.	.	.
13. 87	0. 5359	1. 22	. Q	.	.	.	.	.	.
14. 01	0. 5496	1. 28	. Q	.	.	.	.	.	.
14. 14	0. 5638	1. 31	. Q	.	.	.	.	.	.
14. 27	0. 5785	1. 38	. Q	.	.	.	.	.	.
14. 41	0. 5939	1. 42	. Q	.	.	.	.	.	.
14. 54	0. 6101	1. 52	. Q	.	.	.	.	.	.

					X100EV_F			
14. 67	0. 6271	1. 58	.	Q	.	.	.	.
14. 80	0. 6452	1. 71	.	Q	.	.	.	.
14. 94	0. 6644	1. 79	.	Q	.	.	.	.
15. 07	0. 6851	1. 98	.	Q	.	.	.	.
15. 20	0. 7074	2. 09	.	Q	.	.	.	.
15. 34	0. 7319	2. 37	.	Q	.	.	.	.
15. 47	0. 7576	2. 32	.	Q	.	.	.	.
15. 60	0. 7846	2. 61	.	Q	.	.	.	.
15. 73	0. 8153	2. 98	.	Q	.	.	.	.
15. 87	0. 8574	4. 68	.	.	Q.	.	.	.
16. 00	0. 9184	6. 43	.	.	.	Q	.	.
16. 13	1. 0576	18. 93	.	.	.	.	Q	.
16. 27	1. 1820	3. 74	.	.	Q	.	.	.
16. 40	1. 2153	2. 33	.	Q	.	.	.	.
16. 53	1. 2402	2. 22	.	Q	.	.	.	.
16. 66	1. 2627	1. 88	.	Q	.	.	.	.
16. 80	1. 2820	1. 64	.	Q	.	.	.	.
16. 93	1. 2991	1. 47	.	Q	.	.	.	.
17. 06	1. 3145	1. 34	.	Q	.	.	.	.
17. 20	1. 3287	1. 25	.	Q	.	.	.	.
17. 33	1. 3419	1. 16	.	Q	.	.	.	.
17. 46	1. 3542	1. 08	.	Q	.	.	.	.
17. 59	1. 3657	1. 01	.	Q	.	.	.	.
17. 73	1. 3766	0. 96	.	Q	.	.	.	.
17. 86	1. 3869	0. 93	.	Q	.	.	.	.
17. 99	1. 3969	0. 89	.	Q	.	.	.	.
18. 13	1. 4056	0. 69	.	Q	.	.	.	.
18. 26	1. 4128	0. 62	.	Q	.	.	.	.
18. 39	1. 4195	0. 60	.	Q	.	.	.	.
18. 52	1. 4260	0. 58	.	Q	.	.	.	.
18. 66	1. 4322	0. 56	.	Q	.	.	.	.
18. 79	1. 4383	0. 54	.	Q	.	.	.	.
18. 92	1. 4441	0. 53	.	Q	.	.	.	.
19. 06	1. 4498	0. 51	.	Q	.	.	.	.
19. 19	1. 4553	0. 50	Q	.	.	.	.	.
19. 32	1. 4607	0. 48	Q	.	.	.	.	.
19. 45	1. 4659	0. 47	Q	.	.	.	.	.
19. 59	1. 4710	0. 46	Q	.	.	.	.	.
19. 72	1. 4760	0. 45	Q	.	.	.	.	.
19. 85	1. 4809	0. 44	Q	.	.	.	.	.
19. 98	1. 4856	0. 43	Q	.	.	.	.	.
20. 12	1. 4903	0. 42	Q	.	.	.	.	.
20. 25	1. 4949	0. 41	Q	.	.	.	.	.
20. 38	1. 4993	0. 40	Q	.	.	.	.	.
20. 52	1. 5037	0. 39	Q	.	.	.	.	.
20. 65	1. 5080	0. 39	Q	.	.	.	.	.
20. 78	1. 5122	0. 38	Q	.	.	.	.	.
20. 91	1. 5164	0. 37	Q	.	.	.	.	.
21. 05	1. 5204	0. 37	Q	.	.	.	.	.
21. 18	1. 5244	0. 36	Q	.	.	.	.	.
21. 31	1. 5284	0. 36	Q	.	.	.	.	.
21. 45	1. 5322	0. 35	Q	.	.	.	.	.
21. 58	1. 5360	0. 34	Q	.	.	.	.	.
21. 71	1. 5398	0. 34	Q	.	.	.	.	.
21. 84	1. 5435	0. 33	Q	.	.	.	.	.
21. 98	1. 5471	0. 33	Q	.	.	.	.	.
22. 11	1. 5507	0. 32	Q	.	.	.	.	.
22. 24	1. 5543	0. 32	Q	.	.	.	.	.
22. 38	1. 5577	0. 32	Q	.	.	.	.	.
22. 51	1. 5612	0. 31	Q	.	.	.	.	.
22. 64	1. 5646	0. 31	Q	.	.	.	.	.
22. 77	1. 5679	0. 30	Q	.	.	.	.	.
22. 91	1. 5713	0. 30	Q	.	.	.	.	.
23. 04	1. 5745	0. 30	Q	.	.	.	.	.
23. 17	1. 5778	0. 29	Q	.	.	.	.	.
23. 31	1. 5810	0. 29	Q	.	.	.	.	.
23. 44	1. 5841	0. 29	Q	.	.	.	.	.
23. 57	1. 5872	0. 28	Q	.	.	.	.	.
23. 70	1. 5903	0. 28	Q	.	.	.	.	.
23. 84	1. 5934	0. 28	Q	.	.	.	.	.
23. 97	1. 5964	0. 27	Q	.	.	.	.	.
24. 10	1. 5994	0. 27	Q
24. 24	1. 6009	0. 00	Q

Drainage G

 SMALL AREA UNIT HYDROGRAPH MODEL
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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 1.80
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.060
 LOW LOSS FRACTION = 0.240
 TIME OF CONCENTRATION(MIN.) = 8.11
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.50
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.18

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.05	0.0000	0.00	Q	.	.	.	.
0.19	0.0005	0.08	Q	.	.	.	.
0.32	0.0014	0.08	Q	.	.	.	.
0.46	0.0024	0.09	Q	.	.	.	.
0.59	0.0033	0.09	Q	.	.	.	.
0.73	0.0043	0.09	Q	.	.	.	.
0.86	0.0052	0.09	Q	.	.	.	.
1.00	0.0062	0.09	Q	.	.	.	.
1.13	0.0072	0.09	Q	.	.	.	.
1.27	0.0082	0.09	Q	.	.	.	.
1.40	0.0091	0.09	Q	.	.	.	.
1.54	0.0101	0.09	Q	.	.	.	.
1.67	0.0111	0.09	Q	.	.	.	.
1.81	0.0121	0.09	Q	.	.	.	.
1.94	0.0131	0.09	Q	.	.	.	.
2.08	0.0142	0.09	Q	.	.	.	.
2.21	0.0152	0.09	Q	.	.	.	.
2.35	0.0162	0.09	Q	.	.	.	.
2.48	0.0172	0.09	Q	.	.	.	.
2.62	0.0183	0.09	Q	.	.	.	.
2.75	0.0193	0.09	Q	.	.	.	.
2.89	0.0204	0.09	Q	.	.	.	.
3.02	0.0214	0.10	Q	.	.	.	.
3.16	0.0225	0.10	Q	.	.	.	.
3.29	0.0236	0.10	Q	.	.	.	.
3.43	0.0247	0.10	Q	.	.	.	.
3.56	0.0258	0.10	Q	.	.	.	.
3.70	0.0269	0.10	Q	.	.	.	.
3.84	0.0280	0.10	Q	.	.	.	.
3.97	0.0291	0.10	Q	.	.	.	.
4.11	0.0302	0.10	Q	.	.	.	.

					X100EV_G				
4. 24	0. 0313	0. 10	Q	.	.	.	.	.	.
4. 38	0. 0325	0. 10	Q	.	.	.	.	.	.
4. 51	0. 0336	0. 10	Q	.	.	.	.	.	.
4. 65	0. 0348	0. 10	Q	.	.	.	.	.	.
4. 78	0. 0359	0. 10	Q	.	.	.	.	.	.
4. 92	0. 0371	0. 11	Q	.	.	.	.	.	.
5. 05	0. 0383	0. 11	Q	.	.	.	.	.	.
5. 19	0. 0395	0. 11	Q	.	.	.	.	.	.
5. 32	0. 0407	0. 11	Q	.	.	.	.	.	.
5. 46	0. 0419	0. 11	Q	.	.	.	.	.	.
5. 59	0. 0431	0. 11	Q	.	.	.	.	.	.
5. 73	0. 0443	0. 11	Q	.	.	.	.	.	.
5. 86	0. 0456	0. 11	Q	.	.	.	.	.	.
6. 00	0. 0468	0. 11	Q	.	.	.	.	.	.
6. 13	0. 0481	0. 11	Q	.	.	.	.	.	.
6. 27	0. 0493	0. 11	Q	.	.	.	.	.	.
6. 40	0. 0506	0. 12	Q	.	.	.	.	.	.
6. 54	0. 0519	0. 12	Q	.	.	.	.	.	.
6. 67	0. 0532	0. 12	Q	.	.	.	.	.	.
6. 81	0. 0545	0. 12	Q	.	.	.	.	.	.
6. 94	0. 0559	0. 12	Q	.	.	.	.	.	.
7. 08	0. 0572	0. 12	Q	.	.	.	.	.	.
7. 21	0. 0586	0. 12	Q	.	.	.	.	.	.
7. 35	0. 0599	0. 12	Q	.	.	.	.	.	.
7. 48	0. 0613	0. 12	Q	.	.	.	.	.	.
7. 62	0. 0627	0. 13	Q	.	.	.	.	.	.
7. 75	0. 0641	0. 13	Q	.	.	.	.	.	.
7. 89	0. 0655	0. 13	Q	.	.	.	.	.	.
8. 03	0. 0670	0. 13	Q	.	.	.	.	.	.
8. 16	0. 0684	0. 13	Q	.	.	.	.	.	.
8. 30	0. 0699	0. 13	Q	.	.	.	.	.	.
8. 43	0. 0714	0. 13	Q	.	.	.	.	.	.
8. 57	0. 0729	0. 14	Q	.	.	.	.	.	.
8. 70	0. 0744	0. 14	Q	.	.	.	.	.	.
8. 84	0. 0759	0. 14	Q	.	.	.	.	.	.
8. 97	0. 0775	0. 14	Q	.	.	.	.	.	.
9. 11	0. 0791	0. 14	Q	.	.	.	.	.	.
9. 24	0. 0807	0. 14	Q	.	.	.	.	.	.
9. 38	0. 0823	0. 15	Q	.	.	.	.	.	.
9. 51	0. 0839	0. 15	Q	.	.	.	.	.	.
9. 65	0. 0856	0. 15	Q	.	.	.	.	.	.
9. 78	0. 0873	0. 15	Q	.	.	.	.	.	.
9. 92	0. 0890	0. 15	Q	.	.	.	.	.	.
10. 05	0. 0907	0. 16	Q	.	.	.	.	.	.
10. 19	0. 0924	0. 16	Q	.	.	.	.	.	.
10. 32	0. 0942	0. 16	Q	.	.	.	.	.	.
10. 46	0. 0960	0. 16	Q	.	.	.	.	.	.
10. 59	0. 0978	0. 16	Q	.	.	.	.	.	.
10. 73	0. 0997	0. 17	Q	.	.	.	.	.	.
10. 86	0. 1016	0. 17	Q	.	.	.	.	.	.
11. 00	0. 1035	0. 17	Q	.	.	.	.	.	.
11. 13	0. 1055	0. 18	Q	.	.	.	.	.	.
11. 27	0. 1074	0. 18	Q	.	.	.	.	.	.
11. 40	0. 1095	0. 18	Q	.	.	.	.	.	.
11. 54	0. 1115	0. 19	Q	.	.	.	.	.	.
11. 67	0. 1136	0. 19	Q	.	.	.	.	.	.
11. 81	0. 1158	0. 19	Q	.	.	.	.	.	.
11. 95	0. 1179	0. 20	Q	.	.	.	.	.	.
12. 08	0. 1203	0. 23	Q	.	.	.	.	.	.
12. 22	0. 1231	0. 27	.Q	.	.	.	.	.	.
12. 35	0. 1262	0. 28	.Q	.	.	.	.	.	.
12. 49	0. 1293	0. 28	.Q	.	.	.	.	.	.
12. 62	0. 1325	0. 29	.Q	.	.	.	.	.	.
12. 76	0. 1357	0. 29	.Q	.	.	.	.	.	.
12. 89	0. 1390	0. 30	.Q	.	.	.	.	.	.
13. 03	0. 1424	0. 31	.Q	.	.	.	.	.	.
13. 16	0. 1459	0. 32	.Q	.	.	.	.	.	.
13. 30	0. 1495	0. 32	.Q	.	.	.	.	.	.
13. 43	0. 1532	0. 34	.Q	.	.	.	.	.	.
13. 57	0. 1570	0. 35	.Q	.	.	.	.	.	.
13. 70	0. 1610	0. 36	.Q	.	.	.	.	.	.
13. 84	0. 1651	0. 37	.Q	.	.	.	.	.	.
13. 97	0. 1694	0. 39	.Q	.	.	.	.	.	.
14. 11	0. 1738	0. 40	.Q	.	.	.	.	.	.
14. 24	0. 1784	0. 42	.Q	.	.	.	.	.	.
14. 38	0. 1832	0. 44	.Q	.	.	.	.	.	.
14. 51	0. 1883	0. 47	.Q	.	.	.	.	.	.
14. 65	0. 1936	0. 49	.Q	.	.	.	.	.	.
14. 78	0. 1993	0. 53	. Q	.	.	.	.	.	.

					X100EV_G				
14. 92	0. 2053	0. 55	. Q	.	.	.	.	.	.
15. 05	0. 2117	0. 61	. Q	.	.	.	.	.	.
15. 19	0. 2187	0. 64	. Q	.	.	.	.	.	.
15. 32	0. 2264	0. 73	. Q	.	.	.	.	.	.
15. 46	0. 2345	0. 73	. Q	.	.	.	.	.	.
15. 59	0. 2430	0. 80	. Q	.	.	.	.	.	.
15. 73	0. 2526	0. 91	. Q	.	.	.	.	.	.
15. 86	0. 2657	1. 44	. Q	.	.	.	.	.	.
16. 00	0. 2848	1. 98	. Q	.	.	.	.	.	.
16. 14	0. 3283	5. 82	.	.	Q	.	.	.	.
16. 27	0. 3672	1. 14	. Q	.	.	.	.	.	.
16. 41	0. 3775	0. 71	. Q	.	.	.	.	.	.
16. 54	0. 3853	0. 68	. Q	.	.	.	.	.	.
16. 68	0. 3924	0. 58	. Q	.	.	.	.	.	.
16. 81	0. 3984	0. 50	. Q	.	.	.	.	.	.
16. 95	0. 4037	0. 45	. Q	.	.	.	.	.	.
17. 08	0. 4086	0. 41	. Q	.	.	.	.	.	.
17. 22	0. 4130	0. 38	. Q	.	.	.	.	.	.
17. 35	0. 4171	0. 35	. Q	.	.	.	.	.	.
17. 49	0. 4209	0. 33	. Q	.	.	.	.	.	.
17. 62	0. 4245	0. 31	. Q	.	.	.	.	.	.
17. 76	0. 4279	0. 30	. Q	.	.	.	.	.	.
17. 89	0. 4312	0. 28	. Q	.	.	.	.	.	.
18. 03	0. 4343	0. 27	. Q	.	.	.	.	.	.
18. 16	0. 4369	0. 20	Q	.	.	.	.	.	.
18. 30	0. 4391	0. 19	Q	.	.	.	.	.	.
18. 43	0. 4412	0. 18	Q	.	.	.	.	.	.
18. 57	0. 4432	0. 18	Q	.	.	.	.	.	.
18. 70	0. 4452	0. 17	Q	.	.	.	.	.	.
18. 84	0. 4471	0. 17	Q	.	.	.	.	.	.
18. 97	0. 4489	0. 16	Q	.	.	.	.	.	.
19. 11	0. 4507	0. 16	Q	.	.	.	.	.	.
19. 24	0. 4524	0. 15	Q	.	.	.	.	.	.
19. 38	0. 4541	0. 15	Q	.	.	.	.	.	.
19. 51	0. 4557	0. 14	Q	.	.	.	.	.	.
19. 65	0. 4573	0. 14	Q	.	.	.	.	.	.
19. 78	0. 4589	0. 14	Q	.	.	.	.	.	.
19. 92	0. 4604	0. 13	Q	.	.	.	.	.	.
20. 06	0. 4619	0. 13	Q	.	.	.	.	.	.
20. 19	0. 4633	0. 13	Q	.	.	.	.	.	.
20. 33	0. 4648	0. 13	Q	.	.	.	.	.	.
20. 46	0. 4662	0. 12	Q	.	.	.	.	.	.
20. 60	0. 4675	0. 12	Q	.	.	.	.	.	.
20. 73	0. 4689	0. 12	Q	.	.	.	.	.	.
20. 87	0. 4702	0. 12	Q	.	.	.	.	.	.
21. 00	0. 4715	0. 11	Q	.	.	.	.	.	.
21. 14	0. 4727	0. 11	Q	.	.	.	.	.	.
21. 27	0. 4740	0. 11	Q	.	.	.	.	.	.
21. 41	0. 4752	0. 11	Q	.	.	.	.	.	.
21. 54	0. 4764	0. 11	Q	.	.	.	.	.	.
21. 68	0. 4776	0. 11	Q	.	.	.	.	.	.
21. 81	0. 4788	0. 10	Q	.	.	.	.	.	.
21. 95	0. 4799	0. 10	Q	.	.	.	.	.	.
22. 08	0. 4811	0. 10	Q	.	.	.	.	.	.
22. 22	0. 4822	0. 10	Q	.	.	.	.	.	.
22. 35	0. 4833	0. 10	Q	.	.	.	.	.	.
22. 49	0. 4844	0. 10	Q	.	.	.	.	.	.
22. 62	0. 4855	0. 10	Q	.	.	.	.	.	.
22. 76	0. 4865	0. 09	Q	.	.	.	.	.	.
22. 89	0. 4876	0. 09	Q	.	.	.	.	.	.
23. 03	0. 4886	0. 09	Q	.	.	.	.	.	.
23. 16	0. 4896	0. 09	Q	.	.	.	.	.	.
23. 30	0. 4906	0. 09	Q	.	.	.	.	.	.
23. 43	0. 4916	0. 09	Q	.	.	.	.	.	.
23. 57	0. 4926	0. 09	Q	.	.	.	.	.	.
23. 70	0. 4936	0. 09	Q	.	.	.	.	.	.
23. 84	0. 4946	0. 09	Q	.	.	.	.	.	.
23. 97	0. 4955	0. 08	Q	.	.	.	.	.	.
24. 11	0. 4965	0. 08	Q
24. 25	0. 4969	0. 00	Q

Drainage H

SMALL AREA UNIT HYDROGRAPH MODEL

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Ver. 9.0 Release Date: 01/01/2003 License ID 1355

Analysis prepared by:

Fusco Engineering
16795 Von Karman #100, Irvine, CA 92606

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 7.00
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.060
LOW LOSS FRACTION = 0.240
TIME OF CONCENTRATION(MIN.) = 8.31
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.93
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.69

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.07	0.0010	0.33	Q	.	.	.	.
0.21	0.0047	0.33	Q	.	.	.	.
0.35	0.0085	0.33	Q	.	.	.	.
0.49	0.0123	0.33	Q	.	.	.	.
0.63	0.0161	0.33	Q	.	.	.	.
0.76	0.0199	0.33	Q	.	.	.	.
0.90	0.0237	0.34	Q	.	.	.	.
1.04	0.0276	0.34	Q	.	.	.	.
1.18	0.0315	0.34	Q	.	.	.	.
1.32	0.0354	0.34	Q	.	.	.	.
1.46	0.0393	0.35	Q	.	.	.	.
1.60	0.0433	0.35	Q	.	.	.	.
1.73	0.0473	0.35	Q	.	.	.	.
1.87	0.0513	0.35	Q	.	.	.	.
2.01	0.0553	0.35	Q	.	.	.	.
2.15	0.0594	0.36	Q	.	.	.	.
2.29	0.0635	0.36	Q	.	.	.	.
2.43	0.0676	0.36	Q	.	.	.	.
2.57	0.0717	0.36	Q	.	.	.	.
2.70	0.0759	0.36	Q	.	.	.	.
2.84	0.0801	0.37	Q	.	.	.	.
2.98	0.0843	0.37	Q	.	.	.	.
3.12	0.0885	0.37	Q	.	.	.	.
3.26	0.0928	0.37	Q	.	.	.	.
3.40	0.0971	0.38	Q	.	.	.	.
3.53	0.1015	0.38	Q	.	.	.	.
3.67	0.1058	0.38	Q	.	.	.	.
3.81	0.1102	0.39	Q	.	.	.	.
3.95	0.1146	0.39	Q	.	.	.	.
4.09	0.1191	0.39	Q	.	.	.	.
4.23	0.1236	0.39	Q	.	.	.	.

					X100EV_H			
4. 37	0. 1281	0. 40	Q	.	.	.	.	.
4. 50	0. 1327	0. 40	Q	.	.	.	.	.
4. 64	0. 1373	0. 40	Q	.	.	.	.	.
4. 78	0. 1419	0. 41	Q	.	.	.	.	.
4. 92	0. 1466	0. 41	Q	.	.	.	.	.
5. 06	0. 1513	0. 41	Q	.	.	.	.	.
5. 20	0. 1560	0. 42	Q	.	.	.	.	.
5. 34	0. 1608	0. 42	Q	.	.	.	.	.
5. 47	0. 1656	0. 42	Q	.	.	.	.	.
5. 61	0. 1705	0. 43	Q	.	.	.	.	.
5. 75	0. 1754	0. 43	Q	.	.	.	.	.
5. 89	0. 1803	0. 43	Q	.	.	.	.	.
6. 03	0. 1853	0. 44	Q	.	.	.	.	.
6. 17	0. 1904	0. 44	Q	.	.	.	.	.
6. 30	0. 1954	0. 44	Q	.	.	.	.	.
6. 44	0. 2005	0. 45	Q	.	.	.	.	.
6. 58	0. 2057	0. 45	Q	.	.	.	.	.
6. 72	0. 2109	0. 46	Q	.	.	.	.	.
6. 86	0. 2162	0. 46	Q	.	.	.	.	.
7. 00	0. 2215	0. 47	Q	.	.	.	.	.
7. 14	0. 2269	0. 47	Q	.	.	.	.	.
7. 27	0. 2323	0. 48	Q	.	.	.	.	.
7. 41	0. 2378	0. 48	Q	.	.	.	.	.
7. 55	0. 2433	0. 49	Q	.	.	.	.	.
7. 69	0. 2489	0. 49	Q	.	.	.	.	.
7. 83	0. 2545	0. 50	Q	.	.	.	.	.
7. 97	0. 2602	0. 50	Q	.	.	.	.	.
8. 11	0. 2660	0. 51	Q	.	.	.	.	.
8. 24	0. 2718	0. 51	Q	.	.	.	.	.
8. 38	0. 2777	0. 52	Q	.	.	.	.	.
8. 52	0. 2837	0. 52	Q	.	.	.	.	.
8. 66	0. 2897	0. 53	Q	.	.	.	.	.
8. 80	0. 2958	0. 54	Q	.	.	.	.	.
8. 94	0. 3020	0. 54	Q	.	.	.	.	.
9. 07	0. 3082	0. 55	Q	.	.	.	.	.
9. 21	0. 3146	0. 56	Q	.	.	.	.	.
9. 35	0. 3210	0. 56	Q	.	.	.	.	.
9. 49	0. 3275	0. 57	Q	.	.	.	.	.
9. 63	0. 3341	0. 58	Q	.	.	.	.	.
9. 77	0. 3408	0. 59	Q	.	.	.	.	.
9. 91	0. 3475	0. 59	Q	.	.	.	.	.
10. 04	0. 3544	0. 61	Q	.	.	.	.	.
10. 18	0. 3614	0. 61	Q	.	.	.	.	.
10. 32	0. 3684	0. 62	Q	.	.	.	.	.
10. 46	0. 3756	0. 63	Q	.	.	.	.	.
10. 60	0. 3829	0. 64	Q	.	.	.	.	.
10. 74	0. 3903	0. 65	Q	.	.	.	.	.
10. 88	0. 3978	0. 67	Q	.	.	.	.	.
11. 01	0. 4055	0. 67	Q	.	.	.	.	.
11. 15	0. 4133	0. 69	Q	.	.	.	.	.
11. 29	0. 4212	0. 70	Q	.	.	.	.	.
11. 43	0. 4293	0. 71	Q	.	.	.	.	.
11. 57	0. 4375	0. 72	Q	.	.	.	.	.
11. 71	0. 4459	0. 74	Q	.	.	.	.	.
11. 85	0. 4545	0. 75	.Q	.	.	.	.	.
11. 98	0. 4632	0. 77	.Q	.	.	.	.	.
12. 12	0. 4726	0. 87	.Q	.	.	.	.	.
12. 26	0. 4837	1. 07	.Q	.	.	.	.	.
12. 40	0. 4960	1. 08	.Q	.	.	.	.	.
12. 54	0. 5085	1. 11	.Q	.	.	.	.	.
12. 68	0. 5213	1. 12	.Q	.	.	.	.	.
12. 81	0. 5343	1. 16	.Q	.	.	.	.	.
12. 95	0. 5477	1. 17	.Q	.	.	.	.	.
13. 09	0. 5613	1. 21	.Q	.	.	.	.	.
13. 23	0. 5754	1. 24	.Q	.	.	.	.	.
13. 37	0. 5899	1. 30	.Q	.	.	.	.	.
13. 51	0. 6049	1. 33	.Q	.	.	.	.	.
13. 65	0. 6205	1. 39	.Q	.	.	.	.	.
13. 78	0. 6366	1. 43	.Q	.	.	.	.	.
13. 92	0. 6534	1. 51	. Q	.	.	.	.	.
14. 06	0. 6709	1. 55	. Q	.	.	.	.	.
14. 20	0. 6890	1. 62	. Q	.	.	.	.	.
14. 34	0. 7078	1. 67	. Q	.	.	.	.	.
14. 48	0. 7276	1. 79	. Q	.	.	.	.	.
14. 62	0. 7485	1. 86	. Q	.	.	.	.	.
14. 75	0. 7707	2. 02	. Q	.	.	.	.	.
14. 89	0. 7943	2. 11	. Q	.	.	.	.	.
15. 03	0. 8196	2. 32	. Q	.	.	.	.	.
15. 17	0. 8470	2. 46	. Q	.	.	.	.	.

					X100EV_H			
15. 31	0. 8770	2. 79	.	Q	.	.	.	.
15. 45	0. 9095	2. 89	.	Q	.	.	.	.
15. 58	0. 9435	3. 06	.	Q	.	.	.	.
15. 72	0. 9811	3. 50	.	Q	.	.	.	.
15. 86	1. 0326	5. 51	.	Q	.	.	.	.
16. 00	1. 1075	7. 57	.	Q	.	.	.	.
16. 14	1. 2785	22. 30	.	.	.	Q.	.	.
16. 28	1. 4310	4. 34	.	Q	.	.	.	.
16. 42	1. 4715	2. 73	.	Q	.	.	.	.
16. 55	1. 5020	2. 61	.	Q	.	.	.	.
16. 69	1. 5296	2. 21	.	Q	.	.	.	.
16. 83	1. 5533	1. 93	.	Q	.	.	.	.
16. 97	1. 5743	1. 73	.	Q	.	.	.	.
17. 11	1. 5932	1. 58	.	Q	.	.	.	.
17. 25	1. 6106	1. 47	.	Q	.	.	.	.
17. 39	1. 6268	1. 36	.	Q	.	.	.	.
17. 52	1. 6418	1. 27	.	Q	.	.	.	.
17. 66	1. 6559	1. 19	.	Q	.	.	.	.
17. 80	1. 6692	1. 14	.	Q	.	.	.	.
17. 94	1. 6820	1. 09	.	Q	.	.	.	.
18. 08	1. 6943	1. 05	.	Q	.	.	.	.
18. 22	1. 7047	0. 76	.	Q	.	.	.	.
18. 35	1. 7132	0. 73	.	Q	.	.	.	.
18. 49	1. 7215	0. 71	.	Q	.	.	.	.
18. 63	1. 7294	0. 68	.	Q	.	.	.	.
18. 77	1. 7371	0. 66	.	Q	.	.	.	.
18. 91	1. 7445	0. 64	.	Q	.	.	.	.
19. 05	1. 7517	0. 62	.	Q	.	.	.	.
19. 19	1. 7586	0. 60	.	Q	.	.	.	.
19. 32	1. 7654	0. 58	.	Q	.	.	.	.
19. 46	1. 7720	0. 57	.	Q	.	.	.	.
19. 60	1. 7784	0. 55	.	Q	.	.	.	.
19. 74	1. 7847	0. 54	.	Q	.	.	.	.
19. 88	1. 7908	0. 53	.	Q	.	.	.	.
20. 02	1. 7967	0. 52	.	Q	.	.	.	.
20. 16	1. 8026	0. 50	.	Q	.	.	.	.
20. 29	1. 8083	0. 49	.	Q	.	.	.	.
20. 43	1. 8138	0. 48	.	Q	.	.	.	.
20. 57	1. 8193	0. 47	.	Q	.	.	.	.
20. 71	1. 8247	0. 46	.	Q	.	.	.	.
20. 85	1. 8300	0. 46	.	Q	.	.	.	.
20. 99	1. 8351	0. 45	.	Q	.	.	.	.
21. 12	1. 8402	0. 44	.	Q	.	.	.	.
21. 26	1. 8452	0. 43	.	Q	.	.	.	.
21. 40	1. 8501	0. 42	.	Q	.	.	.	.
21. 54	1. 8549	0. 42	.	Q	.	.	.	.
21. 68	1. 8596	0. 41	.	Q	.	.	.	.
21. 82	1. 8643	0. 40	.	Q	.	.	.	.
21. 96	1. 8689	0. 40	.	Q	.	.	.	.
22. 09	1. 8734	0. 39	.	Q	.	.	.	.
22. 23	1. 8779	0. 39	.	Q	.	.	.	.
22. 37	1. 8823	0. 38	.	Q	.	.	.	.
22. 51	1. 8866	0. 38	.	Q	.	.	.	.
22. 65	1. 8909	0. 37	.	Q	.	.	.	.
22. 79	1. 8951	0. 37	.	Q	.	.	.	.
22. 92	1. 8993	0. 36	.	Q	.	.	.	.
23. 06	1. 9034	0. 36	.	Q	.	.	.	.
23. 20	1. 9075	0. 35	.	Q	.	.	.	.
23. 34	1. 9115	0. 35	.	Q	.	.	.	.
23. 48	1. 9154	0. 34	.	Q	.	.	.	.
23. 62	1. 9193	0. 34	.	Q	.	.	.	.
23. 76	1. 9232	0. 34	.	Q	.	.	.	.
23. 89	1. 9270	0. 33	.	Q	.	.	.	.
24. 03	1. 9308	0. 33	.	Q
24. 17	1. 9327	0. 00	.	Q

Drainage I

 SMALL AREA UNIT HYDROGRAPH MODEL
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 1.10
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.060
 LOW LOSS FRACTION = 0.240
 TIME OF CONCENTRATION(MIN.) = 9.62
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.30
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.11

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.13	0.0003	0.05	Q	.	.	.	.
0.29	0.0010	0.05	Q	.	.	.	.
0.45	0.0016	0.05	Q	.	.	.	.
0.61	0.0023	0.05	Q	.	.	.	.
0.77	0.0030	0.05	Q	.	.	.	.
0.93	0.0037	0.05	Q	.	.	.	.
1.09	0.0044	0.05	Q	.	.	.	.
1.25	0.0051	0.05	Q	.	.	.	.
1.41	0.0058	0.05	Q	.	.	.	.
1.57	0.0066	0.05	Q	.	.	.	.
1.73	0.0073	0.05	Q	.	.	.	.
1.89	0.0080	0.06	Q	.	.	.	.
2.05	0.0088	0.06	Q	.	.	.	.
2.21	0.0095	0.06	Q	.	.	.	.
2.37	0.0102	0.06	Q	.	.	.	.
2.53	0.0110	0.06	Q	.	.	.	.
2.69	0.0117	0.06	Q	.	.	.	.
2.85	0.0125	0.06	Q	.	.	.	.
3.01	0.0133	0.06	Q	.	.	.	.
3.17	0.0140	0.06	Q	.	.	.	.
3.33	0.0148	0.06	Q	.	.	.	.
3.49	0.0156	0.06	Q	.	.	.	.
3.65	0.0164	0.06	Q	.	.	.	.
3.81	0.0172	0.06	Q	.	.	.	.
3.98	0.0180	0.06	Q	.	.	.	.
4.14	0.0188	0.06	Q	.	.	.	.
4.30	0.0196	0.06	Q	.	.	.	.
4.46	0.0205	0.06	Q	.	.	.	.
4.62	0.0213	0.06	Q	.	.	.	.
4.78	0.0221	0.06	Q	.	.	.	.
4.94	0.0230	0.06	Q	.	.	.	.

					X100EV_I			
5. 10	0. 0238	0. 06	Q	.	.	.	.	.
5. 26	0. 0247	0. 07	Q	.	.	.	.	.
5. 42	0. 0256	0. 07	Q	.	.	.	.	.
5. 58	0. 0265	0. 07	Q	.	.	.	.	.
5. 74	0. 0274	0. 07	Q	.	.	.	.	.
5. 90	0. 0283	0. 07	Q	.	.	.	.	.
6. 06	0. 0292	0. 07	Q	.	.	.	.	.
6. 22	0. 0301	0. 07	Q	.	.	.	.	.
6. 38	0. 0310	0. 07	Q	.	.	.	.	.
6. 54	0. 0319	0. 07	Q	.	.	.	.	.
6. 70	0. 0329	0. 07	Q	.	.	.	.	.
6. 86	0. 0338	0. 07	Q	.	.	.	.	.
7. 02	0. 0348	0. 07	Q	.	.	.	.	.
7. 18	0. 0358	0. 07	Q	.	.	.	.	.
7. 34	0. 0368	0. 07	Q	.	.	.	.	.
7. 50	0. 0378	0. 08	Q	.	.	.	.	.
7. 66	0. 0388	0. 08	Q	.	.	.	.	.
7. 82	0. 0398	0. 08	Q	.	.	.	.	.
7. 98	0. 0408	0. 08	Q	.	.	.	.	.
8. 14	0. 0419	0. 08	Q	.	.	.	.	.
8. 30	0. 0430	0. 08	Q	.	.	.	.	.
8. 46	0. 0440	0. 08	Q	.	.	.	.	.
8. 62	0. 0451	0. 08	Q	.	.	.	.	.
8. 78	0. 0462	0. 08	Q	.	.	.	.	.
8. 95	0. 0474	0. 09	Q	.	.	.	.	.
9. 11	0. 0485	0. 09	Q	.	.	.	.	.
9. 27	0. 0496	0. 09	Q	.	.	.	.	.
9. 43	0. 0508	0. 09	Q	.	.	.	.	.
9. 59	0. 0520	0. 09	Q	.	.	.	.	.
9. 75	0. 0532	0. 09	Q	.	.	.	.	.
9. 91	0. 0544	0. 09	Q	.	.	.	.	.
10. 07	0. 0557	0. 10	Q	.	.	.	.	.
10. 23	0. 0570	0. 10	Q	.	.	.	.	.
10. 39	0. 0583	0. 10	Q	.	.	.	.	.
10. 55	0. 0596	0. 10	Q	.	.	.	.	.
10. 71	0. 0609	0. 10	Q	.	.	.	.	.
10. 87	0. 0623	0. 10	Q	.	.	.	.	.
11. 03	0. 0637	0. 11	Q	.	.	.	.	.
11. 19	0. 0651	0. 11	Q	.	.	.	.	.
11. 35	0. 0665	0. 11	Q	.	.	.	.	.
11. 51	0. 0680	0. 11	Q	.	.	.	.	.
11. 67	0. 0695	0. 12	Q	.	.	.	.	.
11. 83	0. 0711	0. 12	Q	.	.	.	.	.
11. 99	0. 0727	0. 12	Q	.	.	.	.	.
12. 15	0. 0744	0. 14	Q	.	.	.	.	.
12. 31	0. 0764	0. 17	Q	.	.	.	.	.
12. 47	0. 0787	0. 17	Q	.	.	.	.	.
12. 63	0. 0810	0. 18	Q	.	.	.	.	.
12. 79	0. 0833	0. 18	Q	.	.	.	.	.
12. 95	0. 0858	0. 19	Q	.	.	.	.	.
13. 11	0. 0882	0. 19	Q	.	.	.	.	.
13. 27	0. 0908	0. 20	Q	.	.	.	.	.
13. 43	0. 0935	0. 20	Q	.	.	.	.	.
13. 60	0. 0962	0. 21	Q	.	.	.	.	.
13. 76	0. 0991	0. 22	Q	.	.	.	.	.
13. 92	0. 1022	0. 24	Q	.	.	.	.	.
14. 08	0. 1053	0. 24	Q	.	.	.	.	.
14. 24	0. 1086	0. 26	.Q	.	.	.	.	.
14. 40	0. 1121	0. 27	.Q	.	.	.	.	.
14. 56	0. 1158	0. 29	.Q	.	.	.	.	.
14. 72	0. 1197	0. 30	.Q	.	.	.	.	.
14. 88	0. 1239	0. 33	.Q	.	.	.	.	.
15. 04	0. 1284	0. 35	.Q	.	.	.	.	.
15. 20	0. 1335	0. 40	.Q	.	.	.	.	.
15. 36	0. 1390	0. 43	.Q	.	.	.	.	.
15. 52	0. 1447	0. 44	.Q	.	.	.	.	.
15. 68	0. 1509	0. 50	.Q	.	.	.	.	.
15. 84	0. 1595	0. 79	.Q	.	.	.	.	.
16. 00	0. 1720	1. 09	.Q	.	.	.	.	.
16. 16	0. 2005	3. 22	.	Q	.	.	.	.
16. 32	0. 2258	0. 60	.Q	.	.	.	.	.
16. 48	0. 2328	0. 45	.Q	.	.	.	.	.
16. 64	0. 2382	0. 38	.Q	.	.	.	.	.
16. 80	0. 2428	0. 32	.Q	.	.	.	.	.
16. 96	0. 2468	0. 28	.Q	.	.	.	.	.
17. 12	0. 2502	0. 25	Q	.	.	.	.	.
17. 28	0. 2534	0. 23	Q	.	.	.	.	.
17. 44	0. 2563	0. 21	Q	.	.	.	.	.
17. 60	0. 2590	0. 19	Q	.	.	.	.	.

				X100EV_I			
17.76	0.2614	0.18	Q	.	.	.	.
17.92	0.2638	0.17	Q	.	.	.	.
18.08	0.2660	0.17	Q	.	.	.	.
18.24	0.2679	0.12	Q	.	.	.	.
18.41	0.2695	0.11	Q	.	.	.	.
18.57	0.2710	0.11	Q	.	.	.	.
18.73	0.2724	0.10	Q	.	.	.	.
18.89	0.2738	0.10	Q	.	.	.	.
19.05	0.2751	0.10	Q	.	.	.	.
19.21	0.2763	0.09	Q	.	.	.	.
19.37	0.2776	0.09	Q	.	.	.	.
19.53	0.2788	0.09	Q	.	.	.	.
19.69	0.2799	0.09	Q	.	.	.	.
19.85	0.2810	0.08	Q	.	.	.	.
20.01	0.2821	0.08	Q	.	.	.	.
20.17	0.2832	0.08	Q	.	.	.	.
20.33	0.2842	0.08	Q	.	.	.	.
20.49	0.2852	0.08	Q	.	.	.	.
20.65	0.2862	0.07	Q	.	.	.	.
20.81	0.2872	0.07	Q	.	.	.	.
20.97	0.2881	0.07	Q	.	.	.	.
21.13	0.2891	0.07	Q	.	.	.	.
21.29	0.2900	0.07	Q	.	.	.	.
21.45	0.2909	0.07	Q	.	.	.	.
21.61	0.2917	0.07	Q	.	.	.	.
21.77	0.2926	0.06	Q	.	.	.	.
21.93	0.2934	0.06	Q	.	.	.	.
22.09	0.2943	0.06	Q	.	.	.	.
22.25	0.2951	0.06	Q	.	.	.	.
22.41	0.2959	0.06	Q	.	.	.	.
22.57	0.2967	0.06	Q	.	.	.	.
22.73	0.2974	0.06	Q	.	.	.	.
22.89	0.2982	0.06	Q	.	.	.	.
23.05	0.2989	0.06	Q	.	.	.	.
23.22	0.2997	0.06	Q	.	.	.	.
23.38	0.3004	0.05	Q	.	.	.	.
23.54	0.3011	0.05	Q	.	.	.	.
23.70	0.3018	0.05	Q	.	.	.	.
23.86	0.3025	0.05	Q	.	.	.	.
24.02	0.3032	0.05	Q
24.18	0.3036	0.00	Q

Drainage J

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Fusco Engineering
16795 Von Karman #100, Irvine, CA 92606

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 11.00
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.060
LOW LOSS FRACTION = 0.240
TIME OF CONCENTRATION(MIN.) = 13.68
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 3.04
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.07

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.04	0.0000	0.00	Q	.	.	.	.
0.27	0.0049	0.52	Q	.	.	.	.
0.50	0.0146	0.52	Q	.	.	.	.
0.72	0.0244	0.52	Q	.	.	.	.
0.95	0.0343	0.53	Q	.	.	.	.
1.18	0.0443	0.53	Q	.	.	.	.
1.41	0.0545	0.54	Q	.	.	.	.
1.64	0.0647	0.55	Q	.	.	.	.
1.86	0.0750	0.55	Q	.	.	.	.
2.09	0.0854	0.56	Q	.	.	.	.
2.32	0.0959	0.56	Q	.	.	.	.
2.55	0.1065	0.57	Q	.	.	.	.
2.78	0.1173	0.57	Q	.	.	.	.
3.00	0.1282	0.58	Q	.	.	.	.
3.23	0.1391	0.59	Q	.	.	.	.
3.46	0.1503	0.59	Q	.	.	.	.
3.69	0.1615	0.60	Q	.	.	.	.
3.92	0.1729	0.61	Q	.	.	.	.
4.14	0.1844	0.61	Q	.	.	.	.
4.37	0.1960	0.62	Q	.	.	.	.
4.60	0.2078	0.63	Q	.	.	.	.
4.83	0.2197	0.64	Q	.	.	.	.
5.06	0.2318	0.64	Q	.	.	.	.
5.28	0.2441	0.66	Q	.	.	.	.
5.51	0.2565	0.66	Q	.	.	.	.
5.74	0.2690	0.67	Q	.	.	.	.
5.97	0.2818	0.68	Q	.	.	.	.
6.20	0.2947	0.69	Q	.	.	.	.
6.42	0.3079	0.70	Q	.	.	.	.
6.65	0.3212	0.71	Q	.	.	.	.
6.88	0.3347	0.72	Q	.	.	.	.

					X100EV_J			
7. 11	0. 3485	0. 74	Q	.	.	.	.	.
7. 34	0. 3624	0. 74	Q	.	.	.	.	.
7. 56	0. 3766	0. 76	.Q	.	.	.	.	.
7. 79	0. 3910	0. 77	.Q	.	.	.	.	.
8. 02	0. 4057	0. 79	.Q	.	.	.	.	.
8. 25	0. 4207	0. 80	.Q	.	.	.	.	.
8. 48	0. 4359	0. 82	.Q	.	.	.	.	.
8. 70	0. 4514	0. 83	.Q	.	.	.	.	.
8. 93	0. 4672	0. 85	.Q	.	.	.	.	.
9. 16	0. 4833	0. 86	.Q	.	.	.	.	.
9. 39	0. 4998	0. 89	.Q	.	.	.	.	.
9. 62	0. 5166	0. 90	.Q	.	.	.	.	.
9. 84	0. 5338	0. 93	.Q	.	.	.	.	.
10. 07	0. 5514	0. 94	.Q	.	.	.	.	.
10. 30	0. 5694	0. 97	.Q	.	.	.	.	.
10. 53	0. 5879	0. 99	.Q	.	.	.	.	.
10. 76	0. 6069	1. 02	.Q	.	.	.	.	.
10. 98	0. 6263	1. 04	.Q	.	.	.	.	.
11. 21	0. 6463	1. 08	.Q	.	.	.	.	.
11. 44	0. 6669	1. 10	.Q	.	.	.	.	.
11. 67	0. 6882	1. 15	.Q	.	.	.	.	.
11. 90	0. 7101	1. 18	.Q	.	.	.	.	.
12. 12	0. 7340	1. 36	.Q	.	.	.	.	.
12. 35	0. 7625	1. 67	. Q	.	.	.	.	.
12. 58	0. 7946	1. 74	. Q	.	.	.	.	.
12. 81	0. 8277	1. 78	. Q	.	.	.	.	.
13. 04	0. 8620	1. 87	. Q	.	.	.	.	.
13. 26	0. 8977	1. 92	. Q	.	.	.	.	.
13. 49	0. 9353	2. 07	. Q	.	.	.	.	.
13. 72	0. 9751	2. 15	. Q	.	.	.	.	.
13. 95	1. 0175	2. 34	. Q	.	.	.	.	.
14. 18	1. 0626	2. 45	. Q	.	.	.	.	.
14. 40	1. 1109	2. 68	. Q	.	.	.	.	.
14. 63	1. 1628	2. 84	. Q	.	.	.	.	.
14. 86	1. 2200	3. 24	. Q	.	.	.	.	.
15. 09	1. 2835	3. 50	. Q	.	.	.	.	.
15. 32	1. 3563	4. 22	. Q	.	.	.	.	.
15. 54	1. 4379	4. 44	. Q	.	.	.	.	.
15. 77	1. 5359	5. 96	. Q	.	.	.	.	.
16. 00	1. 6753	8. 83	. Q	.	.	.	.	.
16. 23	2. 0061	26. 28	. Q	.	.	.	.	.
16. 46	2. 2976	4. 67	. Q	.	.	.	.	.
16. 68	2. 3776	3. 82	. Q	.	.	.	.	.
16. 91	2. 4420	3. 02	. Q	.	.	.	.	.
17. 14	2. 4944	2. 54	. Q	.	.	.	.	.
17. 37	2. 5394	2. 24	. Q	.	.	.	.	.
17. 60	2. 5794	1. 99	. Q	.	.	.	.	.
17. 82	2. 6153	1. 82	. Q	.	.	.	.	.
18. 05	2. 6485	1. 70	. Q	.	.	.	.	.
18. 28	2. 6758	1. 20	. Q	.	.	.	.	.
18. 51	2. 6978	1. 13	. Q	.	.	.	.	.
18. 74	2. 7184	1. 06	. Q	.	.	.	.	.
18. 96	2. 7379	1. 01	. Q	.	.	.	.	.
19. 19	2. 7563	0. 96	. Q	.	.	.	.	.
19. 42	2. 7740	0. 91	. Q	.	.	.	.	.
19. 65	2. 7908	0. 87	. Q	.	.	.	.	.
19. 88	2. 8069	0. 84	. Q	.	.	.	.	.
20. 10	2. 8224	0. 81	. Q	.	.	.	.	.
20. 33	2. 8374	0. 78	. Q	.	.	.	.	.
20. 56	2. 8518	0. 75	. Q	.	.	.	.	.
20. 79	2. 8658	0. 73	Q	.	.	.	.	.
21. 02	2. 8793	0. 71	Q	.	.	.	.	.
21. 24	2. 8924	0. 69	Q	.	.	.	.	.
21. 47	2. 9052	0. 67	Q	.	.	.	.	.
21. 70	2. 9176	0. 65	Q	.	.	.	.	.
21. 93	2. 9297	0. 63	Q	.	.	.	.	.
22. 16	2. 9415	0. 62	Q	.	.	.	.	.
22. 38	2. 9530	0. 60	Q	.	.	.	.	.
22. 61	2. 9642	0. 59	Q	.	.	.	.	.
22. 84	2. 9752	0. 58	Q	.	.	.	.	.
23. 07	2. 9860	0. 56	Q	.	.	.	.	.
23. 30	2. 9965	0. 55	Q	.	.	.	.	.
23. 52	3. 0068	0. 54	Q	.	.	.	.	.
23. 75	3. 0169	0. 53	Q	.	.	.	.	.
23. 98	3. 0268	0. 52	Q	.	.	.	.	.
24. 21	3. 0366	0. 51	Q
24. 44	3. 0414	0. 00	Q

X100EV_J

Drainage K

SMALL AREA UNIT HYDROGRAPH MODEL

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Ver. 9.0 Release Date: 01/01/2003 License ID 1355

Analysis prepared by:

Fusco Engineering
16795 Von Karman #100, Irvine, CA 92606

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 6.30
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.060
LOW LOSS FRACTION = 0.240
TIME OF CONCENTRATION(MIN.) = 11.30
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.74
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.62

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.18	0.0023	0.29	Q	.	.	.	.
0.37	0.0069	0.30	Q	.	.	.	.
0.56	0.0115	0.30	Q	.	.	.	.
0.74	0.0162	0.30	Q	.	.	.	.
0.93	0.0209	0.30	Q	.	.	.	.
1.12	0.0256	0.31	Q	.	.	.	.
1.31	0.0304	0.31	Q	.	.	.	.
1.50	0.0352	0.31	Q	.	.	.	.
1.69	0.0400	0.31	Q	.	.	.	.
1.87	0.0449	0.32	Q	.	.	.	.
2.06	0.0499	0.32	Q	.	.	.	.
2.25	0.0548	0.32	Q	.	.	.	.
2.44	0.0599	0.32	Q	.	.	.	.
2.63	0.0649	0.33	Q	.	.	.	.
2.82	0.0700	0.33	Q	.	.	.	.
3.00	0.0752	0.33	Q	.	.	.	.
3.19	0.0804	0.34	Q	.	.	.	.
3.38	0.0856	0.34	Q	.	.	.	.
3.57	0.0909	0.34	Q	.	.	.	.
3.76	0.0963	0.35	Q	.	.	.	.
3.95	0.1017	0.35	Q	.	.	.	.
4.13	0.1071	0.35	Q	.	.	.	.
4.32	0.1126	0.36	Q	.	.	.	.
4.51	0.1182	0.36	Q	.	.	.	.
4.70	0.1238	0.36	Q	.	.	.	.
4.89	0.1295	0.37	Q	.	.	.	.
5.08	0.1353	0.37	Q	.	.	.	.
5.26	0.1411	0.38	Q	.	.	.	.
5.45	0.1469	0.38	Q	.	.	.	.
5.64	0.1529	0.38	Q	.	.	.	.
5.83	0.1589	0.39	Q	.	.	.	.

					X100EV_K				
6.02	0.1649	0.39	Q	.	.	.	.	.	.
6.21	0.1711	0.40	Q	.	.	.	.	.	.
6.39	0.1773	0.40	Q	.	.	.	.	.	.
6.58	0.1836	0.41	Q	.	.	.	.	.	.
6.77	0.1900	0.41	Q	.	.	.	.	.	.
6.96	0.1964	0.42	Q	.	.	.	.	.	.
7.15	0.2030	0.42	Q	.	.	.	.	.	.
7.34	0.2096	0.43	Q	.	.	.	.	.	.
7.53	0.2163	0.44	Q	.	.	.	.	.	.
7.71	0.2231	0.44	Q	.	.	.	.	.	.
7.90	0.2300	0.45	Q	.	.	.	.	.	.
8.09	0.2371	0.45	Q	.	.	.	.	.	.
8.28	0.2442	0.46	Q	.	.	.	.	.	.
8.47	0.2514	0.47	Q	.	.	.	.	.	.
8.65	0.2587	0.48	Q	.	.	.	.	.	.
8.84	0.2662	0.48	Q	.	.	.	.	.	.
9.03	0.2738	0.49	Q	.	.	.	.	.	.
9.22	0.2815	0.50	Q	.	.	.	.	.	.
9.41	0.2893	0.51	.Q	.	.	.	.	.	.
9.60	0.2973	0.52	.Q	.	.	.	.	.	.
9.78	0.3054	0.53	.Q	.	.	.	.	.	.
9.97	0.3137	0.54	.Q	.	.	.	.	.	.
10.16	0.3222	0.55	.Q	.	.	.	.	.	.
10.35	0.3308	0.56	.Q	.	.	.	.	.	.
10.54	0.3396	0.57	.Q	.	.	.	.	.	.
10.73	0.3486	0.58	.Q	.	.	.	.	.	.
10.91	0.3578	0.60	.Q	.	.	.	.	.	.
11.10	0.3672	0.61	.Q	.	.	.	.	.	.
11.29	0.3768	0.63	.Q	.	.	.	.	.	.
11.48	0.3867	0.64	.Q	.	.	.	.	.	.
11.67	0.3968	0.66	.Q	.	.	.	.	.	.
11.86	0.4072	0.67	.Q	.	.	.	.	.	.
12.05	0.4179	0.70	.Q	.	.	.	.	.	.
12.23	0.4304	0.91	.Q	.	.	.	.	.	.
12.42	0.4451	0.98	.Q	.	.	.	.	.	.
12.61	0.4605	0.99	.Q	.	.	.	.	.	.
12.80	0.4762	1.03	.Q	.	.	.	.	.	.
12.99	0.4925	1.05	.Q	.	.	.	.	.	.
13.18	0.5093	1.11	.Q	.	.	.	.	.	.
13.36	0.5267	1.14	.Q	.	.	.	.	.	.
13.55	0.5450	1.21	.Q	.	.	.	.	.	.
13.74	0.5642	1.25	.Q	.	.	.	.	.	.
13.93	0.5844	1.34	.Q	.	.	.	.	.	.
14.12	0.6057	1.40	.Q	.	.	.	.	.	.
14.30	0.6282	1.49	.Q	.	.	.	.	.	.
14.49	0.6520	1.56	.Q	.	.	.	.	.	.
14.68	0.6776	1.73	.Q	.	.	.	.	.	.
14.87	0.7054	1.83	.Q	.	.	.	.	.	.
15.06	0.7359	2.09	.Q	.	.	.	.	.	.
15.25	0.7696	2.25	.Q	.	.	.	.	.	.
15.43	0.8071	2.56	.Q	.	.	.	.	.	.
15.62	0.8469	2.56	.Q	.	.	.	.	.	.
15.81	0.8981	4.01	.	Q	.	.	.	.	.
16.00	0.9734	5.67	.	.Q	.	.	.	.	.
16.19	1.1484	16.81	.	.	Q	.	.	.	.
16.38	1.3029	3.04	.	Q	.	.	.	.	.
16.57	1.3456	2.45	.Q	.	.	.	.	.	.
16.75	1.3799	1.95	.Q	.	.	.	.	.	.
16.94	1.4078	1.64	.Q	.	.	.	.	.	.
17.13	1.4317	1.43	.Q	.	.	.	.	.	.
17.32	1.4530	1.30	.Q	.	.	.	.	.	.
17.51	1.4722	1.17	.Q	.	.	.	.	.	.
17.69	1.4897	1.08	.Q	.	.	.	.	.	.
17.88	1.5060	1.01	.Q	.	.	.	.	.	.
18.07	1.5213	0.96	.Q	.	.	.	.	.	.
18.26	1.5341	0.69	.Q	.	.	.	.	.	.
18.45	1.5445	0.65	.Q	.	.	.	.	.	.
18.64	1.5544	0.62	.Q	.	.	.	.	.	.
18.83	1.5638	0.59	.Q	.	.	.	.	.	.
19.01	1.5728	0.57	.Q	.	.	.	.	.	.
19.20	1.5814	0.54	.Q	.	.	.	.	.	.
19.39	1.5897	0.52	.Q	.	.	.	.	.	.
19.58	1.5977	0.50	.Q	.	.	.	.	.	.
19.77	1.6054	0.49	Q	.	.	.	.	.	.
19.95	1.6129	0.47	Q	.	.	.	.	.	.
20.14	1.6201	0.46	Q	.	.	.	.	.	.
20.33	1.6271	0.44	Q	.	.	.	.	.	.
20.52	1.6339	0.43	Q	.	.	.	.	.	.
20.71	1.6405	0.42	Q	.	.	.	.	.	.

				X100EV_K			
20.90	1.6470	0.41	Q	.	.	.	.
21.08	1.6533	0.40	Q	.	.	.	.
21.27	1.6594	0.39	Q	.	.	.	.
21.46	1.6655	0.38	Q	.	.	.	.
21.65	1.6713	0.37	Q	.	.	.	.
21.84	1.6771	0.37	Q	.	.	.	.
22.03	1.6827	0.36	Q	.	.	.	.
22.22	1.6882	0.35	Q	.	.	.	.
22.40	1.6936	0.34	Q	.	.	.	.
22.59	1.6989	0.34	Q	.	.	.	.
22.78	1.7041	0.33	Q	.	.	.	.
22.97	1.7092	0.33	Q	.	.	.	.
23.16	1.7142	0.32	Q	.	.	.	.
23.34	1.7192	0.31	Q	.	.	.	.
23.53	1.7240	0.31	Q	.	.	.	.
23.72	1.7288	0.30	Q	.	.	.	.
23.91	1.7335	0.30	Q	.	.	.	.
24.10	1.7381	0.29	Q	.	.	.	.
24.29	1.7404	0.00	Q

iii. EV 2-Year Storm Event

Drainage A

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 349.60
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.380
LOW LOSS FRACTION = 0.540
TIME OF CONCENTRATION(MIN.) = 37.45
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 2
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 17.29
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 24.66

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	20.0	40.0	60.0	80.0
0.40	0.0542	3.31	.Q	.	.	.	.
1.02	0.2262	3.35	.Q	.	.	.	.
1.64	0.4022	3.47	.Q	.	.	.	.
2.27	0.5828	3.53	.Q	.	.	.	.
2.89	0.7684	3.67	.Q	.	.	.	.
3.52	0.9593	3.74	.Q	.	.	.	.
4.14	1.1561	3.89	.Q	.	.	.	.
4.76	1.3590	3.98	.Q	.	.	.	.
5.39	1.5688	4.16	. Q	.	.	.	.
6.01	1.7860	4.26	. Q	.	.	.	.
6.64	2.0114	4.48	. Q	.	.	.	.
7.26	2.2457	4.60	. Q	.	.	.	.
7.89	2.4902	4.88	. Q	.	.	.	.
8.51	2.7458	5.03	. Q	.	.	.	.
9.13	3.0143	5.38	. Q	.	.	.	.
9.76	3.2969	5.58	. Q	.	.	.	.
10.38	3.5967	6.04	. Q	.	.	.	.
11.01	3.9156	6.32	. Q	.	.	.	.
11.63	4.2586	6.98	. Q	.	.	.	.

12.26	4.6291	7.38	.	Q	.	.	.	.
12.88	5.0771	9.99	.	Q	.	.	.	.
13.50	5.6104	10.69	.	Q	.	.	.	.
14.13	6.2128	12.67	.	Q	.	.	.	.
14.75	6.9133	14.49	.	Q	.	.	.	.
15.38	7.8026	19.99	.	Q.	.	.	.	.
16.00	8.9432	24.24	.	.	Q	.	.	.
16.62	11.3992	70.98	.	.	.	.	Q	.
17.25	13.6601	16.67	.	Q	.	.	.	.
17.87	14.3883	11.56	.	Q	.	.	.	.
18.50	14.9136	8.80	.	Q	.	.	.	.
19.12	15.3116	6.63	.	Q	.	.	.	.
19.74	15.6321	5.80	.	Q	.	.	.	.
20.37	15.9158	5.20	.	Q	.	.	.	.
20.99	16.1719	4.73	.	Q	.	.	.	.
21.62	16.4067	4.37	.	Q	.	.	.	.
22.24	16.6242	4.06	.	Q	.	.	.	.
22.87	16.8273	3.81	.	Q	.	.	.	.
23.49	17.0184	3.60	.	Q	.	.	.	.
24.11	17.1992	3.41	.	Q
24.74	17.2871	0.00	Q

Drainage B

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 135.10
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.220
LOW LOSS FRACTION = 0.360
TIME OF CONCENTRATION(MIN.) = 37.48
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 2
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 9.30
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 6.92

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.38	0.0282	1.78	.Q	.	.	.	.
1.01	0.1207	1.80	.Q	.	.	.	.
1.63	0.2154	1.86	.Q	.	.	.	.
2.26	0.3125	1.90	.Q	.	.	.	.
2.88	0.4123	1.97	.Q	.	.	.	.
3.51	0.5150	2.01	. Q	.	.	.	.
4.13	0.6208	2.09	. Q	.	.	.	.
4.76	0.7300	2.14	. Q	.	.	.	.
5.38	0.8428	2.24	. Q	.	.	.	.
6.01	0.9596	2.29	. Q	.	.	.	.
6.63	1.0809	2.41	. Q	.	.	.	.
7.25	1.2069	2.47	. Q	.	.	.	.
7.88	1.3384	2.62	. Q	.	.	.	.
8.50	1.4758	2.70	. Q	.	.	.	.
9.13	1.6202	2.89	. Q	.	.	.	.
9.75	1.7722	3.00	. Q	.	.	.	.
10.38	1.9335	3.25	. Q	.	.	.	.
11.00	2.1050	3.40	. Q	.	.	.	.
11.63	2.2894	3.75	. Q	.	.	.	.

12.25	2.4887	3.97	.	Q	.	.	.	.
12.88	2.7296	5.37	.		Q	.	.	.
13.50	3.0165	5.75	.		Q	.	.	.
14.13	3.3405	6.81	.			Q	.	.
14.75	3.7173	7.79	.				Q	.
15.38	4.1955	10.74	.					Q
16.00	4.8091	13.03	.				Q	.
16.62	6.1300	38.15	.				.	Q
17.25	7.3460	8.96	.			Q	.	.
17.87	7.7377	6.21	.			Q	.	.
18.50	8.0201	4.73	.		Q	.	.	.
19.12	8.2340	3.56	.		Q	.	.	.
19.75	8.4064	3.12	.		Q	.	.	.
20.37	8.5589	2.79	.	Q	.	.	.	.
21.00	8.6967	2.54	.	Q	.	.	.	.
21.62	8.8229	2.35	.	Q	.	.	.	.
22.25	8.9399	2.18	.	Q	.	.	.	.
22.87	9.0492	2.05	.	Q	.	.	.	.
23.50	9.1519	1.93	.	Q	.	.	.	.
24.12	9.2492	1.83	.	Q
24.75	9.2965	0.00	Q

Drainage C

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 63.60
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.600
LOW LOSS FRACTION = 0.670
TIME OF CONCENTRATION(MIN.) = 20.15
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 2
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.25
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 5.38

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.22	0.0039	0.43	Q	.	.	.	.
0.55	0.0159	0.43	Q	.	.	.	.
0.89	0.0280	0.44	Q	.	.	.	.
1.22	0.0404	0.45	Q	.	.	.	.
1.56	0.0529	0.45	Q	.	.	.	.
1.90	0.0656	0.46	Q	.	.	.	.
2.23	0.0785	0.47	Q	.	.	.	.
2.57	0.0915	0.47	Q	.	.	.	.
2.90	0.1048	0.48	Q	.	.	.	.
3.24	0.1182	0.49	Q	.	.	.	.
3.57	0.1319	0.50	Q	.	.	.	.
3.91	0.1459	0.50	.Q	.	.	.	.
4.25	0.1600	0.52	.Q	.	.	.	.
4.58	0.1744	0.52	.Q	.	.	.	.
4.92	0.1891	0.53	.Q	.	.	.	.
5.25	0.2040	0.54	.Q	.	.	.	.
5.59	0.2192	0.56	.Q	.	.	.	.
5.93	0.2347	0.56	.Q	.	.	.	.
6.26	0.2505	0.58	.Q	.	.	.	.

6.60	0.2667	0.59	.Q	.	.	.	.
6.93	0.2832	0.60	.Q	.	.	.	.
7.27	0.3001	0.61	.Q	.	.	.	.
7.60	0.3174	0.63	.Q	.	.	.	.
7.94	0.3351	0.64	.Q	.	.	.	.
8.28	0.3532	0.66	.Q	.	.	.	.
8.61	0.3718	0.68	.Q	.	.	.	.
8.95	0.3910	0.70	.Q	.	.	.	.
9.28	0.4106	0.72	.Q	.	.	.	.
9.62	0.4309	0.75	.Q	.	.	.	.
9.95	0.4519	0.76	.Q	.	.	.	.
10.29	0.4735	0.80	.Q	.	.	.	.
10.63	0.4959	0.82	.Q	.	.	.	.
10.96	0.5191	0.86	.Q	.	.	.	.
11.30	0.5433	0.88	.Q	.	.	.	.
11.63	0.5685	0.93	.Q	.	.	.	.
11.97	0.5948	0.96	.Q	.	.	.	.
12.31	0.6249	1.21	. Q	.	.	.	.
12.64	0.6593	1.27	. Q	.	.	.	.
12.98	0.6959	1.37	. Q	.	.	.	.
13.31	0.7346	1.42	. Q	.	.	.	.
13.65	0.7758	1.55	. Q	.	.	.	.
13.98	0.8198	1.63	. Q	.	.	.	.
14.32	0.8685	1.88	. Q	.	.	.	.
14.66	0.9226	2.01	. Q	.	.	.	.
14.99	0.9835	2.37	. Q	.	.	.	.
15.33	1.0531	2.64	. Q	.	.	.	.
15.66	1.1335	3.15	. Q	.	.	.	.
16.00	1.2390	4.45	. Q	.	.	.	.
16.34	1.4851	13.28	.	.	Q	.	.
16.67	1.7113	3.02	. Q	.	.	.	.
17.01	1.7834	2.17	. Q	.	.	.	.
17.34	1.8375	1.72	. Q	.	.	.	.
17.68	1.8818	1.48	. Q	.	.	.	.
18.02	1.9207	1.32	. Q	.	.	.	.
18.35	1.9527	1.00	.Q	.	.	.	.
18.69	1.9792	0.91	.Q	.	.	.	.
19.02	2.0034	0.84	.Q	.	.	.	.
19.36	2.0258	0.78	.Q	.	.	.	.
19.69	2.0467	0.73	.Q	.	.	.	.
20.03	2.0664	0.69	.Q	.	.	.	.
20.37	2.0851	0.65	.Q	.	.	.	.
20.70	2.1028	0.62	.Q	.	.	.	.
21.04	2.1197	0.59	.Q	.	.	.	.
21.37	2.1358	0.57	.Q	.	.	.	.
21.71	2.1513	0.55	.Q	.	.	.	.
22.05	2.1663	0.53	.Q	.	.	.	.
22.38	2.1807	0.51	.Q	.	.	.	.
22.72	2.1946	0.49	Q	.	.	.	.
23.05	2.2081	0.48	Q	.	.	.	.
23.39	2.2211	0.46	Q	.	.	.	.
23.72	2.2338	0.45	Q	.	.	.	.
24.06	2.2462	0.44	Q	.	.	.	.
24.40	2.2523	0.00	Q	.	.	.	.

Drainage D

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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 Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 14.29
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.410
 LOW LOSS FRACTION = 0.580
 TIME OF CONCENTRATION(MIN.) = 12.72
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 USER SPECIFIED RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 2
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
 3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
 6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
 24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.67
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.04

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.10	0.0005	0.12 Q	.	.	.	.	.
0.31	0.0027	0.12 Q	.	.	.	.	.
0.52	0.0049	0.13 Q	.	.	.	.	.
0.74	0.0071	0.13 Q	.	.	.	.	.
0.95	0.0093	0.13 Q	.	.	.	.	.
1.16	0.0115	0.13 Q	.	.	.	.	.
1.37	0.0138	0.13 Q	.	.	.	.	.
1.58	0.0160	0.13 Q	.	.	.	.	.
1.80	0.0183	0.13 Q	.	.	.	.	.
2.01	0.0207	0.13 Q	.	.	.	.	.
2.22	0.0230	0.13 Q	.	.	.	.	.
2.43	0.0254	0.14 Q	.	.	.	.	.
2.64	0.0277	0.14 Q	.	.	.	.	.
2.86	0.0301	0.14 Q	.	.	.	.	.
3.07	0.0326	0.14 Q	.	.	.	.	.
3.28	0.0350	0.14 Q	.	.	.	.	.
3.49	0.0375	0.14 Q	.	.	.	.	.
3.70	0.0400	0.14 Q	.	.	.	.	.
3.92	0.0426	0.15 Q	.	.	.	.	.
4.13	0.0451	0.15 Q	.	.	.	.	.
4.34	0.0477	0.15 Q	.	.	.	.	.
4.55	0.0503	0.15 Q	.	.	.	.	.
4.76	0.0530	0.15 Q	.	.	.	.	.
4.98	0.0556	0.15 Q	.	.	.	.	.
5.19	0.0584	0.16 Q	.	.	.	.	.
5.40	0.0611	0.16 Q	.	.	.	.	.
5.61	0.0639	0.16 Q	.	.	.	.	.
5.82	0.0667	0.16 Q	.	.	.	.	.
6.04	0.0695	0.16 Q	.	.	.	.	.
6.25	0.0724	0.17 Q	.	.	.	.	.

				X002_D		
6. 46	0. 0753	0. 17	Q	.	.	.
6. 67	0. 0783	0. 17	Q	.	.	.
6. 88	0. 0813	0. 17	Q	.	.	.
7. 10	0. 0843	0. 17	Q	.	.	.
7. 31	0. 0874	0. 18	Q	.	.	.
7. 52	0. 0906	0. 18	Q	.	.	.
7. 73	0. 0938	0. 18	Q	.	.	.
7. 94	0. 0970	0. 19	Q	.	.	.
8. 16	0. 1003	0. 19	Q	.	.	.
8. 37	0. 1036	0. 19	Q	.	.	.
8. 58	0. 1070	0. 20	Q	.	.	.
8. 79	0. 1105	0. 20	Q	.	.	.
9. 00	0. 1140	0. 20	Q	.	.	.
9. 22	0. 1176	0. 21	Q	.	.	.
9. 43	0. 1212	0. 21	Q	.	.	.
9. 64	0. 1249	0. 21	Q	.	.	.
9. 85	0. 1287	0. 22	Q	.	.	.
10. 06	0. 1326	0. 22	Q	.	.	.
10. 28	0. 1366	0. 23	Q	.	.	.
10. 49	0. 1406	0. 23	Q	.	.	.
10. 70	0. 1448	0. 24	Q	.	.	.
10. 91	0. 1490	0. 24	Q	.	.	.
11. 12	0. 1534	0. 25	.Q	.	.	.
11. 34	0. 1579	0. 26	.Q	.	.	.
11. 55	0. 1625	0. 27	.Q	.	.	.
11. 76	0. 1672	0. 27	.Q	.	.	.
11. 97	0. 1721	0. 28	.Q	.	.	.
12. 18	0. 1772	0. 31	.Q	.	.	.
12. 40	0. 1831	0. 36	.Q	.	.	.
12. 61	0. 1895	0. 37	.Q	.	.	.
12. 82	0. 1961	0. 39	.Q	.	.	.
13. 03	0. 2029	0. 39	.Q	.	.	.
13. 24	0. 2100	0. 42	.Q	.	.	.
13. 46	0. 2174	0. 43	.Q	.	.	.
13. 67	0. 2251	0. 45	.Q	.	.	.
13. 88	0. 2332	0. 47	.Q	.	.	.
14. 09	0. 2417	0. 50	. Q	.	.	.
14. 30	0. 2508	0. 54	. Q	.	.	.
14. 52	0. 2606	0. 59	. Q	.	.	.
14. 73	0. 2711	0. 61	. Q	.	.	.
14. 94	0. 2826	0. 69	. Q	.	.	.
15. 15	0. 2950	0. 73	. Q	.	.	.
15. 36	0. 3090	0. 87	. Q	.	.	.
15. 58	0. 3242	0. 87	. Q	.	.	.
15. 79	0. 3424	1. 21	. Q	.	.	.
16. 00	0. 3680	1. 71	. Q	.	.	.
16. 21	0. 4398	6. 49	. Q	.	.	.
16. 42	0. 5051	0. 96	. Q	.	.	.
16. 64	0. 5205	0. 79	. Q	.	.	.
16. 85	0. 5331	0. 65	. Q	.	.	.
17. 06	0. 5437	0. 56	. Q	.	.	.
17. 27	0. 5529	0. 48	.Q	.	.	.
17. 48	0. 5609	0. 44	.Q	.	.	.
17. 70	0. 5683	0. 40	.Q	.	.	.
17. 91	0. 5752	0. 38	.Q	.	.	.
18. 12	0. 5816	0. 35	.Q	.	.	.
18. 33	0. 5871	0. 28	.Q	.	.	.
18. 54	0. 5918	0. 26	.Q	.	.	.
18. 76	0. 5963	0. 25	Q	.	.	.
18. 97	0. 6006	0. 24	Q	.	.	.
19. 18	0. 6046	0. 23	Q	.	.	.
19. 39	0. 6085	0. 22	Q	.	.	.
19. 60	0. 6122	0. 21	Q	.	.	.
19. 82	0. 6158	0. 20	Q	.	.	.
20. 03	0. 6193	0. 19	Q	.	.	.
20. 24	0. 6226	0. 19	Q	.	.	.
20. 45	0. 6258	0. 18	Q	.	.	.
20. 66	0. 6290	0. 18	Q	.	.	.
20. 88	0. 6320	0. 17	Q	.	.	.
21. 09	0. 6350	0. 17	Q	.	.	.
21. 30	0. 6379	0. 16	Q	.	.	.
21. 51	0. 6407	0. 16	Q	.	.	.
21. 72	0. 6434	0. 15	Q	.	.	.
21. 94	0. 6461	0. 15	Q	.	.	.
22. 15	0. 6487	0. 15	Q	.	.	.
22. 36	0. 6513	0. 14	Q	.	.	.
22. 57	0. 6538	0. 14	Q	.	.	.
22. 78	0. 6562	0. 14	Q	.	.	.
23. 00	0. 6587	0. 14	Q	.	.	.

					X002_D		
23.21	0.6610	0.13	Q	.	.	.	.
23.42	0.6633	0.13	Q	.	.	.	.
23.63	0.6656	0.13	Q	.	.	.	.
23.84	0.6678	0.13	Q	.	.	.	.
24.06	0.6700	0.12	Q	.	.	.	.
24.27	0.6711	0.00	Q	.	.	.	.

Drainage E

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
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 Ver. 9.0 Release Date: 01/01/2003 License ID 1355

Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 97.20
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.180
 LOW LOSS FRACTION = 0.350
 TIME OF CONCENTRATION(MIN.) = 34.68
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 USER SPECIFIED RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 2
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
 3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
 6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
 24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 6.79
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 4.88

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.39	0.0212	1.30	.Q	.	.	.	.
0.97	0.0838	1.32	.Q	.	.	.	.
1.55	0.1477	1.36	.Q	.	.	.	.
2.13	0.2132	1.38	.Q	.	.	.	.
2.71	0.2804	1.43	.Q	.	.	.	.
3.28	0.3493	1.46	.Q	.	.	.	.
3.86	0.4201	1.51	.Q	.	.	.	.
4.44	0.4929	1.54	.Q	.	.	.	.
5.02	0.5680	1.60	.Q	.	.	.	.
5.60	0.6454	1.64	.Q	.	.	.	.
6.17	0.7255	1.71	.Q	.	.	.	.
6.75	0.8084	1.76	.Q	.	.	.	.
7.33	0.8944	1.85	.Q	.	.	.	.
7.91	0.9838	1.90	.Q	.	.	.	.
8.49	1.0771	2.01	.Q	.	.	.	.
9.06	1.1746	2.07	.Q	.	.	.	.
9.64	1.2770	2.22	.Q	.	.	.	.
10.22	1.3849	2.30	.Q	.	.	.	.
10.80	1.4993	2.49	.Q	.	.	.	.
11.38	1.6209	2.60	.Q	.	.	.	.
11.95	1.7518	2.88	.Q	.	.	.	.
12.53	1.8987	3.27	.Q	.	.	.	.
13.11	2.0745	4.09	.Q	.	.	.	.
13.69	2.2769	4.38	.Q	.	.	.	.
14.27	2.5062	5.22	.Q	.	.	.	.
14.84	2.7734	5.97	.Q	.	.	.	.
15.42	3.1112	8.18	.Q	.	.	.	.
16.00	3.5398	9.77	.	.Q	.	.	.
16.58	4.4705	29.20	.	.	.	.	.Q
17.16	5.3308	6.82	.Q	.	.	.	.

					X002_E			
17.73	5.6069	4.74	.	Q	.	.	.	.
18.31	5.8120	3.85	.	Q	.	.	.	.
18.89	5.9692	2.73	.	Q	.	.	.	.
19.47	6.0915	2.39	.	Q	.	.	.	.
20.05	6.1997	2.14	.	Q	.	.	.	.
20.62	6.2974	1.95	.	Q	.	.	.	.
21.20	6.3870	1.80	.	Q	.	.	.	.
21.78	6.4700	1.67	.	Q	.	.	.	.
22.36	6.5475	1.57	.	Q	.	.	.	.
22.94	6.6204	1.48	.	Q	.	.	.	.
23.51	6.6894	1.41	.	Q	.	.	.	.
24.09	6.7549	1.34	.	Q	.	.	.	.
24.67	6.7869	0.00	Q	.	.	.	.	.

Drainage F

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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 Ver. 9.0 Release Date: 01/01/2003 License ID 1355

Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 5.80
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
 LOW LOSS FRACTION = 0.260
 TIME OF CONCENTRATION(MIN.) = 7.97
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 USER SPECIFIED RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 2
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
 3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
 6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
 24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.47
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.23

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.06	0.0000	0.00	Q	.	.	.	.
0.19	0.0005	0.09	Q	.	.	.	.
0.33	0.0015	0.09	Q	.	.	.	.
0.46	0.0024	0.09	Q	.	.	.	.
0.59	0.0034	0.09	Q	.	.	.	.
0.72	0.0044	0.09	Q	.	.	.	.
0.86	0.0054	0.09	Q	.	.	.	.
0.99	0.0064	0.09	Q	.	.	.	.
1.12	0.0074	0.09	Q	.	.	.	.
1.26	0.0084	0.09	Q	.	.	.	.
1.39	0.0094	0.09	Q	.	.	.	.
1.52	0.0105	0.09	Q	.	.	.	.
1.65	0.0115	0.09	Q	.	.	.	.
1.79	0.0125	0.09	Q	.	.	.	.
1.92	0.0136	0.09	Q	.	.	.	.
2.05	0.0146	0.10	Q	.	.	.	.
2.19	0.0157	0.10	Q	.	.	.	.
2.32	0.0167	0.10	Q	.	.	.	.
2.45	0.0178	0.10	Q	.	.	.	.
2.58	0.0188	0.10	Q	.	.	.	.
2.72	0.0199	0.10	Q	.	.	.	.
2.85	0.0210	0.10	Q	.	.	.	.
2.98	0.0221	0.10	Q	.	.	.	.
3.12	0.0232	0.10	Q	.	.	.	.
3.25	0.0243	0.10	Q	.	.	.	.
3.38	0.0254	0.10	Q	.	.	.	.
3.51	0.0265	0.10	Q	.	.	.	.
3.65	0.0277	0.10	Q	.	.	.	.
3.78	0.0288	0.10	Q	.	.	.	.
3.91	0.0299	0.10	Q	.	.	.	.

				X002_F			
4. 05	0. 0311	0. 10	Q	.	.	.	.
4. 18	0. 0322	0. 11	Q	.	.	.	.
4. 31	0. 0334	0. 11	Q	.	.	.	.
4. 44	0. 0346	0. 11	Q	.	.	.	.
4. 58	0. 0357	0. 11	Q	.	.	.	.
4. 71	0. 0369	0. 11	Q	.	.	.	.
4. 84	0. 0381	0. 11	Q	.	.	.	.
4. 97	0. 0393	0. 11	Q	.	.	.	.
5. 11	0. 0406	0. 11	Q	.	.	.	.
5. 24	0. 0418	0. 11	Q	.	.	.	.
5. 37	0. 0430	0. 11	Q	.	.	.	.
5. 51	0. 0443	0. 11	Q	.	.	.	.
5. 64	0. 0455	0. 11	Q	.	.	.	.
5. 77	0. 0468	0. 12	Q	.	.	.	.
5. 90	0. 0481	0. 12	Q	.	.	.	.
6. 04	0. 0493	0. 12	Q	.	.	.	.
6. 17	0. 0506	0. 12	Q	.	.	.	.
6. 30	0. 0519	0. 12	Q	.	.	.	.
6. 44	0. 0532	0. 12	Q	.	.	.	.
6. 57	0. 0546	0. 12	Q	.	.	.	.
6. 70	0. 0559	0. 12	Q	.	.	.	.
6. 83	0. 0573	0. 12	Q	.	.	.	.
6. 97	0. 0586	0. 12	Q	.	.	.	.
7. 10	0. 0600	0. 13	Q	.	.	.	.
7. 23	0. 0614	0. 13	Q	.	.	.	.
7. 37	0. 0628	0. 13	Q	.	.	.	.
7. 50	0. 0642	0. 13	Q	.	.	.	.
7. 63	0. 0656	0. 13	Q	.	.	.	.
7. 76	0. 0671	0. 13	Q	.	.	.	.
7. 90	0. 0685	0. 13	Q	.	.	.	.
8. 03	0. 0700	0. 13	Q	.	.	.	.
8. 16	0. 0715	0. 14	Q	.	.	.	.
8. 30	0. 0730	0. 14	Q	.	.	.	.
8. 43	0. 0745	0. 14	Q	.	.	.	.
8. 56	0. 0760	0. 14	Q	.	.	.	.
8. 69	0. 0776	0. 14	Q	.	.	.	.
8. 83	0. 0791	0. 14	Q	.	.	.	.
8. 96	0. 0807	0. 15	Q	.	.	.	.
9. 09	0. 0823	0. 15	Q	.	.	.	.
9. 23	0. 0840	0. 15	Q	.	.	.	.
9. 36	0. 0856	0. 15	Q	.	.	.	.
9. 49	0. 0873	0. 15	Q	.	.	.	.
9. 62	0. 0889	0. 15	Q	.	.	.	.
9. 76	0. 0906	0. 16	Q	.	.	.	.
9. 89	0. 0924	0. 16	Q	.	.	.	.
10. 02	0. 0941	0. 16	Q	.	.	.	.
10. 16	0. 0959	0. 16	Q	.	.	.	.
10. 29	0. 0977	0. 17	Q	.	.	.	.
10. 42	0. 0995	0. 17	Q	.	.	.	.
10. 55	0. 1014	0. 17	Q	.	.	.	.
10. 69	0. 1032	0. 17	Q	.	.	.	.
10. 82	0. 1052	0. 18	Q	.	.	.	.
10. 95	0. 1071	0. 18	Q	.	.	.	.
11. 09	0. 1091	0. 18	Q	.	.	.	.
11. 22	0. 1111	0. 18	Q	.	.	.	.
11. 35	0. 1131	0. 19	Q	.	.	.	.
11. 48	0. 1152	0. 19	Q	.	.	.	.
11. 62	0. 1173	0. 19	Q	.	.	.	.
11. 75	0. 1194	0. 20	Q	.	.	.	.
11. 88	0. 1216	0. 20	Q	.	.	.	.
12. 02	0. 1238	0. 20	Q	.	.	.	.
12. 15	0. 1263	0. 25	.Q	.	.	.	.
12. 28	0. 1291	0. 25	.Q	.	.	.	.
12. 41	0. 1319	0. 26	.Q	.	.	.	.
12. 55	0. 1348	0. 26	.Q	.	.	.	.
12. 68	0. 1378	0. 27	.Q	.	.	.	.
12. 81	0. 1408	0. 28	.Q	.	.	.	.
12. 94	0. 1438	0. 28	.Q	.	.	.	.
13. 08	0. 1470	0. 29	.Q	.	.	.	.
13. 21	0. 1502	0. 30	.Q	.	.	.	.
13. 34	0. 1535	0. 30	.Q	.	.	.	.
13. 48	0. 1569	0. 31	.Q	.	.	.	.
13. 61	0. 1604	0. 32	.Q	.	.	.	.
13. 74	0. 1639	0. 33	.Q	.	.	.	.
13. 87	0. 1676	0. 34	.Q	.	.	.	.
14. 01	0. 1715	0. 36	.Q	.	.	.	.
14. 14	0. 1755	0. 37	.Q	.	.	.	.
14. 27	0. 1797	0. 39	.Q	.	.	.	.
14. 41	0. 1840	0. 41	.Q	.	.	.	.

				X002_F		
14. 54	0. 1886	0. 43	. Q	.	.	.
14. 67	0. 1934	0. 44	. Q	.	.	.
14. 80	0. 1985	0. 47	. Q	.	.	.
14. 94	0. 2038	0. 49	. Q	.	.	.
15. 07	0. 2094	0. 54	. Q	.	.	.
15. 20	0. 2155	0. 56	. Q	.	.	.
15. 34	0. 2220	0. 63	. Q	.	.	.
15. 47	0. 2289	0. 62	. Q	.	.	.
15. 60	0. 2361	0. 69	. Q	.	.	.
15. 73	0. 2442	0. 78	. Q	.	.	.
15. 87	0. 2550	1. 18	. Q	.	.	.
16. 00	0. 2702	1. 60	. Q	.	.	.
16. 13	0. 3097	5. 61	.	. Q	.	.
16. 27	0. 3458	0. 96	. Q	.	.	.
16. 40	0. 3545	0. 63	. Q	.	.	.
16. 53	0. 3612	0. 59	. Q	.	.	.
16. 66	0. 3673	0. 51	. Q	.	.	.
16. 80	0. 3726	0. 46	. Q	.	.	.
16. 93	0. 3774	0. 42	. Q	.	.	.
17. 06	0. 3818	0. 39	. Q	.	.	.
17. 20	0. 3858	0. 35	. Q	.	.	.
17. 33	0. 3895	0. 33	. Q	.	.	.
17. 46	0. 3930	0. 31	. Q	.	.	.
17. 59	0. 3963	0. 29	. Q	.	.	.
17. 73	0. 3995	0. 28	. Q	.	.	.
17. 86	0. 4025	0. 27	. Q	.	.	.
17. 99	0. 4054	0. 26	. Q	.	.	.
18. 13	0. 4079	0. 21	Q	.	.	.
18. 26	0. 4102	0. 20	Q	.	.	.
18. 39	0. 4124	0. 19	Q	.	.	.
18. 52	0. 4144	0. 19	Q	.	.	.
18. 66	0. 4164	0. 18	Q	.	.	.
18. 79	0. 4184	0. 17	Q	.	.	.
18. 92	0. 4202	0. 17	Q	.	.	.
19. 06	0. 4221	0. 16	Q	.	.	.
19. 19	0. 4238	0. 16	Q	.	.	.
19. 32	0. 4256	0. 16	Q	.	.	.
19. 45	0. 4272	0. 15	Q	.	.	.
19. 59	0. 4289	0. 15	Q	.	.	.
19. 72	0. 4305	0. 14	Q	.	.	.
19. 85	0. 4321	0. 14	Q	.	.	.
19. 98	0. 4336	0. 14	Q	.	.	.
20. 12	0. 4351	0. 14	Q	.	.	.
20. 25	0. 4366	0. 13	Q	.	.	.
20. 38	0. 4380	0. 13	Q	.	.	.
20. 52	0. 4394	0. 13	Q	.	.	.
20. 65	0. 4408	0. 13	Q	.	.	.
20. 78	0. 4422	0. 12	Q	.	.	.
20. 91	0. 4435	0. 12	Q	.	.	.
21. 05	0. 4448	0. 12	Q	.	.	.
21. 18	0. 4461	0. 12	Q	.	.	.
21. 31	0. 4474	0. 12	Q	.	.	.
21. 45	0. 4486	0. 11	Q	.	.	.
21. 58	0. 4499	0. 11	Q	.	.	.
21. 71	0. 4511	0. 11	Q	.	.	.
21. 84	0. 4523	0. 11	Q	.	.	.
21. 98	0. 4535	0. 11	Q	.	.	.
22. 11	0. 4546	0. 11	Q	.	.	.
22. 24	0. 4558	0. 10	Q	.	.	.
22. 38	0. 4569	0. 10	Q	.	.	.
22. 51	0. 4580	0. 10	Q	.	.	.
22. 64	0. 4591	0. 10	Q	.	.	.
22. 77	0. 4602	0. 10	Q	.	.	.
22. 91	0. 4613	0. 10	Q	.	.	.
23. 04	0. 4624	0. 10	Q	.	.	.
23. 17	0. 4634	0. 10	Q	.	.	.
23. 31	0. 4645	0. 09	Q	.	.	.
23. 44	0. 4655	0. 09	Q	.	.	.
23. 57	0. 4665	0. 09	Q	.	.	.
23. 70	0. 4675	0. 09	Q	.	.	.
23. 84	0. 4685	0. 09	Q	.	.	.
23. 97	0. 4695	0. 09	Q	.	.	.
24. 10	0. 4705	0. 09	Q	.	.	.
24. 24	0. 4709	0. 00	Q	.	.	.

Drainage G

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
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Analysis prepared by:

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 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 1.80
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
 LOW LOSS FRACTION = 0.260
 TIME OF CONCENTRATION(MIN.) = 8.11
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 USER SPECIFIED RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 2
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
 3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
 6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
 24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.15
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.07

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.05	0.0000	0.00	Q	.	.	.	.
0.19	0.0002	0.03	Q	.	.	.	.
0.32	0.0005	0.03	Q	.	.	.	.
0.46	0.0008	0.03	Q	.	.	.	.
0.59	0.0011	0.03	Q	.	.	.	.
0.73	0.0014	0.03	Q	.	.	.	.
0.86	0.0017	0.03	Q	.	.	.	.
1.00	0.0020	0.03	Q	.	.	.	.
1.13	0.0023	0.03	Q	.	.	.	.
1.27	0.0027	0.03	Q	.	.	.	.
1.40	0.0030	0.03	Q	.	.	.	.
1.54	0.0033	0.03	Q	.	.	.	.
1.67	0.0036	0.03	Q	.	.	.	.
1.81	0.0040	0.03	Q	.	.	.	.
1.94	0.0043	0.03	Q	.	.	.	.
2.08	0.0046	0.03	Q	.	.	.	.
2.21	0.0049	0.03	Q	.	.	.	.
2.35	0.0053	0.03	Q	.	.	.	.
2.48	0.0056	0.03	Q	.	.	.	.
2.62	0.0060	0.03	Q	.	.	.	.
2.75	0.0063	0.03	Q	.	.	.	.
2.89	0.0066	0.03	Q	.	.	.	.
3.02	0.0070	0.03	Q	.	.	.	.
3.16	0.0073	0.03	Q	.	.	.	.
3.29	0.0077	0.03	Q	.	.	.	.
3.43	0.0080	0.03	Q	.	.	.	.
3.56	0.0084	0.03	Q	.	.	.	.
3.70	0.0087	0.03	Q	.	.	.	.
3.84	0.0091	0.03	Q	.	.	.	.
3.97	0.0095	0.03	Q	.	.	.	.

					X002_G		
4. 11	0. 0098	0. 03	Q	.	.	.	.
4. 24	0. 0102	0. 03	Q	.	.	.	.
4. 38	0. 0106	0. 03	Q	.	.	.	.
4. 51	0. 0109	0. 03	Q	.	.	.	.
4. 65	0. 0113	0. 03	Q	.	.	.	.
4. 78	0. 0117	0. 03	Q	.	.	.	.
4. 92	0. 0121	0. 03	Q	.	.	.	.
5. 05	0. 0124	0. 03	Q	.	.	.	.
5. 19	0. 0128	0. 03	Q	.	.	.	.
5. 32	0. 0132	0. 03	Q	.	.	.	.
5. 46	0. 0136	0. 04	Q	.	.	.	.
5. 59	0. 0140	0. 04	Q	.	.	.	.
5. 73	0. 0144	0. 04	Q	.	.	.	.
5. 86	0. 0148	0. 04	Q	.	.	.	.
6. 00	0. 0152	0. 04	Q	.	.	.	.
6. 13	0. 0156	0. 04	Q	.	.	.	.
6. 27	0. 0160	0. 04	Q	.	.	.	.
6. 40	0. 0164	0. 04	Q	.	.	.	.
6. 54	0. 0169	0. 04	Q	.	.	.	.
6. 67	0. 0173	0. 04	Q	.	.	.	.
6. 81	0. 0177	0. 04	Q	.	.	.	.
6. 94	0. 0181	0. 04	Q	.	.	.	.
7. 08	0. 0186	0. 04	Q	.	.	.	.
7. 21	0. 0190	0. 04	Q	.	.	.	.
7. 35	0. 0194	0. 04	Q	.	.	.	.
7. 48	0. 0199	0. 04	Q	.	.	.	.
7. 62	0. 0203	0. 04	Q	.	.	.	.
7. 75	0. 0208	0. 04	Q	.	.	.	.
7. 89	0. 0213	0. 04	Q	.	.	.	.
8. 03	0. 0217	0. 04	Q	.	.	.	.
8. 16	0. 0222	0. 04	Q	.	.	.	.
8. 30	0. 0227	0. 04	Q	.	.	.	.
8. 43	0. 0231	0. 04	Q	.	.	.	.
8. 57	0. 0236	0. 04	Q	.	.	.	.
8. 70	0. 0241	0. 04	Q	.	.	.	.
8. 84	0. 0246	0. 04	Q	.	.	.	.
8. 97	0. 0251	0. 05	Q	.	.	.	.
9. 11	0. 0256	0. 05	Q	.	.	.	.
9. 24	0. 0261	0. 05	Q	.	.	.	.
9. 38	0. 0267	0. 05	Q	.	.	.	.
9. 51	0. 0272	0. 05	Q	.	.	.	.
9. 65	0. 0277	0. 05	Q	.	.	.	.
9. 78	0. 0283	0. 05	Q	.	.	.	.
9. 92	0. 0288	0. 05	Q	.	.	.	.
10. 05	0. 0294	0. 05	Q	.	.	.	.
10. 19	0. 0299	0. 05	Q	.	.	.	.
10. 32	0. 0305	0. 05	Q	.	.	.	.
10. 46	0. 0311	0. 05	Q	.	.	.	.
10. 59	0. 0316	0. 05	Q	.	.	.	.
10. 73	0. 0322	0. 05	Q	.	.	.	.
10. 86	0. 0328	0. 05	Q	.	.	.	.
11. 00	0. 0335	0. 06	Q	.	.	.	.
11. 13	0. 0341	0. 06	Q	.	.	.	.
11. 27	0. 0347	0. 06	Q	.	.	.	.
11. 40	0. 0354	0. 06	Q	.	.	.	.
11. 54	0. 0360	0. 06	Q	.	.	.	.
11. 67	0. 0367	0. 06	Q	.	.	.	.
11. 81	0. 0374	0. 06	Q	.	.	.	.
11. 95	0. 0381	0. 06	Q	.	.	.	.
12. 08	0. 0388	0. 07	Q	.	.	.	.
12. 22	0. 0396	0. 08	Q	.	.	.	.
12. 35	0. 0405	0. 08	Q	.	.	.	.
12. 49	0. 0414	0. 08	Q	.	.	.	.
12. 62	0. 0423	0. 08	Q	.	.	.	.
12. 76	0. 0433	0. 08	Q	.	.	.	.
12. 89	0. 0442	0. 09	Q	.	.	.	.
13. 03	0. 0452	0. 09	Q	.	.	.	.
13. 16	0. 0462	0. 09	Q	.	.	.	.
13. 30	0. 0473	0. 09	Q	.	.	.	.
13. 43	0. 0483	0. 10	Q	.	.	.	.
13. 57	0. 0494	0. 10	Q	.	.	.	.
13. 70	0. 0505	0. 10	Q	.	.	.	.
13. 84	0. 0517	0. 10	Q	.	.	.	.
13. 97	0. 0529	0. 11	Q	.	.	.	.
14. 11	0. 0541	0. 11	Q	.	.	.	.
14. 24	0. 0554	0. 12	Q	.	.	.	.
14. 38	0. 0568	0. 12	Q	.	.	.	.
14. 51	0. 0582	0. 13	Q	.	.	.	.
14. 65	0. 0597	0. 14	Q	.	.	.	.

					X002_G		
14.78	0.0613	0.15	Q	.	.	.	.
14.92	0.0630	0.15	Q	.	.	.	.
15.05	0.0648	0.17	Q	.	.	.	.
15.19	0.0666	0.17	Q	.	.	.	.
15.32	0.0687	0.19	Q	.	.	.	.
15.46	0.0709	0.20	Q	.	.	.	.
15.59	0.0731	0.21	Q	.	.	.	.
15.73	0.0757	0.24	Q	.	.	.	.
15.86	0.0790	0.36	.Q	.	.	.	.
16.00	0.0838	0.49	.Q	.	.	.	.
16.14	0.0962	1.72	.	Q	.	.	.
16.27	0.1074	0.29	.Q	.	.	.	.
16.41	0.1101	0.19	Q	.	.	.	.
16.54	0.1122	0.18	Q	.	.	.	.
16.68	0.1141	0.16	Q	.	.	.	.
16.81	0.1158	0.14	Q	.	.	.	.
16.95	0.1173	0.13	Q	.	.	.	.
17.08	0.1187	0.12	Q	.	.	.	.
17.22	0.1199	0.11	Q	.	.	.	.
17.35	0.1211	0.10	Q	.	.	.	.
17.49	0.1222	0.09	Q	.	.	.	.
17.62	0.1232	0.09	Q	.	.	.	.
17.76	0.1242	0.09	Q	.	.	.	.
17.89	0.1251	0.08	Q	.	.	.	.
18.03	0.1260	0.08	Q	.	.	.	.
18.16	0.1268	0.06	Q	.	.	.	.
18.30	0.1275	0.06	Q	.	.	.	.
18.43	0.1282	0.06	Q	.	.	.	.
18.57	0.1288	0.06	Q	.	.	.	.
18.70	0.1295	0.06	Q	.	.	.	.
18.84	0.1301	0.05	Q	.	.	.	.
18.97	0.1307	0.05	Q	.	.	.	.
19.11	0.1312	0.05	Q	.	.	.	.
19.24	0.1318	0.05	Q	.	.	.	.
19.38	0.1323	0.05	Q	.	.	.	.
19.51	0.1328	0.05	Q	.	.	.	.
19.65	0.1334	0.05	Q	.	.	.	.
19.78	0.1339	0.04	Q	.	.	.	.
19.92	0.1344	0.04	Q	.	.	.	.
20.06	0.1348	0.04	Q	.	.	.	.
20.19	0.1353	0.04	Q	.	.	.	.
20.33	0.1358	0.04	Q	.	.	.	.
20.46	0.1362	0.04	Q	.	.	.	.
20.60	0.1366	0.04	Q	.	.	.	.
20.73	0.1371	0.04	Q	.	.	.	.
20.87	0.1375	0.04	Q	.	.	.	.
21.00	0.1379	0.04	Q	.	.	.	.
21.14	0.1383	0.04	Q	.	.	.	.
21.27	0.1387	0.04	Q	.	.	.	.
21.41	0.1391	0.04	Q	.	.	.	.
21.54	0.1395	0.03	Q	.	.	.	.
21.68	0.1399	0.03	Q	.	.	.	.
21.81	0.1403	0.03	Q	.	.	.	.
21.95	0.1407	0.03	Q	.	.	.	.
22.08	0.1410	0.03	Q	.	.	.	.
22.22	0.1414	0.03	Q	.	.	.	.
22.35	0.1418	0.03	Q	.	.	.	.
22.49	0.1421	0.03	Q	.	.	.	.
22.62	0.1425	0.03	Q	.	.	.	.
22.76	0.1428	0.03	Q	.	.	.	.
22.89	0.1432	0.03	Q	.	.	.	.
23.03	0.1435	0.03	Q	.	.	.	.
23.16	0.1438	0.03	Q	.	.	.	.
23.30	0.1441	0.03	Q	.	.	.	.
23.43	0.1445	0.03	Q	.	.	.	.
23.57	0.1448	0.03	Q	.	.	.	.
23.70	0.1451	0.03	Q	.	.	.	.
23.84	0.1454	0.03	Q	.	.	.	.
23.97	0.1457	0.03	Q	.	.	.	.
24.11	0.1460	0.03	Q	.	.	.	.
24.25	0.1462	0.00	Q	.	.	.	.

Drainage H

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 7.00
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
 LOW LOSS FRACTION = 0.260
 TIME OF CONCENTRATION(MIN.) = 9.37
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 USER SPECIFIED RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 2
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
 3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
 6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
 24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.57
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.27

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.07	0.0000	0.00	Q	.	.	.	.
0.23	0.0007	0.11	Q	.	.	.	.
0.38	0.0021	0.11	Q	.	.	.	.
0.54	0.0035	0.11	Q	.	.	.	.
0.70	0.0049	0.11	Q	.	.	.	.
0.85	0.0063	0.11	Q	.	.	.	.
1.01	0.0077	0.11	Q	.	.	.	.
1.16	0.0091	0.11	Q	.	.	.	.
1.32	0.0105	0.11	Q	.	.	.	.
1.48	0.0120	0.11	Q	.	.	.	.
1.63	0.0134	0.11	Q	.	.	.	.
1.79	0.0149	0.11	Q	.	.	.	.
1.95	0.0164	0.11	Q	.	.	.	.
2.10	0.0179	0.12	Q	.	.	.	.
2.26	0.0194	0.12	Q	.	.	.	.
2.41	0.0209	0.12	Q	.	.	.	.
2.57	0.0224	0.12	Q	.	.	.	.
2.73	0.0239	0.12	Q	.	.	.	.
2.88	0.0255	0.12	Q	.	.	.	.
3.04	0.0270	0.12	Q	.	.	.	.
3.19	0.0286	0.12	Q	.	.	.	.
3.35	0.0301	0.12	Q	.	.	.	.
3.51	0.0317	0.12	Q	.	.	.	.
3.66	0.0333	0.12	Q	.	.	.	.
3.82	0.0349	0.12	Q	.	.	.	.
3.98	0.0365	0.13	Q	.	.	.	.
4.13	0.0382	0.13	Q	.	.	.	.
4.29	0.0398	0.13	Q	.	.	.	.
4.44	0.0415	0.13	Q	.	.	.	.
4.60	0.0432	0.13	Q	.	.	.	.

					X002_H			
4. 76	0. 0448	0. 13	Q	.	.	.	.	.
4. 91	0. 0466	0. 13	Q	.	.	.	.	.
5. 07	0. 0483	0. 13	Q	.	.	.	.	.
5. 22	0. 0500	0. 14	Q	.	.	.	.	.
5. 38	0. 0518	0. 14	Q	.	.	.	.	.
5. 54	0. 0535	0. 14	Q	.	.	.	.	.
5. 69	0. 0553	0. 14	Q	.	.	.	.	.
5. 85	0. 0571	0. 14	Q	.	.	.	.	.
6. 01	0. 0589	0. 14	Q	.	.	.	.	.
6. 16	0. 0607	0. 14	Q	.	.	.	.	.
6. 32	0. 0626	0. 14	Q	.	.	.	.	.
6. 47	0. 0645	0. 15	Q	.	.	.	.	.
6. 63	0. 0663	0. 15	Q	.	.	.	.	.
6. 79	0. 0683	0. 15	Q	.	.	.	.	.
6. 94	0. 0702	0. 15	Q	.	.	.	.	.
7. 10	0. 0721	0. 15	Q	.	.	.	.	.
7. 25	0. 0741	0. 15	Q	.	.	.	.	.
7. 41	0. 0761	0. 16	Q	.	.	.	.	.
7. 57	0. 0781	0. 16	Q	.	.	.	.	.
7. 72	0. 0801	0. 16	Q	.	.	.	.	.
7. 88	0. 0822	0. 16	Q	.	.	.	.	.
8. 04	0. 0843	0. 16	Q	.	.	.	.	.
8. 19	0. 0864	0. 16	Q	.	.	.	.	.
8. 35	0. 0885	0. 17	Q	.	.	.	.	.
8. 50	0. 0907	0. 17	Q	.	.	.	.	.
8. 66	0. 0929	0. 17	Q	.	.	.	.	.
8. 82	0. 0951	0. 17	Q	.	.	.	.	.
8. 97	0. 0973	0. 18	Q	.	.	.	.	.
9. 13	0. 0996	0. 18	Q	.	.	.	.	.
9. 28	0. 1019	0. 18	Q	.	.	.	.	.
9. 44	0. 1042	0. 18	Q	.	.	.	.	.
9. 60	0. 1066	0. 19	Q	.	.	.	.	.
9. 75	0. 1090	0. 19	Q	.	.	.	.	.
9. 91	0. 1115	0. 19	Q	.	.	.	.	.
10. 07	0. 1140	0. 19	Q	.	.	.	.	.
10. 22	0. 1165	0. 20	Q	.	.	.	.	.
10. 38	0. 1190	0. 20	Q	.	.	.	.	.
10. 53	0. 1217	0. 20	Q	.	.	.	.	.
10. 69	0. 1243	0. 21	Q	.	.	.	.	.
10. 85	0. 1270	0. 21	Q	.	.	.	.	.
11. 00	0. 1298	0. 21	Q	.	.	.	.	.
11. 16	0. 1326	0. 22	Q	.	.	.	.	.
11. 32	0. 1354	0. 22	Q	.	.	.	.	.
11. 47	0. 1384	0. 23	Q	.	.	.	.	.
11. 63	0. 1413	0. 23	Q	.	.	.	.	.
11. 78	0. 1444	0. 24	Q	.	.	.	.	.
11. 94	0. 1475	0. 24	Q	.	.	.	.	.
12. 10	0. 1508	0. 27	.Q	.	.	.	.	.
12. 25	0. 1545	0. 30	.Q	.	.	.	.	.
12. 41	0. 1585	0. 31	.Q	.	.	.	.	.
12. 56	0. 1626	0. 32	.Q	.	.	.	.	.
12. 72	0. 1668	0. 33	.Q	.	.	.	.	.
12. 88	0. 1711	0. 33	.Q	.	.	.	.	.
13. 03	0. 1755	0. 35	.Q	.	.	.	.	.
13. 19	0. 1800	0. 35	.Q	.	.	.	.	.
13. 35	0. 1847	0. 37	.Q	.	.	.	.	.
13. 50	0. 1895	0. 38	.Q	.	.	.	.	.
13. 66	0. 1944	0. 39	.Q	.	.	.	.	.
13. 81	0. 1996	0. 40	.Q	.	.	.	.	.
13. 97	0. 2049	0. 42	.Q	.	.	.	.	.
14. 13	0. 2104	0. 44	.Q	.	.	.	.	.
14. 28	0. 2163	0. 48	.Q	.	.	.	.	.
14. 44	0. 2226	0. 49	.Q	.	.	.	.	.
14. 59	0. 2291	0. 53	. Q	.	.	.	.	.
14. 75	0. 2361	0. 55	. Q	.	.	.	.	.
14. 91	0. 2434	0. 59	. Q	.	.	.	.	.
15. 06	0. 2513	0. 62	. Q	.	.	.	.	.
15. 22	0. 2598	0. 70	. Q	.	.	.	.	.
15. 38	0. 2691	0. 75	. Q	.	.	.	.	.
15. 53	0. 2788	0. 76	. Q	.	.	.	.	.
15. 69	0. 2893	0. 86	. Q	.	.	.	.	.
15. 84	0. 3032	1. 30	. Q	.	.	.	.	.
16. 00	0. 3229	1. 75	. Q	.	.	.	.	.
16. 16	0. 3736	6. 11	. Q	.	.	.	.	.
16. 31	0. 4195	1. 01	. Q	.	.	.	.	.
16. 47	0. 4310	0. 76	. Q	.	.	.	.	.
16. 62	0. 4401	0. 66	. Q	.	.	.	.	.
16. 78	0. 4480	0. 57	. Q	.	.	.	.	.
16. 94	0. 4550	0. 51	. Q	.	.	.	.	.

					X002_H		
17. 09	0. 4612	0. 46	. Q	.	.	.	.
17. 25	0. 4669	0. 41	. Q	.	.	.	.
17. 41	0. 4720	0. 38	. Q	.	.	.	.
17. 56	0. 4768	0. 36	. Q	.	.	.	.
17. 72	0. 4813	0. 34	. Q	.	.	.	.
17. 87	0. 4856	0. 32	. Q	.	.	.	.
18. 03	0. 4897	0. 31	. Q	.	.	.	.
18. 19	0. 4933	0. 25	Q	.	.	.	.
18. 34	0. 4964	0. 24	Q	.	.	.	.
18. 50	0. 4994	0. 23	Q	.	.	.	.
18. 65	0. 5023	0. 22	Q	.	.	.	.
18. 81	0. 5050	0. 21	Q	.	.	.	.
18. 97	0. 5077	0. 20	Q	.	.	.	.
19. 12	0. 5102	0. 20	Q	.	.	.	.
19. 28	0. 5127	0. 19	Q	.	.	.	.
19. 44	0. 5151	0. 18	Q	.	.	.	.
19. 59	0. 5175	0. 18	Q	.	.	.	.
19. 75	0. 5197	0. 17	Q	.	.	.	.
19. 90	0. 5220	0. 17	Q	.	.	.	.
20. 06	0. 5241	0. 17	Q	.	.	.	.
20. 22	0. 5262	0. 16	Q	.	.	.	.
20. 37	0. 5283	0. 16	Q	.	.	.	.
20. 53	0. 5303	0. 15	Q	.	.	.	.
20. 68	0. 5323	0. 15	Q	.	.	.	.
20. 84	0. 5342	0. 15	Q	.	.	.	.
21. 00	0. 5361	0. 14	Q	.	.	.	.
21. 15	0. 5379	0. 14	Q	.	.	.	.
21. 31	0. 5397	0. 14	Q	.	.	.	.
21. 47	0. 5415	0. 14	Q	.	.	.	.
21. 62	0. 5433	0. 13	Q	.	.	.	.
21. 78	0. 5450	0. 13	Q	.	.	.	.
21. 93	0. 5467	0. 13	Q	.	.	.	.
22. 09	0. 5483	0. 13	Q	.	.	.	.
22. 25	0. 5500	0. 13	Q	.	.	.	.
22. 40	0. 5516	0. 12	Q	.	.	.	.
22. 56	0. 5532	0. 12	Q	.	.	.	.
22. 72	0. 5547	0. 12	Q	.	.	.	.
22. 87	0. 5563	0. 12	Q	.	.	.	.
23. 03	0. 5578	0. 12	Q	.	.	.	.
23. 18	0. 5593	0. 12	Q	.	.	.	.
23. 34	0. 5607	0. 11	Q	.	.	.	.
23. 50	0. 5622	0. 11	Q	.	.	.	.
23. 65	0. 5636	0. 11	Q	.	.	.	.
23. 81	0. 5651	0. 11	Q	.	.	.	.
23. 96	0. 5665	0. 11	Q	.	.	.	.
24. 12	0. 5678	0. 11	Q	.	.	.	.
24. 28	0. 5685	0. 00	Q	.	.	.	.

Drainage I

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

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 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 1.10
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
 LOW LOSS FRACTION = 0.260
 TIME OF CONCENTRATION(MIN.) = 9.32
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 USER SPECIFIED RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 2
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
 3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
 6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
 24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.09
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.04

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.00	0.0000	0.00	Q	.	.	.	.
0.16	0.0001	0.02	Q	.	.	.	.
0.31	0.0003	0.02	Q	.	.	.	.
0.47	0.0005	0.02	Q	.	.	.	.
0.62	0.0008	0.02	Q	.	.	.	.
0.78	0.0010	0.02	Q	.	.	.	.
0.93	0.0012	0.02	Q	.	.	.	.
1.09	0.0014	0.02	Q	.	.	.	.
1.24	0.0016	0.02	Q	.	.	.	.
1.40	0.0019	0.02	Q	.	.	.	.
1.55	0.0021	0.02	Q	.	.	.	.
1.71	0.0023	0.02	Q	.	.	.	.
1.86	0.0026	0.02	Q	.	.	.	.
2.02	0.0028	0.02	Q	.	.	.	.
2.18	0.0030	0.02	Q	.	.	.	.
2.33	0.0033	0.02	Q	.	.	.	.
2.49	0.0035	0.02	Q	.	.	.	.
2.64	0.0037	0.02	Q	.	.	.	.
2.80	0.0040	0.02	Q	.	.	.	.
2.95	0.0042	0.02	Q	.	.	.	.
3.11	0.0044	0.02	Q	.	.	.	.
3.26	0.0047	0.02	Q	.	.	.	.
3.42	0.0049	0.02	Q	.	.	.	.
3.57	0.0052	0.02	Q	.	.	.	.
3.73	0.0054	0.02	Q	.	.	.	.
3.88	0.0057	0.02	Q	.	.	.	.
4.04	0.0059	0.02	Q	.	.	.	.
4.19	0.0062	0.02	Q	.	.	.	.
4.35	0.0065	0.02	Q	.	.	.	.
4.51	0.0067	0.02	Q	.	.	.	.

					X002_I			
4. 66	0. 0070	0. 02	Q	.	.	.	.	.
4. 82	0. 0072	0. 02	Q	.	.	.	.	.
4. 97	0. 0075	0. 02	Q	.	.	.	.	.
5. 13	0. 0078	0. 02	Q	.	.	.	.	.
5. 28	0. 0081	0. 02	Q	.	.	.	.	.
5. 44	0. 0083	0. 02	Q	.	.	.	.	.
5. 59	0. 0086	0. 02	Q	.	.	.	.	.
5. 75	0. 0089	0. 02	Q	.	.	.	.	.
5. 90	0. 0092	0. 02	Q	.	.	.	.	.
6. 06	0. 0095	0. 02	Q	.	.	.	.	.
6. 21	0. 0097	0. 02	Q	.	.	.	.	.
6. 37	0. 0100	0. 02	Q	.	.	.	.	.
6. 52	0. 0103	0. 02	Q	.	.	.	.	.
6. 68	0. 0106	0. 02	Q	.	.	.	.	.
6. 84	0. 0109	0. 02	Q	.	.	.	.	.
6. 99	0. 0112	0. 02	Q	.	.	.	.	.
7. 15	0. 0115	0. 02	Q	.	.	.	.	.
7. 30	0. 0118	0. 02	Q	.	.	.	.	.
7. 46	0. 0121	0. 02	Q	.	.	.	.	.
7. 61	0. 0125	0. 02	Q	.	.	.	.	.
7. 77	0. 0128	0. 03	Q	.	.	.	.	.
7. 92	0. 0131	0. 03	Q	.	.	.	.	.
8. 08	0. 0134	0. 03	Q	.	.	.	.	.
8. 23	0. 0138	0. 03	Q	.	.	.	.	.
8. 39	0. 0141	0. 03	Q	.	.	.	.	.
8. 54	0. 0144	0. 03	Q	.	.	.	.	.
8. 70	0. 0148	0. 03	Q	.	.	.	.	.
8. 85	0. 0151	0. 03	Q	.	.	.	.	.
9. 01	0. 0155	0. 03	Q	.	.	.	.	.
9. 17	0. 0158	0. 03	Q	.	.	.	.	.
9. 32	0. 0162	0. 03	Q	.	.	.	.	.
9. 48	0. 0166	0. 03	Q	.	.	.	.	.
9. 63	0. 0169	0. 03	Q	.	.	.	.	.
9. 79	0. 0173	0. 03	Q	.	.	.	.	.
9. 94	0. 0177	0. 03	Q	.	.	.	.	.
10. 10	0. 0181	0. 03	Q	.	.	.	.	.
10. 25	0. 0185	0. 03	Q	.	.	.	.	.
10. 41	0. 0189	0. 03	Q	.	.	.	.	.
10. 56	0. 0193	0. 03	Q	.	.	.	.	.
10. 72	0. 0197	0. 03	Q	.	.	.	.	.
10. 87	0. 0201	0. 03	Q	.	.	.	.	.
11. 03	0. 0206	0. 03	Q	.	.	.	.	.
11. 18	0. 0210	0. 03	Q	.	.	.	.	.
11. 34	0. 0215	0. 04	Q	.	.	.	.	.
11. 50	0. 0219	0. 04	Q	.	.	.	.	.
11. 65	0. 0224	0. 04	Q	.	.	.	.	.
11. 81	0. 0229	0. 04	Q	.	.	.	.	.
11. 96	0. 0233	0. 04	Q	.	.	.	.	.
12. 12	0. 0239	0. 04	Q	.	.	.	.	.
12. 27	0. 0245	0. 05	Q	.	.	.	.	.
12. 43	0. 0251	0. 05	Q	.	.	.	.	.
12. 58	0. 0257	0. 05	Q	.	.	.	.	.
12. 74	0. 0264	0. 05	Q	.	.	.	.	.
12. 89	0. 0271	0. 05	Q	.	.	.	.	.
13. 05	0. 0278	0. 05	Q	.	.	.	.	.
13. 20	0. 0285	0. 06	Q	.	.	.	.	.
13. 36	0. 0292	0. 06	Q	.	.	.	.	.
13. 51	0. 0299	0. 06	Q	.	.	.	.	.
13. 67	0. 0307	0. 06	Q	.	.	.	.	.
13. 83	0. 0315	0. 06	Q	.	.	.	.	.
13. 98	0. 0324	0. 07	Q	.	.	.	.	.
14. 14	0. 0332	0. 07	Q	.	.	.	.	.
14. 29	0. 0342	0. 07	Q	.	.	.	.	.
14. 45	0. 0351	0. 08	Q	.	.	.	.	.
14. 60	0. 0362	0. 08	Q	.	.	.	.	.
14. 76	0. 0373	0. 09	Q	.	.	.	.	.
14. 91	0. 0384	0. 09	Q	.	.	.	.	.
15. 07	0. 0396	0. 10	Q	.	.	.	.	.
15. 22	0. 0410	0. 11	Q	.	.	.	.	.
15. 38	0. 0424	0. 12	Q	.	.	.	.	.
15. 53	0. 0440	0. 12	Q	.	.	.	.	.
15. 69	0. 0456	0. 14	Q	.	.	.	.	.
15. 84	0. 0478	0. 20	Q	.	.	.	.	.
16. 00	0. 0509	0. 28	Q	.	.	.	.	.
16. 16	0. 0588	0. 96	Q	.	.	.	.	.
16. 31	0. 0660	0. 16	Q	.	.	.	.	.
16. 47	0. 0678	0. 12	Q	.	.	.	.	.
16. 62	0. 0692	0. 10	Q	.	.	.	.	.
16. 78	0. 0705	0. 09	Q	.	.	.	.	.

					X002_I		
16.93	0.0716	0.08	Q	.	.	.	.
17.09	0.0725	0.07	Q	.	.	.	.
17.24	0.0734	0.07	Q	.	.	.	.
17.40	0.0742	0.06	Q	.	.	.	.
17.55	0.0750	0.06	Q	.	.	.	.
17.71	0.0757	0.05	Q	.	.	.	.
17.86	0.0764	0.05	Q	.	.	.	.
18.02	0.0770	0.05	Q	.	.	.	.
18.17	0.0776	0.04	Q	.	.	.	.
18.33	0.0781	0.04	Q	.	.	.	.
18.49	0.0785	0.04	Q	.	.	.	.
18.64	0.0790	0.03	Q	.	.	.	.
18.80	0.0794	0.03	Q	.	.	.	.
18.95	0.0798	0.03	Q	.	.	.	.
19.11	0.0802	0.03	Q	.	.	.	.
19.26	0.0806	0.03	Q	.	.	.	.
19.42	0.0810	0.03	Q	.	.	.	.
19.57	0.0814	0.03	Q	.	.	.	.
19.73	0.0817	0.03	Q	.	.	.	.
19.88	0.0821	0.03	Q	.	.	.	.
20.04	0.0824	0.03	Q	.	.	.	.
20.19	0.0827	0.03	Q	.	.	.	.
20.35	0.0831	0.02	Q	.	.	.	.
20.50	0.0834	0.02	Q	.	.	.	.
20.66	0.0837	0.02	Q	.	.	.	.
20.82	0.0840	0.02	Q	.	.	.	.
20.97	0.0843	0.02	Q	.	.	.	.
21.13	0.0846	0.02	Q	.	.	.	.
21.28	0.0849	0.02	Q	.	.	.	.
21.44	0.0851	0.02	Q	.	.	.	.
21.59	0.0854	0.02	Q	.	.	.	.
21.75	0.0857	0.02	Q	.	.	.	.
21.90	0.0860	0.02	Q	.	.	.	.
22.06	0.0862	0.02	Q	.	.	.	.
22.21	0.0865	0.02	Q	.	.	.	.
22.37	0.0867	0.02	Q	.	.	.	.
22.52	0.0870	0.02	Q	.	.	.	.
22.68	0.0872	0.02	Q	.	.	.	.
22.83	0.0875	0.02	Q	.	.	.	.
22.99	0.0877	0.02	Q	.	.	.	.
23.15	0.0879	0.02	Q	.	.	.	.
23.30	0.0882	0.02	Q	.	.	.	.
23.46	0.0884	0.02	Q	.	.	.	.
23.61	0.0886	0.02	Q	.	.	.	.
23.77	0.0888	0.02	Q	.	.	.	.
23.92	0.0891	0.02	Q	.	.	.	.
24.08	0.0893	0.02	Q	.	.	.	.
24.23	0.0894	0.00	Q	.	.	.	.

Drainage J

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

Fusco Engineering
 16795 Von Karman #100, Irvine, CA 92606

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 11.00
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
 LOW LOSS FRACTION = 0.260
 TIME OF CONCENTRATION(MIN.) = 15.25
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 USER SPECIFIED RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 2
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
 3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
 6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
 24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.89
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.43

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.24	0.0018	0.17	Q	.	.	.	.
0.50	0.0053	0.17	Q	.	.	.	.
0.75	0.0089	0.17	Q	.	.	.	.
1.00	0.0125	0.17	Q	.	.	.	.
1.26	0.0161	0.17	Q	.	.	.	.
1.51	0.0198	0.18	Q	.	.	.	.
1.77	0.0235	0.18	Q	.	.	.	.
2.02	0.0273	0.18	Q	.	.	.	.
2.28	0.0311	0.18	Q	.	.	.	.
2.53	0.0349	0.18	Q	.	.	.	.
2.78	0.0388	0.19	Q	.	.	.	.
3.04	0.0428	0.19	Q	.	.	.	.
3.29	0.0467	0.19	Q	.	.	.	.
3.55	0.0508	0.19	Q	.	.	.	.
3.80	0.0549	0.20	Q	.	.	.	.
4.05	0.0590	0.20	Q	.	.	.	.
4.31	0.0632	0.20	Q	.	.	.	.
4.56	0.0674	0.20	Q	.	.	.	.
4.82	0.0717	0.21	Q	.	.	.	.
5.07	0.0761	0.21	Q	.	.	.	.
5.32	0.0805	0.21	Q	.	.	.	.
5.58	0.0850	0.22	Q	.	.	.	.
5.83	0.0896	0.22	Q	.	.	.	.
6.09	0.0942	0.22	Q	.	.	.	.
6.34	0.0989	0.22	Q	.	.	.	.
6.60	0.1037	0.23	Q	.	.	.	.
6.85	0.1085	0.23	Q	.	.	.	.
7.10	0.1135	0.24	Q	.	.	.	.
7.36	0.1185	0.24	Q	.	.	.	.
7.61	0.1236	0.25	Q	.	.	.	.

					X002_J			
7. 87	0. 1288	0. 25	Q	.	.	.	.	.
8. 12	0. 1341	0. 26	.Q	.	.	.	.	.
8. 38	0. 1395	0. 26	.Q	.	.	.	.	.
8. 63	0. 1450	0. 27	.Q	.	.	.	.	.
8. 88	0. 1507	0. 27	.Q	.	.	.	.	.
9. 14	0. 1564	0. 28	.Q	.	.	.	.	.
9. 39	0. 1623	0. 28	.Q	.	.	.	.	.
9. 65	0. 1684	0. 29	.Q	.	.	.	.	.
9. 90	0. 1745	0. 30	.Q	.	.	.	.	.
10. 15	0. 1809	0. 31	.Q	.	.	.	.	.
10. 41	0. 1874	0. 31	.Q	.	.	.	.	.
10. 66	0. 1940	0. 32	.Q	.	.	.	.	.
10. 92	0. 2009	0. 33	.Q	.	.	.	.	.
11. 17	0. 2080	0. 34	.Q	.	.	.	.	.
11. 43	0. 2153	0. 35	.Q	.	.	.	.	.
11. 68	0. 2228	0. 37	.Q	.	.	.	.	.
11. 93	0. 2306	0. 38	.Q	.	.	.	.	.
12. 19	0. 2392	0. 44	.Q	.	.	.	.	.
12. 44	0. 2490	0. 48	.Q	.	.	.	.	.
12. 70	0. 2594	0. 51	. Q	.	.	.	.	.
12. 95	0. 2703	0. 52	. Q	.	.	.	.	.
13. 20	0. 2816	0. 56	. Q	.	.	.	.	.
13. 46	0. 2935	0. 57	. Q	.	.	.	.	.
13. 71	0. 3060	0. 62	. Q	.	.	.	.	.
13. 97	0. 3192	0. 64	. Q	.	.	.	.	.
14. 22	0. 3335	0. 72	. Q	.	.	.	.	.
14. 48	0. 3490	0. 76	. Q	.	.	.	.	.
14. 73	0. 3658	0. 85	. Q	.	.	.	.	.
14. 98	0. 3842	0. 91	. Q	.	.	.	.	.
15. 24	0. 4049	1. 07	. Q	.	.	.	.	.
15. 49	0. 4286	1. 19	. Q	.	.	.	.	.
15. 75	0. 4562	1. 44	. Q	.	.	.	.	.
16. 00	0. 4932	2. 08	. Q	.	.	.	.	.
16. 25	0. 5884	6. 97	.	.	Q	.	.	.
16. 51	0. 6741	1. 18	. Q	.	.	.	.	.
16. 76	0. 6968	0. 98	. Q	.	.	.	.	.
17. 02	0. 7154	0. 80	. Q	.	.	.	.	.
17. 27	0. 7308	0. 67	. Q	.	.	.	.	.
17. 52	0. 7441	0. 59	. Q	.	.	.	.	.
17. 78	0. 7560	0. 54	. Q	.	.	.	.	.
18. 03	0. 7669	0. 50	.Q	.	.	.	.	.
18. 29	0. 7761	0. 39	.Q	.	.	.	.	.
18. 54	0. 7840	0. 36	.Q	.	.	.	.	.
18. 80	0. 7913	0. 34	.Q	.	.	.	.	.
19. 05	0. 7981	0. 32	.Q	.	.	.	.	.
19. 30	0. 8046	0. 30	.Q	.	.	.	.	.
19. 56	0. 8108	0. 29	.Q	.	.	.	.	.
19. 81	0. 8167	0. 27	.Q	.	.	.	.	.
20. 07	0. 8224	0. 26	.Q	.	.	.	.	.
20. 32	0. 8278	0. 25	.Q	.	.	.	.	.
20. 58	0. 8330	0. 24	Q	.	.	.	.	.
20. 83	0. 8380	0. 23	Q	.	.	.	.	.
21. 08	0. 8429	0. 23	Q	.	.	.	.	.
21. 34	0. 8476	0. 22	Q	.	.	.	.	.
21. 59	0. 8521	0. 21	Q	.	.	.	.	.
21. 85	0. 8565	0. 21	Q	.	.	.	.	.
22. 10	0. 8608	0. 20	Q	.	.	.	.	.
22. 35	0. 8650	0. 20	Q	.	.	.	.	.
22. 61	0. 8691	0. 19	Q	.	.	.	.	.
22. 86	0. 8731	0. 19	Q	.	.	.	.	.
23. 12	0. 8770	0. 18	Q	.	.	.	.	.
23. 37	0. 8808	0. 18	Q	.	.	.	.	.
23. 62	0. 8845	0. 18	Q	.	.	.	.	.
23. 88	0. 8882	0. 17	Q	.	.	.	.	.
24. 13	0. 8917	0. 17	Q
24. 39	0. 8935	0. 00	Q

Drainage K

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

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Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 6.30
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.120
LOW LOSS FRACTION = 0.260
TIME OF CONCENTRATION(MIN.) = 11.93
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 2
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.51
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.24

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.09	0.0000	0.00	Q	.	.	.	.
0.29	0.0008	0.10	Q	.	.	.	.
0.49	0.0024	0.10	Q	.	.	.	.
0.69	0.0040	0.10	Q	.	.	.	.
0.89	0.0056	0.10	Q	.	.	.	.
1.09	0.0072	0.10	Q	.	.	.	.
1.29	0.0089	0.10	Q	.	.	.	.
1.49	0.0105	0.10	Q	.	.	.	.
1.68	0.0122	0.10	Q	.	.	.	.
1.88	0.0139	0.10	Q	.	.	.	.
2.08	0.0155	0.10	Q	.	.	.	.
2.28	0.0173	0.10	Q	.	.	.	.
2.48	0.0190	0.11	Q	.	.	.	.
2.68	0.0207	0.11	Q	.	.	.	.
2.88	0.0225	0.11	Q	.	.	.	.
3.08	0.0243	0.11	Q	.	.	.	.
3.27	0.0260	0.11	Q	.	.	.	.
3.47	0.0279	0.11	Q	.	.	.	.
3.67	0.0297	0.11	Q	.	.	.	.
3.87	0.0315	0.11	Q	.	.	.	.
4.07	0.0334	0.11	Q	.	.	.	.
4.27	0.0353	0.12	Q	.	.	.	.
4.47	0.0372	0.12	Q	.	.	.	.
4.67	0.0391	0.12	Q	.	.	.	.
4.87	0.0410	0.12	Q	.	.	.	.
5.06	0.0430	0.12	Q	.	.	.	.
5.26	0.0450	0.12	Q	.	.	.	.
5.46	0.0470	0.12	Q	.	.	.	.
5.66	0.0490	0.12	Q	.	.	.	.
5.86	0.0511	0.13	Q	.	.	.	.
6.06	0.0531	0.13	Q	.	.	.	.

					X002_K			
6. 26	0. 0552	0. 13	Q	.	.	.	.	.
6. 46	0. 0574	0. 13	Q	.	.	.	.	.
6. 65	0. 0595	0. 13	Q	.	.	.	.	.
6. 85	0. 0617	0. 13	Q	.	.	.	.	.
7. 05	0. 0639	0. 14	Q	.	.	.	.	.
7. 25	0. 0662	0. 14	Q	.	.	.	.	.
7. 45	0. 0685	0. 14	Q	.	.	.	.	.
7. 65	0. 0708	0. 14	Q	.	.	.	.	.
7. 85	0. 0731	0. 14	Q	.	.	.	.	.
8. 05	0. 0755	0. 15	Q	.	.	.	.	.
8. 25	0. 0779	0. 15	Q	.	.	.	.	.
8. 44	0. 0803	0. 15	Q	.	.	.	.	.
8. 64	0. 0828	0. 15	Q	.	.	.	.	.
8. 84	0. 0854	0. 15	Q	.	.	.	.	.
9. 04	0. 0879	0. 16	Q	.	.	.	.	.
9. 24	0. 0906	0. 16	Q	.	.	.	.	.
9. 44	0. 0932	0. 16	Q	.	.	.	.	.
9. 64	0. 0960	0. 17	Q	.	.	.	.	.
9. 84	0. 0987	0. 17	Q	.	.	.	.	.
10. 03	0. 1015	0. 17	Q	.	.	.	.	.
10. 23	0. 1044	0. 18	Q	.	.	.	.	.
10. 43	0. 1074	0. 18	Q	.	.	.	.	.
10. 63	0. 1104	0. 19	Q	.	.	.	.	.
10. 83	0. 1134	0. 19	Q	.	.	.	.	.
11. 03	0. 1166	0. 19	Q	.	.	.	.	.
11. 23	0. 1198	0. 20	Q	.	.	.	.	.
11. 43	0. 1231	0. 20	Q	.	.	.	.	.
11. 63	0. 1265	0. 21	Q	.	.	.	.	.
11. 82	0. 1300	0. 22	Q	.	.	.	.	.
12. 02	0. 1336	0. 22	Q	.	.	.	.	.
12. 22	0. 1376	0. 27	.Q	.	.	.	.	.
12. 42	0. 1422	0. 28	.Q	.	.	.	.	.
12. 62	0. 1468	0. 29	.Q	.	.	.	.	.
12. 82	0. 1517	0. 30	.Q	.	.	.	.	.
13. 02	0. 1567	0. 31	.Q	.	.	.	.	.
13. 22	0. 1618	0. 32	.Q	.	.	.	.	.
13. 42	0. 1672	0. 33	.Q	.	.	.	.	.
13. 61	0. 1727	0. 34	.Q	.	.	.	.	.
13. 81	0. 1785	0. 36	.Q	.	.	.	.	.
14. 01	0. 1846	0. 38	.Q	.	.	.	.	.
14. 21	0. 1911	0. 42	.Q	.	.	.	.	.
14. 41	0. 1981	0. 43	.Q	.	.	.	.	.
14. 61	0. 2055	0. 47	.Q	.	.	.	.	.
14. 81	0. 2134	0. 49	.Q	.	.	.	.	.
15. 01	0. 2220	0. 55	. Q	.	.	.	.	.
15. 20	0. 2314	0. 59	. Q	.	.	.	.	.
15. 40	0. 2420	0. 69	. Q	.	.	.	.	.
15. 60	0. 2532	0. 67	. Q	.	.	.	.	.
15. 80	0. 2668	0. 99	. Q	.	.	.	.	.
16. 00	0. 2862	1. 38	. Q	.	Q	.	.	.
16. 20	0. 3361	4. 70	.	.	.	.	.	.
16. 40	0. 3811	0. 78	. Q	.	.	.	.	.
16. 60	0. 3927	0. 64	. Q	.	.	.	.	.
16. 80	0. 4022	0. 52	. Q	.	.	.	.	.
16. 99	0. 4102	0. 45	.Q	.	.	.	.	.
17. 19	0. 4171	0. 39	.Q	.	.	.	.	.
17. 39	0. 4232	0. 35	.Q	.	.	.	.	.
17. 59	0. 4288	0. 33	.Q	.	.	.	.	.
17. 79	0. 4340	0. 30	.Q	.	.	.	.	.
17. 99	0. 4388	0. 28	.Q	.	.	.	.	.
18. 19	0. 4430	0. 23	Q	.	.	.	.	.
18. 39	0. 4467	0. 21	Q	.	.	.	.	.
18. 58	0. 4501	0. 20	Q	.	.	.	.	.
18. 78	0. 4533	0. 19	Q	.	.	.	.	.
18. 98	0. 4564	0. 18	Q	.	.	.	.	.
19. 18	0. 4593	0. 18	Q	.	.	.	.	.
19. 38	0. 4621	0. 17	Q	.	.	.	.	.
19. 58	0. 4649	0. 16	Q	.	.	.	.	.
19. 78	0. 4675	0. 16	Q	.	.	.	.	.
19. 98	0. 4700	0. 15	Q	.	.	.	.	.
20. 18	0. 4725	0. 15	Q	.	.	.	.	.
20. 37	0. 4749	0. 14	Q	.	.	.	.	.
20. 57	0. 4772	0. 14	Q	.	.	.	.	.
20. 77	0. 4794	0. 13	Q	.	.	.	.	.
20. 97	0. 4816	0. 13	Q	.	.	.	.	.
21. 17	0. 4837	0. 13	Q	.	.	.	.	.
21. 37	0. 4858	0. 12	Q	.	.	.	.	.
21. 57	0. 4878	0. 12	Q	.	.	.	.	.
21. 77	0. 4898	0. 12	Q	.	.	.	.	.

					X002_K		
21.97	0.4918	0.12	Q	.	.	.	.
22.16	0.4937	0.11	Q	.	.	.	.
22.36	0.4955	0.11	Q	.	.	.	.
22.56	0.4973	0.11	Q	.	.	.	.
22.76	0.4991	0.11	Q	.	.	.	.
22.96	0.5009	0.11	Q	.	.	.	.
23.16	0.5026	0.10	Q	.	.	.	.
23.36	0.5043	0.10	Q	.	.	.	.
23.56	0.5060	0.10	Q	.	.	.	.
23.75	0.5076	0.10	Q	.	.	.	.
23.95	0.5092	0.10	Q	.	.	.	.
24.15	0.5108	0.10	Q	.	.	.	.
24.35	0.5116	0.00	Q	.	.	.	.

B4 Proposed Condition Small Area Unit Hydrograph Calculations

a) High Confidence Events

i. Infiltration Analysis

INFILTRATION RATE CALCULATION SUMMARY
PROPOSED NEWPORT BANNING RANCH PROJECT
100-YEAR HIGH-CONFIDENCE EVENT

Proposed Condition			
Node	A	B	C
Total Area (ac)	315.98	127.93	104.35
Y	0.88	0.96	0.94
Ybar	0.12	0.04	0.06
Average a_p	0.47	0.32	0.61
Total Fm (in/hr)	0.12	0.06	0.12

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA A

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 100-Year Storm Event for Non-Mountainous Area (in) = 5.63

Total Area (ac) = 315.98

a_p - See Figure C-4

P24, 100-Year Storm Event for Mountainous Area (in) = 11.27

Y = 0.88

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.12**

Average a_p = 0.47

Total F_m (in/hr) = **0.12**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	7.57	A	Pervious	0.76	0.002	52	9.23	1.85	0.20	0.000	0.10	0.40	0.04	0.001
					Impervious	6.81	0.022	100	0.00	0.00	1.00	0.022				
2	Urban Cover - Roadway	10%	2.65	D	Pervious	0.27	0.001	91	0.99	0.20	0.82	0.001	0.10	0.20	0.02	0.000
					Impervious	2.39	0.008	100	0.00	0.00	1.00	0.008				
3	Single Family Residential (>10 dwellings/acre)	20%	45.27	A	Pervious	9.05	0.029	52	9.23	1.85	0.20	0.006	0.20	0.40	0.08	0.011
					Impervious	36.22	0.115	100	0.00	0.00	1.00	0.115				
4	Single Family Residential (>10 dwellings/acre)	20%	31.84	B	Pervious	6.37	0.020	76	3.16	0.63	0.54	0.011	0.20	0.30	0.06	0.006
					Impervious	25.47	0.081	100	0.00	0.00	1.00	0.081				
5	Single Family Residential (>10 dwellings/acre)	20%	26.51	D	Pervious	5.30	0.017	91	0.99	0.20	0.82	0.014	0.20	0.20	0.04	0.003
					Impervious	21.21	0.067	100	0.00	0.00	1.00	0.067				
6	Commercial / Industrial	10%	31.91	D	Pervious	3.19	0.010	91	0.99	0.20	0.82	0.008	0.10	0.20	0.02	0.002
					Impervious	28.72	0.091	100	0.00	0.00	1.00	0.091				
7	Oil Operations	100%	4.70	D	Pervious	4.70	0.015	99	0.10	0.02	0.98	0.015	1.00	0.20	0.20	0.003
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				
8	Open Space / Habitat Area	100%	16.64	A	Pervious	16.64	0.053	66	5.15	1.03	0.39	0.020	1.00	0.40	0.40	0.021
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				
9	Oxbow Loop Channel	10%	6.55	A	Pervious	0.66	0.002	93	0.75	0.15	0.86	0.002	0.10	0.40	0.04	0.001
					Impervious	5.90	0.019	100	0.00	0.00	1.00	0.019				

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA A

Onsite Area																		
No.	Land Use	Pervious- ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC III	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m					
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)		
1	Urban Cover - Roadway	10%	15.02	D	Pervious	1.50	0.005	91	0.99	0.20	0.82	0.004	0.10	0.20	0.02	0.001		
					Impervious	13.52	0.043	100	0.00	0.00	1.00	0.043						
2	Single Family Residential (Condominium)	35%	4.22	B	Pervious	1.48	0.005	76	3.16	0.63	0.54	0.003	0.35	0.30	0.11	0.001		
					Impervious	2.74	0.009	100	0.00	0.00	1.00	0.009						
3	Single Family Residential (Condominium)	35%	34.29	D	Pervious	12.00	0.038	91	0.99	0.20	0.82	0.031	0.35	0.20	0.07	0.008		
					Impervious	22.29	0.071	100	0.00	0.00	1.00	0.071						
4	Public Park	85%	12.22	B	Pervious	10.39	0.033	76	3.16	0.63	0.54	0.018	0.85	0.30	0.26	0.010		
					Impervious	1.83	0.006	100	0.00	0.00	1.00	0.006						
5	Public Park	85%	10.74	D	Pervious	9.13	0.029	91	0.99	0.20	0.82	0.024	0.85	0.20	0.17	0.006		
					Impervious	1.61	0.005	100	0.00	0.00	1.00	0.005						
6	Oil Operations	100%	4.78	A	Pervious	4.78	0.015	93	0.75	0.15	0.86	0.013	1.00	0.40	0.40	0.006		
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000						
7	Open Space / Habitat Area	100%	61.07	D	Pervious	61.07	0.193	96	0.42	0.08	0.92	0.177	1.00	0.20	0.20	0.039		
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000						
Total Area =					315.98		Y =					0.88		Total F _m =			0.12	
									Ybar = 1 - Y =					0.12				

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA B

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 100-Year Storm Event for Non-Mountainous Area (in) = 5.63

Total Area (ac) = 127.93

a_p - See Figure C-4

P24, 100-Year Storm Event for Mountainous Area (in) = 11.27

Y = 0.96

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.04**

Average a_p = 0.32

Total F_m (in/hr) = **0.06**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	5.35	D	Pervious	0.54	0.004	91	0.99	0.20	0.82	0.003	0.10	0.20	0.02	0.001
					Impervious	4.82	0.038	100	0.00	0.00	1.00	0.038				
2	Single Family Residential (>10 dwellings/acre)	20%	5.94	D	Pervious	1.19	0.009	91	0.99	0.20	0.82	0.008	0.20	0.20	0.04	0.002
					Impervious	4.75	0.037	100	0.00	0.00	1.00	0.037				
3	Commercial / Industrial	10%	78.14	D	Pervious	7.81	0.061	91	0.99	0.20	0.82	0.050	0.10	0.20	0.02	0.012
					Impervious	70.33	0.550	100	0.00	0.00	1.00	0.550				
4	School	60%	9.91	D	Pervious	5.95	0.046	91	0.99	0.20	0.82	0.038	0.60	0.20	0.12	0.009
					Impervious	3.96	0.031	100	0.00	0.00	1.00	0.031				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (Condominium)	35%	4.43	D	Pervious	1.55	0.012	91	0.99	0.20	0.82	0.010	0.35	0.20	0.07	0.002
					Impervious	2.88	0.023	100	0.00	0.00	1.00	0.023				
2	Open Space / Habitat Area	100%	24.16	D	Pervious	24.16	0.189	96	0.42	0.08	0.92	0.173	1.00	0.20	0.20	0.038
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				

Total Area = **127.93**

Y = **0.96**

Total F_m = **0.06**

Ybar = 1 - Y = **0.04**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA C

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 100-Year Storm Event for Non-Mountainous Area (in) = 5.63

Total Area (ac) = 104.35

a_p - See Figure C-4

P24, 100-Year Storm Event for Mountainous Area (in) = 11.27

Y = 0.94

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.06**

Average a_p = 0.61

Total F_m (in/hr) = **0.12**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Commercial / Industrial	10%	1.95	D	Pervious	0.20	0.002	91	0.99	0.20	0.82	0.002	0.10	0.20	0.02	0.000
					Impervious	1.76	0.017	100	0.00	0.00	1.00	0.017				
2	Oil Operations	100%	6.26	D	Pervious	6.26	0.060	99	0.10	0.02	0.98	0.059	1.00	0.20	0.20	0.012
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC III	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	11.35	D	Pervious	1.14	0.011	91	0.99	0.20	0.82	0.009	0.10	0.20	0.02	0.002
					Impervious	10.22	0.098	100	0.00	0.00	1.00	0.098				
2	Single Family Residential (Condominium)	35%	41.68	D	Pervious	14.59	0.140	91	0.99	0.20	0.82	0.114	0.35	0.20	0.07	0.028
					Impervious	27.09	0.260	100	0.00	0.00	1.00	0.260				
3	Public Park	85%	9.61	D	Pervious	8.17	0.078	91	0.99	0.20	0.82	0.064	0.85	0.20	0.17	0.016
					Impervious	1.44	0.014	100	0.00	0.00	1.00	0.014				
4	Oil Operations	100%	9.76	D	Pervious	9.76	0.094	99	0.10	0.02	0.98	0.092	1.00	0.20	0.20	0.019
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				
5	Open Space / Habitat Area	100%	23.74	D	Pervious	23.74	0.228	96	0.42	0.08	0.92	0.208	1.00	0.20	0.20	0.046
					Impervious	0.00	0.000	100	0.00	0.00	1.00	0.000				

Total Area = **104.35**

Y = **0.94**

Total F_m = **0.12**

Ybar = 1 - Y = **0.06**

INFILTRATION RATE CALCULATION SUMMARY
PROPOSED NEWPORT BANNING RANCH PROJECT
25-YEAR HIGH-CONFIDENCE EVENT

Proposed Condition			
Node	A	B	C
Total Area (ac)	315.98	127.93	104.35
Y	0.70	0.82	0.74
Ybar	0.30	0.18	0.26
Average a_p	0.47	0.32	0.61
Total Fm (in/hr)	0.12	0.06	0.12

INFILTRATION RATE CALCULATION SPREADSHEET
PROPOSED NEWPORT BANNING RANCH PROJECT
25-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA A

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

CN - See Figure C-1 and C-3

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

Total Area (ac) = 315.98

Y = 0.70

Ybar = 1 - Y = **0.30**

$$F_m = a_p F_p$$

a_p - See Figure C-4

F_p - See Table C-2

Average a_p = 0.47

Total F_m (in/hr) = **0.12**

Offsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _i
										S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)	
1	9	Urban Cover - Roadway	10%	7.57	A	Pervious	0.76	0.002	32	21.25	4.25	0.00	0.000	0.10	0.40	0.04	0.001	0.002
						Impervious	6.81	0.022	98	0.20	0.04	0.95	0.020					
2	9	Urban Cover - Roadway	10%	2.65	D	Pervious	0.27	0.001	75	3.33	0.67	0.45	0.000	0.10	0.20	0.02	0.000	0.001
						Impervious	2.39	0.008	98	0.20	0.04	0.95	0.007					
3	9	Single Family Residential (>10 dwellings/acre)	20%	45.27	A	Pervious	9.05	0.029	32	21.25	4.25	0.00	0.000	0.20	0.40	0.08	0.011	0.029
						Impervious	36.22	0.115	98	0.20	0.04	0.95	0.109					
4	9	Single Family Residential (>10 dwellings/acre)	20%	31.84	B	Pervious	6.37	0.020	56	7.86	1.57	0.18	0.004	0.20	0.30	0.06	0.006	0.020
						Impervious	25.47	0.081	98	0.20	0.04	0.95	0.076					
5	9	Single Family Residential (>10 dwellings/acre)	20%	26.51	D	Pervious	5.30	0.017	75	3.33	0.67	0.45	0.008	0.20	0.20	0.04	0.003	0.017
						Impervious	21.21	0.067	98	0.20	0.04	0.95	0.064					
6	9	Commercial / Industrial	10%	31.91	D	Pervious	3.19	0.010	75	3.33	0.67	0.45	0.005	0.10	0.20	0.02	0.002	0.010
						Impervious	28.72	0.091	98	0.20	0.04	0.95	0.086					
7	1	Oil Operations	100%	4.70	D	Pervious	4.70	0.015	93	0.75	0.15	0.82	0.012	1.00	0.20	0.20	0.003	0.015
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
8	6	Open Space / Habitat Area	100%	16.64	A	Pervious	16.64	0.053	46	11.74	2.35	0.07	0.004	1.00	0.40	0.40	0.021	0.053
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
9	1	Oxbow Loop Channel	10%	6.55	A	Pervious	0.66	0.002	78	2.82	0.56	0.51	0.001	0.10	0.40	0.04	0.001	0.002
						Impervious	5.90	0.019	98	0.20	0.04	0.95	0.018					

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

25-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA A

Onsite Area																									
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m											
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	a _p *A _j							
1	9	Urban Cover - Roadway	10%	15.02	D	Pervious	1.50	0.005	75	3.33	0.67	0.45	0.002	0.10	0.20	0.02	0.001	0.005							
						Impervious	13.52	0.043	98	0.20	0.04	0.95	0.041												
2	9	Single Family Residential (Condominium)	35%	4.22	B	Pervious	1.48	0.005	56	7.86	1.57	0.18	0.001	0.35	0.30	0.11	0.001	0.005							
						Impervious	2.74	0.009	98	0.20	0.04	0.95	0.008												
3	9	Single Family Residential (Condominium)	35%	34.29	D	Pervious	12.00	0.038	75	3.33	0.67	0.45	0.017	0.35	0.20	0.07	0.008	0.038							
						Impervious	22.29	0.071	98	0.20	0.04	0.95	0.067												
4	9	Public Park	85%	12.22	B	Pervious	10.39	0.033	56	7.86	1.57	0.18	0.006	0.85	0.30	0.26	0.010	0.033							
						Impervious	1.83	0.006	98	0.20	0.04	0.95	0.005												
5	9	Public Park	85%	10.74	D	Pervious	9.13	0.029	75	3.33	0.67	0.45	0.013	0.85	0.20	0.17	0.006	0.029							
						Impervious	1.61	0.005	98	0.20	0.04	0.95	0.005												
6	1	Oil Operations	100%	4.78	A	Pervious	4.78	0.015	78	2.82	0.56	0.51	0.008	1.00	0.40	0.40	0.006	0.015							
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000												
7	6	Open Space / Habitat Area	100%	61.07	D	Pervious	61.07	0.193	83	2.05	0.41	0.61	0.117	1.00	0.20	0.20	0.039	0.193							
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000												
Total Area =				315.98		Y = 0.70												Total F _m =		0.12		0.47			
										Y _{bar} = 1 - Y =								0.30							

INFILTRATION RATE CALCULATION SPREADSHEET
PROPOSED NEWPORT BANNING RANCH PROJECT
25-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA B

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49
P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Total Area (ac) = 127.93

Y = 0.82

Ybar = 1 - Y = **0.18**

a_p - See Figure C-4

F_p - See Table C-2

Average a_p = 0.32

Total F_m (in/hr) = **0.06**

Offsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _j
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	9	Urban Cover - Roadway	10%	5.35	D	Pervious	0.54	0.004	75	3.33	0.67	0.45	0.002	0.10	0.20	0.02	0.001	0.004
						Impervious	4.82	0.038	98	0.20	0.04	0.95	0.036					
2	9	Single Family Residential (>10 dwellings/acre)	20%	5.94	D	Pervious	1.19	0.009	75	3.33	0.67	0.45	0.004	0.20	0.20	0.04	0.002	0.009
						Impervious	4.75	0.037	98	0.20	0.04	0.95	0.035					
3	9	Commercial / Industrial	10%	78.14	D	Pervious	7.81	0.061	75	3.33	0.67	0.45	0.028	0.10	0.20	0.02	0.012	0.061
						Impervious	70.33	0.550	98	0.20	0.04	0.95	0.521					
4	9	School	60%	9.91	D	Pervious	5.95	0.046	75	3.33	0.67	0.45	0.021	0.60	0.20	0.12	0.009	0.046
						Impervious	3.96	0.031	98	0.20	0.04	0.95	0.029					
Onsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _j
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	9	Single Family Residential (Condominium)	35%	4.43	D	Pervious	1.55	0.012	75	3.33	0.67	0.45	0.006	0.35	0.20	0.07	0.002	0.012
						Impervious	2.88	0.023	98	0.20	0.04	0.95	0.021					
2	6	Open Space / Habitat Area	100%	24.16	D	Pervious	24.16	0.189	83	2.05	0.41	0.61	0.114	1.00	0.20	0.20	0.038	0.189
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					

Total Area = **127.93**

Y = **0.82**

Total F_m = **0.06** **0.32**

Ybar = 1 - Y = **0.18**

INFILTRATION RATE CALCULATION SPREADSHEET
PROPOSED NEWPORT BANNING RANCH PROJECT
25-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA C

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

4.49

Total Area (ac) = 104.35

a_p - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

8.76

Y = 0.74

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.26**

Average a_p = 0.61

Total F_m (in/hr) = **0.12**

Offsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _i
										S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)	
1	9	Commercial / Industrial	10%	1.95	D	Pervious	0.20	0.002	75	3.33	0.67	0.45	0.001	0.10	0.20	0.02	0.000	0.002
						Impervious	1.76	0.017	98	0.20	0.04	0.95	0.016					
2	1	Oil Operations	100%	6.26	D	Pervious	6.26	0.060	93	0.75	0.15	0.82	0.049	1.00	0.20	0.20	0.012	0.060
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
Onsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p *A _j
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	9	Urban Cover - Roadway	10%	11.35	D	Pervious	1.14	0.011	75	3.33	0.67	0.45	0.005	0.10	0.20	0.02	0.002	0.011
						Impervious	10.22	0.098	98	0.20	0.04	0.95	0.093					
2	9	Single Family Residential (Condominium)	35%	41.68	D	Pervious	14.59	0.140	75	3.33	0.67	0.45	0.064	0.35	0.20	0.07	0.028	0.140
						Impervious	27.09	0.260	98	0.20	0.04	0.95	0.246					
3	9	Public Park	85%	9.61	D	Pervious	8.17	0.078	75	3.33	0.67	0.45	0.036	0.85	0.20	0.17	0.016	0.078
						Impervious	1.44	0.014	98	0.20	0.04	0.95	0.013					
4	1	Oil Operations	100%	9.76	D	Pervious	9.76	0.094	93	0.75	0.15	0.82	0.077	1.00	0.20	0.20	0.019	0.094
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
5	6	Open Space / Habitat Area	100%	23.74	D	Pervious	23.74	0.228	83	2.05	0.41	0.61	0.138	1.00	0.20	0.20	0.046	0.228
						Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000					
Total Area =										Y =				Total F _m =				
										Ybar = 1 - Y =								
										0.74				0.12				0.61
										0.26								

INFILTRATION RATE CALCULATION SUMMARY
PROPOSED NEWPORT BANNING RANCH PROJECT
10-YEAR HIGH-CONFIDENCE EVENT

Proposed Condition			
Node	A	B	C
Total Area (ac)	315.98	127.93	104.35
Y	0.67	0.79	0.70
Ybar	0.33	0.21	0.30
Average a_p	0.47	0.32	0.61
Total Fm (in/hr)	0.12	0.06	0.12

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

10-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA A

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 10-Year Storm Event for Non-Mountainous Area (in) = 3.68

Total Area (ac) = 315.98

ap - See Figure C-4

P24, 10-Year Storm Event for Mountainous Area (in) = 7.05

Y = 0.67

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.33**

Average ap = 0.47

Total Fm (in/hr) = **0.12**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	7.57	A	Pervious	0.76	0.002	32	21.25	4.25	0.00	0.000	0.10	0.40	0.04	0.001
					Impervious	6.81	0.022	98	0.20	0.04	0.94	0.020				
2	Urban Cover - Roadway	10%	2.65	D	Pervious	0.27	0.001	75	3.33	0.67	0.39	0.000	0.10	0.20	0.02	0.000
					Impervious	2.39	0.008	98	0.20	0.04	0.94	0.007				
3	Single Family Residential (>10 dwellings/acre)	20%	45.27	A	Pervious	9.05	0.029	32	21.25	4.25	0.00	0.000	0.20	0.40	0.08	0.011
					Impervious	36.22	0.115	98	0.20	0.04	0.94	0.107				
4	Single Family Residential (>10 dwellings/acre)	20%	31.84	B	Pervious	6.37	0.020	56	7.86	1.57	0.12	0.002	0.20	0.30	0.06	0.006
					Impervious	25.47	0.081	98	0.20	0.04	0.94	0.075				
5	Single Family Residential (>10 dwellings/acre)	20%	26.51	D	Pervious	5.30	0.017	75	3.33	0.67	0.39	0.007	0.20	0.20	0.04	0.003
					Impervious	21.21	0.067	98	0.20	0.04	0.94	0.063				
6	Commercial / Industrial	10%	31.91	D	Pervious	3.19	0.010	75	3.33	0.67	0.39	0.004	0.10	0.20	0.02	0.002
					Impervious	28.72	0.091	98	0.20	0.04	0.94	0.085				
7	Oil Operations	100%	4.70	D	Pervious	4.70	0.015	93	0.75	0.15	0.79	0.012	1.00	0.20	0.20	0.003
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				
8	Open Space / Habitat Area	100%	16.64	A	Pervious	16.64	0.053	46	11.74	2.35	0.04	0.002	1.00	0.40	0.40	0.021
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				
9	Oxbow Loop Channel	10%	6.55	A	Pervious	0.66	0.002	78	2.82	0.56	0.44	0.001	0.10	0.40	0.04	0.001
					Impervious	5.90	0.019	98	0.20	0.04	0.94	0.017				

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

10-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA A

Onsite Area																			
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m						
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)			
1	Urban Cover - Roadway	10%	15.02	D	Pervious	1.50	0.005	75	3.33	0.67	0.39	0.002	0.10	0.20	0.02	0.001			
					Impervious	13.52	0.043	98	0.20	0.04	0.94	0.040							
2	Single Family Residential (Condominiums)	35%	4.22	B	Pervious	1.48	0.005	56	7.86	1.57	0.12	0.001	0.35	0.30	0.11	0.001			
					Impervious	2.74	0.009	98	0.20	0.04	0.94	0.008							
3	Single Family Residential (Condominiums)	35%	34.29	D	Pervious	12.00	0.038	75	3.33	0.67	0.39	0.015	0.35	0.20	0.07	0.008			
					Impervious	22.29	0.071	98	0.20	0.04	0.94	0.066							
4	Public Park	85%	12.22	B	Pervious	10.39	0.033	56	7.86	1.57	0.12	0.004	0.85	0.30	0.26	0.010			
					Impervious	1.83	0.006	98	0.20	0.04	0.94	0.005							
5	Public Park	85%	10.74	D	Pervious	9.13	0.029	75	3.33	0.67	0.39	0.011	0.85	0.20	0.17	0.006			
					Impervious	1.61	0.005	98	0.20	0.04	0.94	0.005							
6	Oil Operations	100%	4.78	A	Pervious	4.78	0.015	78	2.82	0.56	0.44	0.007	1.00	0.40	0.40	0.006			
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000							
7	Open Space / Habitat Area	100%	61.07	D	Pervious	61.07	0.193	83	2.05	0.41	0.55	0.106	1.00	0.20	0.20	0.039			
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000							
Total Area =					315.98		Y =					0.67		Total F _m =			0.12		
										Ybar = 1 - Y =					0.33				

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

10-YEAR HIGH-CONFIDENCE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA B

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 10-Year Storm Event for Non-Mountainous Area (in) = 3.68

Total Area (ac) = 127.93

a_p - See Figure C-4

P24, 10-Year Storm Event for Mountainous Area (in) = 7.05

Y = 0.79

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.21**

Average a_p = 0.32

Total F_m (in/hr) = **0.06**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	5.35	D	Pervious	0.54	0.004	75	3.33	0.67	0.39	0.002	0.10	0.20	0.02	0.001
					Impervious	4.82	0.038	98	0.20	0.04	0.94	0.035				
2	Single Family Residential (>10 dwellings/acre)	20%	5.94	D	Pervious	1.19	0.009	75	3.33	0.67	0.39	0.004	0.20	0.20	0.04	0.002
					Impervious	4.75	0.037	98	0.20	0.04	0.94	0.035				
3	Commercial / Industrial	10%	78.14	D	Pervious	7.81	0.061	75	3.33	0.67	0.39	0.024	0.10	0.20	0.02	0.012
					Impervious	70.33	0.550	98	0.20	0.04	0.94	0.515				
4	School	60%	9.91	D	Pervious	5.95	0.046	75	3.33	0.67	0.39	0.018	0.60	0.20	0.12	0.009
					Impervious	3.96	0.031	98	0.20	0.04	0.94	0.029				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (Condominiums)	35%	4.43	D	Pervious	1.55	0.012	75	3.33	0.67	0.39	0.005	0.35	0.20	0.07	0.002
					Impervious	2.88	0.023	98	0.20	0.04	0.94	0.021				
2	Open Space / Habitat Area	100%	24.16	D	Pervious	24.16	0.189	83	2.05	0.41	0.55	0.103	1.00	0.20	0.20	0.038
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				

Total Area = **127.93**

Y = **0.79**

Total F_m = **0.06**

Ybar = 1 - Y = **0.21**

INFILTRATION RATE CALCULATION SPREADSHEET
PROPOSED NEWPORT BANNING RANCH PROJECT
10-YEAR HIGH-CONFIDENCE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA C

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 10-Year Storm Event for Non-Mountainous Area (in) = 3.68

Total Area (ac) = 104.35

a_p - See Figure C-4

P24, 10-Year Storm Event for Mountainous Area (in) = 7.05

Y = 0.70

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.30**

Average a_p = 0.61

Total F_m (in/hr) = **0.12**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Commercial / Industrial	10%	1.95	D	Pervious	0.20	0.002	75	3.33	0.67	0.39	0.001	0.10	0.20	0.02	0.000
					Impervious	1.76	0.017	98	0.20	0.04	0.94	0.016				
2	Oil Operations	100%	6.26	D	Pervious	6.26	0.060	93	0.75	0.15	0.79	0.047	1.00	0.20	0.20	0.012
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	11.35	D	Pervious	1.14	0.011	75	3.33	0.67	0.39	0.004	0.10	0.20	0.02	0.002
					Impervious	10.22	0.098	98	0.20	0.04	0.94	0.092				
2	Single Family Residential (Condominiums)	35%	41.68	D	Pervious	14.59	0.140	75	3.33	0.67	0.39	0.054	0.35	0.20	0.07	0.028
					Impervious	27.09	0.260	98	0.20	0.04	0.94	0.243				
3	Public Park	85%	9.61	D	Pervious	8.17	0.078	75	3.33	0.67	0.39	0.030	0.85	0.20	0.17	0.016
					Impervious	1.44	0.014	98	0.20	0.04	0.94	0.013				
4	Oil Operations	100%	9.76	D	Pervious	9.76	0.094	93	0.75	0.15	0.79	0.074	1.00	0.20	0.20	0.019
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				
5	Open Space / Habitat Area	100%	23.74	D	Pervious	23.74	0.228	83	2.05	0.41	0.55	0.124	1.00	0.20	0.20	0.046
					Impervious	0.00	0.000	98	0.20	0.04	0.94	0.000				

Total Area = **104.35**

Y = **0.70**

Total F_m = **0.12**

Ybar = 1 - Y = **0.30**

ii. HC 100-Year Storm Event

Drainage A

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 316.00
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.120
LOW LOSS FRACTION = 0.120
TIME OF CONCENTRATION(MIN.) = 25.42
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 118.31
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 29.95

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	162.5	325.0	487.5	650.0
0.32	0.2940	21.94	.Q	.	.	.	.
0.75	1.0658	22.14	.Q	.	.	.	.
1.17	1.8501	22.66	.Q	.	.	.	.
1.60	2.6482	22.93	.Q	.	.	.	.
2.02	3.4609	23.49	.Q	.	.	.	.
2.44	4.2888	23.79	.Q	.	.	.	.
2.87	5.1327	24.42	.Q	.	.	.	.
3.29	5.9934	24.74	.Q	.	.	.	.
3.71	6.8719	25.44	.Q	.	.	.	.
4.14	7.7689	25.80	.Q	.	.	.	.
4.56	8.6858	26.57	.Q	.	.	.	.
4.98	9.6235	26.99	.Q	.	.	.	.
5.41	10.5836	27.86	.Q	.	.	.	.
5.83	11.5671	28.32	.Q	.	.	.	.
6.26	12.5761	29.31	.Q	.	.	.	.
6.68	13.6117	29.84	.Q	.	.	.	.
7.10	14.6766	30.98	.Q	.	.	.	.
7.53	15.7721	31.60	.Q	.	.	.	.
7.95	16.9017	32.92	.Q	.	.	.	.
8.37	18.0671	33.65	.Q	.	.	.	.
8.80	19.2727	35.22	.Q	.	.	.	.
9.22	20.5209	36.08	.Q	.	.	.	.
9.65	21.8174	37.98	.Q	.	.	.	.
10.07	23.1655	39.03	.Q	.	.	.	.
10.49	24.5732	41.38	.Q	.	.	.	.
10.92	26.0450	42.70	.Q	.	.	.	.
11.34	27.5926	45.70	.Q	.	.	.	.
11.76	29.2228	47.42	.Q	.	.	.	.
12.19	30.9912	53.59	.Q	.	.	.	.
12.61	33.1063	67.23	.Q	.	.	.	.
13.03	35.5652	73.22	.Q	.	.	.	.

					P100_A		
13.46	38.1927	76.86	.	Q	.	.	.
13.88	41.0444	86.03	.	Q	.	.	.
14.31	44.1614	92.01	.	Q	.	.	.
14.73	47.6813	109.05	.	Q	.	.	.
15.15	51.7150	121.36	.	Q	.	.	.
15.58	56.6173	158.66	.	Q	.	.	.
16.00	62.8749	198.77	.	Q	.	.	.
16.42	77.7198	649.18	.	.	.	Q.	.
16.85	91.5148	138.80	.	Q	.	.	.
17.27	95.6916	99.78	.	Q	.	.	.
17.69	98.8577	81.07	.	Q	.	.	.
18.12	101.5033	70.04	.	Q	.	.	.
18.54	103.5929	49.32	.	Q	.	.	.
18.97	105.2289	44.13	.	Q	.	.	.
19.39	106.7046	40.16	.	Q	.	.	.
19.81	108.0553	37.00	.	Q	.	.	.
20.24	109.3054	34.41	.	Q	.	.	.
20.66	110.4722	32.24	.	Q	.	.	.
21.08	111.5689	30.40	.	Q	.	.	.
21.51	112.6054	28.81	.	Q	.	.	.
21.93	113.5896	27.41	.	Q	.	.	.
22.36	114.5279	26.18	.	Q	.	.	.
22.78	115.4254	25.08	.	Q	.	.	.
23.20	116.2864	24.10	.	Q	.	.	.
23.63	117.1146	23.21	.	Q	.	.	.
24.05	117.9130	22.40	.	Q	.	.	.
24.47	118.3051	0.00	Q

Drainage B

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 127.90
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.060
LOW LOSS FRACTION = 0.040
TIME OF CONCENTRATION(MIN.) = 29.40
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 51.56
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 8.45

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	62.5	125.0	187.5	250.0
0.32	0.0000	0.00	Q	.	.	.	.
0.81	0.1992	9.84	.Q	.	.	.	.
1.30	0.6004	9.97	.Q	.	.	.	.
1.79	1.0099	10.25	.Q	.	.	.	.
2.28	1.4280	10.40	.Q	.	.	.	.
2.77	1.8554	10.71	.Q	.	.	.	.
3.26	2.2925	10.88	.Q	.	.	.	.
3.75	2.7400	11.23	.Q	.	.	.	.
4.24	3.1984	11.41	.Q	.	.	.	.
4.73	3.6687	11.81	.Q	.	.	.	.
5.22	4.1514	12.03	.Q	.	.	.	.
5.71	4.6478	12.49	.Q	.	.	.	.
6.20	5.1584	12.73	. Q	.	.	.	.
6.69	5.6850	13.27	. Q	.	.	.	.
7.18	6.2282	13.56	. Q	.	.	.	.
7.67	6.7901	14.19	. Q	.	.	.	.
8.16	7.3719	14.54	. Q	.	.	.	.
8.65	7.9762	15.31	. Q	.	.	.	.
9.14	8.6046	15.73	. Q	.	.	.	.

9.63	9.2607	16.68	. Q	.	.	.	.
10.12	9.9468	17.21	. Q	.	.	.	.
10.61	10.6681	18.42	. Q	.	.	.	.
11.10	11.4280	19.11	. Q	.	.	.	.
11.59	12.2346	20.73	. Q	.	.	.	.
12.08	13.0932	21.68	. Q	.	.	.	.
12.57	14.1380	29.92	. Q	.	.	.	.
13.06	15.3798	31.41	. Q	.	.	.	.
13.55	16.7275	35.15	. Q	.	.	.	.
14.04	18.2003	37.58	. Q	.	.	.	.
14.53	19.8639	44.58	. Q	.	.	.	.
15.02	21.7709	49.61	. Q	.	.	.	.
15.51	24.1445	67.62	. Q	.	.	.	.
16.00	27.1440	80.52	. Q	.	.	.	.
16.49	33.7762	247.03	.	.	.	Q.	.
16.98	39.9268	56.74	. Q.	.	.	.	.
17.47	41.8976	40.59	. Q	.	.	.	.
17.96	43.3903	33.13	. Q	.	.	.	.
18.45	44.5511	24.20	. Q	.	.	.	.
18.94	45.4434	19.88	. Q	.	.	.	.
19.43	46.2060	17.79	. Q	.	.	.	.
19.92	46.8938	16.18	. Q	.	.	.	.
20.41	47.5234	14.91	. Q	.	.	.	.
20.90	48.1061	13.87	. Q	.	.	.	.
21.39	48.6500	12.99	. Q	.	.	.	.
21.88	49.1612	12.25	.Q	.	.	.	.
22.37	49.6443	11.61	.Q	.	.	.	.
22.86	50.1031	11.05	.Q	.	.	.	.
23.35	50.5404	10.55	.Q	.	.	.	.
23.84	50.9587	10.11	.Q	.	.	.	.
24.33	51.3601	9.71	.Q
24.82	51.5567	0.00	Q

Drainage C

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 104.40
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
LOW LOSS FRACTION = 0.060
TIME OF CONCENTRATION(MIN.) = 14.82
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 41.38
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 7.60

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	75.0	150.0	225.0	300.0
0.19	0.0788	7.72	.Q	.	.	.	.
0.44	0.2371	7.80	.Q	.	.	.	.
0.69	0.3969	7.85	.Q	.	.	.	.
0.93	0.5582	7.96	.Q	.	.	.	.
1.18	0.7212	8.01	.Q	.	.	.	.
1.43	0.8858	8.12	.Q	.	.	.	.
1.67	1.0522	8.18	.Q	.	.	.	.
1.92	1.2204	8.30	.Q	.	.	.	.
2.17	1.3904	8.36	.Q	.	.	.	.
2.42	1.5624	8.48	.Q	.	.	.	.
2.66	1.7362	8.55	.Q	.	.	.	.
2.91	1.9121	8.68	.Q	.	.	.	.
3.16	2.0900	8.75	.Q	.	.	.	.
3.40	2.2700	8.89	.Q	.	.	.	.
3.65	2.4523	8.96	.Q	.	.	.	.
3.90	2.6368	9.11	.Q	.	.	.	.
4.14	2.8236	9.19	.Q	.	.	.	.
4.39	3.0129	9.35	.Q	.	.	.	.
4.64	3.2047	9.44	.Q	.	.	.	.

4.89	3.3990	9.61	.Q	.	.	.	.
5.13	3.5960	9.70	.Q	.	.	.	.
5.38	3.7959	9.88	.Q	.	.	.	.
5.63	3.9986	9.98	.Q	.	.	.	.
5.87	4.2043	10.18	.Q	.	.	.	.
6.12	4.4130	10.28	.Q	.	.	.	.
6.37	4.6251	10.50	.Q	.	.	.	.
6.61	4.8405	10.61	.Q	.	.	.	.
6.86	5.0594	10.84	.Q	.	.	.	.
7.11	5.2820	10.96	.Q	.	.	.	.
7.36	5.5084	11.22	.Q	.	.	.	.
7.60	5.7388	11.35	.Q	.	.	.	.
7.85	5.9734	11.63	.Q	.	.	.	.
8.10	6.2124	11.78	.Q	.	.	.	.
8.34	6.4560	12.09	.Q	.	.	.	.
8.59	6.7044	12.25	.Q	.	.	.	.
8.84	6.9580	12.59	.Q	.	.	.	.
9.08	7.2170	12.78	.Q	.	.	.	.
9.33	7.4817	13.16	.Q	.	.	.	.
9.58	7.7524	13.36	.Q	.	.	.	.
9.82	8.0295	13.79	.Q	.	.	.	.
10.07	8.3135	14.02	.Q	.	.	.	.
10.32	8.6047	14.51	.Q	.	.	.	.
10.57	8.9037	14.78	.Q	.	.	.	.
10.81	9.2111	15.34	. Q	.	.	.	.
11.06	9.5273	15.65	. Q	.	.	.	.
11.31	9.8534	16.30	. Q	.	.	.	.
11.55	10.1899	16.66	. Q	.	.	.	.
11.80	10.5379	17.44	. Q	.	.	.	.
12.05	10.8982	17.86	. Q	.	.	.	.
12.30	11.3208	23.54	. Q	.	.	.	.
12.54	11.8068	24.09	. Q	.	.	.	.
12.79	12.3110	25.31	. Q	.	.	.	.
13.04	12.8347	26.00	. Q	.	.	.	.
13.28	13.3811	27.54	. Q	.	.	.	.
13.53	13.9522	28.41	. Q	.	.	.	.
13.78	14.5529	30.44	. Q	.	.	.	.
14.02	15.1863	31.62	. Q	.	.	.	.
14.27	15.8624	34.62	. Q	.	.	.	.
14.52	16.5866	36.33	. Q	.	.	.	.
14.77	17.3722	40.64	. Q	.	.	.	.
15.01	18.2304	43.44	. Q	.	.	.	.
15.26	19.1966	51.23	. Q	.	.	.	.
15.51	20.2976	56.64	. Q	.	.	.	.
15.75	21.5949	70.47	. Q.	.	.	.	.
16.00	23.2997	96.56	. Q	.	.	.	.
16.25	27.3328	298.58	. Q.	.	.	.	.
16.49	30.9685	57.63	. Q	.	.	.	.
16.74	32.0350	46.87	. Q	.	.	.	.
16.99	32.9045	38.31	. Q	.	.	.	.
17.23	33.6320	32.97	. Q	.	.	.	.
17.48	34.2684	29.38	. Q	.	.	.	.
17.73	34.8411	26.73	. Q	.	.	.	.
17.98	35.3659	24.68	. Q	.	.	.	.
18.22	35.8187	19.69	. Q	.	.	.	.
18.47	36.1936	17.04	. Q	.	.	.	.
18.72	36.5305	15.97	. Q	.	.	.	.
18.96	36.8470	15.05	. Q	.	.	.	.
19.21	37.1463	14.26	.Q	.	.	.	.
19.46	37.4304	13.57	.Q	.	.	.	.
19.70	37.7012	12.96	.Q	.	.	.	.
19.95	37.9603	12.42	.Q	.	.	.	.
20.20	38.2089	11.93	.Q	.	.	.	.
20.45	38.4479	11.49	.Q	.	.	.	.
20.69	38.6784	11.09	.Q	.	.	.	.
20.94	38.9010	10.72	.Q	.	.	.	.
21.19	39.1165	10.39	.Q	.	.	.	.

21.43	39.3253	10.08	.Q	.	.	.	.
21.68	39.5281	9.79	.Q	.	.	.	.
21.93	39.7251	9.52	.Q	.	.	.	.
22.17	39.9169	9.27	.Q	.	.	.	.
22.42	40.1038	9.04	.Q	.	.	.	.
22.67	40.2861	8.82	.Q	.	.	.	.
22.92	40.4640	8.61	.Q	.	.	.	.
23.16	40.6379	8.42	.Q	.	.	.	.
23.41	40.8079	8.24	.Q	.	.	.	.
23.66	40.9744	8.07	.Q	.	.	.	.
23.90	41.1374	7.90	.Q	.	.	.	.
24.15	41.2971	7.75	.Q	.	.	.	.
24.40	41.3762	0.00	Q

iii. HC 25-Year Storm Event

Drainage A

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 316.00
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
LOW LOSS FRACTION = 0.300
TIME OF CONCENTRATION(MIN.) = 26.88
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 79.67
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 38.57

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	125.0	250.0	375.0	500.0
0.32	0.1800	13.61	.Q	.	.	.	.
0.77	0.6863	13.74	.Q	.	.	.	.
1.22	1.2014	14.08	.Q	.	.	.	.
1.66	1.7262	14.26	.Q	.	.	.	.
2.11	2.2614	14.64	.Q	.	.	.	.
2.56	2.8072	14.84	.Q	.	.	.	.
3.01	3.3646	15.26	.Q	.	.	.	.
3.46	3.9338	15.49	.Q	.	.	.	.
3.90	4.5159	15.96	.Q	.	.	.	.
4.35	5.1113	16.21	.Q	.	.	.	.
4.80	5.7211	16.74	.Q	.	.	.	.
5.25	6.3460	17.02	.Q	.	.	.	.
5.70	6.9872	17.62	.Q	.	.	.	.
6.14	7.6457	17.94	.Q	.	.	.	.
6.59	8.3229	18.64	.Q	.	.	.	.
7.04	9.0200	19.01	.Q	.	.	.	.
7.49	9.7389	19.82	.Q	.	.	.	.
7.94	10.4810	20.26	.Q	.	.	.	.
8.38	11.2490	21.22	.Q	.	.	.	.

8.83	12.0445	21.75	.Q	.	.	.	.
9.28	12.8712	22.91	.Q	.	.	.	.
9.73	13.7312	23.55	.Q	.	.	.	.
10.18	14.6298	24.99	.Q	.	.	.	.
10.62	15.5698	25.79	. Q	.	.	.	.
11.07	16.5588	27.63	. Q	.	.	.	.
11.52	17.6014	28.69	. Q	.	.	.	.
11.97	18.7089	31.14	. Q	.	.	.	.
12.42	19.9662	36.77	. Q	.	.	.	.
12.86	21.5157	46.93	. Q	.	.	.	.
13.31	23.2953	49.20	. Q	.	.	.	.
13.76	25.2224	54.90	. Q	.	.	.	.
14.21	27.3230	58.58	. Q	.	.	.	.
14.66	29.6665	68.01	. Q	.	.	.	.
15.10	32.3249	75.59	. Q	.	.	.	.
15.55	35.7192	107.76	. Q	.	.	.	.
16.00	40.2639	137.74	. .Q	.	.	.	.
16.45	51.9308	492.48	.	.	.	.Q.	.
16.90	62.6990	89.20	. Q	.	.	.	.
17.34	65.5079	62.53	. Q	.	.	.	.
17.79	67.6249	51.82	. Q	.	.	.	.
18.24	69.4163	44.95	. Q	.	.	.	.
18.69	70.8010	29.85	. Q	.	.	.	.
19.14	71.8473	26.67	. Q	.	.	.	.
19.58	72.7898	24.24	.Q	.	.	.	.
20.03	73.6515	22.31	.Q	.	.	.	.
20.48	74.4482	20.73	.Q	.	.	.	.
20.93	75.1913	19.41	.Q	.	.	.	.
21.38	75.8890	18.28	.Q	.	.	.	.
21.82	76.5480	17.31	.Q	.	.	.	.
22.27	77.1733	16.47	.Q	.	.	.	.
22.72	77.7691	15.72	.Q	.	.	.	.
23.17	78.3386	15.05	.Q	.	.	.	.
23.62	78.8847	14.45	.Q	.	.	.	.
24.06	79.4097	13.91	.Q
24.51	79.6672	0.00	Q

Drainage B

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 127.90
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.060
LOW LOSS FRACTION = 0.180
TIME OF CONCENTRATION(MIN.) = 30.94
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 36.77
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 11.08

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	47.5	95.0	142.5	190.0
0.01	0.0000	0.00	Q	.	.	.	.
0.53	0.1376	6.46	.Q	.	.	.	.
1.05	0.4161	6.62	.Q	.	.	.	.
1.56	0.7002	6.71	.Q	.	.	.	.
2.08	0.9907	6.92	.Q	.	.	.	.
2.59	1.2878	7.03	.Q	.	.	.	.
3.11	1.5922	7.26	.Q	.	.	.	.
3.62	1.9040	7.38	.Q	.	.	.	.
4.14	2.2240	7.64	.Q	.	.	.	.
4.66	2.5526	7.78	.Q	.	.	.	.
5.17	2.8906	8.08	.Q	.	.	.	.
5.69	3.2385	8.24	.Q	.	.	.	.
6.20	3.5973	8.59	.Q	.	.	.	.
6.72	3.9676	8.79	.Q	.	.	.	.
7.23	4.3509	9.20	.Q	.	.	.	.
7.75	4.7479	9.43	.Q	.	.	.	.
8.27	5.1605	9.93	. Q	.	.	.	.
8.78	5.5897	10.21	. Q	.	.	.	.
9.30	6.0381	10.83	. Q	.	.	.	.

9.81	6.5072	11.18	. Q	.	.	.	.
10.33	7.0008	11.98	. Q	.	.	.	.
10.84	7.5211	12.44	. Q	.	.	.	.
11.36	8.0738	13.50	. Q	.	.	.	.
11.87	8.6626	14.13	. Q	.	.	.	.
12.39	9.3656	18.86	. Q	.	.	.	.
12.91	10.2296	21.69	. Q	.	.	.	.
13.42	11.2074	24.20	. Q	.	.	.	.
13.94	12.2733	25.82	. Q	.	.	.	.
14.45	13.4633	30.02	. Q	.	.	.	.
14.97	14.8211	33.70	. Q	.	.	.	.
15.48	16.5736	48.55	. Q	.	.	.	.
16.00	18.8221	56.97	. .Q	.	.	.	.
16.52	24.0787	189.73	. .	.	.	. Q.	.
17.03	28.9624	39.46	. Q	.	.	.	.
17.55	30.3960	27.81	. Q	.	.	.	.
18.06	31.4754	22.84	. Q	.	.	.	.
18.58	32.2784	14.84	. Q	.	.	.	.
19.09	32.8704	12.94	. Q	.	.	.	.
19.61	33.3925	11.56	. Q	.	.	.	.
20.13	33.8629	10.51	. Q	.	.	.	.
20.64	34.2930	9.67	. Q	.	.	.	.
21.16	34.6906	8.99	.Q	.	.	.	.
21.67	35.0614	8.41	.Q	.	.	.	.
22.19	35.4096	7.93	.Q	.	.	.	.
22.70	35.7385	7.51	.Q	.	.	.	.
23.22	36.0505	7.14	.Q	.	.	.	.
23.73	36.3478	6.81	.Q	.	.	.	.
24.25	36.6321	6.52	.Q
24.77	36.7711	0.00	Q

Drainage C

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 104.40
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
LOW LOSS FRACTION = 0.260
TIME OF CONCENTRATION(MIN.) = 15.18
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 27.23
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 11.83

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	57.5	115.0	172.5	230.0
0.06	0.0000	0.00	Q	.	.	.	.
0.31	0.0497	4.75	Q	.	.	.	.
0.57	0.1497	4.81	Q	.	.	.	.
0.82	0.2507	4.85	Q	.	.	.	.
1.07	0.3528	4.92	Q	.	.	.	.
1.33	0.4559	4.95	Q	.	.	.	.
1.58	0.5602	5.02	Q	.	.	.	.
1.83	0.6656	5.06	Q	.	.	.	.
2.08	0.7723	5.14	Q	.	.	.	.
2.34	0.8801	5.18	Q	.	.	.	.
2.59	0.9892	5.26	Q	.	.	.	.
2.84	1.0996	5.30	Q	.	.	.	.
3.10	1.2114	5.39	Q	.	.	.	.
3.35	1.3245	5.43	Q	.	.	.	.
3.60	1.4390	5.52	Q	.	.	.	.
3.86	1.5550	5.57	Q	.	.	.	.
4.11	1.6726	5.67	Q	.	.	.	.
4.36	1.7917	5.72	Q	.	.	.	.
4.61	1.9124	5.83	.Q	.	.	.	.

4.87	2.0348	5.88	.Q	.	.	.	.
5.12	2.1590	6.00	.Q	.	.	.	.
5.37	2.2850	6.05	.Q	.	.	.	.
5.63	2.4129	6.18	.Q	.	.	.	.
5.88	2.5427	6.24	.Q	.	.	.	.
6.13	2.6745	6.37	.Q	.	.	.	.
6.39	2.8085	6.44	.Q	.	.	.	.
6.64	2.9447	6.59	.Q	.	.	.	.
6.89	3.0832	6.66	.Q	.	.	.	.
7.14	3.2242	6.82	.Q	.	.	.	.
7.40	3.3676	6.90	.Q	.	.	.	.
7.65	3.5137	7.07	.Q	.	.	.	.
7.90	3.6626	7.16	.Q	.	.	.	.
8.16	3.8143	7.35	.Q	.	.	.	.
8.41	3.9692	7.45	.Q	.	.	.	.
8.66	4.1273	7.67	.Q	.	.	.	.
8.92	4.2887	7.78	.Q	.	.	.	.
9.17	4.4538	8.01	.Q	.	.	.	.
9.42	4.6227	8.14	.Q	.	.	.	.
9.68	4.7957	8.41	.Q	.	.	.	.
9.93	4.9729	8.55	.Q	.	.	.	.
10.18	5.1548	8.85	.Q	.	.	.	.
10.43	5.3415	9.01	.Q	.	.	.	.
10.69	5.5336	9.36	.Q	.	.	.	.
10.94	5.7313	9.55	.Q	.	.	.	.
11.19	5.9353	9.96	.Q	.	.	.	.
11.45	6.1458	10.18	.Q	.	.	.	.
11.70	6.3636	10.66	.Q	.	.	.	.
11.95	6.5892	10.92	.Q	.	.	.	.
12.20	6.8515	14.16	. Q	.	.	.	.
12.46	7.1623	15.56	. Q	.	.	.	.
12.71	7.4957	16.33	. Q	.	.	.	.
12.96	7.8417	16.76	. Q	.	.	.	.
13.22	8.2023	17.73	. Q	.	.	.	.
13.47	8.5786	18.28	. Q	.	.	.	.
13.72	8.9740	19.54	. Q	.	.	.	.
13.98	9.3903	20.28	. Q	.	.	.	.
14.23	9.8301	21.79	. Q	.	.	.	.
14.48	10.2965	22.82	. Q	.	.	.	.
14.73	10.8016	25.49	. Q	.	.	.	.
14.99	11.3527	27.22	. Q	.	.	.	.
15.24	11.9723	32.05	. Q	.	.	.	.
15.49	12.6927	36.86	. Q	.	.	.	.
15.75	13.5619	46.28	. Q	.	.	.	.
16.00	14.8082	72.92	. Q	.	.	.	.
16.25	17.9666	229.18	.	.	.	.	.Q.
16.51	20.7392	36.03	. Q	.	.	.	.
16.76	21.4227	29.35	. Q	.	.	.	.
17.01	21.9810	24.05	. Q	.	.	.	.
17.27	22.4530	21.10	. Q	.	.	.	.
17.52	22.8710	18.88	. Q	.	.	.	.
17.77	23.2484	17.22	. Q	.	.	.	.
18.02	23.5951	15.93	. Q	.	.	.	.
18.28	23.8788	11.20	.Q	.	.	.	.
18.53	24.1048	10.41	.Q	.	.	.	.
18.78	24.3155	9.75	.Q	.	.	.	.
19.04	24.5134	9.18	.Q	.	.	.	.
19.29	24.7003	8.70	.Q	.	.	.	.
19.54	24.8777	8.27	.Q	.	.	.	.
19.80	25.0467	7.89	.Q	.	.	.	.
20.05	25.2082	7.56	.Q	.	.	.	.
20.30	25.3631	7.26	.Q	.	.	.	.
20.55	25.5120	6.99	.Q	.	.	.	.
20.81	25.6555	6.74	.Q	.	.	.	.
21.06	25.7941	6.51	.Q	.	.	.	.
21.31	25.9281	6.31	.Q	.	.	.	.
21.57	26.0580	6.12	.Q	.	.	.	.

21.82	26.1840	5.94	.Q	.	.	.	.
22.07	26.3064	5.77	.Q	.	.	.	.
22.33	26.4255	5.62	Q	.	.	.	.
22.58	26.5416	5.48	Q	.	.	.	.
22.83	26.6547	5.34	Q	.	.	.	.
23.08	26.7651	5.22	Q	.	.	.	.
23.34	26.8730	5.10	Q	.	.	.	.
23.59	26.9784	4.99	Q	.	.	.	.
23.84	27.0816	4.88	Q	.	.	.	.
24.10	27.1826	4.78	Q	.	.	.	.
24.35	27.2326	0.00	Q

iv. HC 10-Year Storm Event

Drainage A

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 316.00
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
LOW LOSS FRACTION = 0.330
TIME OF CONCENTRATION(MIN.) = 28.16
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 62.99
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 33.91

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	100.0	200.0	300.0	400.0
0.04	0.0000	0.00	Q	.	.	.	.
0.51	0.2119	10.93	.Q	.	.	.	.
0.98	0.6385	11.07	.Q	.	.	.	.
1.45	1.0734	11.36	.Q	.	.	.	.
1.92	1.5169	11.51	.Q	.	.	.	.
2.39	1.9697	11.83	.Q	.	.	.	.
2.86	2.4320	12.00	.Q	.	.	.	.
3.33	2.9046	12.36	.Q	.	.	.	.
3.80	3.3879	12.56	.Q	.	.	.	.
4.27	3.8827	12.96	.Q	.	.	.	.
4.74	4.3897	13.18	.Q	.	.	.	.
5.21	4.9098	13.64	.Q	.	.	.	.
5.67	5.4437	13.89	.Q	.	.	.	.
6.14	5.9927	14.42	.Q	.	.	.	.
6.61	6.5575	14.71	.Q	.	.	.	.
7.08	7.1400	15.32	.Q	.	.	.	.
7.55	7.7409	15.66	.Q	.	.	.	.
8.02	8.3626	16.39	.Q	.	.	.	.
8.49	9.0063	16.80	.Q	.	.	.	.

8.96	9.6749	17.68	.Q	.	.	.	.
9.43	10.3703	18.17	.Q	.	.	.	.
9.90	11.0964	19.27	.Q	.	.	.	.
10.37	11.8557	19.88	.Q	.	.	.	.
10.84	12.6541	21.28	. Q	.	.	.	.
11.31	13.4953	22.09	. Q	.	.	.	.
11.78	14.3883	23.96	. Q	.	.	.	.
12.25	15.3390	25.06	. Q	.	.	.	.
12.71	16.4967	34.63	. Q	.	.	.	.
13.18	17.8734	36.35	. Q	.	.	.	.
13.65	19.3674	40.68	. Q	.	.	.	.
14.12	20.9996	43.48	. Q	.	.	.	.
14.59	22.8386	51.34	. Q	.	.	.	.
15.06	24.9424	57.14	. Q	.	.	.	.
15.53	27.6104	80.42	. Q	.	.	.	.
16.00	31.1534	102.27	. Q	.	.	.	.
16.47	40.7151	390.76	.	.	.	.	Q.
16.94	49.5613	65.38	. Q	.	.	.	.
17.41	51.7396	46.94	. Q	.	.	.	.
17.88	53.3936	38.34	. Q	.	.	.	.
18.35	54.7513	31.66	. Q	.	.	.	.
18.82	55.8110	22.97	. Q	.	.	.	.
19.29	56.6551	20.55	. Q	.	.	.	.
19.75	57.4164	18.70	.Q	.	.	.	.
20.22	58.1131	17.22	.Q	.	.	.	.
20.69	58.7577	16.02	.Q	.	.	.	.
21.16	59.3594	15.01	.Q	.	.	.	.
21.63	59.9248	14.15	.Q	.	.	.	.
22.10	60.4592	13.40	.Q	.	.	.	.
22.57	60.9665	12.75	.Q	.	.	.	.
23.04	61.4501	12.18	.Q	.	.	.	.
23.51	61.9126	11.67	.Q	.	.	.	.
23.98	62.3563	11.21	.Q	.	.	.	.
24.45	62.7842	10.85	.Q
24.92	62.9946	0.00	Q

Drainage B

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 127.90
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.060
LOW LOSS FRACTION = 0.210
TIME OF CONCENTRATION(MIN.) = 32.10
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 29.17
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 10.05

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	40.0	80.0	120.0	160.0
0.49	0.1043	5.21	.Q	.	.	.	.
1.02	0.3361	5.28	.Q	.	.	.	.
1.56	0.5728	5.43	.Q	.	.	.	.
2.09	0.8150	5.52	.Q	.	.	.	.
2.63	1.0629	5.70	.Q	.	.	.	.
3.16	1.3169	5.79	.Q	.	.	.	.
3.70	1.5775	6.00	.Q	.	.	.	.
4.23	1.8450	6.10	.Q	.	.	.	.
4.77	2.1200	6.34	.Q	.	.	.	.
5.30	2.4030	6.46	.Q	.	.	.	.
5.84	2.6948	6.74	.Q	.	.	.	.
6.37	2.9959	6.88	.Q	.	.	.	.
6.91	3.3073	7.21	.Q	.	.	.	.
7.44	3.6298	7.38	.Q	.	.	.	.
7.98	3.9648	7.77	.Q	.	.	.	.
8.51	4.3132	7.99	.Q	.	.	.	.
9.05	4.6770	8.47	. Q	.	.	.	.
9.58	5.0574	8.74	. Q	.	.	.	.
10.12	5.4574	9.35	. Q	.	.	.	.

10.65	5.8788	9.71	. Q	.	.	.	.
11.19	6.3262	10.53	. Q	.	.	.	.
11.72	6.8025	11.01	. Q	.	.	.	.
12.26	7.3308	12.88	. Q	.	.	.	.
12.79	7.9734	16.18	. Q	.	.	.	.
13.32	8.7315	18.11	. Q	.	.	.	.
13.86	9.5597	19.36	. Q	.	.	.	.
14.40	10.4928	22.85	. Q	.	.	.	.
14.93	11.5603	25.44	. Q	.	.	.	.
15.47	12.9464	37.26	. Q.	.	.	.	.
16.00	14.7633	44.92	. .Q	.	.	.	.
16.53	19.1223	152.26	. .	.	.	Q	.
17.07	23.1500	29.93	. Q	.	.	.	.
17.61	24.2736	20.89	. Q	.	.	.	.
18.14	25.1128	17.07	. Q	.	.	.	.
18.67	25.7457	11.56	. Q	.	.	.	.
19.21	26.2245	10.10	. Q	.	.	.	.
19.74	26.6474	9.03	. Q	.	.	.	.
20.28	27.0288	8.22	. Q	.	.	.	.
20.82	27.3779	7.57	.Q	.	.	.	.
21.35	27.7009	7.04	.Q	.	.	.	.
21.89	28.0023	6.60	.Q	.	.	.	.
22.42	28.2856	6.22	.Q	.	.	.	.
22.95	28.5533	5.89	.Q	.	.	.	.
23.49	28.8075	5.61	.Q	.	.	.	.
24.02	29.0497	5.35	.Q
24.56	29.1681	0.00	Q

Drainage C

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 104.40
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
LOW LOSS FRACTION = 0.300
TIME OF CONCENTRATION(MIN.) = 15.44
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 21.35
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 10.66

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	47.5	95.0	142.5	190.0
0.05	0.0000	0.00	Q	.	.	.	.
0.30	0.0400	3.76	Q	.	.	.	.
0.56	0.1203	3.79	Q	.	.	.	.
0.82	0.2014	3.84	Q	.	.	.	.
1.07	0.2834	3.87	Q	.	.	.	.
1.33	0.3662	3.92	Q	.	.	.	.
1.59	0.4500	3.95	Q	.	.	.	.
1.85	0.5347	4.01	Q	.	.	.	.
2.10	0.6203	4.04	Q	.	.	.	.
2.36	0.7070	4.11	Q	.	.	.	.
2.62	0.7947	4.14	Q	.	.	.	.
2.88	0.8834	4.20	Q	.	.	.	.
3.13	0.9732	4.24	Q	.	.	.	.
3.39	1.0641	4.31	Q	.	.	.	.
3.65	1.1561	4.35	Q	.	.	.	.
3.91	1.2494	4.42	Q	.	.	.	.
4.16	1.3439	4.46	Q	.	.	.	.
4.42	1.4397	4.54	Q	.	.	.	.
4.68	1.5368	4.59	Q	.	.	.	.

4.93	1.6352	4.67	Q	.	.	.	.
5.19	1.7351	4.72	Q	.	.	.	.
5.45	1.8365	4.81	.Q	.	.	.	.
5.71	1.9394	4.86	.Q	.	.	.	.
5.96	2.0439	4.97	.Q	.	.	.	.
6.22	2.1501	5.02	.Q	.	.	.	.
6.48	2.2580	5.13	.Q	.	.	.	.
6.74	2.3677	5.19	.Q	.	.	.	.
6.99	2.4793	5.31	.Q	.	.	.	.
7.25	2.5928	5.37	.Q	.	.	.	.
7.51	2.7085	5.50	.Q	.	.	.	.
7.77	2.8263	5.57	.Q	.	.	.	.
8.02	2.9464	5.72	.Q	.	.	.	.
8.28	3.0689	5.80	.Q	.	.	.	.
8.54	3.1939	5.96	.Q	.	.	.	.
8.79	3.3216	6.05	.Q	.	.	.	.
9.05	3.4521	6.23	.Q	.	.	.	.
9.31	3.5856	6.32	.Q	.	.	.	.
9.57	3.7223	6.53	.Q	.	.	.	.
9.82	3.8623	6.64	.Q	.	.	.	.
10.08	4.0059	6.87	.Q	.	.	.	.
10.34	4.1534	7.00	.Q	.	.	.	.
10.60	4.3050	7.26	.Q	.	.	.	.
10.85	4.4610	7.41	.Q	.	.	.	.
11.11	4.6218	7.72	.Q	.	.	.	.
11.37	4.7878	7.89	.Q	.	.	.	.
11.63	4.9595	8.26	.Q	.	.	.	.
11.88	5.1373	8.46	.Q	.	.	.	.
12.14	5.3298	9.65	. Q	.	.	.	.
12.40	5.5549	11.51	. Q	.	.	.	.
12.65	5.8060	12.10	. Q	.	.	.	.
12.91	6.0668	12.42	. Q	.	.	.	.
13.17	6.3388	13.16	. Q	.	.	.	.
13.43	6.6232	13.58	. Q	.	.	.	.
13.68	6.9222	14.55	. Q	.	.	.	.
13.94	7.2376	15.11	. Q	.	.	.	.
14.20	7.5733	16.46	. Q	.	.	.	.
14.46	7.9321	17.28	. Q	.	.	.	.
14.71	8.3215	19.34	. Q	.	.	.	.
14.97	8.7469	20.67	. Q	.	.	.	.
15.23	9.2259	24.38	. Q	.	.	.	.
15.49	9.7776	27.50	. Q	.	.	.	.
15.74	10.4480	35.54	. Q	.	.	.	.
16.00	11.4174	55.62	. .Q	.	.	.	.
16.26	14.0056	187.78	.	.	.	Q.	.
16.51	16.2955	27.56	. Q	.	.	.	.
16.77	16.8258	22.31	. Q	.	.	.	.
17.03	17.2568	18.23	. Q	.	.	.	.
17.29	17.6180	15.74	. Q	.	.	.	.
17.54	17.9346	14.04	. Q	.	.	.	.
17.80	18.2198	12.78	. Q	.	.	.	.
18.06	18.4811	11.80	. Q	.	.	.	.
18.32	18.6988	8.68	.Q	.	.	.	.
18.57	18.8768	8.07	.Q	.	.	.	.
18.83	19.0430	7.56	.Q	.	.	.	.
19.09	19.1991	7.13	.Q	.	.	.	.
19.35	19.3467	6.75	.Q	.	.	.	.
19.60	19.4868	6.42	.Q	.	.	.	.
19.86	19.6204	6.14	.Q	.	.	.	.
20.12	19.7481	5.88	.Q	.	.	.	.
20.37	19.8707	5.65	.Q	.	.	.	.
20.63	19.9885	5.44	.Q	.	.	.	.
20.89	20.1021	5.25	.Q	.	.	.	.
21.15	20.2119	5.07	.Q	.	.	.	.
21.40	20.3181	4.91	.Q	.	.	.	.
21.66	20.4210	4.77	.Q	.	.	.	.
21.92	20.5209	4.63	Q	.	.	.	.

22.18	20.6180	4.50	Q	.	.	.	.
22.43	20.7125	4.38	Q	.	.	.	.
22.69	20.8046	4.27	Q	.	.	.	.
22.95	20.8944	4.17	Q	.	.	.	.
23.21	20.9821	4.07	Q	.	.	.	.
23.46	21.0677	3.98	Q	.	.	.	.
23.72	21.1515	3.90	Q	.	.	.	.
23.98	21.2335	3.81	Q	.	.	.	.
24.23	21.3139	3.75	Q	.	.	.	.
24.49	21.3537	0.00	Q	.	.	.	.

b) Expected Value (50% Confidence) Events (

i. Infiltration Analysis

INFILTRATION RATE CALCULATION SUMMARY
PROPOSED NEWPORT BANNING RANCH PROJECT
100-YEAR EXPECTED VALUE EVENT

Proposed Condition			
Node	A	B	C
Total Area (ac)	315.98	127.93	104.35
Y	0.70	0.82	0.74
Ybar	0.30	0.18	0.26
Average a_p	0.47	0.32	0.61
Total Fm (in/hr)	0.14	0.10	0.18

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA A

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

Total Area (ac) = 315.98

ap - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Y = 0.70

Fp - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.30**

Average ap = 0.47

Total Fm (in/hr) = **0.14**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	7.57	A	Pervious	0.76	0.002	32	21.25	4.25	0.00	0.000	0.10	0.30	0.03	0.001
					Impervious	6.81	0.022	98	0.20	0.04	0.95	0.020				
2	Urban Cover - Roadway	10%	2.65	D	Pervious	0.27	0.001	75	3.33	0.67	0.45	0.000	0.10	0.30	0.03	0.000
					Impervious	2.39	0.008	98	0.20	0.04	0.95	0.007				
3	Single Family Residential (>10 dwellings/acre)	20%	45.27	A	Pervious	9.05	0.029	32	21.25	4.25	0.00	0.000	0.20	0.30	0.06	0.009
					Impervious	36.22	0.115	98	0.20	0.04	0.95	0.109				
4	Single Family Residential (>10 dwellings/acre)	20%	31.84	B	Pervious	6.37	0.020	56	7.86	1.57	0.18	0.004	0.20	0.30	0.06	0.006
					Impervious	25.47	0.081	98	0.20	0.04	0.95	0.076				
5	Single Family Residential (>10 dwellings/acre)	20%	26.51	D	Pervious	5.30	0.017	75	3.33	0.67	0.45	0.008	0.20	0.30	0.06	0.005
					Impervious	21.21	0.067	98	0.20	0.04	0.95	0.064				
6	Commercial / Industrial	10%	31.91	D	Pervious	3.19	0.010	75	3.33	0.67	0.45	0.005	0.10	0.30	0.03	0.003
					Impervious	28.72	0.091	98	0.20	0.04	0.95	0.086				
7	Oil Operations	100%	4.70	D	Pervious	4.70	0.015	93	0.75	0.15	0.82	0.012	1.00	0.30	0.30	0.004
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				
8	Open Space / Habitat Area	100%	16.64	A	Pervious	16.64	0.053	46	11.74	2.35	0.07	0.004	1.00	0.30	0.30	0.016
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				
9	Oxbow Loop Channel	10%	6.55	A	Pervious	0.66	0.002	78	2.82	0.56	0.51	0.001	0.10	0.30	0.03	0.001
					Impervious	5.90	0.019	98	0.20	0.04	0.95	0.018				

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA A

Onsite Area																		
No.	Land Use	Pervious- ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m					
									S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)		
1	Urban Cover - Roadway	10%	15.02	D	Pervious	1.50	0.005	75	3.33	0.67	0.45	0.002	0.10	0.30	0.03	0.001		
					Impervious	13.52	0.043	98	0.20	0.04	0.95	0.041						
2	Single Family Residential (Condominiums)	35%	4.22	B	Pervious	1.48	0.005	56	7.86	1.57	0.18	0.001	0.35	0.30	0.11	0.001		
					Impervious	2.74	0.009	98	0.20	0.04	0.95	0.008						
3	Single Family Residential (Condominiums)	35%	34.29	D	Pervious	12.00	0.038	75	3.33	0.67	0.45	0.017	0.35	0.30	0.11	0.011		
					Impervious	22.29	0.071	98	0.20	0.04	0.95	0.067						
4	Public Park	85%	12.22	B	Pervious	10.39	0.033	56	7.86	1.57	0.18	0.006	0.85	0.30	0.26	0.010		
					Impervious	1.83	0.006	98	0.20	0.04	0.95	0.005						
5	Public Park	85%	10.74	D	Pervious	9.13	0.029	75	3.33	0.67	0.45	0.013	0.85	0.30	0.26	0.009		
					Impervious	1.61	0.005	98	0.20	0.04	0.95	0.005						
6	Oil Operations	100%	4.78	A	Pervious	4.78	0.015	78	2.82	0.56	0.51	0.008	1.00	0.30	0.30	0.005		
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000						
7	Open Space / Habitat Area	100%	61.07	D	Pervious	61.07	0.193	83	2.05	0.41	0.61	0.117	1.00	0.30	0.30	0.058		
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000						
Total Area =					315.98		Y =					0.70		Total F _m =			0.14	
									Ybar = 1 - Y =					0.30				

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA B

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

Total Area (ac) = 127.93

a_p - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Y = 0.82

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.18**

Average a_p = 0.32

Total F_m (in/hr) = **0.10**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	5.35	D	Pervious	0.54	0.004	75	3.33	0.67	0.45	0.002	0.10	0.30	0.03	0.001
					Impervious	4.82	0.038	98	0.20	0.04	0.95	0.036				
2	Single Family Residential (>10 dwellings/acre)	20%	5.94	D	Pervious	1.19	0.009	75	3.33	0.67	0.45	0.004	0.20	0.30	0.06	0.003
					Impervious	4.75	0.037	98	0.20	0.04	0.95	0.035				
3	Commercial / Industrial	10%	78.14	D	Pervious	7.81	0.061	75	3.33	0.67	0.45	0.028	0.10	0.30	0.03	0.018
					Impervious	70.33	0.550	98	0.20	0.04	0.95	0.521				
4	School	60%	9.91	D	Pervious	5.95	0.046	75	3.33	0.67	0.45	0.021	0.60	0.30	0.18	0.014
					Impervious	3.96	0.031	98	0.20	0.04	0.95	0.029				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Single Family Residential (Condominiums)	35%	4.43	D	Pervious	1.55	0.012	75	3.33	0.67	0.45	0.006	0.35	0.30	0.11	0.004
					Impervious	2.88	0.023	98	0.20	0.04	0.95	0.021				
2	Open Space / Habitat Area	100%	24.16	D	Pervious	24.16	0.189	83	2.05	0.41	0.61	0.114	1.00	0.30	0.30	0.057
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				

Total Area = **127.93**

Y = **0.82**

Total F_m = **0.10**

Ybar = 1 - Y = **0.18**

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

100-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA C

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j \quad F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2 S$$

P24, 25-Year Storm Event for Non-Mountainous Area (in) = 4.49

Total Area (ac) = 104.35

a_p - See Figure C-4

P24, 25-Year Storm Event for Mountainous Area (in) = 8.76

Y = 0.74

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.26**

Average a_p = 0.61

Total F_m (in/hr) = **0.18**

Offsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Commercial / Industrial	10%	1.95	D	Pervious	0.20	0.002	75	3.33	0.67	0.45	0.001	0.10	0.30	0.03	0.001
					Impervious	1.76	0.017	98	0.20	0.04	0.95	0.016				
2	Oil Operations	100%	6.26	D	Pervious	6.26	0.060	93	0.75	0.15	0.82	0.049	1.00	0.30	0.30	0.018
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				
Onsite Area																
No.	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m			
									S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)
1	Urban Cover - Roadway	10%	11.35	D	Pervious	1.14	0.011	75	3.33	0.67	0.45	0.005	0.10	0.30	0.03	0.003
					Impervious	10.22	0.098	98	0.20	0.04	0.95	0.093				
2	Single Family Residential (Condominiums)	35%	41.68	D	Pervious	14.59	0.140	75	3.33	0.67	0.45	0.064	0.35	0.30	0.11	0.042
					Impervious	27.09	0.260	98	0.20	0.04	0.95	0.246				
3	Public Park	85%	9.61	D	Pervious	8.17	0.078	75	3.33	0.67	0.45	0.036	0.85	0.30	0.26	0.023
					Impervious	1.44	0.014	98	0.20	0.04	0.95	0.013				
4	Oil Operations	100%	9.76	D	Pervious	9.76	0.094	93	0.75	0.15	0.82	0.077	1.00	0.30	0.30	0.028
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				
5	Open Space / Habitat Area	100%	23.74	D	Pervious	23.74	0.228	83	2.05	0.41	0.61	0.138	1.00	0.30	0.30	0.068
					Impervious	0.00	0.000	98	0.20	0.04	0.95	0.000				

Total Area = **104.35**

Y = **0.74**

Total F_m = **0.18**

Ybar = 1 - Y = **0.26**

INFILTRATION RATE CALCULATION SUMMARY
PROPOSED NEWPORT BANNING RANCH PROJECT
2-YEAR EXPECTED VALUE EVENT

Proposed Condition			
Node	A	B	C
Total Area (ac)	315.98	127.93	104.35
Y	0.53	0.63	0.49
Ybar	0.47	0.37	0.51
Average a_p	0.47	0.32	0.61
Total Fm (in/hr)	0.28	0.19	0.37

INFILTRATION RATE CALCULATION SPREADSHEET
PROPOSED NEWPORT BANNING RANCH PROJECT
2-YEAR EXPECTED VALUE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA A

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

P24, 2-Year Storm Event for Non-Mountainous Area (in) = 1.44
P24, 2-Year Storm Event for Mountainous Area (in) = 2.67

Total Area (ac) = 315.98

Y = 0.53

Ybar = 1 - Y = **0.47**

a_p - See Figure C-4

F_p - See Table C-2

Average a_p = 0.47

Total F_m (in/hr) = **0.28**

Offsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m				a _p *A _j
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	
1	9	Urban Cover - Roadway	10%	7.57	A	Pervious	0.76	0.002	32	21.25	4.25	0.30	0.001	0.10	0.60	0.06	0.001	0.002
						Impervious	6.81	0.022	98	0.20	0.04	0.85	0.018					
2	9	Urban Cover - Roadway	10%	2.65	D	Pervious	0.27	0.001	75	3.33	0.67	0.10	0.000	0.10	0.60	0.06	0.001	0.001
						Impervious	2.39	0.008	98	0.20	0.04	0.85	0.006					
3	9	Single Family Residential (>10 dwellings/acre)	20%	45.27	A	Pervious	9.05	0.029	32	21.25	4.25	0.30	0.009	0.20	0.60	0.12	0.017	0.029
						Impervious	36.22	0.115	98	0.20	0.04	0.85	0.097					
4	9	Single Family Residential (>10 dwellings/acre)	20%	31.84	B	Pervious	6.37	0.020	56	7.86	1.57	0.00	0.000	0.20	0.60	0.12	0.012	0.020
						Impervious	25.47	0.081	98	0.20	0.04	0.85	0.068					
5	9	Single Family Residential (>10 dwellings/acre)	20%	26.51	D	Pervious	5.30	0.017	75	3.33	0.67	0.10	0.002	0.20	0.60	0.12	0.010	0.017
						Impervious	21.21	0.067	98	0.20	0.04	0.85	0.057					
6	9	Commercial / Industrial	10%	31.91	D	Pervious	3.19	0.010	75	3.33	0.67	0.10	0.001	0.10	0.60	0.06	0.006	0.010
						Impervious	28.72	0.091	98	0.20	0.04	0.85	0.077					
7	1	Oil Operations	100%	4.70	D	Pervious	4.70	0.015	93	0.75	0.15	0.56	0.008	1.00	0.60	0.60	0.009	0.015
						Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000					
8	6	Open Space / Habitat Area	100%	16.64	A	Pervious	16.64	0.053	46	11.74	2.35	0.05	0.003	1.00	0.60	0.60	0.032	0.053
						Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000					
9	1	Oxbow Loop Channel	10%	6.55	A	Pervious	0.66	0.002	78	2.82	0.56	0.14	0.000	0.10	0.60	0.06	0.001	0.002
						Impervious	5.90	0.019	98	0.20	0.04	0.85	0.016					

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

2-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA A

Onsite Area																									
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m											
										S	I _a	Y _j	Y _j *A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _j (in/hr)	a _p *A _j							
1	9	Urban Cover - Roadway	10%	15.02	D	Pervious	1.50	0.005	75	3.33	0.67	0.10	0.000	0.10	0.60	0.06	0.003	0.005							
						Impervious	13.52	0.043	98	0.20	0.04	0.85	0.036												
2	9	Single Family Residential (Condominium)	35%	4.22	B	Pervious	1.48	0.005	56	7.86	1.57	0.00	0.000	0.35	0.60	0.21	0.003	0.005							
						Impervious	2.74	0.009	98	0.20	0.04	0.85	0.007												
3	9	Single Family Residential (Condominium)	35%	34.29	D	Pervious	12.00	0.038	75	3.33	0.67	0.10	0.004	0.35	0.60	0.21	0.023	0.038							
						Impervious	22.29	0.071	98	0.20	0.04	0.85	0.060												
4	9	Public Park	85%	12.22	B	Pervious	10.39	0.033	56	7.86	1.57	0.00	0.000	0.85	0.60	0.51	0.020	0.033							
						Impervious	1.83	0.006	98	0.20	0.04	0.85	0.005												
5	9	Public Park	85%	10.74	D	Pervious	9.13	0.029	75	3.33	0.67	0.10	0.003	0.85	0.60	0.51	0.017	0.029							
						Impervious	1.61	0.005	98	0.20	0.04	0.85	0.004												
6	1	Oil Operations	100%	4.78	A	Pervious	4.78	0.015	78	2.82	0.56	0.14	0.002	1.00	0.60	0.60	0.009	0.015							
						Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000												
7	6	Open Space / Habitat Area	100%	61.07	D	Pervious	61.07	0.193	83	2.05	0.41	0.24	0.046	1.00	0.60	0.60	0.116	0.193							
						Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000												
Total Area =				315.98		Y = 0.53										Total F _m =		0.28		0.47					
										Y _{bar} = 1 - Y =								0.47							

INFILTRATION RATE CALCULATION SPREADSHEET

PROPOSED NEWPORT BANNING RANCH PROJECT

2-YEAR EXPECTED VALUE EVENT

Single Area Unit Hydrograph Designation: DRAINAGE AREA B

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

P24, 2-Year Storm Event for Non-Mountainous Area (in) = 1.44

Total Area (ac) = 127.93

a_p - See Figure C-4

P24, 2-Year Storm Event for Mountainous Area (in) = 2.67

Y = 0.63

F_p - See Table C-2

CN - See Figure C-1 and C-3

Ybar = 1 - Y = **0.37**

Average a_p = 0.32

Total F_m (in/hr) = **0.19**

Offsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p * A _j
										S	I _a	Y _j	Y _j * A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m * A _j (in/hr)	
1	9	Urban Cover - Roadway	10%	5.35	D	Pervious	0.54	0.004	75	3.33	0.67	0.10	0.000	0.10	0.60	0.06	0.003	0.004
						Impervious	4.82	0.038	98	0.20	0.04	0.85	0.032					
2	9	Single Family Residential (>10 dwellings/acre)	20%	5.94	D	Pervious	1.19	0.009	75	3.33	0.67	0.10	0.001	0.20	0.60	0.12	0.006	0.009
						Impervious	4.75	0.037	98	0.20	0.04	0.85	0.031					
3	9	Commercial / Industrial	10%	78.14	D	Pervious	7.81	0.061	75	3.33	0.67	0.10	0.006	0.10	0.60	0.06	0.037	0.061
						Impervious	70.33	0.550	98	0.20	0.04	0.85	0.466					
4	9	School	60%	9.91	D	Pervious	5.95	0.046	75	3.33	0.67	0.10	0.005	0.60	0.60	0.36	0.028	0.046
						Impervious	3.96	0.031	98	0.20	0.04	0.85	0.026					
Onsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _j (Area Fraction)	CN AMC II	Low Loss Rate, Ybar				Max. Loss Rate, F _m				a _p * A _j
										S	I _a	Y _j	Y _j * A _j	a _p	F _p (in/hr)	F _m (in/hr)	F _m * A _j (in/hr)	
1	9	Single Family Residential (Condominium)	35%	4.43	D	Pervious	1.55	0.012	75	3.33	0.67	0.10	0.001	0.35	0.60	0.21	0.007	0.012
						Impervious	2.88	0.023	98	0.20	0.04	0.85	0.019					
2	6	Open Space / Habitat Area	100%	24.16	D	Pervious	24.16	0.189	83	2.05	0.41	0.24	0.045	1.00	0.60	0.60	0.113	0.189
						Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000					

Total Area = **127.93**

Y = **0.63**

Total F_m = **0.19** **0.32**

Ybar = 1 - Y = **0.37**

INFILTRATION RATE CALCULATION SPREADSHEET
PROPOSED NEWPORT BANNING RANCH PROJECT
2-YEAR EXPECTED VALUE EVENT
Single Area Unit Hydrograph Designation: DRAINAGE AREA C

1) Loss Rate Calculation - Area-Averaged Low Loss Rate Fraction, Ybar and Area-Averaged maximum Loss Rate, F_m (inch/hour), equations taken from Orange County Hydrology Manual, Section C

$$A_j = \frac{A_i}{A_1 + A_2 + \dots + A_m}$$

$$Y_j = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$

$$Y = \frac{Y_1 A_1 + Y_2 A_2 + \dots + Y_m A_m}{A_1 + A_2 + \dots + A_m} = \sum Y_j A_j$$

$$F_m = a_p F_p$$

$$S = \frac{1000}{CN} - 10 \quad I_a = 0.2S$$

P24, 2-Year Storm Event for Non-Mountainous Area (in) = 1.44
P24, 2-Year Storm Event for Mountainous Area (in) = 2.67

Total Area (ac) = 104.35

Y = 0.49

Ybar = 1 - Y = **0.51**

a_p - See Figure C-4

F_p - See Table C-2

Average a_p = 0.61

Total F_m (in/hr) = **0.37**

CN - See Figure C-1 and C-3

Offsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m				a _p *A _i
										S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)	
1	9	Commercial / Industrial	10%	1.95	D	Pervious	0.20	0.002	75	3.33	0.67	0.10	0.000	0.10	0.60	0.06	0.001	0.002
						Impervious	1.76	0.017	98	0.20	0.04	0.85	0.014					
2	1	Oil Operations	100%	6.26	D	Pervious	6.26	0.060	93	0.75	0.15	0.56	0.034	1.00	0.60	0.60	0.036	0.060
						Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000					
Onsite Area																		
No.	Infil. Class	Land Use	Pervious-ness (%)	Area (ac)	Soil Group	Pervious/ Impervious	Area (ac)	A _i (Area Fraction)	CN AMC II	Low Loss Rate, Y _{bar}				Max. Loss Rate, F _m				a _p *A _i
										S	I _a	Y _j	Y _j *A _i	a _p	F _p (in/hr)	F _m (in/hr)	F _m *A _i (in/hr)	
1	9	Urban Cover - Roadway	10%	11.35	D	Pervious	1.14	0.011	75	3.33	0.67	0.10	0.001	0.10	0.60	0.06	0.007	0.011
						Impervious	10.22	0.098	98	0.20	0.04	0.85	0.083					
2	9	Single Family Residential (Condominium)	35%	41.68	D	Pervious	14.59	0.140	75	3.33	0.67	0.10	0.014	0.35	0.60	0.21	0.084	0.140
						Impervious	27.09	0.260	98	0.20	0.04	0.85	0.220					
3	9	Public Park	85%	9.61	D	Pervious	8.17	0.078	75	3.33	0.67	0.10	0.008	0.85	0.60	0.51	0.047	0.078
						Impervious	1.44	0.014	98	0.20	0.04	0.85	0.012					
4	1	Oil Operations	100%	9.76	D	Pervious	9.76	0.094	93	0.75	0.15	0.56	0.053	1.00	0.60	0.60	0.056	0.094
						Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000					
5	6	Open Space / Habitat Area	100%	23.74	D	Pervious	23.74	0.228	83	2.05	0.41	0.24	0.054	1.00	0.60	0.60	0.137	0.228
						Impervious	0.00	0.000	98	0.20	0.04	0.85	0.000					
Total Area = 104.35																		
Y = 0.49																		
Ybar = 1 - Y = 0.51																		
Total F _m = 0.37																		
0.61																		

ii. EV 100-Year Storm Event

Drainage A

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 316.00
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
LOW LOSS FRACTION = 0.300
TIME OF CONCENTRATION(MIN.) = 26.88
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 79.67
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 38.57

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	125.0	250.0	375.0	500.0
0.32	0.1800	13.61	.Q	.	.	.	.
0.77	0.6863	13.74	.Q	.	.	.	.
1.22	1.2014	14.08	.Q	.	.	.	.
1.66	1.7262	14.26	.Q	.	.	.	.
2.11	2.2614	14.64	.Q	.	.	.	.
2.56	2.8072	14.84	.Q	.	.	.	.
3.01	3.3646	15.26	.Q	.	.	.	.
3.46	3.9338	15.49	.Q	.	.	.	.
3.90	4.5159	15.96	.Q	.	.	.	.
4.35	5.1113	16.21	.Q	.	.	.	.
4.80	5.7211	16.74	.Q	.	.	.	.
5.25	6.3460	17.02	.Q	.	.	.	.
5.70	6.9872	17.62	.Q	.	.	.	.
6.14	7.6457	17.94	.Q	.	.	.	.
6.59	8.3229	18.64	.Q	.	.	.	.
7.04	9.0200	19.01	.Q	.	.	.	.
7.49	9.7389	19.82	.Q	.	.	.	.
7.94	10.4810	20.26	.Q	.	.	.	.
8.38	11.2490	21.22	.Q	.	.	.	.

8.83	12.0445	21.75	.Q	.	.	.	.
9.28	12.8712	22.91	.Q	.	.	.	.
9.73	13.7312	23.55	.Q	.	.	.	.
10.18	14.6298	24.99	.Q	.	.	.	.
10.62	15.5698	25.79	. Q	.	.	.	.
11.07	16.5588	27.63	. Q	.	.	.	.
11.52	17.6014	28.69	. Q	.	.	.	.
11.97	18.7089	31.14	. Q	.	.	.	.
12.42	19.9662	36.77	. Q	.	.	.	.
12.86	21.5157	46.93	. Q	.	.	.	.
13.31	23.2953	49.20	. Q	.	.	.	.
13.76	25.2224	54.90	. Q	.	.	.	.
14.21	27.3230	58.58	. Q	.	.	.	.
14.66	29.6665	68.01	. Q	.	.	.	.
15.10	32.3249	75.59	. Q	.	.	.	.
15.55	35.7192	107.76	. Q	.	.	.	.
16.00	40.2639	137.74	. .Q	.	.	.	.
16.45	51.9308	492.48	.	.	.	.Q.	.
16.90	62.6990	89.20	. Q	.	.	.	.
17.34	65.5079	62.53	. Q	.	.	.	.
17.79	67.6249	51.82	. Q	.	.	.	.
18.24	69.4163	44.95	. Q	.	.	.	.
18.69	70.8010	29.85	. Q	.	.	.	.
19.14	71.8473	26.67	. Q	.	.	.	.
19.58	72.7898	24.24	.Q	.	.	.	.
20.03	73.6515	22.31	.Q	.	.	.	.
20.48	74.4482	20.73	.Q	.	.	.	.
20.93	75.1913	19.41	.Q	.	.	.	.
21.38	75.8890	18.28	.Q	.	.	.	.
21.82	76.5480	17.31	.Q	.	.	.	.
22.27	77.1733	16.47	.Q	.	.	.	.
22.72	77.7691	15.72	.Q	.	.	.	.
23.17	78.3386	15.05	.Q	.	.	.	.
23.62	78.8847	14.45	.Q	.	.	.	.
24.06	79.4097	13.91	.Q
24.51	79.6672	0.00	Q

Drainage B

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 127.90
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.060
LOW LOSS FRACTION = 0.180
TIME OF CONCENTRATION(MIN.) = 30.94
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 36.77
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 11.08

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	47.5	95.0	142.5	190.0
0.01	0.0000	0.00	Q	.	.	.	.
0.53	0.1376	6.46	.Q	.	.	.	.
1.05	0.4161	6.62	.Q	.	.	.	.
1.56	0.7002	6.71	.Q	.	.	.	.
2.08	0.9907	6.92	.Q	.	.	.	.
2.59	1.2878	7.03	.Q	.	.	.	.
3.11	1.5922	7.26	.Q	.	.	.	.
3.62	1.9040	7.38	.Q	.	.	.	.
4.14	2.2240	7.64	.Q	.	.	.	.
4.66	2.5526	7.78	.Q	.	.	.	.
5.17	2.8906	8.08	.Q	.	.	.	.
5.69	3.2385	8.24	.Q	.	.	.	.
6.20	3.5973	8.59	.Q	.	.	.	.
6.72	3.9676	8.79	.Q	.	.	.	.
7.23	4.3509	9.20	.Q	.	.	.	.
7.75	4.7479	9.43	.Q	.	.	.	.
8.27	5.1605	9.93	. Q	.	.	.	.
8.78	5.5897	10.21	. Q	.	.	.	.
9.30	6.0381	10.83	. Q	.	.	.	.

9.81	6.5072	11.18	. Q	.	.	.	.
10.33	7.0008	11.98	. Q	.	.	.	.
10.84	7.5211	12.44	. Q	.	.	.	.
11.36	8.0738	13.50	. Q	.	.	.	.
11.87	8.6626	14.13	. Q	.	.	.	.
12.39	9.3656	18.86	. Q	.	.	.	.
12.91	10.2296	21.69	. Q	.	.	.	.
13.42	11.2074	24.20	. Q	.	.	.	.
13.94	12.2733	25.82	. Q	.	.	.	.
14.45	13.4633	30.02	. Q	.	.	.	.
14.97	14.8211	33.70	. Q	.	.	.	.
15.48	16.5736	48.55	. Q	.	.	.	.
16.00	18.8221	56.97	. .Q	.	.	.	.
16.52	24.0787	189.73	. .	.	.	. Q.	.
17.03	28.9624	39.46	. Q	.	.	.	.
17.55	30.3960	27.81	. Q	.	.	.	.
18.06	31.4754	22.84	. Q	.	.	.	.
18.58	32.2784	14.84	. Q	.	.	.	.
19.09	32.8704	12.94	. Q	.	.	.	.
19.61	33.3925	11.56	. Q	.	.	.	.
20.13	33.8629	10.51	. Q	.	.	.	.
20.64	34.2930	9.67	. Q	.	.	.	.
21.16	34.6906	8.99	.Q	.	.	.	.
21.67	35.0614	8.41	.Q	.	.	.	.
22.19	35.4096	7.93	.Q	.	.	.	.
22.70	35.7385	7.51	.Q	.	.	.	.
23.22	36.0505	7.14	.Q	.	.	.	.
23.73	36.3478	6.81	.Q	.	.	.	.
24.25	36.6321	6.52	.Q
24.77	36.7711	0.00	Q

Drainage C

 SMALL AREA UNIT HYDROGRAPH MODEL
 =====

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Analysis prepared by:

 Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA(ACRES) = 104.40
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.120
 LOW LOSS FRACTION = 0.260
 TIME OF CONCENTRATION(MIN.) = 15.18
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 25
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
 24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 27.23
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 11.83

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	57.5	115.0	172.5	230.0
0.06	0.0000	0.00	Q	.	.	.	.
0.31	0.0497	4.75	Q	.	.	.	.
0.57	0.1497	4.81	Q	.	.	.	.
0.82	0.2507	4.85	Q	.	.	.	.
1.07	0.3528	4.92	Q	.	.	.	.
1.33	0.4559	4.95	Q	.	.	.	.
1.58	0.5602	5.02	Q	.	.	.	.
1.83	0.6656	5.06	Q	.	.	.	.
2.08	0.7723	5.14	Q	.	.	.	.
2.34	0.8801	5.18	Q	.	.	.	.
2.59	0.9892	5.26	Q	.	.	.	.
2.84	1.0996	5.30	Q	.	.	.	.
3.10	1.2114	5.39	Q	.	.	.	.
3.35	1.3245	5.43	Q	.	.	.	.
3.60	1.4390	5.52	Q	.	.	.	.
3.86	1.5550	5.57	Q	.	.	.	.
4.11	1.6726	5.67	Q	.	.	.	.
4.36	1.7917	5.72	Q	.	.	.	.
4.61	1.9124	5.83	.Q	.	.	.	.
4.87	2.0348	5.88	.Q	.	.	.	.
5.12	2.1590	6.00	.Q	.	.	.	.
5.37	2.2850	6.05	.Q	.	.	.	.
5.63	2.4129	6.18	.Q	.	.	.	.
5.88	2.5427	6.24	.Q	.	.	.	.
6.13	2.6745	6.37	.Q	.	.	.	.
6.39	2.8085	6.44	.Q	.	.	.	.
6.64	2.9447	6.59	.Q	.	.	.	.
6.89	3.0832	6.66	.Q	.	.	.	.
7.14	3.2242	6.82	.Q	.	.	.	.
7.40	3.3676	6.90	.Q	.	.	.	.
7.65	3.5137	7.07	.Q	.	.	.	.

PEV100_C			
7. 90	3. 6626	7. 16	.Q
8. 16	3. 8143	7. 35	.Q
8. 41	3. 9692	7. 45	.Q
8. 66	4. 1273	7. 67	.Q
8. 92	4. 2887	7. 78	.Q
9. 17	4. 4538	8. 01	.Q
9. 42	4. 6227	8. 14	.Q
9. 68	4. 7957	8. 41	.Q
9. 93	4. 9729	8. 55	.Q
10. 18	5. 1548	8. 85	.Q
10. 43	5. 3415	9. 01	.Q
10. 69	5. 5336	9. 36	.Q
10. 94	5. 7313	9. 55	.Q
11. 19	5. 9353	9. 96	.Q
11. 45	6. 1458	10. 18	.Q
11. 70	6. 3636	10. 66	.Q
11. 95	6. 5892	10. 92	.Q
12. 20	6. 8515	14. 16	.Q
12. 46	7. 1623	15. 56	.Q
12. 71	7. 4957	16. 33	.Q
12. 96	7. 8417	16. 76	.Q
13. 22	8. 2023	17. 73	.Q
13. 47	8. 5786	18. 28	.Q
13. 72	8. 9740	19. 54	.Q
13. 98	9. 3903	20. 28	.Q
14. 23	9. 8301	21. 79	.Q
14. 48	10. 2965	22. 82	.Q
14. 73	10. 8016	25. 49	.Q
14. 99	11. 3527	27. 22	.Q
15. 24	11. 9723	32. 05	.Q
15. 49	12. 6927	36. 86	.Q
15. 75	13. 5619	46. 28	.Q
16. 00	14. 8082	72. 92	.Q
16. 25	17. 9666	229. 18	.Q
16. 51	20. 7392	36. 03	.Q
16. 76	21. 4227	29. 35	.Q
17. 01	21. 9810	24. 05	.Q
17. 27	22. 4530	21. 10	.Q
17. 52	22. 8710	18. 88	.Q
17. 77	23. 2484	17. 22	.Q
18. 02	23. 5951	15. 93	.Q
18. 28	23. 8788	11. 20	.Q
18. 53	24. 1048	10. 41	.Q
18. 78	24. 3155	9. 75	.Q
19. 04	24. 5134	9. 18	.Q
19. 29	24. 7003	8. 70	.Q
19. 54	24. 8777	8. 27	.Q
19. 80	25. 0467	7. 89	.Q
20. 05	25. 2082	7. 56	.Q
20. 30	25. 3631	7. 26	.Q
20. 55	25. 5120	6. 99	.Q
20. 81	25. 6555	6. 74	.Q
21. 06	25. 7941	6. 51	.Q
21. 31	25. 9281	6. 31	.Q
21. 57	26. 0580	6. 12	.Q
21. 82	26. 1840	5. 94	.Q
22. 07	26. 3064	5. 77	.Q
22. 33	26. 4255	5. 62	.Q
22. 58	26. 5416	5. 48	.Q
22. 83	26. 6547	5. 34	.Q
23. 08	26. 7651	5. 22	.Q
23. 34	26. 8730	5. 10	.Q
23. 59	26. 9784	4. 99	.Q
23. 84	27. 0816	4. 88	.Q
24. 10	27. 1826	4. 78	.Q
24. 35	27. 2326	0. 00	.Q

iii. EV 2-Year Storm Event

Drainage A

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 316.00
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.280
LOW LOSS FRACTION = 0.470
TIME OF CONCENTRATION(MIN.) = 37.17
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 2
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 17.97
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 19.95

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	20.0	40.0	60.0	80.0
0.51	0.0733	3.46	.Q	.	.	.	.
1.13	0.2517	3.51	.Q	.	.	.	.
1.75	0.4344	3.63	.Q	.	.	.	.
2.37	0.6220	3.70	.Q	.	.	.	.
2.99	0.8148	3.83	.Q	.	.	.	.
3.61	1.0130	3.91	.Q	.	.	.	.
4.23	1.2173	4.07	. Q	.	.	.	.
4.85	1.4281	4.16	. Q	.	.	.	.
5.47	1.6460	4.35	. Q	.	.	.	.
6.09	1.8715	4.46	. Q	.	.	.	.
6.71	2.1056	4.69	. Q	.	.	.	.
7.33	2.3489	4.82	. Q	.	.	.	.
7.95	2.6028	5.10	. Q	.	.	.	.
8.57	2.8682	5.26	. Q	.	.	.	.
9.19	3.1470	5.63	. Q	.	.	.	.
9.81	3.4405	5.84	. Q	.	.	.	.
10.42	3.7519	6.32	. Q	.	.	.	.
11.04	4.0830	6.61	. Q	.	.	.	.
11.66	4.4392	7.30	. Q	.	.	.	.

12.28	4.8239	7.73	.	Q	.	.	.	.
12.90	5.2890	10.44	.	Q	.	.	.	.
13.52	5.8425	11.18	.	Q	.	.	.	.
14.14	6.4678	13.25	.	Q	.	.	.	.
14.76	7.1952	15.17	.	Q	.	.	.	.
15.38	8.1185	20.90	.		Q	.	.	.
16.00	9.3012	25.30	.		Q	.	.	.
16.62	11.8500	74.26	.		.	.	Q	.
17.24	14.1972	17.44	.	Q	.	.	.	.
17.86	14.9530	12.09	.	Q	.	.	.	.
18.48	15.5012	9.32	.	Q	.	.	.	.
19.10	15.9174	6.93	.	Q	.	.	.	.
19.72	16.2503	6.07	.	Q	.	.	.	.
20.34	16.5448	5.44	.	Q	.	.	.	.
20.96	16.8109	4.95	.	Q	.	.	.	.
21.58	17.0546	4.57	.	Q	.	.	.	.
22.19	17.2805	4.25	.	Q	.	.	.	.
22.81	17.4915	3.99	.	Q	.	.	.	.
23.43	17.6899	3.76	.	Q	.	.	.	.
24.05	17.8776	3.57	.	Q
24.67	17.9689	0.00	Q

Drainage B

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 127.90
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.190
LOW LOSS FRACTION = 0.370
TIME OF CONCENTRATION(MIN.) = 37.45
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 2
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 8.66
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 6.69

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.40	0.0272	1.66	.Q	.	.	.	.
1.02	0.1133	1.68	.Q	.	.	.	.
1.64	0.2015	1.74	.Q	.	.	.	.
2.27	0.2920	1.77	.Q	.	.	.	.
2.89	0.3850	1.84	.Q	.	.	.	.
3.52	0.4807	1.87	.Q	.	.	.	.
4.14	0.5793	1.95	.Q	.	.	.	.
4.76	0.6809	1.99	.Q	.	.	.	.
5.39	0.7861	2.08	. Q	.	.	.	.
6.01	0.8949	2.13	. Q	.	.	.	.
6.64	1.0078	2.25	. Q	.	.	.	.
7.26	1.1252	2.31	. Q	.	.	.	.
7.89	1.2477	2.44	. Q	.	.	.	.
8.51	1.3758	2.52	. Q	.	.	.	.
9.13	1.5103	2.70	. Q	.	.	.	.
9.76	1.6519	2.80	. Q	.	.	.	.
10.38	1.8021	3.03	. Q	.	.	.	.
11.01	1.9619	3.17	. Q	.	.	.	.
11.63	2.1338	3.50	. Q	.	.	.	.

12.26	2.3194	3.70	.	Q	.	.	.	.
12.88	2.5439	5.00	.	Q	.	.	.	.
13.50	2.8111	5.36	.	Q	.	.	.	.
14.13	3.1129	6.35	.	Q	.	.	.	.
14.75	3.4639	7.26	.	Q	.	.	.	.
15.38	3.9095	10.01	.		Q	.	.	.
16.00	4.4810	12.14	.		Q	.	.	.
16.62	5.7116	35.57	.		.	.	Q	.
17.25	6.8444	8.35	.	Q	.	.	.	.
17.87	7.2093	5.79	.	Q	.	.	.	.
18.50	7.4725	4.41	.	Q	.	.	.	.
19.12	7.6719	3.32	.	Q	.	.	.	.
19.74	7.8325	2.91	.	Q	.	.	.	.
20.37	7.9746	2.60	.	Q	.	.	.	.
20.99	8.1030	2.37	.	Q	.	.	.	.
21.62	8.2206	2.19	.	Q	.	.	.	.
22.24	8.3295	2.04	.	Q	.	.	.	.
22.87	8.4313	1.91	.	Q	.	.	.	.
23.49	8.5271	1.80	.	Q	.	.	.	.
24.11	8.6177	1.71	.	Q
24.74	8.6617	0.00	Q

Drainage C

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Analysis prepared by:

Problem Descriptions:

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 104.40
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.370
LOW LOSS FRACTION = 0.510
TIME OF CONCENTRATION(MIN.) = 16.80
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 2
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.13
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.28
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.37
3-HOUR POINT RAINFALL VALUE(INCHES) = 0.62
6-HOUR POINT RAINFALL VALUE(INCHES) = 0.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 1.44

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 5.55
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 6.98

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.04	0.0000	0.00	Q	.	.	.	.
0.32	0.0122	1.05	.Q	.	.	.	.
0.60	0.0367	1.07	.Q	.	.	.	.
0.88	0.0615	1.08	.Q	.	.	.	.
1.16	0.0866	1.09	.Q	.	.	.	.
1.44	0.1120	1.10	.Q	.	.	.	.
1.72	0.1376	1.12	.Q	.	.	.	.
2.00	0.1636	1.13	.Q	.	.	.	.
2.28	0.1899	1.15	.Q	.	.	.	.
2.56	0.2166	1.16	.Q	.	.	.	.
2.84	0.2435	1.18	.Q	.	.	.	.
3.12	0.2708	1.19	.Q	.	.	.	.
3.40	0.2985	1.21	.Q	.	.	.	.
3.68	0.3266	1.22	.Q	.	.	.	.
3.96	0.3550	1.24	.Q	.	.	.	.
4.24	0.3839	1.25	.Q	.	.	.	.
4.52	0.4132	1.28	.Q	.	.	.	.
4.80	0.4429	1.29	.Q	.	.	.	.
5.08	0.4731	1.32	.Q	.	.	.	.

5.36	0.5037	1.33	.Q	.	.	.	.
5.64	0.5348	1.36	.Q	.	.	.	.
5.92	0.5665	1.38	.Q	.	.	.	.
6.20	0.5987	1.41	.Q	.	.	.	.
6.48	0.6314	1.42	.Q	.	.	.	.
6.76	0.6648	1.46	.Q	.	.	.	.
7.04	0.6987	1.48	.Q	.	.	.	.
7.32	0.7333	1.51	.Q	.	.	.	.
7.60	0.7686	1.53	.Q	.	.	.	.
7.88	0.8046	1.58	.Q	.	.	.	.
8.16	0.8413	1.60	.Q	.	.	.	.
8.44	0.8789	1.65	.Q	.	.	.	.
8.72	0.9173	1.67	.Q	.	.	.	.
9.00	0.9566	1.73	.Q	.	.	.	.
9.28	0.9968	1.75	.Q	.	.	.	.
9.56	1.0381	1.81	.Q	.	.	.	.
9.84	1.0805	1.85	.Q	.	.	.	.
10.12	1.1240	1.92	.Q	.	.	.	.
10.40	1.1688	1.95	.Q	.	.	.	.
10.68	1.2149	2.03	. Q	.	.	.	.
10.96	1.2625	2.08	. Q	.	.	.	.
11.24	1.3117	2.17	. Q	.	.	.	.
11.52	1.3626	2.23	. Q	.	.	.	.
11.80	1.4155	2.34	. Q	.	.	.	.
12.08	1.4705	2.41	. Q	.	.	.	.
12.36	1.5335	3.04	. Q	.	.	.	.
12.64	1.6049	3.13	. Q	.	.	.	.
12.92	1.6794	3.32	. Q	.	.	.	.
13.20	1.7574	3.42	. Q	.	.	.	.
13.48	1.8395	3.67	. Q	.	.	.	.
13.76	1.9262	3.82	. Q	.	.	.	.
14.04	2.0186	4.17	. Q	.	.	.	.
14.32	2.1187	4.48	. Q	.	.	.	.
14.60	2.2290	5.06	. Q	.	.	.	.
14.88	2.3501	5.40	. Q	.	.	.	.
15.16	2.4864	6.37	. Q	.	.	.	.
15.44	2.6422	7.09	. Q	.	.	.	.
15.72	2.8230	8.53	. Q	.	.	.	.
16.00	3.0637	12.27	. Q	.	.	.	.
16.28	3.6515	38.54	.	.	.	Q	.
16.56	4.1835	7.45	. Q	.	.	.	.
16.84	4.3372	5.83	. Q	.	.	.	.
17.12	4.4598	4.77	. Q	.	.	.	.
17.40	4.5610	3.98	. Q	.	.	.	.
17.68	4.6481	3.54	. Q	.	.	.	.
17.96	4.7263	3.22	. Q	.	.	.	.
18.24	4.7946	2.69	. Q	.	.	.	.
18.52	4.8521	2.28	. Q	.	.	.	.
18.80	4.9031	2.13	. Q	.	.	.	.
19.08	4.9507	1.99	.Q	.	.	.	.
19.36	4.9955	1.88	.Q	.	.	.	.
19.64	5.0379	1.78	.Q	.	.	.	.
19.92	5.0782	1.70	.Q	.	.	.	.
20.20	5.1166	1.62	.Q	.	.	.	.
20.48	5.1534	1.56	.Q	.	.	.	.
20.76	5.1887	1.50	.Q	.	.	.	.
21.04	5.2227	1.44	.Q	.	.	.	.
21.32	5.2554	1.39	.Q	.	.	.	.
21.60	5.2871	1.35	.Q	.	.	.	.
21.88	5.3177	1.30	.Q	.	.	.	.
22.16	5.3474	1.27	.Q	.	.	.	.
22.44	5.3763	1.23	.Q	.	.	.	.
22.72	5.4044	1.20	.Q	.	.	.	.
23.00	5.4317	1.17	.Q	.	.	.	.
23.28	5.4583	1.14	.Q	.	.	.	.
23.56	5.4843	1.11	.Q	.	.	.	.
23.84	5.5097	1.08	.Q	.	.	.	.

24.12	5.5345	1.06	.Q	.	.	.	.
24.40	5.5467	0.00	Q	.	.	.	.

C HEC-RAS MODELING

ras82101_N_Arroyo.rep

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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X      X  XXXXXX      XXXX      XXXX      XX      XXXX
X      X  X          X      X      X      X      X
X      X  X          X      X      X      X      X
XXXXXXX XXXX      X      XXX XXXX      XXXXXX      XXXX
X      X  X          X      X      X      X      X
X      X  X          X      X      X      X      X
X      X  XXXXXX      XXXX      X      X      X      XXXXX

```

PROJECT DATA

Project Title: Newport Banning Ranch
Project File : ras82101.prj
Run Date and Time: 4/15/2008 11:14:38 AM

Project in English units

PLAN DATA

Plan Title: N Arroyo Run
Plan File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.p02

Geometry Title: Nouth Arroyo
Geometry File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.g02

Flow Title : N_Arroyo Flows
Flow File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.f02

Plan Summary Information:

Number of:	Cross Sections =	6	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

Computational Information

Water surface calculation tolerance =	0.01
Critical depth calculation tolerance =	0.01
Maximum number of iterations =	20
Maximum difference tolerance =	0.3
Flow tolerance factor =	0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: N_Arroyo Flows
Flow File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.f02

Flow Data (cfs)

River	Reach	RS	EV 2yr	EV 100yr
N_Arroyo	1	809	45	160

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
N_Arroyo	1	EV 2yr	Critical	Critical
N_Arroyo	1	EV 100yr	Critical	Critical

GEOMETRY DATA

Geometry Title: Nouth Arroyo

Geometry File : p:\Projects\821\01\Wat\HH\El R Study\HEC_RAS\ras82101.g02

CROSS SECTION

RIVER: N_Arroyo

REACH: 1 RS: 809

INPUT

Description:

Station	Elevation	Data	num=	17						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
0	52.72	3.16	50.65	4.16	50	31.73	45	31.73	44.94	
46.96	40	53.35	40	55.35	40.42	58.51	41	61.67	41.62	
63.91	42	64.91	42.2	68.51	43	72.64	44	73.64	44.1	
76.8	45	100.23	45.4							

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	31.73	.06	76.8	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	31.73	76.8		121.96 124.01	131.23	.1	.3

CROSS SECTION OUTPUT Profile #EV 2yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	41.75	Wt. n-Val.		0.060	
Vel Head (ft)	0.06	Reach Len. (ft)	121.96	124.01	131.23
W.S. Elev (ft)	41.69	Flow Area (sq ft)		22.47	
Crit W.S. (ft)	40.94	Area (sq ft)		22.47	
E.G. Slope (ft/ft)	0.005884	Flow (cfs)		45.00	
Q Total (cfs)	45.00	Top Width (ft)		20.33	
Top Width (ft)	20.33	Avg. Vel. (ft/s)		2.00	
Vel Total (ft/s)	2.00	Hydr. Depth (ft)		1.11	
Max Chl Dpth (ft)	1.69	Conv. (cfs)		586.6	
Conv. Total (cfs)	586.6	Wetted Per. (ft)		20.76	
Length Wtd. (ft)	124.01	Shear (lb/sq ft)		0.40	
Min Ch El (ft)	40.00	Stream Power (lb/ft s)		0.80	
Alpha	1.00	Cum Volume (acre-ft)		0.22	
Frctn Loss (ft)	1.75	Cum SA (acres)		0.26	
C & E Loss (ft)	0.02				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #EV 100yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	42.95	Wt. n-Val.		0.060	
Vel Head (ft)	0.16	Reach Len. (ft)	121.96	124.01	131.23
W.S. Elev (ft)	42.79	Flow Area (sq ft)		49.94	
Crit W.S. (ft)		Area (sq ft)		49.94	
E.G. Slope (ft/ft)	0.008456	Flow (cfs)		160.00	
Q Total (cfs)	160.00	Top Width (ft)		29.22	
Top Width (ft)	29.22	Avg. Vel. (ft/s)		3.20	
Vel Total (ft/s)	3.20	Hydr. Depth (ft)		1.71	
Max Chl Dpth (ft)	2.79	Conv. (cfs)		1740.0	
Conv. Total (cfs)	1740.0	Wetted Per. (ft)		29.93	
Length Wtd. (ft)	124.04	Shear (lb/sq ft)		0.88	
Min Ch El (ft)	40.00	Stream Power (lb/ft s)		2.82	
Alpha	1.00	Cum Volume (acre-ft)	0.00	0.55	0.00
Frctn Loss (ft)	2.14	Cum SA (acres)	0.01	0.37	0.02
C & E Loss (ft)	0.03				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: N_Arroyo

REACH: 1

RS: 685

INPUT

Description:

Station	Elevation	Data	num=	41
Sta	Elev	Sta	Elev	Sta
0	55.6	1	55	9.6
23.25	45.72	24.67	45	26.9
32.74	39.92	32.74	39.89	32.74
37.81	39.1	38.81	39	44.28
65.31	40	67.54	40.2	69.78
90.68	41.21	94.29	41.05	95.29
100.53	40.65	101.95	40.61	102.95
107.6	40.89	108.6	41	110.01
117.42	42.03			

Manning's n	Values	num=	3
Sta	n Val	Sta	n Val
0	.06	32.74	.06
		65.31	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	32.74	65.31		161.18	166.09		.1	.3

CROSS SECTION OUTPUT Profile #EV 2yr

E.G. Elev (ft)	39.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.060	
W.S. Elev (ft)	39.74	Reach Len. (ft)	161.18	166.09	167.39
Crit W.S. (ft)	39.74	Flow Area (sq ft)		11.37	
E.G. Slope (ft/ft)	0.069249	Area (sq ft)		11.37	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	23.95	Top Width (ft)		23.95	
Vel Total (ft/s)	3.96	Avg. Vel. (ft/s)		3.96	
Max Chl Dpth (ft)	0.74	Hydr. Depth (ft)		0.47	
Conv. Total (cfs)	171.0	Conv. (cfs)		171.0	
Length Wtd. (ft)	166.09	Wetted Per. (ft)		24.05	
Min Ch El (ft)	39.00	Shear (lb/sq ft)		2.04	
Alpha	1.00	Stream Power (lb/ft s)		8.09	
Frctn Loss (ft)	7.97	Cum Volume (acre-ft)		0.17	
C & E Loss (ft)	0.01	Cum SA (acres)		0.20	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #EV 100yr

E.G. Elev (ft)	40.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.		0.060	0.060
W.S. Elev (ft)	40.34	Reach Len. (ft)	161.18	166.09	167.39
Crit W.S. (ft)	40.34	Flow Area (sq ft)		29.73	0.69
E.G. Slope (ft/ft)	0.053032	Area (sq ft)		29.73	0.69
Q Total (cfs)	160.00	Flow (cfs)		158.71	1.15
Top Width (ft)	37.44	Top Width (ft)		32.57	4.35
Vel Total (ft/s)	5.25	Avg. Vel. (ft/s)		5.34	1.67
Max Chl Dpth (ft)	1.34	Hydr. Depth (ft)		0.91	0.16
Conv. Total (cfs)	694.8	Conv. (cfs)		689.2	5.0
Length Wtd. (ft)	166.09	Wetted Per. (ft)		32.82	4.36
Min Ch El (ft)	39.00	Shear (lb/sq ft)		3.00	0.52
Alpha	1.03	Stream Power (lb/ft s)		16.01	0.87
Frctn Loss (ft)	8.69	Cum Volume (acre-ft)		0.44	0.00
C & E Loss (ft)	0.02	Cum SA (acres)		0.28	0.02

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: N_Arroyo
 REACH: 1

RS: 519

INPUT

Description:

Station	Elevation	Data	num=	65
Sta	Elev	Sta	Elev	Sta
0	49.84	0	49.21	5
14.47	39.57	15.89	39.1	17.3
22.96	38.19	24.37	38	37.1
44.76	36.67	46.99	36.63	49.82
63.96	36.22	66.79	36.19	69.03
76.46	36.05	77.46	36.05	86.13
91.6	35.94	100.09	35.87	102.92
112.82	35.62	115.65	35.54	119.89
125.54	35.22	130.54	35.04	131.54
150.07	28.48	157.88	25	162.12
167.78	22.94	172.02	22	174.85
180.87	20.06	181.87	20	184.11
202.16	25	203.57	25.89	210.64

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	157.88	.06	202.16	.06

Bank	Sta	Left	Right	Lengths	Left	Channel	Right	Coeff	Contr.	Expan.
	157.88	202.16	129.98	119.28	109.74			.1	.3	

CROSS SECTION OUTPUT Profile #EV 2yr

E.G. Elev (ft)	21.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.060	
W. S. Elev (ft)	21.24	Reach Len. (ft)	129.98	119.28	109.74
Crit W. S. (ft)	21.10	Flow Area (sq ft)		11.79	
E.G. Slope (ft/ft)	0.035202	Area (sq ft)		11.79	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	15.57	Top Width (ft)		15.57	
Vel Total (ft/s)	3.82	Avg. Vel. (ft/s)		3.82	
Max Chl Dpth (ft)	1.24	Hydr. Depth (ft)		0.76	
Conv. Total (cfs)	239.8	Conv. (cfs)		239.8	
Length Wtd. (ft)	119.28	Wetted Per. (ft)		15.84	
Min Ch El (ft)	20.00	Shear (lb/sq ft)		1.64	
Alpha	1.00	Stream Power (lb/ft s)		6.25	
Frctn Loss (ft)	2.31	Cum Volume (acre-ft)		0.13	
C & E Loss (ft)	0.03	Cum SA (acres)		0.12	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #EV 100yr

E.G. Elev (ft)	22.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.		0.060	
W. S. Elev (ft)	21.98	Reach Len. (ft)	129.98	119.28	109.74
Crit W. S. (ft)	21.98	Flow Area (sq ft)		25.38	
E.G. Slope (ft/ft)	0.051614	Area (sq ft)		25.38	
Q Total (cfs)	160.00	Flow (cfs)		160.00	
Top Width (ft)	20.91	Top Width (ft)		20.91	
Vel Total (ft/s)	6.30	Avg. Vel. (ft/s)		6.30	
Max Chl Dpth (ft)	1.98	Hydr. Depth (ft)		1.21	
Conv. Total (cfs)	704.3	Conv. (cfs)		704.3	
Length Wtd. (ft)	119.27	Wetted Per. (ft)		21.39	
Min Ch El (ft)	20.00	Shear (lb/sq ft)		3.82	
Alpha	1.00	Stream Power (lb/ft s)		24.10	
Frctn Loss (ft)	1.54	Cum Volume (acre-ft)	0.00	0.33	0.00
C & E Loss (ft)	0.14	Cum SA (acres)	0.01	0.18	0.01

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: N_Arroyo
REACH: 1

RS: 399

INPUT

Description:

Station Elevation Data				num= 45			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	39.82	3.16	37.27	7.16	35	9.4	34.55
11.4	33.6	13.4	32.78	15.63	32	17.63	31
23.73	30	27.86	29.75	34.93	29.59	38.09	29.67
42.25	29.78	43.25	29.8	45.25	29.86	46.25	29.87
49.49	29.81	50.49	29.6	51.49	29.6	52.49	29.53
54.9	28.57	55.9	28	56.9	27.23	57.9	27
60.32	25.71	61.32	25	71.51	21.91	77.6	20
87.8	18.13	88.8	17.82	91.8	17	93.22	17.14
100.34	19	103.34	20	105.58	20.49	115.77	25.01
							128.93
							29.19

Manning's n Values			num= 3		
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	77.6	.06	103.34	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	77.6	103.34		133.51	133.65	129.63	.1
							.3

CROSS SECTION OUTPUT Profile #EV 2yr

E.G. Elev (ft)	19.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.060	
W.S. Elev (ft)	19.00	Reach Len. (ft)	133.51	133.65	129.63
Crit W.S. (ft)		Flow Area (sq ft)		16.71	
E.G. Slope (ft/ft)	0.012262	Area (sq ft)		16.71	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	16.68	Top Width (ft)		16.68	
Vel Total (ft/s)	2.69	Avg. Vel. (ft/s)		2.69	
Max Chl Dpth (ft)	2.00	Hydr. Depth (ft)		1.00	
Conv. Total (cfs)	406.4	Conv. (cfs)		406.4	
Length Wtd. (ft)	133.65	Wetted Per. (ft)		17.17	
Min Ch El (ft)	17.00	Shear (lb/sq ft)		0.74	
Alpha	1.00	Stream Power (lb/ft s)		2.01	
Frctn Loss (ft)	1.47	Cum Volume (acre-ft)		0.09	
C & E Loss (ft)	0.00	Cum SA (acres)		0.08	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #EV 100yr

E.G. Elev (ft)	20.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.060	0.060	0.060
W.S. Elev (ft)	20.60	Reach Len. (ft)	133.51	133.65	129.63
Crit W.S. (ft)		Flow Area (sq ft)	0.56	53.20	0.80
E.G. Slope (ft/ft)	0.005736	Area (sq ft)	0.56	53.20	0.80
Q Total (cfs)	160.00	Flow (cfs)	0.46	158.85	0.69
Top Width (ft)	30.11	Top Width (ft)	1.90	25.74	2.48
Vel Total (ft/s)	2.93	Avg. Vel. (ft/s)	0.81	2.99	0.86
Max Chl Dpth (ft)	3.60	Hydr. Depth (ft)	0.30	2.07	0.32
Conv. Total (cfs)	2112.6	Conv. (cfs)	6.0	2097.5	9.1
Length Wtd. (ft)	133.64	Wetted Per. (ft)	1.99	26.48	2.55
Min Ch El (ft)	17.00	Shear (lb/sq ft)	0.10	0.72	0.11
Alpha	1.03	Stream Power (lb/ft s)	0.08	2.15	0.10
Frctn Loss (ft)	1.19	Cum Volume (acre-ft)	0.00	0.22	0.00
C & E Loss (ft)	0.02	Cum SA (acres)	0.00	0.12	0.00

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: N_Arroyo
REACH: 1

RS: 266

INPUT

Description:

Station	Elevation	Data	num=	25	Station	Elevation	Station	Elevation	Station	Elevation	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	23.08	4	23.2	16.04	24	21.04	24	22.04	23.6		
24.04	23	25.04	22.48	26.04	22	28.04	21.17	29.04	21		
30.04	20	32.04	18.98	37.04	15	40.46	15	41.46	16.5		
45.46	20	48	24.233	48.46	25	50.46	26.53	52.46	30		
53.46	30.1	67.49	35	71.49	37.33	76.49	40	79.49	41.38		

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	21.04	.06	48	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	21.04	48		135.31	134.23	135.07	.1

CROSS SECTION OUTPUT Profile #EV 2yr

E.G. Elev (ft)	17.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.060	
W.S. Elev (ft)	17.50	Reach Len. (ft)	135.31	134.23	135.07
Crit W.S. (ft)		Flow Area (sq ft)		14.77	
E.G. Slope (ft/ft)	0.009905	Area (sq ft)		14.77	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	8.70	Top Width (ft)		8.70	
Vel Total (ft/s)	3.05	Avg. Vel. (ft/s)		3.05	
Max Chl Dpth (ft)	2.50	Hydr. Depth (ft)		1.70	
Conv. Total (cfs)	452.2	Conv. (cfs)		452.2	
Length Wtd. (ft)	134.23	Wetted Per. (ft)		10.75	
Min Ch El (ft)	15.00	Shear (lb/sq ft)		0.85	
Alpha	1.00	Stream Power (lb/ft s)		2.59	
Frctn Loss (ft)	2.72	Cum Volume (acre-ft)		0.04	
C & E Loss (ft)	0.01	Cum SA (acres)		0.04	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #EV 100yr

E.G. Elev (ft)	19.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.		0.060	
W.S. Elev (ft)	19.13	Reach Len. (ft)	135.31	134.23	135.07
Crit W.S. (ft)	18.04	Flow Area (sq ft)		32.20	
E.G. Slope (ft/ft)	0.015769	Area (sq ft)		32.20	
Q Total (cfs)	160.00	Flow (cfs)		160.00	
Top Width (ft)	12.72	Top Width (ft)		12.72	
Vel Total (ft/s)	4.97	Avg. Vel. (ft/s)		4.97	
Max Chl Dpth (ft)	4.13	Hydr. Depth (ft)		2.53	
Conv. Total (cfs)	1274.1	Conv. (cfs)		1274.1	
Length Wtd. (ft)	134.23	Wetted Per. (ft)		15.94	
Min Ch El (ft)	15.00	Shear (lb/sq ft)		1.99	
Alpha	1.00	Stream Power (lb/ft s)		9.88	
Frctn Loss (ft)	3.60	Cum Volume (acre-ft)		0.09	
C & E Loss (ft)	0.01	Cum SA (acres)		0.06	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: N_Arroyo
REACH: 1

RS: 132

INPUT

Description:

ras82101_N_Arroyo.rep

Station Elevation Data						num= 34					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	17.66	1	18	12	18	13	17.99	19.08	17		
23.08	16	24.08	15.96	28.08	15	30.08	14.85	33.08	14.71		
37.08	14.43	40.08	14.25	42.32	14.14	44.32	14	45.32	13.41		
47.32	13	48.32	13	49.32	14	50.32	14.3	52.32	15		
54.32	17.13	55	17.805	57.32	20.11	58.32	20.25	62.32	22.93		
63.32	23.47	66.32	25	68.32	26.21	69.73	26.61	71.73	27.77		
73.73	28.8	74.73	29.27	76.73	30	82.73	30				

Manning's n Values						num= 3					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.06	12	.06	55	.06						

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	12	55		11.17 131.59	25.19	.1	.3

CROSS SECTION OUTPUT Profile #EV 2yr

E.G. Elev (ft)	14.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.060	
W.S. Elev (ft)	14.63	Reach Len. (ft)			
Crit W.S. (ft)	14.63	Flow Area (sq ft)		10.41	
E.G. Slope (ft/ft)	0.062119	Area (sq ft)		10.41	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	17.03	Top Width (ft)		17.03	
Vel Total (ft/s)	4.32	Avg. Vel. (ft/s)		4.32	
Max Chl Dpth (ft)	1.63	Hydr. Depth (ft)		0.61	
Conv. Total (cfs)	180.6	Conv. (cfs)		180.6	
Length Wtd. (ft)		Wetted Per. (ft)		17.77	
Min Ch El (ft)	13.00	Shear (lb/sq ft)		2.27	
Alpha	1.00	Stream Power (lb/ft s)		9.82	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #EV 100yr

E.G. Elev (ft)	15.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.		0.060	
W.S. Elev (ft)	15.37	Reach Len. (ft)			
Crit W.S. (ft)	15.37	Flow Area (sq ft)		27.30	
E.G. Slope (ft/ft)	0.055499	Area (sq ft)		27.30	
Q Total (cfs)	160.00	Flow (cfs)		160.00	
Top Width (ft)	26.10	Top Width (ft)		26.10	
Vel Total (ft/s)	5.86	Avg. Vel. (ft/s)		5.86	
Max Chl Dpth (ft)	2.37	Hydr. Depth (ft)		1.05	
Conv. Total (cfs)	679.2	Conv. (cfs)		679.2	
Length Wtd. (ft)		Wetted Per. (ft)		27.12	
Min Ch El (ft)	13.00	Shear (lb/sq ft)		3.49	
Alpha	1.00	Stream Power (lb/ft s)		20.44	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River: N_Arroyo

Reach	River Sta.	n1	n2	n3
1	809	.06	.06	.06
1	685	.06	.06	.06
1	519	.06	.06	.06
1	399	.06	.06	.06
1	266	.06	.06	.06
1	132	.06	.06	.06

SUMMARY OF REACH LENGTHS

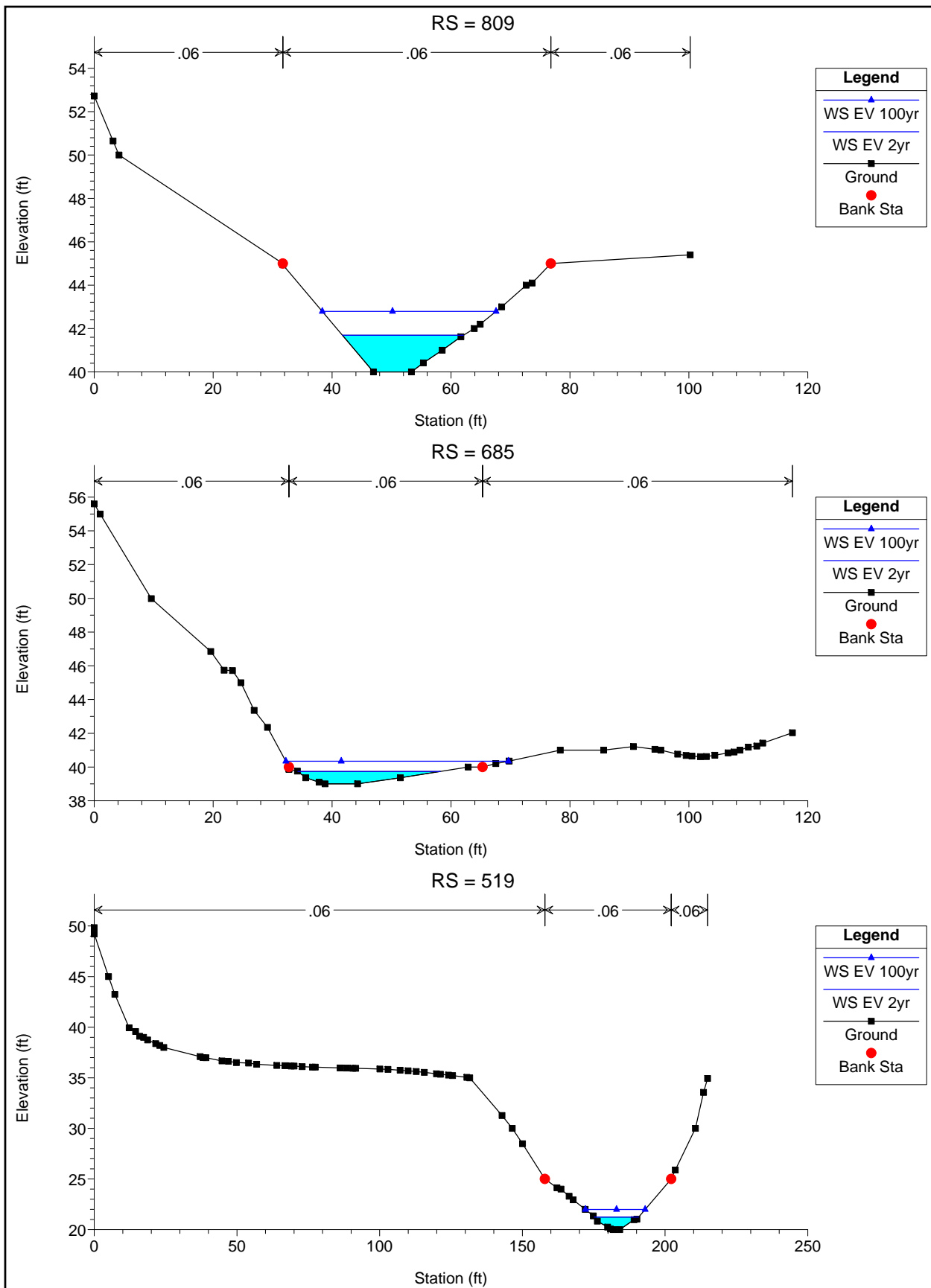
River: N_Arroyo

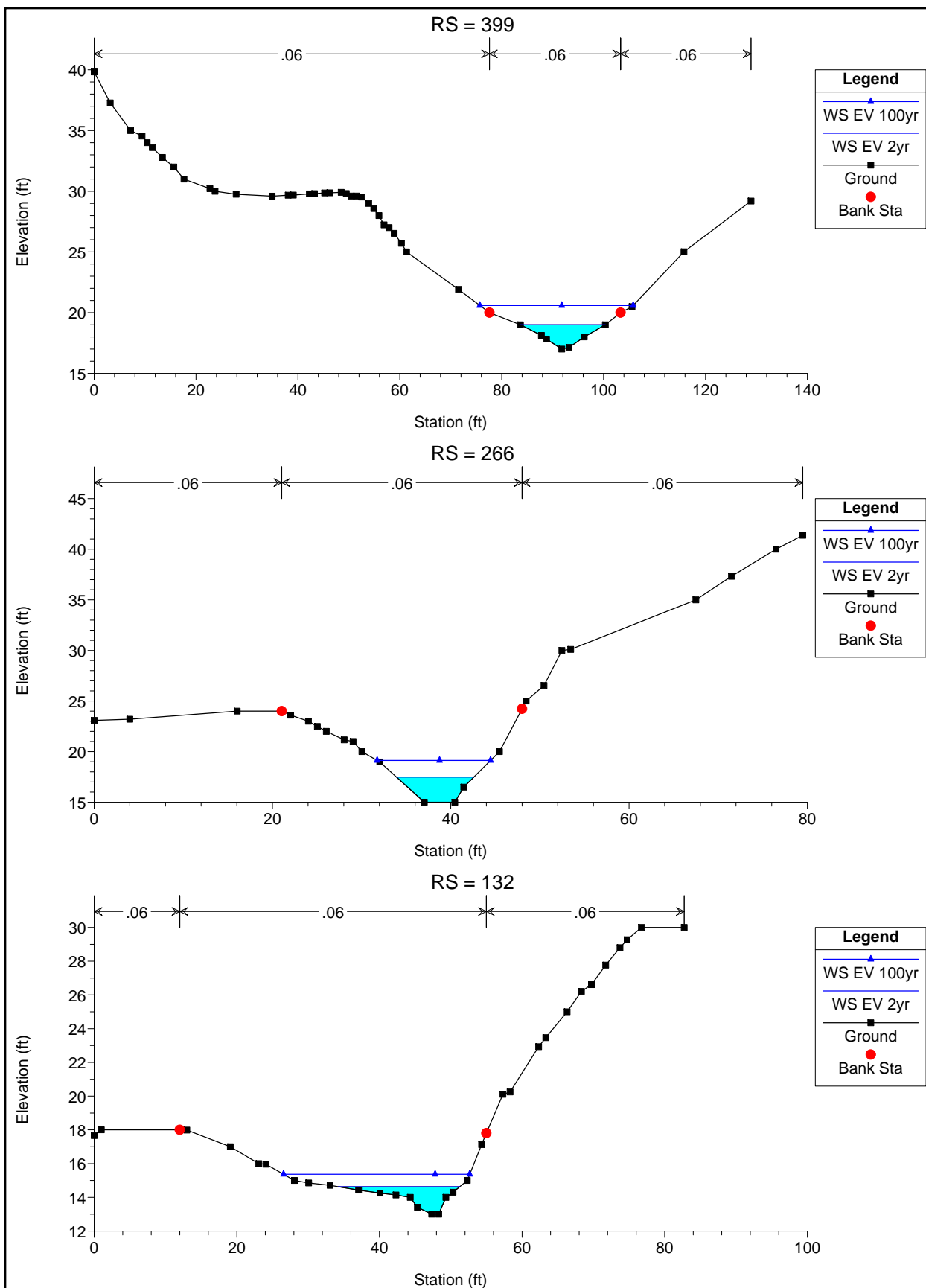
Reach	River Sta.	Left	Channel	Right
-------	------------	------	---------	-------

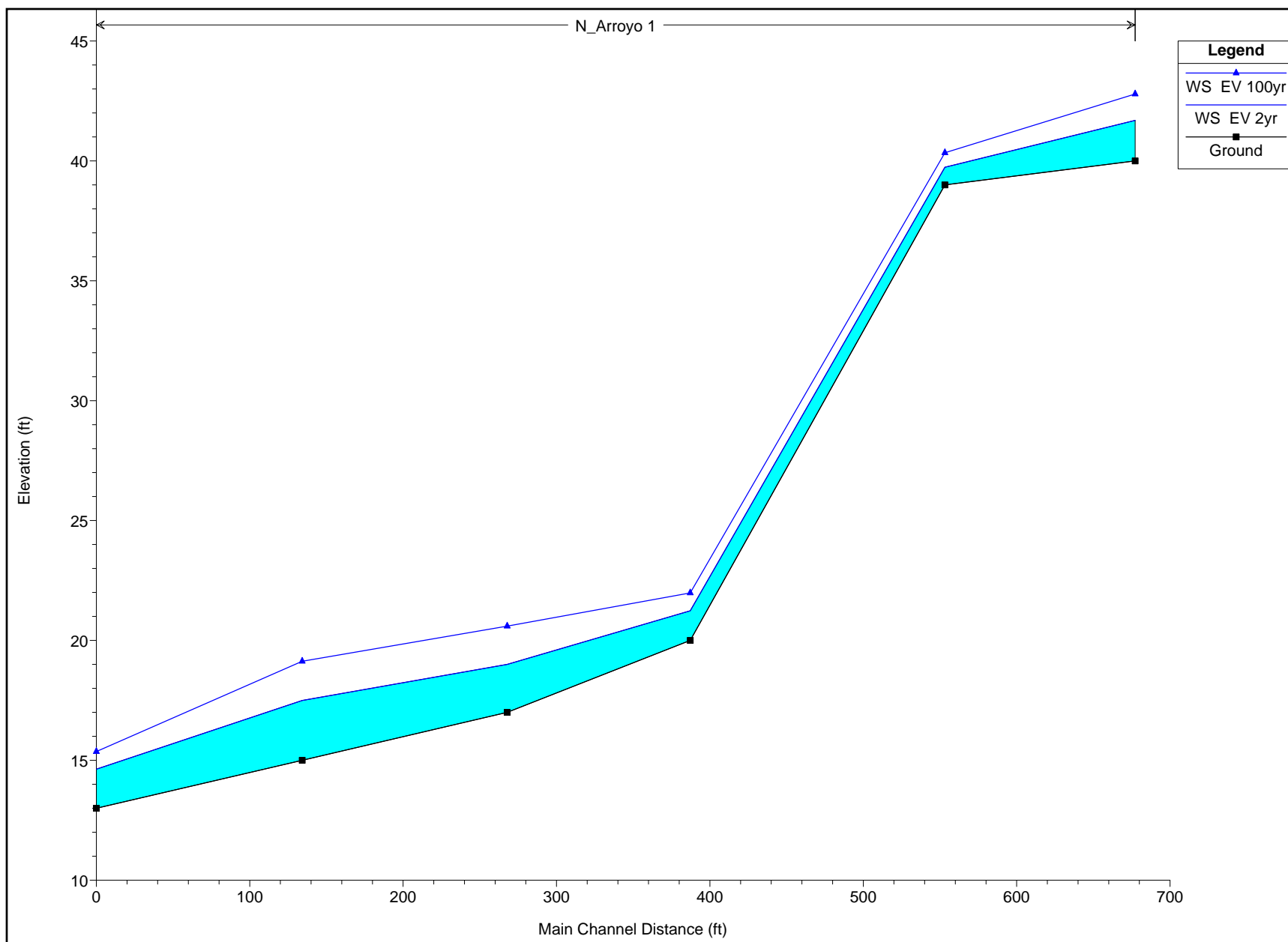
		ras82101_N_Arroyo.rep		
1	809	121.96	124.01	131.23
1	685	161.18	166.09	167.39
1	519	129.98	119.28	109.74
1	399	133.51	133.65	129.63
1	266	135.31	134.23	135.07
1	132	11.17	131.59	25.19

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: N_Arroyo

Reach	River Sta.	Contr.	Expan.
1	809	.1	.3
1	685	.1	.3
1	519	.1	.3
1	399	.1	.3
1	266	.1	.3
1	132	.1	.3







ras82101_Ex_S_Arroyo.rep

HEC-RAS Version 3.1.3 May 2005
U. S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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X      X  XXXXXX      XXXX      XXXX      XX      XXXX
X      X  X          X  X      X  X  X  X  X
X      X  X          X  X      X  X  X  X  X
XXXXXXX XXXX      X      XXX XXXX XXXXXX XXXX
X      X  X          X  X      X  X  X  X  X
X      X  X          X  X      X  X  X  X  X
X      X  XXXXXX      XXXX      X  X  X  X  XXXXX

```

PROJECT DATA

Project Title: Newport Banning Ranch
Project File : ras82101.prj
Run Date and Time: 4/15/2008 3:54:07 PM

Project in English units

PLAN DATA

Plan Title: Ex. S Arroyo Run
Plan File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.p01

Geometry Title: X South Arroyo
Geometry File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.g01

Flow Title : Ex. S_Arroyo Flows
Flow File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.f01

Plan Summary Information:

Number of:	Cross Sections =	12	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

Computational Information

Water surface calculation tolerance =	0.01
Critical depth calculation tolerance =	0.01
Maximum number of iterations =	20
Maximum difference tolerance =	0.3
Flow tolerance factor =	0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Ex. S_Arroyo Flows
Flow File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.f01

Flow Data (cfs)

River	Reach	RS	Ex EV 2yr	Ex EV 100yr
S_Arroyo	1	2256	27	95
S_Arroyo	1	1112	34	138
S_Arroyo	1	481	45	198

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
S_Arroyo	1	Ex EV 2yr	Critical	Critical
S_Arroyo	1	Ex EV 100yr	Critical	Critical

ras82101_Ex_S_Arroyo.rep

GEOMETRY DATA

Geometry Title: X South Arroyo

Geometry File : p:\Projects\821\01\Wat\HH\ElR Study\HEC_RAS\ras82101.g01

CROSS SECTION

RIVER: S_Arroyo

REACH: 1

RS: 2256

INPUT

Description:

Station	Elevation	Data	num=	41	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	72.65	4.47	71.39	5.47	71.06	9.08	70	14.91	67.75			
21.23	65.41	22.2365	24367	23.23	65	25.47	64.23	36.65	60			
38.06	59.17	44.77	55	57.13	55	58.54	55.24	59.54	55.85			
63.15	56.85	64.15	57.3	66.39	57.79	74.45	59.97	74.45	59.98			
74.45	60	74.45	60.07	79.83	65	80.83	66.97	82.83	70			
84.25	70.88	85.25	71.05	86.25	71	87.25	70.93	88.25	70.48			
89.66	70.28	90.66	70.17	92.9	70.44	94.31	70.61	95.31	70.5			
96.73	70	103.61	70	104.61	70.27	106.85	70.49	109.68	71			
110.68	71											

Manning's n	Values	num=	3	Sta	n Val	Sta	n Val
0	.06	36.65	.06	74.45	.06		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	36.65	74.45		193.64	193.64	.1	.3

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	56.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.060	
W.S. Elev (ft)	56.04	Reach Len. (ft)	193.64	193.64	193.64
Crit W.S. (ft)	55.50	Flow Area (sq ft)		15.61	
E.G. Slope (ft/ft)	0.005746	Area (sq ft)		15.61	
Q Total (cfs)	27.00	Flow (cfs)		27.00	
Top Width (ft)	17.14	Top Width (ft)		17.14	
Vel Total (ft/s)	1.73	Avg. Vel. (ft/s)		1.73	
Max Chl Dpth (ft)	1.04	Hydr. Depth (ft)		0.91	
Conv. Total (cfs)	356.2	Conv. (cfs)		356.2	
Length Wtd. (ft)	193.64	Wetted Per. (ft)		17.65	
Min Ch El (ft)	55.00	Shear (lb/sq ft)		0.32	
Alpha	1.00	Stream Power (lb/ft s)		0.55	
Frctn Loss (ft)	2.43	Cum Volume (acre-ft)		0.86	
C & E Loss (ft)	0.02	Cum SA (acres)		1.52	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	57.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11 <td>Wt. n-Val.</td> <td></td> <td>0.060</td> <td></td>	Wt. n-Val.		0.060	
W.S. Elev (ft)	57.07 <td>Reach Len. (ft)</td> <td>193.64</td> <td>193.64</td> <td>193.64</td>	Reach Len. (ft)	193.64	193.64	193.64
Crit W.S. (ft)		Flow Area (sq ft)		35.99	
E.G. Slope (ft/ft)	0.006317	Area (sq ft)		35.99	
Q Total (cfs)	95.00	Flow (cfs)		95.00	
Top Width (ft)	22.20	Top Width (ft)		22.20	
Vel Total (ft/s)	2.64	Avg. Vel. (ft/s)		2.64	
Max Chl Dpth (ft)	2.07	Hydr. Depth (ft)		1.62	
Conv. Total (cfs)	1195.3	Conv. (cfs)		1195.3	
Length Wtd. (ft)	193.64	Wetted Per. (ft)		23.17	
Min Ch El (ft)	55.00	Shear (lb/sq ft)		0.61	
Alpha	1.00	Stream Power (lb/ft s)		1.62	
Frctn Loss (ft)	2.58	Cum Volume (acre-ft)	0.01	2.16	0.01
C & E Loss (ft)	0.03	Cum SA (acres)	0.05	1.90	0.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1 RS: 2062

INPUT

Description:

Station		Elevation Data		num= 43		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	65.75	2.83	65	5.66	64	8.49	64	9.9	64.71				
11.31	65.13	12.73	65.34	14.14	65.49	15.56	65.54	16.97	65.51				
18.38	65	21.21	65	22.63	64.16	24.04	64	25.46	63.38				
26.87	62.85	31.11	61.16	33.94	60.6	35.36	60.14	36.77	60				
38.18	59.67	39.6	59.43	41.01	59	45.25	56.16	46.67	54.82				
48.08	54	50.91	53.42	52.33	52.97	56.57	52.65	57.98	52.65				
62.23	53	63.64	53	65.05	55	67.88	56.47	73.54	59.7				
74.95	60	82.02	62.8	86.27	64.6	87.68	65	91.92	67.15				
97.58	70	107.48	72.65	111.72	73.52								

Manning's n Values		num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.06	36.77	.06	74.95	.06		

Bank	Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
	36.77	74.95	160.23	160.23	160.23	.1	.3	

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	53.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.060	
W.S. Elev (ft)	53.45	Reach Len. (ft)	160.23	160.23	160.23
Crit W.S. (ft)	53.38	Flow Area (sq ft)		7.52	
E.G. Slope (ft/ft)	0.045880	Area (sq ft)		7.52	
Q Total (cfs)	27.00	Flow (cfs)		27.00	
Top Width (ft)	13.17	Top Width (ft)		13.17	
Vel Total (ft/s)	3.59	Avg. Vel. (ft/s)		3.59	
Max Chl Dpth (ft)	0.80	Hydr. Depth (ft)		0.57	
Conv. Total (cfs)	126.1	Conv. (cfs)		126.1	
Length Wtd. (ft)	160.23	Wetted Per. (ft)		13.50	
Min Ch El (ft)	52.65	Shear (lb/sq ft)		1.60	
Alpha	1.00	Stream Power (lb/ft s)		5.73	
Frctn Loss (ft)	2.89	Cum Volume (acre-ft)		0.81	
C & E Loss (ft)	0.05	Cum SA (acres)		1.45	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	54.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.		0.060	
W.S. Elev (ft)	54.13	Reach Len. (ft)	160.23	160.23	160.23
Crit W.S. (ft)	54.05	Flow Area (sq ft)		17.84	
E.G. Slope (ft/ft)	0.044582	Area (sq ft)		17.84	
Q Total (cfs)	95.00	Flow (cfs)		95.00	
Top Width (ft)	16.59	Top Width (ft)		16.59	
Vel Total (ft/s)	5.32	Avg. Vel. (ft/s)		5.32	
Max Chl Dpth (ft)	1.48	Hydr. Depth (ft)		1.08	
Conv. Total (cfs)	449.9	Conv. (cfs)		449.9	
Length Wtd. (ft)	160.23	Wetted Per. (ft)		17.36	
Min Ch El (ft)	52.65	Shear (lb/sq ft)		2.86	
Alpha	1.00	Stream Power (lb/ft s)		15.23	
Frctn Loss (ft)	3.00	Cum Volume (acre-ft)	0.01	2.04	0.01
C & E Loss (ft)	0.10	Cum SA (acres)	0.05	1.82	0.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1

RS: 1902

INPUT

Description:

Station	Elevation	Data	num=	21	Station	Elevation	Data	num=	21
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	64.29	2.24	62.79	6.71	60.14	7.71	59.78	18	55
22.48	53.97	31.08	52.07	36.91	50.9	37.91	50.54	40.74	50
61.11	50	65.59	51.14	66.59	51.33	71.06	52.74	73.3	53.66
77.77	55	82.77	57.7	87.77	60	92.24	61.4	102.54	65
103.95	65.27								

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	18	.06	77.77	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	18	77.77		245.09	245.09	.1	.3

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	50.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.060	
W.S. Elev (ft)	50.67	Reach Len. (ft)	245.09	245.09	245.09
Crit W.S. (ft)		Flow Area (sq ft)		15.73	
E.G. Slope (ft/ft)	0.009555	Area (sq ft)		15.73	
Q Total (cfs)	27.00	Flow (cfs)		27.00	
Top Width (ft)	26.21	Top Width (ft)		26.21	
Vel Total (ft/s)	1.72	Avg. Vel. (ft/s)		1.72	
Max Chl Dpth (ft)	0.67	Hydr. Depth (ft)		0.60	
Conv. Total (cfs)	276.2	Conv. (cfs)		276.2	
Length Wtd. (ft)	245.09	Wetted Per. (ft)		26.36	
Min Ch El (ft)	50.00	Shear (lb/sq ft)		0.36	
Alpha	1.00	Stream Power (lb/ft s)		0.61	
Frctn Loss (ft)	5.02	Cum Volume (acre-ft)		0.77	
C & E Loss (ft)	0.02	Cum SA (acres)		1.38	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	51.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.060	
W.S. Elev (ft)	51.36	Reach Len. (ft)	245.09	245.09	245.09
Crit W.S. (ft)		Flow Area (sq ft)		35.56	
E.G. Slope (ft/ft)	0.010268	Area (sq ft)		35.56	
Q Total (cfs)	95.00	Flow (cfs)		95.00	
Top Width (ft)	32.05	Top Width (ft)		32.05	
Vel Total (ft/s)	2.67	Avg. Vel. (ft/s)		2.67	
Max Chl Dpth (ft)	1.36	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	937.5	Conv. (cfs)		937.5	
Length Wtd. (ft)	245.09	Wetted Per. (ft)		32.38	
Min Ch El (ft)	50.00	Shear (lb/sq ft)		0.70	
Alpha	1.00	Stream Power (lb/ft s)		1.88	
Frctn Loss (ft)	4.95	Cum Volume (acre-ft)	0.01	1.94	0.01
C & E Loss (ft)	0.03	Cum SA (acres)	0.05	1.73	0.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1

RS: 1657

INPUT

ras82101_Ex_S_Arroyo.rep

Description:

Station Elevation Data									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	67.68	5	66.18	8.61	65	25.63	60.21	27.05	59.69
33.45	56.22	35.69	55	42.09	52.76	49.9	50	52.14	48.53
57.14	45	71.4	45	87.03	48.98	89.26	49.72	90.68	50
99.9	53.9	102.13	55	112.13	59.43	113.55	60	115.78	60.32
116.78	60.44								

Manning's n Values					
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	49.9	.06	90.68	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	49.9	90.68		193.82	193.82	.1	.3

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	45.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.060	
W.S. Elev (ft)	45.47	Reach Len. (ft)	193.82	193.82	193.82
Crit W.S. (ft)	45.47	Flow Area (sq ft)		7.21	
E.G. Slope (ft/ft)	0.071442	Area (sq ft)		7.21	
Q Total (cfs)	27.00	Flow (cfs)		27.00	
Top Width (ft)	16.75	Top Width (ft)		16.75	
Vel Total (ft/s)	3.74	Avg. Vel. (ft/s)		3.74	
Max Chl Dpth (ft)	0.47	Hydr. Depth (ft)		0.43	
Conv. Total (cfs)	101.0	Conv. (cfs)		101.0	
Length Wtd. (ft)	193.82	Wetted Per. (ft)		16.95	
Min Ch El (ft)	45.00	Shear (lb/sq ft)		1.90	
Alpha	1.00	Stream Power (lb/ft s)		7.10	
Frctn Loss (ft)	1.19	Cum Volume (acre-ft)		0.70	
C & E Loss (ft)	0.06	Cum SA (acres)		1.26	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	46.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.		0.060	
W.S. Elev (ft)	46.04	Reach Len. (ft)	193.82	193.82	193.82
Crit W.S. (ft)	46.04	Flow Area (sq ft)		17.68	
E.G. Slope (ft/ft)	0.056464	Area (sq ft)		17.68	
Q Total (cfs)	95.00	Flow (cfs)		95.00	
Top Width (ft)	19.81	Top Width (ft)		19.81	
Vel Total (ft/s)	5.37	Avg. Vel. (ft/s)		5.37	
Max Chl Dpth (ft)	1.04	Hydr. Depth (ft)		0.89	
Conv. Total (cfs)	399.8	Conv. (cfs)		399.8	
Length Wtd. (ft)	193.82	Wetted Per. (ft)		20.27	
Min Ch El (ft)	45.00	Shear (lb/sq ft)		3.08	
Alpha	1.00	Stream Power (lb/ft s)		16.52	
Frctn Loss (ft)	1.79	Cum Volume (acre-ft)	0.01	1.79	0.01
C & E Loss (ft)	0.11	Cum SA (acres)	0.05	1.58	0.04

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: S_Arroyo
REACH: 1

RS: 1463

ras82101_Ex_S_Arroyo.rep

INPUT

Description:

Station Elevation Data			num= 36								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	59.42	0	59.38	14.87	55	21.94	52.69	29.75	50		
41.06	45.83	43.3	45	46.13	43.98	56.76	40	66.66	40		
68.07	40.44	75.14	45	85.77	49.14	87.18	50	88.6	50.37		
91.43	51	92.84	51.5	94.26	52	97.91	53	98.91	53.26		
101.14	54	102.56	55	103.97	55.22	106.8	55.7	107.8	55.81		
108.8	55.91	110.8	56	112.21	56	113.21	56.09	114.21	56.16		
115.21	56.45	116.63	56.72	118.04	57	119.46	57.45	122.28	58		
123.7	58.49										

Manning's n Values			num= 3		
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	43.3	.06	75.14	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	43.3	75.14		171.6	171.6	.1	.3

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	41.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.060	
W.S. Elev (ft)	41.54	Reach Len. (ft)	171.60	171.60	171.60
Crit W.S. (ft)		Flow Area (sq ft)		21.19	
E.G. Slope (ft/ft)	0.002097	Area (sq ft)		21.19	
Q Total (cfs)	27.00	Flow (cfs)		27.00	
Top Width (ft)	17.12	Top Width (ft)		17.12	
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)		1.27	
Max Chl Dpth (ft)	1.54	Hydr. Depth (ft)		1.24	
Conv. Total (cfs)	589.6	Conv. (cfs)		589.6	
Length Wtd. (ft)	171.60	Wetted Per. (ft)		17.79	
Min Ch El (ft)	40.00	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		0.20	
Frctn Loss (ft)	1.06	Cum Volume (acre-ft)		0.64	
C & E Loss (ft)	0.01	Cum SA (acres)		1.18	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	42.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.060	
W.S. Elev (ft)	42.63	Reach Len. (ft)	171.60	171.60	171.60
Crit W.S. (ft)		Flow Area (sq ft)		42.32	
E.G. Slope (ft/ft)	0.003624	Area (sq ft)		42.32	
Q Total (cfs)	95.00	Flow (cfs)		95.00	
Top Width (ft)	21.72	Top Width (ft)		21.72	
Vel Total (ft/s)	2.24	Avg. Vel. (ft/s)		2.24	
Max Chl Dpth (ft)	2.63	Hydr. Depth (ft)		1.95	
Conv. Total (cfs)	1578.2	Conv. (cfs)		1578.2	
Length Wtd. (ft)	171.60	Wetted Per. (ft)		22.90	
Min Ch El (ft)	40.00	Shear (lb/sq ft)		0.42	
Alpha	1.00	Stream Power (lb/ft s)		0.94	
Frctn Loss (ft)	1.61	Cum Volume (acre-ft)	0.01	1.66	0.01
C & E Loss (ft)	0.03	Cum SA (acres)	0.05	1.49	0.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1 RS: 1292

INPUT

Description:

Station Elevation Data			num= 40								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

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0	51.51	1	51.07	4.61	50	6.84	49.54	8.84	49.23
11.08	48.8	18.69	47.36	24.08	45.98	26.08	45.77	27.49	45.54
29.73	45	36.05	43.63	40.53	42.73	42.76	42.24	45	41.85
53.54	40	78.37	40	79.79	40.56	81.79	41	83.2	41.2
85.2	42	88.81	43	91.97	44	92.97	44.05	96.57	45
97.57	45.25	100.74	46	102.97	46.38	105.21	47	111.57	48
115.17	48.36	116.17	48.4	117.17	48.45	118.59	48.5	119.59	48.54
120.59	48.56	122	48.58	126.12	48.78	128.36	49	130.6	49.49

Manning's n Values
 Sta n Val Sta num= 3 n Val Sta n Val
 0 .06 45 .06 85.2 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 45 85.2 179.73 179.73 179.73 .1 .3

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	40.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.060	
W.S. Elev (ft)	40.33	Reach Len. (ft)	179.73	179.73	179.73
Crit W.S. (ft)	40.33	Flow Area (sq ft)		8.48	
E.G. Slope (ft/ft)	0.078501	Area (sq ft)		8.48	
Q Total (cfs)	27.00	Flow (cfs)		27.00	
Top Width (ft)	27.16	Top Width (ft)		27.16	
Vel Total (ft/s)	3.19	Avg. Vel. (ft/s)		3.19	
Max Chl Dpth (ft)	0.33	Hydr. Depth (ft)		0.31	
Conv. Total (cfs)	96.4	Conv. (cfs)		96.4	
Length Wtd. (ft)	179.73	Wetted Per. (ft)		27.26	
Min Ch El (ft)	40.00	Shear (lb/sq ft)		1.52	
Alpha	1.00	Stream Power (lb/ft s)		4.85	
Frctn Loss (ft)	1.44	Cum Volume (acre-ft)		0.58	
C & E Loss (ft)	0.04	Cum SA (acres)		1.10	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	41.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.		0.060	
W.S. Elev (ft)	40.74	Reach Len. (ft)	179.73	179.73	179.73
Crit W.S. (ft)	40.74	Flow Area (sq ft)		20.45	
E.G. Slope (ft/ft)	0.060563	Area (sq ft)		20.45	
Q Total (cfs)	95.00	Flow (cfs)		95.00	
Top Width (ft)	30.51	Top Width (ft)		30.51	
Vel Total (ft/s)	4.65	Avg. Vel. (ft/s)		4.65	
Max Chl Dpth (ft)	0.74	Hydr. Depth (ft)		0.67	
Conv. Total (cfs)	386.0	Conv. (cfs)		386.0	
Length Wtd. (ft)	179.73	Wetted Per. (ft)		30.71	
Min Ch El (ft)	40.00	Shear (lb/sq ft)		2.52	
Alpha	1.00	Stream Power (lb/ft s)		11.69	
Frctn Loss (ft)	1.55	Cum Volume (acre-ft)	0.01	1.53	0.01
C & E Loss (ft)	0.08	Cum SA (acres)	0.05	1.38	0.04

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: S_Arroyo
 REACH: 1

RS: 1112

ras82101_Ex_S_Arroyo.rep

INPUT

Description:

Station Elevation Data			num= 29		
Sta	Elev	Sta	Elev	Sta	Elev
0	43.01	12.53	40	33.62	35.85
65.89	34	68.13	34.15	70.36	34.41
77.62	35.44	79.85	36	80.85	36.15
86.87	37.93	87.87	38.02	91.48	39.01
101.08	40.88	102.08	41	105.69	41.97
111.3	43	113.53	43.42	115.77	44.02

Manning's n Values			num= 3		
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	33.62	.06	79.85	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	33.62	79.85		215.95	215.95	.1	.3

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	35.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.060	
W.S. Elev (ft)	35.02	Reach Len. (ft)	215.95	215.95	215.95
Crit W.S. (ft)	34.44	Flow Area (sq ft)		28.72	
E.G. Slope (ft/ft)	0.003363	Area (sq ft)		28.72	
Q Total (cfs)	34.00	Flow (cfs)		34.00	
Top Width (ft)	38.26	Top Width (ft)		38.26	
Vel Total (ft/s)	1.18	Avg. Vel. (ft/s)		1.18	
Max Chl Dpth (ft)	1.02	Hydr. Depth (ft)		0.75	
Conv. Total (cfs)	586.3	Conv. (cfs)		586.3	
Length Wtd. (ft)	215.95	Wetted Per. (ft)		38.36	
Min Ch El (ft)	34.00	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		0.19	
Frctn Loss (ft)	1.99	Cum Volume (acre-ft)		0.50	
C & E Loss (ft)	0.01	Cum SA (acres)		0.96	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	35.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.060	
W.S. Elev (ft)	35.93	Reach Len. (ft)	215.95	215.95	215.95
Crit W.S. (ft)		Flow Area (sq ft)	0.01	66.97	
E.G. Slope (ft/ft)	0.004225	Area (sq ft)	0.01	66.97	
Q Total (cfs)	138.00	Flow (cfs)	0.00	138.00	
Top Width (ft)	46.31	Top Width (ft)	0.38	45.93	
Vel Total (ft/s)	2.06	Avg. Vel. (ft/s)	0.18	2.06	
Max Chl Dpth (ft)	1.93	Hydr. Depth (ft)	0.04	1.46	
Conv. Total (cfs)	2123.1	Conv. (cfs)	0.0	2123.0	
Length Wtd. (ft)	215.95	Wetted Per. (ft)	0.39	46.24	
Min Ch El (ft)	34.00	Shear (lb/sq ft)	0.01	0.38	
Alpha	1.00	Stream Power (lb/ft s)	0.00	0.79	
Frctn Loss (ft)	2.29	Cum Volume (acre-ft)	0.01	1.35	0.01
C & E Loss (ft)	0.03	Cum SA (acres)	0.05	1.23	0.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1 RS: 896

INPUT

Description:

Station Elevation Data			num= 40		
Sta	Elev	Sta	Elev	Sta	Elev
0	43.13	1	42.74	11.2	40
31.74	34	34.74	33.51	37.74	33

ras82101_Ex_S_Arroyo.rep

44.9	32.6	47.14	32.49	62.27	32.43	63.27	32.48	65.27	32.48
66.27	32.54	67.27	32.55	69.5	32.62	71.5	32.73	73.5	32.87
75.74	33	76.74	33.08	77.74	33.11	82.84	33.49	85.84	33.67
89.96	34	91.96	34.21	98.04	35	105.12	35.57	110.21	36
112.21	36.24	118.3	37	122.3	37.6	125.46	38	127.46	38.33
128.46	38.54	130.46	38.83	131.87	38.95	132.87	39	134.87	39.25

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	34.74	.06	82.84	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

34.74	82.84	240.26	240.26	240.26	.1	.3
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CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	33.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.060	
W.S. Elev (ft)	32.86	Reach Len. (ft)	240.26	240.26	240.26
Crit W.S. (ft)	32.86	Flow Area (sq ft)		10.59	
E.G. Slope (ft/ft)	0.078473	Area (sq ft)		10.59	
Q Total (cfs)	34.00	Flow (cfs)		34.00	
Top Width (ft)	33.62	Top Width (ft)		33.62	
Vel Total (ft/s)	3.21	Avg. Vel. (ft/s)		3.21	
Max Chl Dpth (ft)	0.43	Hydr. Depth (ft)		0.31	
Conv. Total (cfs)	121.4	Conv. (cfs)		121.4	
Length Wtd. (ft)	240.26	Wetted Per. (ft)		33.64	
Min Ch El (ft)	32.43	Shear (lb/sq ft)		1.54	
Alpha	1.00	Stream Power (lb/ft s)		4.95	
Frctn Loss (ft)	3.36	Cum Volume (acre-ft)		0.41	
C & E Loss (ft)	0.04	Cum SA (acres)		0.78	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	33.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.060	
W.S. Elev (ft)	33.34	Reach Len. (ft)	240.26	240.26	240.26
Crit W.S. (ft)	33.34	Flow Area (sq ft)		29.77	
E.G. Slope (ft/ft)	0.061155	Area (sq ft)		29.77	
Q Total (cfs)	138.00	Flow (cfs)		138.00	
Top Width (ft)	45.15	Top Width (ft)		45.15	
Vel Total (ft/s)	4.63	Avg. Vel. (ft/s)		4.63	
Max Chl Dpth (ft)	0.91	Hydr. Depth (ft)		0.66	
Conv. Total (cfs)	558.0	Conv. (cfs)		558.0	
Length Wtd. (ft)	240.26	Wetted Per. (ft)		45.22	
Min Ch El (ft)	32.43	Shear (lb/sq ft)		2.51	
Alpha	1.00	Stream Power (lb/ft s)		11.65	
Frctn Loss (ft)	3.55	Cum Volume (acre-ft)	0.01	1.11	0.01
C & E Loss (ft)	0.08	Cum SA (acres)	0.05	1.00	0.04

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: S_Arroyo
REACH: 1

RS: 656

INPUT

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Description:

Station Elevation Data									
num= 41									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	32.18	1	32	5.47	31.11	6.47	31	7.47	30.75
11.94	30	18.03	28.95	23.41	28	26.57	27.45	28.81	27
30.81	26.67	34.93	26	39.41	25.32	41.41	25	79.35	25
86.63	25.9	87.63	26	93.96	26.88	94.96	27	103.5	27.88
104.5	28	105.92	28.13	106.92	28.25	112.31	28.73	115.31	28.95
116.73	29	117.73	29.04	119.96	29.13	123.13	29.2	124.13	29.22
127.29	29.29	128.29	29.32	132.76	29.38	136.88	29.41	139.12	29.45
142.12	29.49	143.53	29.5	144.53	29.52	146.95	29.52	150.11	29.57
151.11	29.58								

Manning's n Values

num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	34.93	.06	87.63	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	34.93	87.63		175.08	175.08	.1	.3

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	25.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.060	
W.S. Elev (ft)	25.63	Reach Len. (ft)	175.08	175.08	175.08
Crit W.S. (ft)		Flow Area (sq ft)		26.74	
E.G. Slope (ft/ft)	0.005613	Area (sq ft)		26.74	
Q Total (cfs)	34.00	Flow (cfs)		34.00	
Top Width (ft)	47.07	Top Width (ft)		47.07	
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)		1.27	
Max Chl Dpth (ft)	0.63	Hydr. Depth (ft)		0.57	
Conv. Total (cfs)	453.8	Conv. (cfs)		453.8	
Length Wtd. (ft)	175.08	Wetted Per. (ft)		47.16	
Min Ch El (ft)	25.00	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)		0.25	
Frctn Loss (ft)	0.99	Cum Volume (acre-ft)		0.30	
C & E Loss (ft)	0.00	Cum SA (acres)		0.56	

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	26.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.060	0.060	0.060
W.S. Elev (ft)	26.32	Reach Len. (ft)	175.08	175.08	175.08
Crit W.S. (ft)		Flow Area (sq ft)	0.31	61.99	0.37
E.G. Slope (ft/ft)	0.006492	Area (sq ft)	0.31	61.99	0.37
Q Total (cfs)	138.00	Flow (cfs)	0.18	137.61	0.21
Top Width (ft)	56.95	Top Width (ft)	1.96	52.70	2.29
Vel Total (ft/s)	2.20	Avg. Vel. (ft/s)	0.58	2.22	0.58
Max Chl Dpth (ft)	1.32	Hydr. Depth (ft)	0.16	1.18	0.16
Conv. Total (cfs)	1712.7	Conv. (cfs)	2.3	1707.8	2.6
Length Wtd. (ft)	175.08	Wetted Per. (ft)	1.99	52.84	2.31
Min Ch El (ft)	25.00	Shear (lb/sq ft)	0.06	0.48	0.06
Alpha	1.01	Stream Power (lb/ft s)	0.04	1.06	0.04
Frctn Loss (ft)	0.75	Cum Volume (acre-ft)	0.01	0.86	0.01
C & E Loss (ft)	0.01	Cum SA (acres)	0.04	0.73	0.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1 RS: 481

INPUT

Description:

Station Elevation Data									
num= 46									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	37.91	3.16	37.28	4.16	37	6.4	36.61	9.56	36
10.56	35.82	13.72	35	15.14	34.43	17.37	34	20.98	33
24.58	32.09	25.58	32	27	31.62	29.23	30.96	31.47	30
32.88	29.73	37.36	29	39.59	28	41.01	27.75	43.24	27
47.72	26.76	57.15	26.27	71.09	25.53	80.53	25	86.36	24.73
103.36	24	120.86	24	141.45	23.87	144.28	24	161.28	25
168.49	25.51	176.55	26	183.26	26.6	186.87	27	190.47	28
191.89	28.21	194.12	29	195.12	29.21	200.12	30	202.36	30.47

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 203.36 30.65 210.57 32.22 214.17 32.97 224.47 35 230.3 37.02
 232.54 37.67

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .06 80.53 .06 161.28 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 80.53 161.28 149.6 149.6 149.6 .1 .3

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	24.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.060	
W.S. Elev (ft)	24.64	Reach Len. (ft)	149.60	149.60	149.60
Crit W.S. (ft)		Flow Area (sq ft)		36.24	
E.G. Slope (ft/ft)	0.005694	Area (sq ft)		36.24	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	66.87	Top Width (ft)		66.87	
Vel Total (ft/s)	1.24	Avg. Vel. (ft/s)		1.24	
Max Chl Dpth (ft)	0.77	Hydr. Depth (ft)		0.54	
Conv. Total (cfs)	596.3	Conv. (cfs)		596.3	
Length Wtd. (ft)	149.60	Wetted Per. (ft)		66.91	
Min Ch El (ft)	23.87	Shear (lb/sq ft)		0.19	
Alpha	1.00	Stream Power (lb/ft s)		0.24	
Frctn Loss (ft)	1.18	Cum Volume (acre-ft)		0.18	
C & E Loss (ft)	0.01	Cum SA (acres)		0.33	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	25.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.060	0.060	0.060
W.S. Elev (ft)	25.59	Reach Len. (ft)	149.60	149.60	149.60
Crit W.S. (ft)		Flow Area (sq ft)	3.14	110.49	2.50
E.G. Slope (ft/ft)	0.003327	Area (sq ft)	3.14	110.49	2.50
Q Total (cfs)	198.00	Flow (cfs)	1.99	194.44	1.57
Top Width (ft)	99.99	Top Width (ft)	10.65	80.75	8.59
Vel Total (ft/s)	1.70	Avg. Vel. (ft/s)	0.63	1.76	0.63
Max Chl Dpth (ft)	1.72	Hydr. Depth (ft)	0.30	1.37	0.29
Conv. Total (cfs)	3432.6	Conv. (cfs)	34.5	3370.9	27.2
Length Wtd. (ft)	149.60	Wetted Per. (ft)	10.66	80.80	8.61
Min Ch El (ft)	23.87	Shear (lb/sq ft)	0.06	0.28	0.06
Alpha	1.05	Stream Power (lb/ft s)	0.04	0.50	0.04
Frctn Loss (ft)	0.92	Cum Volume (acre-ft)	0.01	0.51	0.00
C & E Loss (ft)	0.02	Cum SA (acres)	0.02	0.46	0.01

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo
 REACH: 1 RS: 331

INPUT

Description:

Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	28.1	1	28	2	27.82	3	27.75	4	27.53
7.48	27.45	9	27.28	10	27.21	12	27.15	15	26.87
18.79	26.71	28	26.6	31	26.69	33	26.74	34	26.72
35.29	26.68	38	26.91	41	27	66	27	67	26.94
69.07	26.64	72	26.17	74	26	75	25.87	84	24.98
88.76	24	95	23.17	96	23	100	22.18	101	22
107.15	22	111	22.74	113	23	121	24.01	126	24.46
132.47	25	135	25.23	138	25.53	139	25.64	140	25.72
141.46	25.81	143	26	146	26.73	147	27.1	151	28
152.13	28.05	153	28.14	155	29	159	29.84	160	30
161.56	30.21	162	30.64	173	33.57	178	35	182	35.89

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	84.52	.06	132.47	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	84.52	132.47		206.09	206.09	.1	.3

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	23.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.060	
W.S. Elev (ft)	23.40	Reach Len. (ft)	206.09	206.09	206.09
Crit W.S. (ft)	22.93	Flow Area (sq ft)		19.19	
E.G. Slope (ft/ft)	0.011637	Area (sq ft)		19.19	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	23.11	Top Width (ft)		23.11	
Vel Total (ft/s)	2.34	Avg. Vel. (ft/s)		2.34	
Max Chl Dpth (ft)	1.40	Hydr. Depth (ft)		0.83	
Conv. Total (cfs)	417.1	Conv. (cfs)		417.1	
Length Wtd. (ft)	206.09	Wetted Per. (ft)		23.35	
Min Ch El (ft)	22.00	Shear (lb/sq ft)		0.60	
Alpha	1.00	Stream Power (lb/ft s)		1.40	
Frctn Loss (ft)	5.02	Cum Volume (acre-ft)		0.08	
C & E Loss (ft)	0.01	Cum SA (acres)		0.18	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	24.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.060	
W.S. Elev (ft)	24.50	Reach Len. (ft)	206.09	206.09	206.09
Crit W.S. (ft)	23.93	Flow Area (sq ft)		53.67	
E.G. Slope (ft/ft)	0.015136	Area (sq ft)		53.67	
Q Total (cfs)	198.00	Flow (cfs)		198.00	
Top Width (ft)	39.89	Top Width (ft)		39.89	
Vel Total (ft/s)	3.69	Avg. Vel. (ft/s)		3.69	
Max Chl Dpth (ft)	2.50	Hydr. Depth (ft)		1.35	
Conv. Total (cfs)	1609.4	Conv. (cfs)		1609.4	
Length Wtd. (ft)	206.09	Wetted Per. (ft)		40.29	
Min Ch El (ft)	22.00	Shear (lb/sq ft)		1.26	
Alpha	1.00	Stream Power (lb/ft s)		4.64	
Frctn Loss (ft)	5.58	Cum Volume (acre-ft)		0.23	
C & E Loss (ft)	0.01	Cum SA (acres)		0.26	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo
 REACH: 1

RS: 125

INPUT

Description:

Station	Elevation	Data	num=	79						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	32.23	0	32	2.24	31.31	3.65	30.94	6.89	30.68	
8.3	30.57	14.13	30.45	15.13	30.46	16.55	30.46	18.78	30.49	
21.02	30.48	22.02	30.47	23.43	30.45	27.04	30.26	29.27	30.12	
30.27	30	31.69	29.72	33.92	29	35.34	28.4	36.34	27.69	
38.57	27	40.81	26.14	41.81	26	42.81	25.65	45.05	25	
47.28	24.46	48.7	23.83	51.86	23	53.27	22.59	55.51	22	
58.34	21.23	59.34	21	62.94	20.18	63.94	20	65.36	20	
69.83	19.53	74.3	19	78.77	18.76	83.25	18.51	89.08	18.17	
90.49	18.11	92.73	18	132.94	18	137.94	18.3	143.77	18.63	
149.6	19	152.76	19.31	158.59	20	159.59	20.52	161.01	21.17	
163.24	23.08	166.85	25	167.85	26	169.26	26.58	170.26	27.22	
171.68	28.27	173.09	29	175.33	29.59	176.33	29.78	178.56	30.08	
179.98	30.15	184.45	30.63	185.45	30.77	188.28	31	191.44	31.27	
192.85	31.31	193.85	31.39	195.27	31.43	196.27	31.49	199.1	31.59	
202.26	32	203.67	32	207.28	32.66	208.28	33	209.69	33.19	

211.93 34 212.93 34.53 214.34 35 214.34 35.09

Manning's n Values num= 3
Sta n Val Sta n Val
0 .06 63.94 .06 158.59 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
63.94 158.59 124.97 124.97 124.97 .1 .3

CROSS SECTION OUTPUT Profile #Ex EV 2yr

E.G. Elev (ft)	18.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.060	
W.S. Elev (ft)	18.32	Reach Len. (ft)			
Crit W.S. (ft)	18.32	Flow Area (sq ft)		14.82	
E.G. Slope (ft/ft)	0.079816	Area (sq ft)		14.82	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	51.83	Top Width (ft)		51.83	
Vel Total (ft/s)	3.04	Avg. Vel. (ft/s)		3.04	
Max Chl Dpth (ft)	0.32	Hydr. Depth (ft)		0.29	
Conv. Total (cfs)	159.3	Conv. (cfs)		159.3	
Length Wtd. (ft)		Wetted Per. (ft)		51.84	
Min Ch El (ft)	18.00	Shear (lb/sq ft)		1.42	
Alpha	1.00	Stream Power (lb/ft s)		4.33	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #Ex EV 100yr

E.G. Elev (ft)	19.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.		0.060	
W.S. Elev (ft)	18.80	Reach Len. (ft)			
Crit W.S. (ft)	18.80	Flow Area (sq ft)		43.54	
E.G. Slope (ft/ft)	0.061593	Area (sq ft)		43.54	
Q Total (cfs)	198.00	Flow (cfs)		198.00	
Top Width (ft)	68.38	Top Width (ft)		68.38	
Vel Total (ft/s)	4.55	Avg. Vel. (ft/s)		4.55	
Max Chl Dpth (ft)	0.80	Hydr. Depth (ft)		0.64	
Conv. Total (cfs)	797.8	Conv. (cfs)		797.8	
Length Wtd. (ft)		Wetted Per. (ft)		68.42	
Min Ch El (ft)	18.00	Shear (lb/sq ft)		2.45	
Alpha	1.00	Stream Power (lb/ft s)		11.13	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING' S N VALUES

Ri ver: S_Arroyo

Reach	Ri ver Sta.	n1	n2	n3
1	2256	.06	.06	.06
1	2062	.06	.06	.06
1	1902	.06	.06	.06
1	1657	.06	.06	.06
1	1463	.06	.06	.06
1	1292	.06	.06	.06
1	1112	.06	.06	.06
1	896	.06	.06	.06
1	656	.06	.06	.06
1	481	.06	.06	.06
1	331	.06	.06	.06
1	125	.06	.06	.06

SUMMARY OF REACH LENGTHS

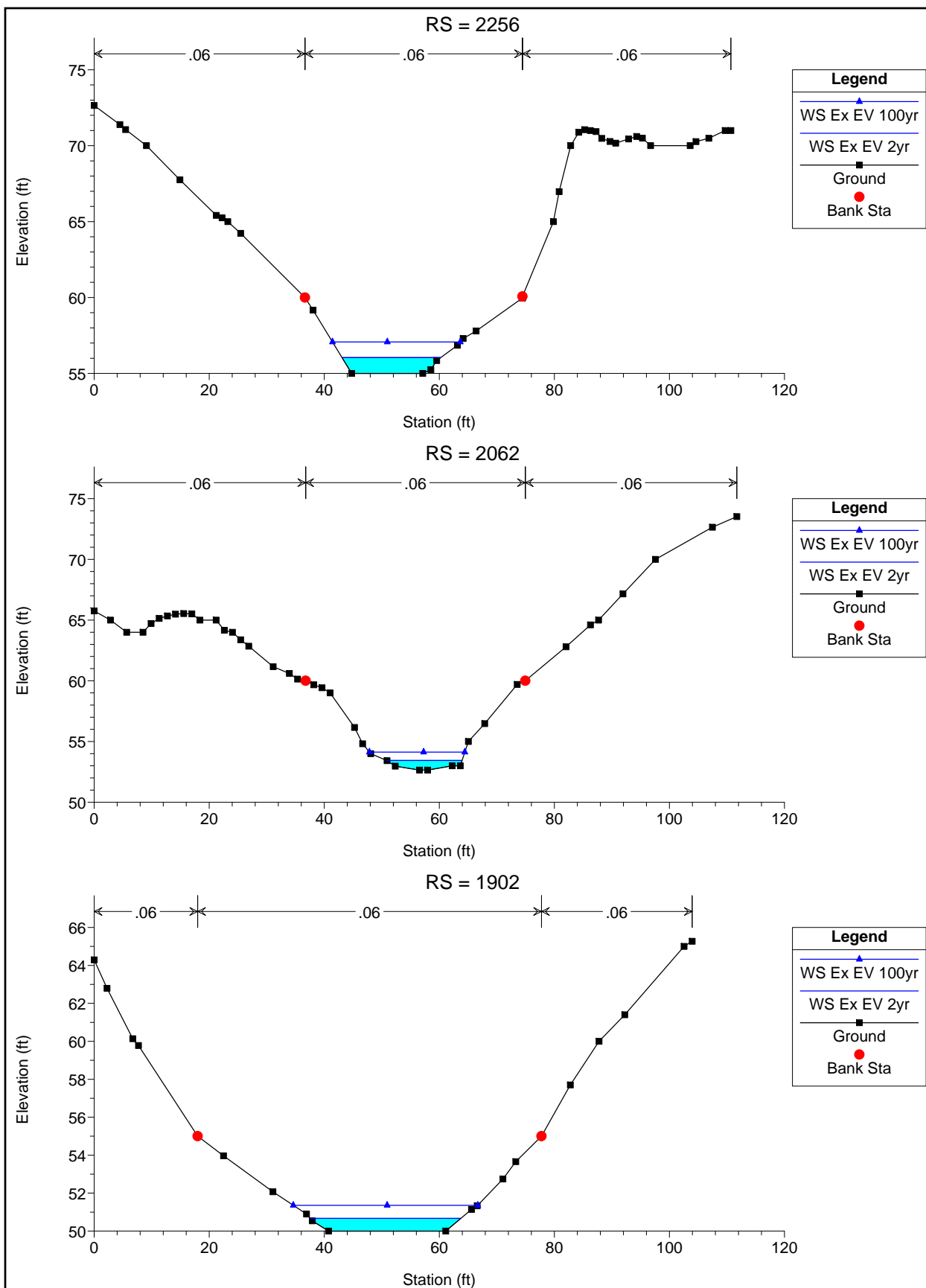
Ri ver: S_Arroyo

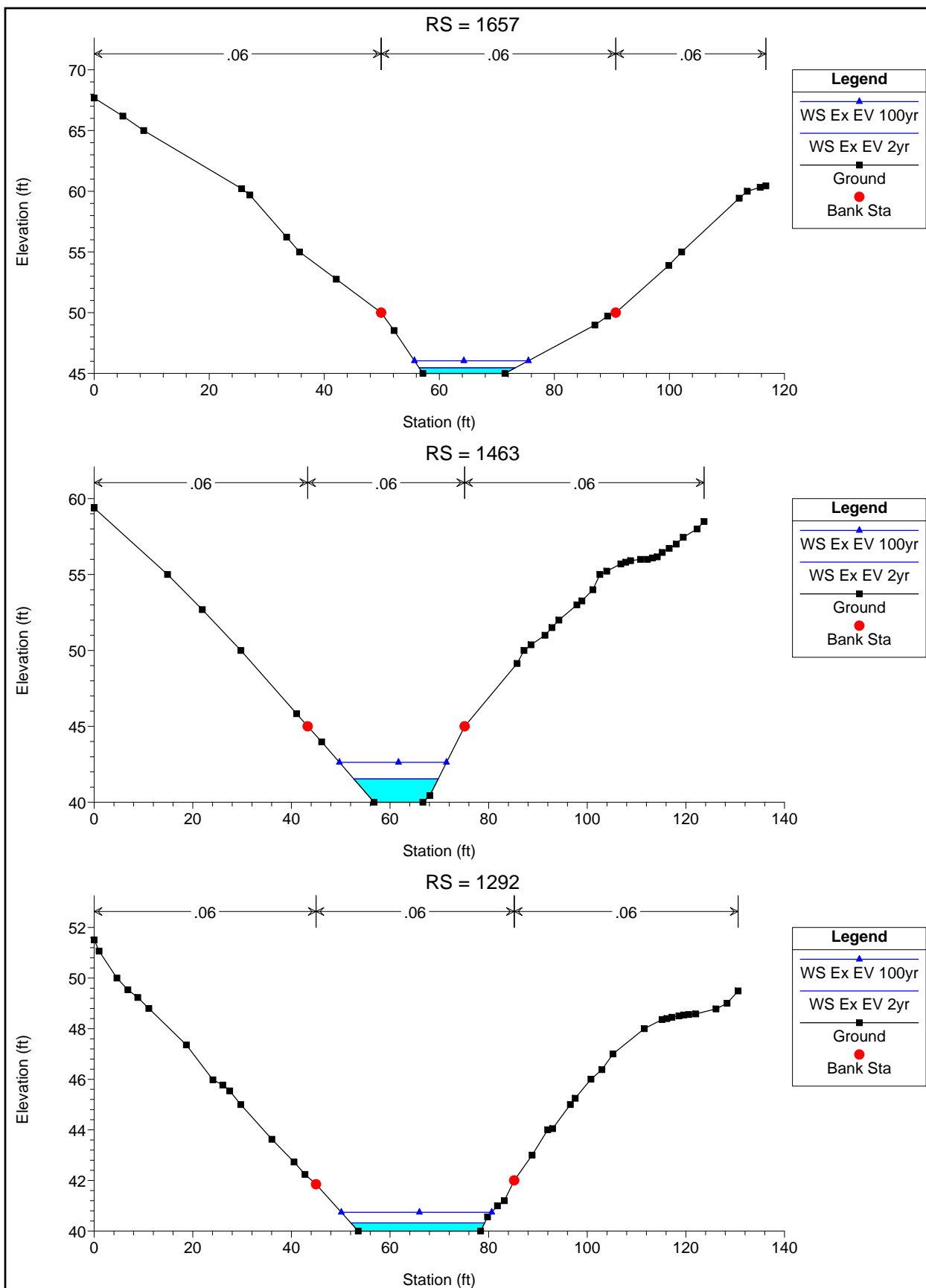
Reach	Ri ver Sta.	Left	Channel	Ri ght
1	2256	193.64	193.64	193.64
1	2062	160.23	160.23	160.23

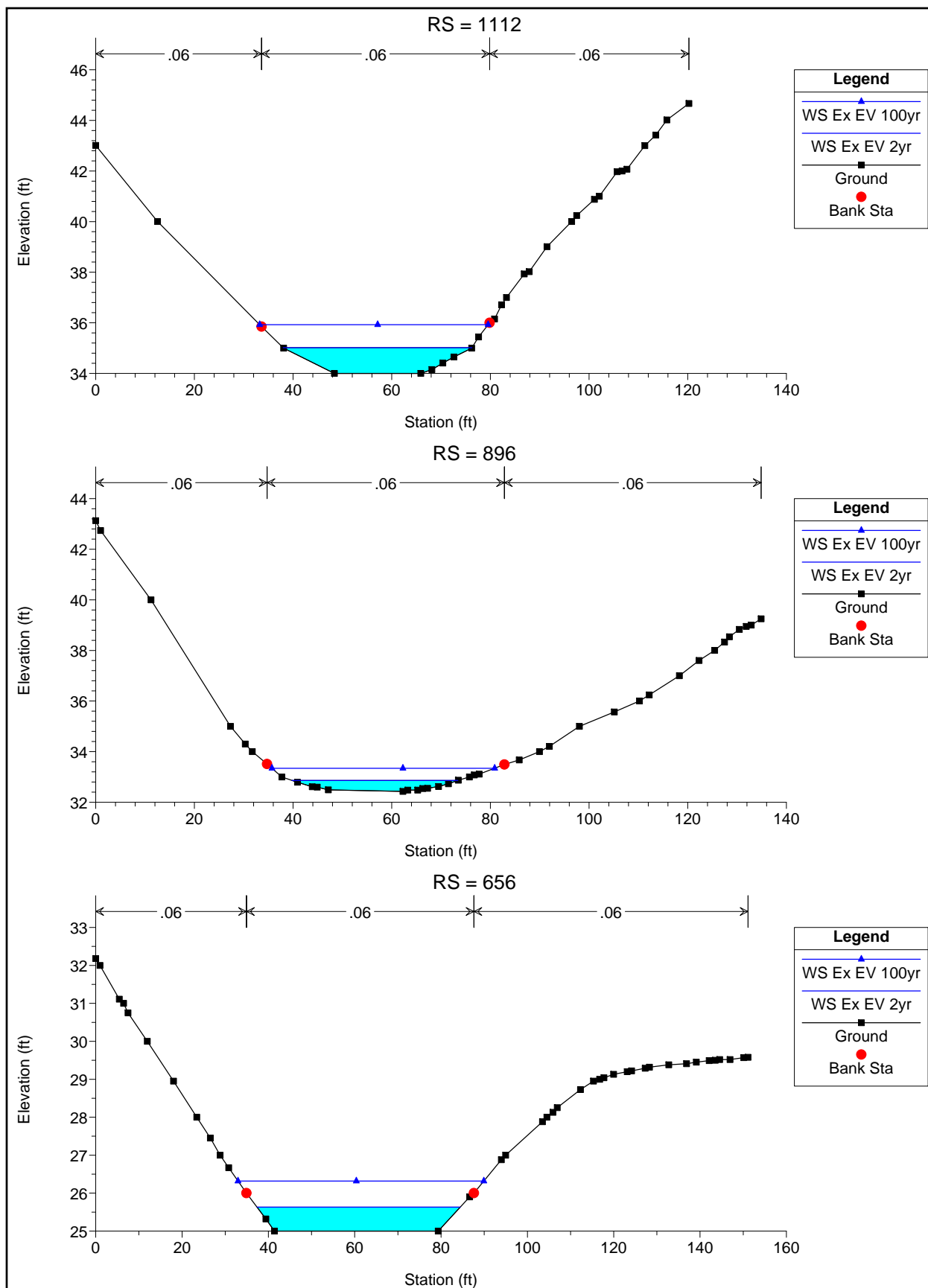
ras82101_Ex_S_Arroyo.rep				
1	1902	245.09	245.09	245.09
1	1657	193.82	193.82	193.82
1	1463	171.6	171.6	171.6
1	1292	179.73	179.73	179.73
1	1112	215.95	215.95	215.95
1	896	240.26	240.26	240.26
1	656	175.08	175.08	175.08
1	481	149.6	149.6	149.6
1	331	206.09	206.09	206.09
1	125	124.97	124.97	124.97

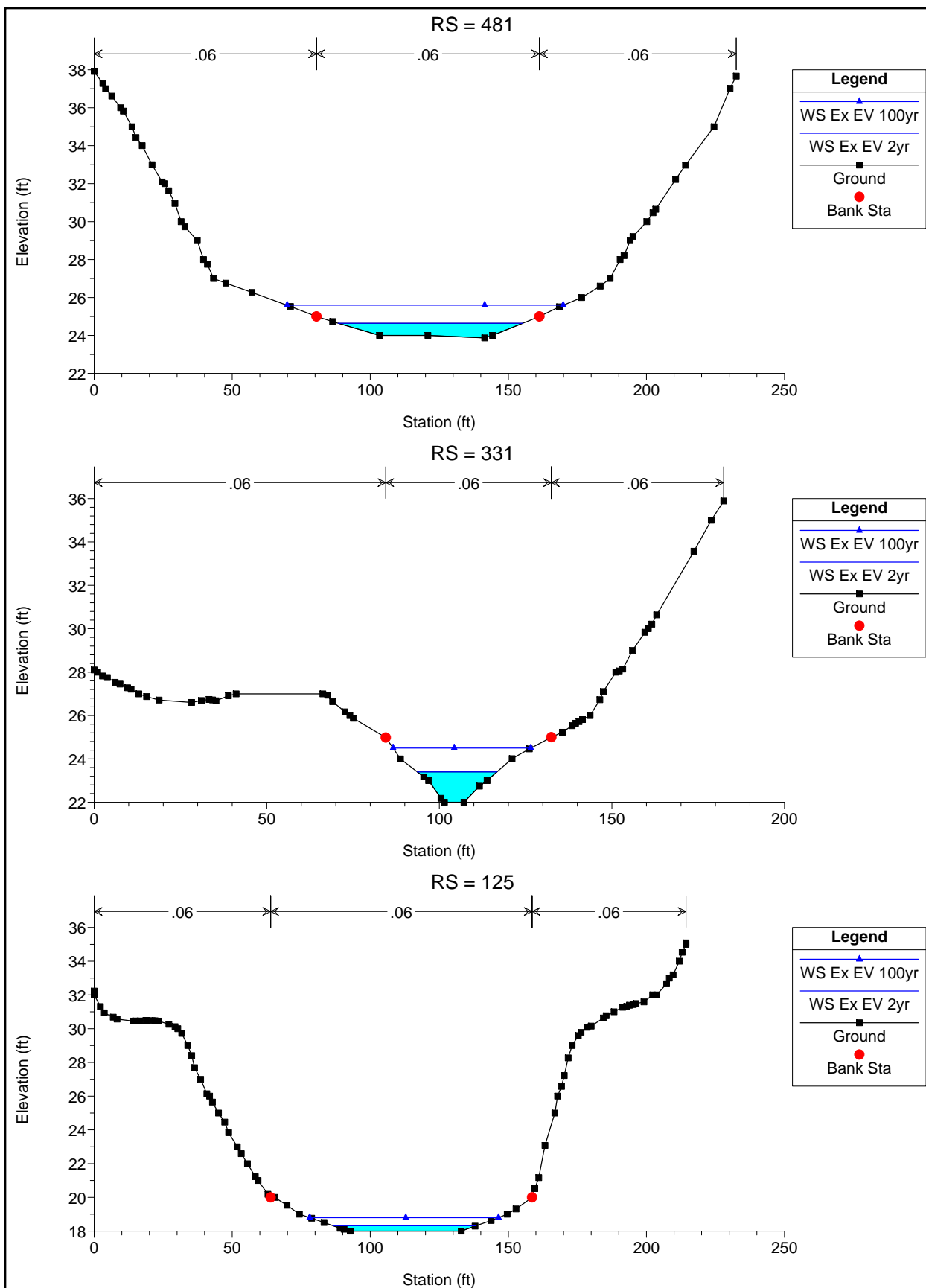
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: S_Arroyo

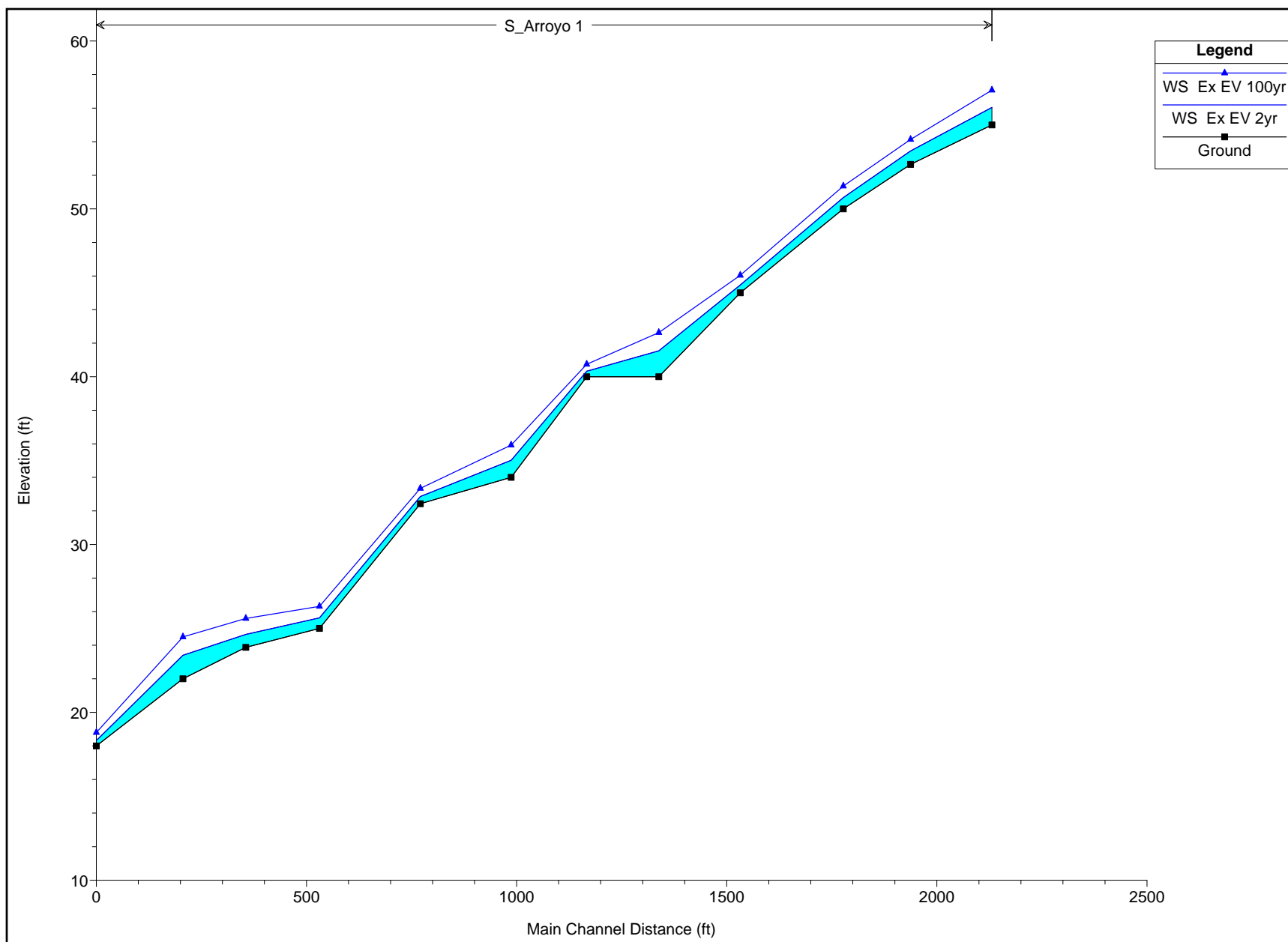
Reach	River Sta.	Contr.	Expan.
1	2256	.1	.3
1	2062	.1	.3
1	1902	.1	.3
1	1657	.1	.3
1	1463	.1	.3
1	1292	.1	.3
1	1112	.1	.3
1	896	.1	.3
1	656	.1	.3
1	481	.1	.3
1	331	.1	.3
1	125	.1	.3











ras82101_S_Pr_Arroyo.rep

HEC-RAS Version 3.1.3 May 2005
U. S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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X      X  XXXXXX      XXXX      XXXX      XX      XXXX
X      X  X          X  X      X  X  X  X  X
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PROJECT DATA

Project Title: Newport Banning Ranch
Project File : ras82101.prj
Run Date and Time: 4/15/2008 3:58:31 PM

Project in English units

PLAN DATA

Plan Title: Pr. S Arroyo Run
Plan File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.p03

Geometry Title: P South Arroyo
Geometry File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.g03

Flow Title : Pr. S_Arroyo Flows
Flow File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.f03

Plan Summary Information:

Number of:	Cross Sections =	11	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

Computational Information

Water surface calculation tolerance =	0.01
Critical depth calculation tolerance =	0.01
Maximum number of iterations =	20
Maximum difference tolerance =	0.3
Flow tolerance factor =	0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Pr. S_Arroyo Flows
Flow File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.f03

Flow Data (cfs)

River	Reach	RS	Pr EV 2yr	Pr EV 100yr
S_Arroyo	1	2062	30	107
S_Arroyo	1	1112	32	122
S_Arroyo	1	481	32	130

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
S_Arroyo	1	Pr EV 2yr	Critical	Critical

ras82101_S_Pr_Arroyo.rep

GEOMETRY DATA

Geometry Title: P South Arroyo
Geometry File : p:\Projects\821\01\Wat\HH\EIR Study\HEC_RAS\ras82101.g03

CROSS SECTION

RIVER: S_Arroyo
REACH: 1 RS: 2062

INPUT

Description:

Station		Elevation Data		num=	43	Station		Elevation Data		num=	43
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	65.75	2.83	65	5.66	64	8.49	64	9.9	64.71		
11.31	65.13	12.73	65.34	14.14	65.49	15.56	65.54	16.97	65.51		
18.38	65	21.21	65	22.63	64.16	24.04	64	25.46	63.38		
26.87	62.85	31.11	61.16	33.94	60.6	35.36	60.14	36.77	60		
38.18	59.67	39.6	59.43	41.01	59	45.25	56.16	46.67	54.82		
48.08	54	50.91	53.42	52.33	52.97	56.57	52.65	57.98	52.65		
62.23	53	63.64	53	65.05	55	67.88	56.47	73.54	59.7		
74.95	60	82.02	62.8	86.27	64.6	87.68	65	91.92	67.15		
97.58	70	107.48	72.65	111.72	73.52						

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
0	.06	36.77	.06
		74.95	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	36.77	74.95		160.23	160.23	.1	.3

CROSS SECTION OUTPUT Profile #Pr EV 2yr

E.G. Elev (ft)	53.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.060	
W.S. Elev (ft)	53.49	Reach Len. (ft)	160.23	160.23	160.23
Crit W.S. (ft)	53.41	Flow Area (sq ft)		8.08	
E.G. Slope (ft/ft)	0.045684	Area (sq ft)		8.08	
Q Total (cfs)	30.00	Flow (cfs)		30.00	
Top Width (ft)	13.41	Top Width (ft)		13.41	
Vel Total (ft/s)	3.71	Avg. Vel. (ft/s)		3.71	
Max Chl Dpth (ft)	0.84	Hydr. Depth (ft)		0.60	
Conv. Total (cfs)	140.4	Conv. (cfs)		140.4	
Length Wtd. (ft)	160.23	Wetted Per. (ft)		13.77	
Min Ch El (ft)	52.65	Shear (lb/sq ft)		1.67	
Alpha	1.00	Stream Power (lb/ft s)		6.22	
Frctn Loss (ft)	2.90	Cum Volume (acre-ft)		0.75	
C & E Loss (ft)	0.05	Cum SA (acres)		1.41	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Pr EV 100yr

E.G. Elev (ft)	54.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.		0.060	
W.S. Elev (ft)	54.21	Reach Len. (ft)	160.23	160.23	160.23
Crit W.S. (ft)	54.14	Flow Area (sq ft)		19.20	
E.G. Slope (ft/ft)	0.045174	Area (sq ft)		19.20	
Q Total (cfs)	107.00	Flow (cfs)		107.00	
Top Width (ft)	16.78	Top Width (ft)		16.78	
Vel Total (ft/s)	5.57	Avg. Vel. (ft/s)		5.57	
Max Chl Dpth (ft)	1.56	Hydr. Depth (ft)		1.14	
Conv. Total (cfs)	503.4	Conv. (cfs)		503.4	
Length Wtd. (ft)	160.23	Wetted Per. (ft)		17.62	
Min Ch El (ft)	52.65	Shear (lb/sq ft)		3.07	
Alpha	1.00	Stream Power (lb/ft s)		17.12	
Frctn Loss (ft)	3.03	Cum Volume (acre-ft)	0.00	1.82	0.00
C & E Loss (ft)	0.11	Cum SA (acres)	0.02	1.78	0.02

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than

Warning: 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo
REACH: 1

RS: 1902

INPUT

Description:

Station	Elevation	Data	num=	21						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
0	64.29	2.24	62.79	6.71	60.14	7.71	59.78	18	55	
22.48	53.97	31.08	52.07	36.91	50.9	37.91	50.54	40.74	50	
61.11	50	65.59	51.14	66.59	51.33	71.06	52.74	73.3	53.66	
77.77	55	82.77	57.7	87.77	60	92.24	61.4	102.54	65	
103.95	65.27									

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	18	.06	77.77	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	18	77.77		245.09	245.09	.1	.3

CROSS SECTION OUTPUT Profile #Pr EV 2yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	50.76	Wt. n-Val.		0.060	
Vel Head (ft)	0.05	Reach Len. (ft)	245.09	245.09	245.09
W.S. Elev (ft)	50.71	Flow Area (sq ft)		16.79	
Crit W.S. (ft)		Area (sq ft)		16.79	
E.G. Slope (ft/ft)	0.009636	Flow (cfs)		30.00	
Q Total (cfs)	30.00	Top Width (ft)		26.48	
Top Width (ft)	26.48	Avg. Vel. (ft/s)		1.79	
Vel Total (ft/s)	1.79	Hydr. Depth (ft)		0.63	
Max Chl Dpth (ft)	0.71	Conv. (cfs)		305.6	
Conv. Total (cfs)	305.6	Wetted Per. (ft)		26.65	
Length Wtd. (ft)	245.09	Shear (lb/sq ft)		0.38	
Min Ch El (ft)	50.00	Stream Power (lb/ft s)		0.68	
Alpha	1.00	Cum Volume (acre-ft)		0.71	
Frctn Loss (ft)	5.02	Cum SA (acres)		1.34	
C & E Loss (ft)	0.02				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Pr EV 100yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	51.57	Wt. n-Val.		0.060	
Vel Head (ft)	0.12	Reach Len. (ft)	245.09	245.09	245.09
W.S. Elev (ft)	51.45	Flow Area (sq ft)		38.50	
Crit W.S. (ft)		Area (sq ft)		38.50	
E.G. Slope (ft/ft)	0.010308	Flow (cfs)		107.00	
Q Total (cfs)	107.00	Top Width (ft)		32.79	
Top Width (ft)	32.79	Avg. Vel. (ft/s)		2.78	
Vel Total (ft/s)	2.78	Hydr. Depth (ft)		1.17	
Max Chl Dpth (ft)	1.45	Conv. (cfs)		1053.9	
Conv. Total (cfs)	1053.9	Wetted Per. (ft)		33.14	
Length Wtd. (ft)	245.09	Shear (lb/sq ft)		0.75	
Min Ch El (ft)	50.00	Stream Power (lb/ft s)		2.08	
Alpha	1.00	Cum Volume (acre-ft)	0.00	1.72	0.00
Frctn Loss (ft)	4.94	Cum SA (acres)	0.02	1.69	0.02
C & E Loss (ft)	0.04				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1

RS: 1657

INPUT

Description:

Station Elevation Data			num= 21			Elev			Sta			Elev			Sta			Elev		
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev			
0	67.68	5	66.18	8.61	65	25.63	60.21	27.05	59.69											
33.45	56.22	35.69	55	42.09	52.76	49.9	50	52.14	48.53											
57.14	45	71.4	45	87.03	48.98	89.26	49.72	90.68	50											
99.9	53.9	102.13	55	112.13	59.43	113.55	60	115.78	60.32											
116.78	60.44																			

Manning's n Values			num= 3		
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	49.9	.06	90.68	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	49.9	90.68		193.82	193.82	.1	.3

CROSS SECTION OUTPUT Profile #Pr EV 2yr

E.G. Elev (ft)	45.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.060	
W.S. Elev (ft)	45.50	Reach Len. (ft)	193.82	193.82	193.82
Crit W.S. (ft)	45.50	Flow Area (sq ft)		7.77	
E.G. Slope (ft/ft)	0.069784	Area (sq ft)		7.77	
Q Total (cfs)	30.00	Flow (cfs)		30.00	
Top Width (ft)	16.92	Top Width (ft)		16.92	
Vel Total (ft/s)	3.86	Avg. Vel. (ft/s)		3.86	
Max Chl Dpth (ft)	0.50	Hydr. Depth (ft)		0.46	
Conv. Total (cfs)	113.6	Conv. (cfs)		113.6	
Length Wtd. (ft)	193.82	Wetted Per. (ft)		17.14	
Min Ch El (ft)	45.00	Shear (lb/sq ft)		1.97	
Alpha	1.00	Stream Power (lb/ft s)		7.62	
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)		0.64	
C & E Loss (ft)	0.06	Cum SA (acres)		1.22	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Pr EV 100yr

E.G. Elev (ft)	46.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.		0.060	
W.S. Elev (ft)	46.12	Reach Len. (ft)	193.82	193.82	193.82
Crit W.S. (ft)	46.12	Flow Area (sq ft)		19.22	
E.G. Slope (ft/ft)	0.055810	Area (sq ft)		19.22	
Q Total (cfs)	107.00	Flow (cfs)		107.00	
Top Width (ft)	20.22	Top Width (ft)		20.22	
Vel Total (ft/s)	5.57	Avg. Vel. (ft/s)		5.57	
Max Chl Dpth (ft)	1.12	Hydr. Depth (ft)		0.95	
Conv. Total (cfs)	452.9	Conv. (cfs)		452.9	
Length Wtd. (ft)	193.82	Wetted Per. (ft)		20.71	
Min Ch El (ft)	45.00	Shear (lb/sq ft)		3.23	
Alpha	1.00	Stream Power (lb/ft s)		18.00	
Frctn Loss (ft)	1.85	Cum Volume (acre-ft)	0.00	1.55	0.00
C & E Loss (ft)	0.12	Cum SA (acres)	0.02	1.54	0.02

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1

RS: 1463

INPUT

Description:

Station	Elevation	Data	num=	36	Station	Elevation	Data	num=	36
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	59.42	0	59.38	14.87	55	21.94	52.69	29.75	50
41.06	45.83	43.3	45	46.13	43.98	56.76	40	66.66	40
68.07	40.44	75.14	45	85.77	49.14	87.18	50	88.6	50.37
91.43	51	92.84	51.5	94.26	52	97.91	53	98.91	53.26
101.14	54	102.56	55	103.97	55.22	106.8	55.7	107.8	55.81
108.8	55.91	110.8	56	112.21	56	113.21	56.09	114.21	56.16
115.21	56.45	116.63	56.72	118.04	57	119.46	57.45	122.28	58
123.7	58.49								

Manning's n	Values	num=	3
Sta	n Val	Sta	n Val
0	.06	43.3	.06
		75.14	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	43.3	75.14		171.6	171.6	.1	.3

CROSS SECTION OUTPUT Profile #Pr EV 2yr

E.G. Elev (ft)	41.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.060	
W.S. Elev (ft)	41.61	Reach Len. (ft)	171.60	171.60	171.60
Crit W.S. (ft)		Flow Area (sq ft)		22.41	
E.G. Slope (ft/ft)	0.002203	Area (sq ft)		22.41	
Q Total (cfs)	30.00	Flow (cfs)		30.00	
Top Width (ft)	17.42	Top Width (ft)		17.42	
Vel Total (ft/s)	1.34	Avg. Vel. (ft/s)		1.34	
Max Chl Dpth (ft)	1.61	Hydr. Depth (ft)		1.29	
Conv. Total (cfs)	639.2	Conv. (cfs)		639.2	
Length Wtd. (ft)	171.60	Wetted Per. (ft)		18.12	
Min Ch El (ft)	40.00	Shear (lb/sq ft)		0.17	
Alpha	1.00	Stream Power (lb/ft s)		0.23	
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)		0.57	
C & E Loss (ft)	0.01	Cum SA (acres)		1.14	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Pr EV 100yr

E.G. Elev (ft)	42.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.060	
W.S. Elev (ft)	42.76	Reach Len. (ft)	171.60	171.60	171.60
Crit W.S. (ft)		Flow Area (sq ft)		45.32	
E.G. Slope (ft/ft)	0.003797	Area (sq ft)		45.32	
Q Total (cfs)	107.00	Flow (cfs)		107.00	
Top Width (ft)	22.29	Top Width (ft)		22.29	
Vel Total (ft/s)	2.36	Avg. Vel. (ft/s)		2.36	
Max Chl Dpth (ft)	2.76	Hydr. Depth (ft)		2.03	
Conv. Total (cfs)	1736.6	Conv. (cfs)		1736.6	
Length Wtd. (ft)	171.60	Wetted Per. (ft)		23.54	
Min Ch El (ft)	40.00	Shear (lb/sq ft)		0.46	
Alpha	1.00	Stream Power (lb/ft s)		1.08	
Frctn Loss (ft)	1.66	Cum Volume (acre-ft)	0.00	1.41	0.00
C & E Loss (ft)	0.03	Cum SA (acres)	0.02	1.45	0.02

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1

RS: 1292

INPUT

ras82101_S_Pr_Arroyo.rep

Description:

Station Elevation Data									
Sta		Elev		Sta		Elev		Sta	
0		51.51		1		51.07		4	
11.08		48.8		18.69		47.36		24.08	
29.73		45		36.05		43.63		40.53	
53.54		40		78.37		40		79.79	
85.2		42		88.81		43		91.97	
97.57		45.25		100.74		46		102.97	
115.17		48.36		116.17		48.4		117.17	
120.59		48.56		122		48.58		126.12	

Manning's n Values					
Sta		n Val		Sta	
0		.06		45	

Bank Sta:		Left		Right		Lengths:		Left Channel		Right		Coeff Contr.		Expan.	
		45		85.2				179.73		179.73		.1		.3	

CROSS SECTION OUTPUT Profile #Pr EV 2yr

E.G. Elev (ft)	40.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.060	
W.S. Elev (ft)	40.35	Reach Len. (ft)	179.73	179.73	179.73
Crit W.S. (ft)	40.35	Flow Area (sq ft)		9.14	
E.G. Slope (ft/ft)	0.075952	Area (sq ft)		9.14	
Q Total (cfs)	30.00	Flow (cfs)		30.00	
Top Width (ft)	27.34	Top Width (ft)		27.34	
Vel Total (ft/s)	3.28	Avg. Vel. (ft/s)		3.28	
Max Chl Dpth (ft)	0.35	Hydr. Depth (ft)		0.33	
Conv. Total (cfs)	108.9	Conv. (cfs)		108.9	
Length Wtd. (ft)	179.73	Wetted Per. (ft)		27.44	
Min Ch El (ft)	40.00	Shear (lb/sq ft)		1.58	
Alpha	1.00	Stream Power (lb/ft s)		5.18	
Frctn Loss (ft)	1.59	Cum Volume (acre-ft)		0.51	
C & E Loss (ft)	0.04	Cum SA (acres)		1.05	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Pr EV 100yr

E.G. Elev (ft)	41.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.		0.060	
W.S. Elev (ft)	40.80	Reach Len. (ft)	179.73	179.73	179.73
Crit W.S. (ft)	40.80	Flow Area (sq ft)		22.20	
E.G. Slope (ft/ft)	0.059757	Area (sq ft)		22.20	
Q Total (cfs)	107.00	Flow (cfs)		107.00	
Top Width (ft)	31.03	Top Width (ft)		31.03	
Vel Total (ft/s)	4.82	Avg. Vel. (ft/s)		4.82	
Max Chl Dpth (ft)	0.80	Hydr. Depth (ft)		0.72	
Conv. Total (cfs)	437.7	Conv. (cfs)		437.7	
Length Wtd. (ft)	179.73	Wetted Per. (ft)		31.25	
Min Ch El (ft)	40.00	Shear (lb/sq ft)		2.65	
Alpha	1.00	Stream Power (lb/ft s)		12.77	
Frctn Loss (ft)	1.73	Cum Volume (acre-ft)	0.00	1.28	0.00
C & E Loss (ft)	0.09	Cum SA (acres)	0.02	1.34	0.02

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1

RS: 1112

INPUT

Description:

Station	Elevation	Data	num=	29						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
0	43.01	12.53	40	33.62	35.85	38.1	35	48.39	34	
65.89	34	68.13	34.15	70.36	34.41	72.6	34.65	76.2	35	
77.62	35.44	79.85	36	80.85	36.15	82.27	36.71	83.27	37	
86.87	37.93	87.87	38.02	91.48	39.01	96.48	40	97.48	40.24	
101.08	40.88	102.08	41	105.69	41.97	106.69	42	107.69	42.07	
111.3	43	113.53	43.42	115.77	44.02	120.24	44.67			

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	33.62	.06	79.85	.06

Bank	Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
	33.62	79.85	215.95	215.95	215.95	.1	.3	

CROSS SECTION OUTPUT Profile #Pr EV 2yr

E.G. Elev (ft)	35.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.060	
W.S. Elev (ft)	34.99	Reach Len. (ft)	215.95	215.95	215.95
Crit W.S. (ft)	34.42	Flow Area (sq ft)		27.55	
E.G. Slope (ft/ft)	0.003370	Area (sq ft)		27.55	
Q Total (cfs)	32.00	Flow (cfs)		32.00	
Top Width (ft)	37.86	Top Width (ft)		37.86	
Vel Total (ft/s)	1.16	Avg. Vel. (ft/s)		1.16	
Max Chl Dpth (ft)	0.99	Hydr. Depth (ft)		0.73	
Conv. Total (cfs)	551.2	Conv. (cfs)		551.2	
Length Wtd. (ft)	215.95	Wetted Per. (ft)		37.95	
Min Ch El (ft)	34.00	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.18	
Frctn Loss (ft)	1.99	Cum Volume (acre-ft)		0.43	
C & E Loss (ft)	0.01	Cum SA (acres)		0.92	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Pr EV 100yr

E.G. Elev (ft)	35.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.060	
W.S. Elev (ft)	35.82	Reach Len. (ft)	215.95	215.95	215.95
Crit W.S. (ft)	34.94	Flow Area (sq ft)		62.32	
E.G. Slope (ft/ft)	0.004129	Area (sq ft)		62.32	
Q Total (cfs)	122.00	Flow (cfs)		122.00	
Top Width (ft)	45.39	Top Width (ft)		45.39	
Vel Total (ft/s)	1.96	Avg. Vel. (ft/s)		1.96	
Max Chl Dpth (ft)	1.82	Hydr. Depth (ft)		1.37	
Conv. Total (cfs)	1898.5	Conv. (cfs)		1898.5	
Length Wtd. (ft)	215.95	Wetted Per. (ft)		45.68	
Min Ch El (ft)	34.00	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		0.69	
Frctn Loss (ft)	2.26	Cum Volume (acre-ft)	0.00	1.10	0.00
C & E Loss (ft)	0.03	Cum SA (acres)	0.02	1.18	0.02

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1

RS: 896

INPUT

Description:

Station	Elevation	Data	num=	40
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ras82101_S_Pr_Arroyo.rep

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	43.13	1	42.74	11.2	40	27.32	35	30.32	34.3
31.74	34	34.74	33.51	37.74	33	40.9	32.79	43.9	32.61
44.9	32.6	47.14	32.49	62.27	32.43	63.27	32.48	65.27	32.48
66.27	32.54	67.27	32.55	69.5	32.62	71.5	32.73	73.5	32.87
75.74	33	76.74	33.08	77.74	33.11	82.84	33.49	85.84	33.67
89.96	34	91.96	34.21	98.04	35	105.12	35.57	110.21	36
112.21	36.24	118.3	37	122.3	37.6	125.46	38	127.46	38.33
128.46	38.54	130.46	38.83	131.87	38.95	132.87	39	134.87	39.25

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .06 34.74 .06 82.84 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 34.74 82.84 240.26 240.26 240.26 .1 .3

CROSS SECTION OUTPUT Profile #Pr EV 2yr

E.G. Elev (ft)	33.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.060	
W.S. Elev (ft)	32.85	Reach Len. (ft)	240.26	240.26	240.26
Crit W.S. (ft)	32.85	Flow Area (sq ft)		10.21	
E.G. Slope (ft/ft)	0.077400	Area (sq ft)		10.21	
Q Total (cfs)	32.00	Flow (cfs)		32.00	
Top Width (ft)	33.29	Top Width (ft)		33.29	
Vel Total (ft/s)	3.13	Avg. Vel. (ft/s)		3.13	
Max Chl Dpth (ft)	0.42	Hydr. Depth (ft)		0.31	
Conv. Total (cfs)	115.0	Conv. (cfs)		115.0	
Length Wtd. (ft)	240.26	Wetted Per. (ft)		33.31	
Min Ch El (ft)	32.43	Shear (lb/sq ft)		1.48	
Alpha	1.00	Stream Power (lb/ft s)		4.64	
Frctn Loss (ft)	3.54	Cum Volume (acre-ft)		0.34	
C & E Loss (ft)	0.04	Cum SA (acres)		0.74	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Pr EV 100yr

E.G. Elev (ft)	33.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.		0.060	
W.S. Elev (ft)	33.28	Reach Len. (ft)	240.26	240.26	240.26
Crit W.S. (ft)	33.28	Flow Area (sq ft)		27.15	
E.G. Slope (ft/ft)	0.062843	Area (sq ft)		27.15	
Q Total (cfs)	122.00	Flow (cfs)		122.00	
Top Width (ft)	44.01	Top Width (ft)		44.01	
Vel Total (ft/s)	4.49	Avg. Vel. (ft/s)		4.49	
Max Chl Dpth (ft)	0.85	Hydr. Depth (ft)		0.62	
Conv. Total (cfs)	486.7	Conv. (cfs)		486.7	
Length Wtd. (ft)	240.26	Wetted Per. (ft)		44.08	
Min Ch El (ft)	32.43	Shear (lb/sq ft)		2.42	
Alpha	1.00	Stream Power (lb/ft s)		10.86	
Frctn Loss (ft)	4.27	Cum Volume (acre-ft)	0.00	0.88	0.00
C & E Loss (ft)	0.07	Cum SA (acres)	0.02	0.96	0.02

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1

RS: 656

INPUT

Description:

Station Elevation Data			num= 41			Elev			Sta		
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	32.18	1	32	5.47	31.11	6.47	31	7.47	30.75		
11.94	30	18.03	28.95	23.41	28	26.57	27.45	28.81	27		
30.81	26.67	34.93	26	39.41	25.32	41.41	25	79.35	25		
86.63	25.9	87.63	26	93.96	26.88	94.96	27	103.5	27.88		
104.5	28	105.92	28.13	106.92	28.25	112.31	28.73	115.31	28.95		
116.73	29	117.73	29.04	119.96	29.13	123.13	29.2	124.13	29.22		
127.29	29.29	128.29	29.32	132.76	29.38	136.88	29.41	139.12	29.45		
142.12	29.49	143.53	29.5	144.53	29.52	146.95	29.52	150.11	29.57		
151.11	29.58										

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	34.93	.06	87.63	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	34.93	87.63		175.08	175.08	.1	.3

CROSS SECTION OUTPUT Profile #Pr EV 2yr

E.G. Elev (ft)	25.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.060	
W.S. Elev (ft)	25.60	Reach Len. (ft)	175.08	175.08	175.08
Crit W.S. (ft)	25.28	Flow Area (sq ft)		25.14	
E.G. Slope (ft/ft)	0.006028	Area (sq ft)		25.14	
Q Total (cfs)	32.00	Flow (cfs)		32.00	
Top Width (ft)	46.57	Top Width (ft)		46.57	
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)		1.27	
Max Chl Dpth (ft)	0.60	Hydr. Depth (ft)		0.54	
Conv. Total (cfs)	412.2	Conv. (cfs)		412.2	
Length Wtd. (ft)	175.08	Wetted Per. (ft)		46.65	
Min Ch El (ft)	25.00	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)		0.26	
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)		0.24	
C & E Loss (ft)	0.00	Cum SA (acres)		0.52	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Pr EV 100yr

E.G. Elev (ft)	26.24	Element	Left OB	Channel	Right OB
Vel Head (ft) <td>0.08 <td>Wt. n-Val. <td>0.060</td> <td>0.060</td> <td>0.060</td> </td></td>	0.08 <td>Wt. n-Val. <td>0.060</td> <td>0.060</td> <td>0.060</td> </td>	Wt. n-Val. <td>0.060</td> <td>0.060</td> <td>0.060</td>	0.060	0.060	0.060
W.S. Elev (ft) <td>26.16 <td>Reach Len. (ft) <td>175.08</td> <td>175.08</td> <td>175.08</td> </td></td>	26.16 <td>Reach Len. (ft) <td>175.08</td> <td>175.08</td> <td>175.08</td> </td>	Reach Len. (ft) <td>175.08</td> <td>175.08</td> <td>175.08</td>	175.08	175.08	175.08
Crit W.S. (ft) <td></td> <td>Flow Area (sq ft) <td>0.08</td> <td>53.65</td> <td>0.09</td> </td>		Flow Area (sq ft) <td>0.08</td> <td>53.65</td> <td>0.09</td>	0.08	53.65	0.09
E.G. Slope (ft/ft) <td>0.008254</td> <td>Area (sq ft) <td>0.08</td> <td>53.65</td> <td>0.09</td> </td>	0.008254	Area (sq ft) <td>0.08</td> <td>53.65</td> <td>0.09</td>	0.08	53.65	0.09
Q Total (cfs) <td>122.00</td> <td>Flow (cfs) <td>0.03</td> <td>121.93</td> <td>0.04</td> </td>	122.00	Flow (cfs) <td>0.03</td> <td>121.93</td> <td>0.04</td>	0.03	121.93	0.04
Top Width (ft) <td>54.84</td> <td>Top Width (ft) <td>0.99</td> <td>52.70</td> <td>1.15</td> </td>	54.84	Top Width (ft) <td>0.99</td> <td>52.70</td> <td>1.15</td>	0.99	52.70	1.15
Vel Total (ft/s) <td>2.27</td> <td>Avg. Vel. (ft/s) <td>0.41</td> <td>2.27</td> <td>0.42</td> </td>	2.27	Avg. Vel. (ft/s) <td>0.41</td> <td>2.27</td> <td>0.42</td>	0.41	2.27	0.42
Max Chl Dpth (ft) <td>1.16</td> <td>Hydr. Depth (ft) <td>0.08</td> <td>1.02</td> <td>0.08</td> </td>	1.16	Hydr. Depth (ft) <td>0.08</td> <td>1.02</td> <td>0.08</td>	0.08	1.02	0.08
Conv. Total (cfs) <td>1342.9</td> <td>Conv. (cfs) <td>0.4</td> <td>1342.1</td> <td>0.4</td> </td>	1342.9	Conv. (cfs) <td>0.4</td> <td>1342.1</td> <td>0.4</td>	0.4	1342.1	0.4
Length Wtd. (ft) <td>175.08</td> <td>Wetted Per. (ft) <td>1.00</td> <td>52.84</td> <td>1.16</td> </td>	175.08	Wetted Per. (ft) <td>1.00</td> <td>52.84</td> <td>1.16</td>	1.00	52.84	1.16
Min Ch El (ft) <td>25.00</td> <td>Shear (lb/sq ft) <td>0.04</td> <td>0.52</td> <td>0.04</td> </td>	25.00	Shear (lb/sq ft) <td>0.04</td> <td>0.52</td> <td>0.04</td>	0.04	0.52	0.04
Alpha	1.00	Stream Power (lb/ft s) <td>0.02</td> <td>1.19</td> <td>0.02</td>	0.02	1.19	0.02
Frctn Loss (ft) <td>0.93</td> <td>Cum Volume (acre-ft) <td>0.00</td> <td>0.66</td> <td>0.00</td> </td>	0.93	Cum Volume (acre-ft) <td>0.00</td> <td>0.66</td> <td>0.00</td>	0.00	0.66	0.00
C & E Loss (ft) <td>0.01</td> <td>Cum SA (acres) <td>0.02</td> <td>0.69</td> <td>0.02</td> </td>	0.01	Cum SA (acres) <td>0.02</td> <td>0.69</td> <td>0.02</td>	0.02	0.69	0.02

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo

REACH: 1

RS: 481

INPUT

Description:

Station Elevation Data			num= 46			Elev			Sta		
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	37.91	3.16	37.28	4.16	37	6.4	36.61	9.56	36		
10.56	35.82	13.72	35	15.14	34.43	17.37	34	20.98	33		

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24.58	32.09	25.58	32	27	31.62	29.23	30.96	31.47	30
32.88	29.73	37.36	29	39.59	28	41.01	27.75	43.24	27
47.72	26.76	57.15	26.27	71.09	25.53	80.53	25	86.36	24.73
103.36	24	120.86	24	141.45	23.87	144.28	24	161.28	25
168.49	25.51	176.55	26	183.26	26.6	186.87	27	190.47	28
191.89	28.21	194.12	29	195.12	29.21	200.12	30	202.36	30.47
203.36	30.65	210.57	32.22	214.17	32.97	224.47	35	230.3	37.02
232.54	37.67								

Manning's n Values

Sta	n Val	Sta	num=	3	Sta	n Val
0	.06	80.53	.06	161.28	.06	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	80.53	161.28		149.6	149.6	.1	.3

CROSS SECTION OUTPUT Profile #Pr EV 2yr

E.G. Elev (ft)	24.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.060	
W.S. Elev (ft)	24.51	Reach Len. (ft)	149.60	149.60	149.60
Crit W.S. (ft)		Flow Area (sq ft)		27.40	
E.G. Slope (ft/ft)	0.006512	Area (sq ft)		27.40	
Q Total (cfs)	32.00	Flow (cfs)		32.00	
Top Width (ft)	61.32	Top Width (ft)		61.32	
Vel Total (ft/s)	1.17	Avg. Vel. (ft/s)		1.17	
Max Chl Dpth (ft)	0.64	Hydr. Depth (ft)		0.45	
Conv. Total (cfs)	396.5	Conv. (cfs)		396.5	
Length Wtd. (ft)	149.60	Wetted Per. (ft)		61.35	
Min Ch El (ft)	23.87	Shear (lb/sq ft)		0.18	
Alpha	1.00	Stream Power (lb/ft s)		0.21	
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)		0.14	
C & E Loss (ft)	0.00	Cum SA (acres)		0.31	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Pr EV 100yr

E.G. Elev (ft)	25.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.060	0.060	0.060
W.S. Elev (ft)	25.26	Reach Len. (ft)	149.60	149.60	149.60
Crit W.S. (ft)		Flow Area (sq ft)	0.58	83.15	0.46
E.G. Slope (ft/ft)	0.003812	Area (sq ft)	0.58	83.15	0.46
Q Total (cfs)	130.00	Flow (cfs)	0.23	129.60	0.18
Top Width (ft)	88.91	Top Width (ft)	4.55	80.75	3.61
Vel Total (ft/s)	1.54	Avg. Vel. (ft/s)	0.39	1.56	0.39
Max Chl Dpth (ft)	1.39	Hydr. Depth (ft)	0.13	1.03	0.13
Conv. Total (cfs)	2105.5	Conv. (cfs)	3.6	2099.0	2.9
Length Wtd. (ft)	149.60	Wetted Per. (ft)	4.56	80.80	3.62
Min Ch El (ft)	23.87	Shear (lb/sq ft)	0.03	0.24	0.03
Alpha	1.02	Stream Power (lb/ft s)	0.01	0.38	0.01
Frctn Loss (ft)	0.98	Cum Volume (acre-ft)	0.00	0.38	0.00
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.43	0.01

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo
 REACH: 1 RS: 331

INPUT

Description:

Station	Elevation	Data	num=	55					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	28.1	1	28	2.41	27.82	3.83	27.75	6.06	27.53
7.48	27.45	9.71	27.28	10.71	27.21	12.95	27	15.19	26.87
18.79	26.71	28.23	26.6	31.05	26.69	33.29	26.74	34.29	26.72
35.29	26.68	38.9	26.91	41.13	27	66.24	27	67.65	26.94
69.07	26.64	72.67	26.17	74.08	26	75.08	25.87	84.52	24.98
88.76	24	95.47	23.17	96.88	23	100.49	22.18	101.49	22
107.15	22	111.62	22.74	113.85	23	121.07	24.01	126.07	24.46
132.47	25	135.63	25.23	138.46	25.53	139.46	25.64	140.46	25.72
141.46	25.81	143.7	26	146.52	26.73	147.52	27.1	151.13	28

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152.13	28.05	153.13	28.14	155.96	29	159.56	29.84	160.56	30
161.56	30.21	162.98	30.64	173.79	33.57	178.79	35	182.4	35.89

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	84.52	.06	132.47	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

84.52	132.47	206.09	206.09	206.09	.1	.3
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CROSS SECTION OUTPUT Profile #Pr EV 2yr

E.G. Elev (ft)	23.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.060	
W.S. Elev (ft)	23.21	Reach Len. (ft)	206.09	206.09	206.09
Crit W.S. (ft)	22.77	Flow Area (sq ft)		15.09	
E.G. Slope (ft/ft)	0.010982	Area (sq ft)		15.09	
Q Total (cfs)	32.00	Flow (cfs)		32.00	
Top Width (ft)	20.23	Top Width (ft)		20.23	
Vel Total (ft/s)	2.12	Avg. Vel. (ft/s)		2.12	
Max Chl Dpth (ft)	1.21	Hydr. Depth (ft)		0.75	
Conv. Total (cfs)	305.4	Conv. (cfs)		305.4	
Length Wtd. (ft)	206.09	Wetted Per. (ft)		20.44	
Min Ch El (ft)	22.00	Shear (lb/sq ft)		0.51	
Alpha	1.00	Stream Power (lb/ft s)		1.07	
Frctn Loss (ft)	4.90	Cum Volume (acre-ft)		0.06	
C & E Loss (ft)	0.00	Cum SA (acres)		0.17	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Pr EV 100yr

E.G. Elev (ft)	24.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.060	
W.S. Elev (ft)	24.13	Reach Len. (ft)	206.09	206.09	206.09
Crit W.S. (ft)	23.59	Flow Area (sq ft)		40.16	
E.G. Slope (ft/ft)	0.013995	Area (sq ft)		40.16	
Q Total (cfs)	130.00	Flow (cfs)		130.00	
Top Width (ft)	34.24	Top Width (ft)		34.24	
Vel Total (ft/s)	3.24	Avg. Vel. (ft/s)		3.24	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.17	
Conv. Total (cfs)	1098.9	Conv. (cfs)		1098.9	
Length Wtd. (ft)	206.09	Wetted Per. (ft)		34.57	
Min Ch El (ft)	22.00	Shear (lb/sq ft)		1.01	
Alpha	1.00	Stream Power (lb/ft s)		3.29	
Frctn Loss (ft)	5.41	Cum Volume (acre-ft)		0.17	
C & E Loss (ft)	0.01	Cum SA (acres)		0.23	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: S_Arroyo
REACH: 1 RS: 125

INPUT

Description:

Station	Elevation	Data	num=	79
Sta	Elev	Sta	Elev	Sta
0	32.23	0	32	2.24
8.3	30.57	14.13	30.45	15.13
21.02	30.48	22.02	30.47	23.43
30.27	30	31.69	29.72	33.92
38.57	27	40.81	26.14	41.81
47.28	24.46	48.7	23.83	51.86
58.34	21.23	59.34	21	62.94
69.83	19.53	74.3	19	78.77
90.49	18.11	92.73	18	132.94
149.6	19	152.76	19.31	158.59
163.24	23.08	166.85	25	167.85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
31.31	3.65	30.94	6.89	30.68					
30.46	16.55	30.46	18.78	30.49					
30.45	27.04	30.26	29.27	30.12					
29	35.34	28.4	36.34	27.69					
26	42.81	25.65	45.05	25					
23	53.27	22.59	55.51	22					
20.18	63.94	20	65.36	20					
18.76	83.25	18.51	89.08	18.17					
18	137.94	18.3	143.77	18.63					
20	159.59	20.52	161.01	21.17					
26	169.26	26.58	170.26	27.22					

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171.68	28.27	173.09	29	175.33	29.59	176.33	29.78	178.56	30.08
179.98	30.15	184.45	30.63	185.45	30.77	188.28	31	191.44	31.27
192.85	31.31	193.85	31.39	195.27	31.43	196.27	31.49	199.1	31.59
202.26	32	203.67	32	207.28	32.66	208.28	33	209.69	33.19
211.93	34	212.93	34.53	214.34	35	214.34	35.09		

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .06 63.94 .06 158.59 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
63.94 158.59 124.97 124.97 124.97 .1 .3

CROSS SECTION OUTPUT Profile #Pr EV 2yr

E.G. Elev (ft)	18.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.060	
W.S. Elev (ft)	18.26	Reach Len. (ft)			
Crit W.S. (ft)	18.26	Flow Area (sq ft)		11.66	
E.G. Slope (ft/ft)	0.084876	Area (sq ft)		11.66	
Q Total (cfs)	32.00	Flow (cfs)		32.00	
Top Width (ft)	49.70	Top Width (ft)		49.70	
Vel Total (ft/s)	2.74	Avg. Vel. (ft/s)		2.74	
Max Chl Dpth (ft)	0.26	Hydr. Depth (ft)		0.23	
Conv. Total (cfs)	109.8	Conv. (cfs)		109.8	
Length Wtd. (ft)		Wetted Per. (ft)		49.71	
Min Ch El (ft)	18.00	Shear (lb/sq ft)		1.24	
Alpha	1.00	Stream Power (lb/ft s)		3.41	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #Pr EV 100yr

E.G. Elev (ft)	18.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.		0.060	
W.S. Elev (ft)	18.62	Reach Len. (ft)			
Crit W.S. (ft)	18.62	Flow Area (sq ft)		31.95	
E.G. Slope (ft/ft)	0.065892	Area (sq ft)		31.95	
Q Total (cfs)	130.00	Flow (cfs)		130.00	
Top Width (ft)	62.36	Top Width (ft)		62.36	
Vel Total (ft/s)	4.07	Avg. Vel. (ft/s)		4.07	
Max Chl Dpth (ft)	0.62	Hydr. Depth (ft)		0.51	
Conv. Total (cfs)	506.4	Conv. (cfs)		506.4	
Length Wtd. (ft)		Wetted Per. (ft)		62.40	
Min Ch El (ft)	18.00	Shear (lb/sq ft)		2.11	
Alpha	1.00	Stream Power (lb/ft s)		8.57	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River: S_Arroyo

Reach	River Sta.	n1	n2	n3
1	2062	.06	.06	.06
1	1902	.06	.06	.06
1	1657	.06	.06	.06
1	1463	.06	.06	.06
1	1292	.06	.06	.06
1	1112	.06	.06	.06
1	896	.06	.06	.06
1	656	.06	.06	.06
1	481	.06	.06	.06
1	331	.06	.06	.06
1	125	.06	.06	.06

SUMMARY OF REACH LENGTHS

River: S_Arroyo

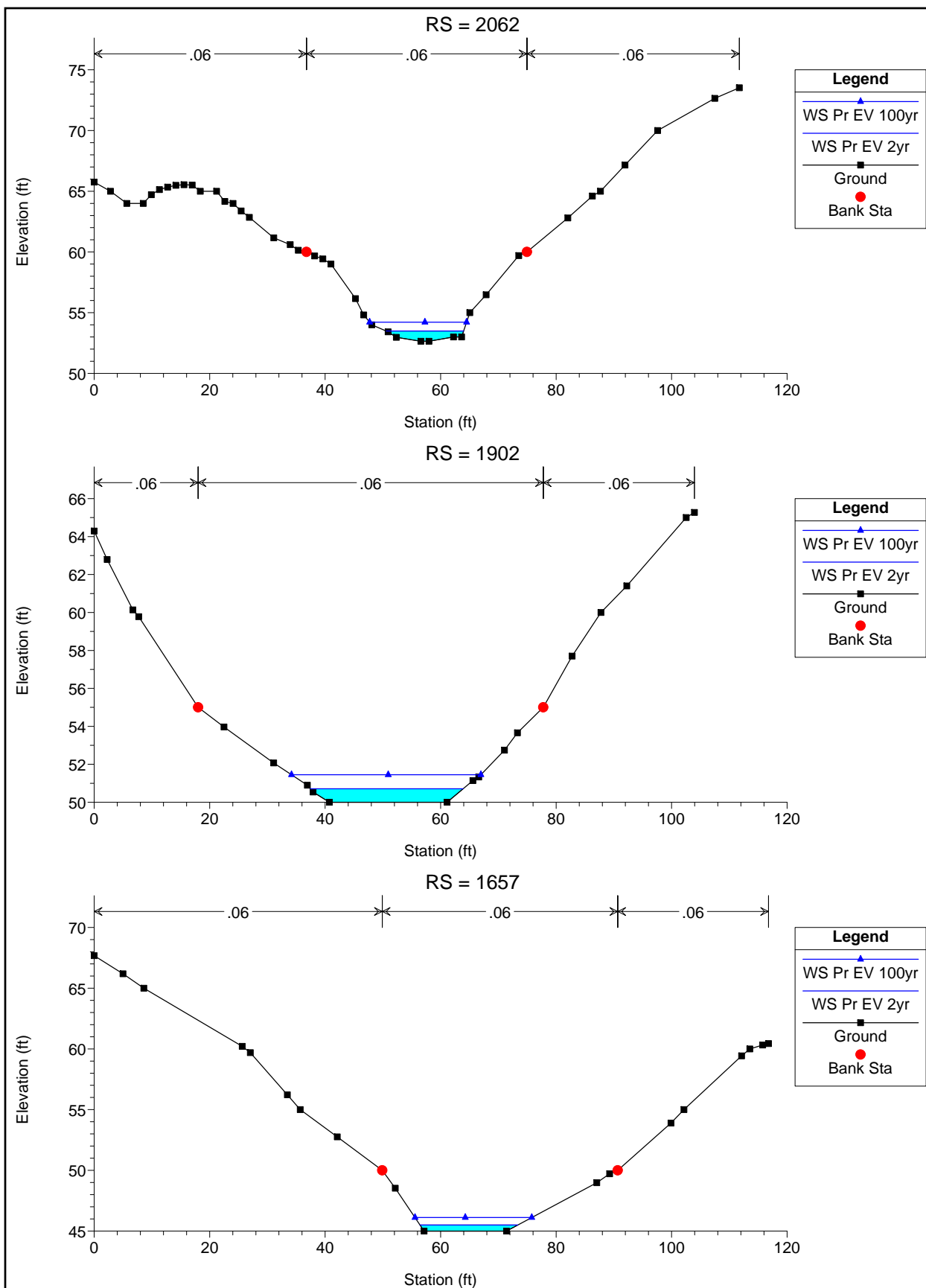
Reach	River Sta.	Left	Channel	Right
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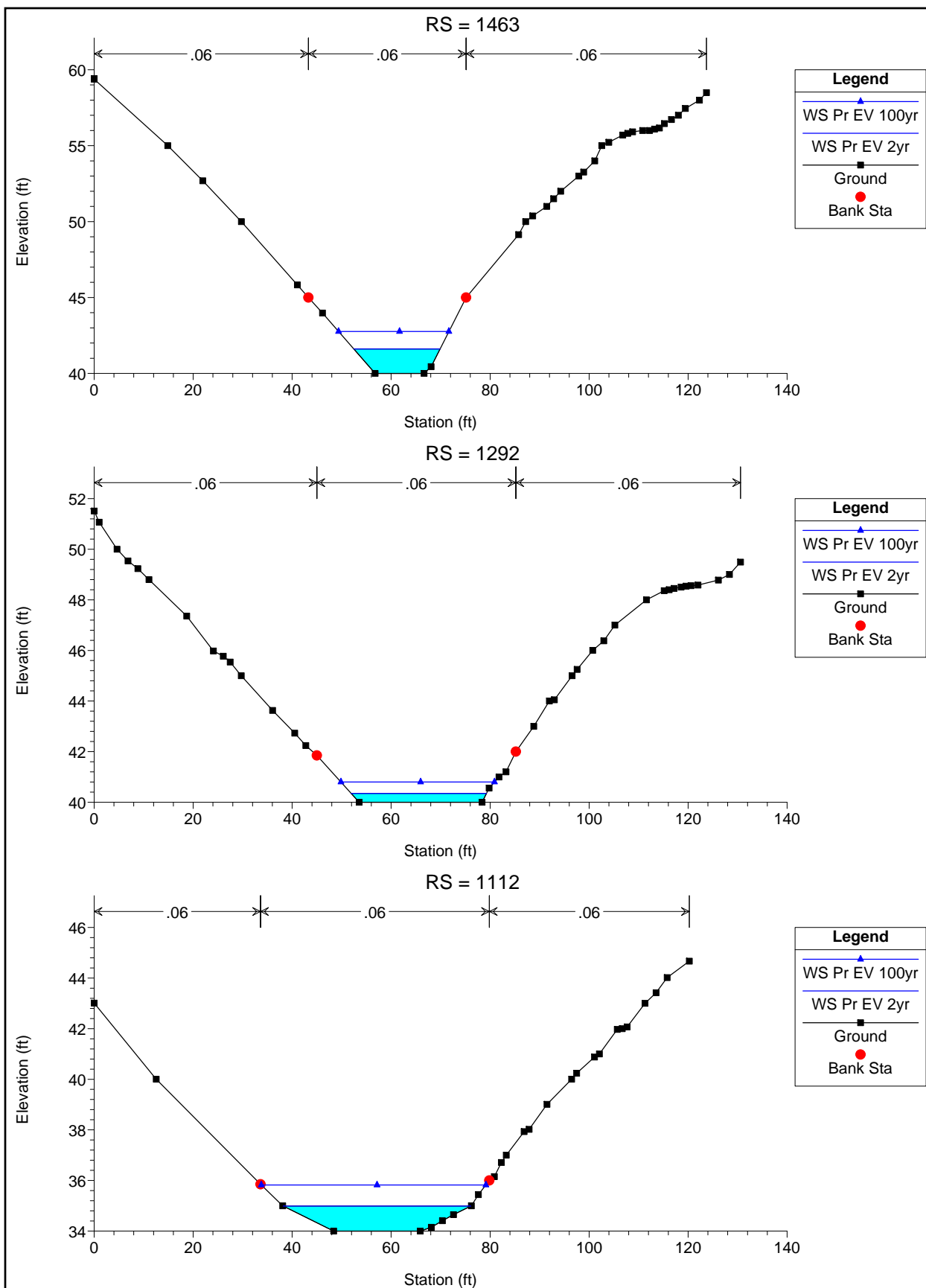
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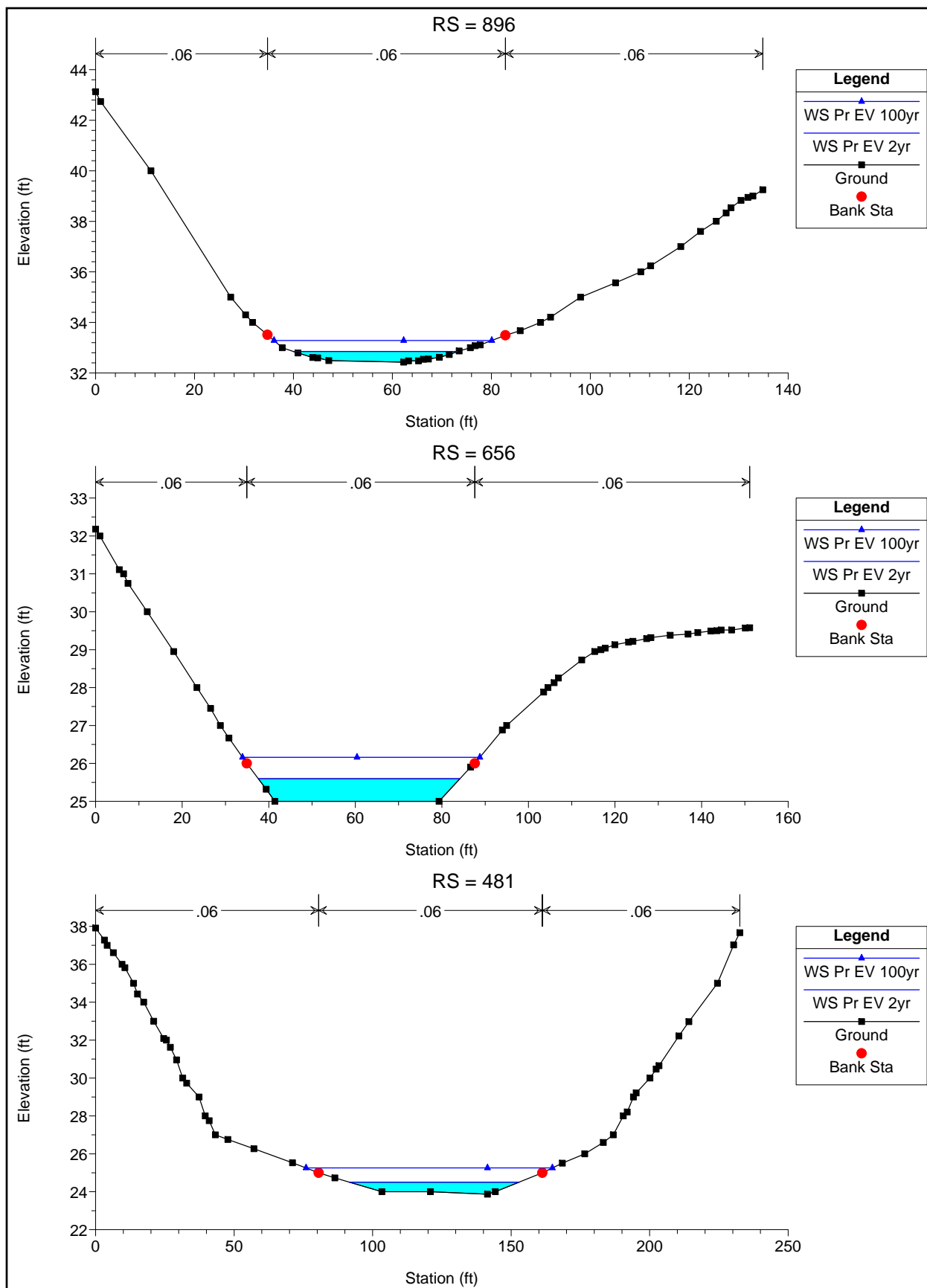
1	2062	160.23	160.23	160.23
1	1902	245.09	245.09	245.09
1	1657	193.82	193.82	193.82
1	1463	171.6	171.6	171.6
1	1292	179.73	179.73	179.73
1	1112	215.95	215.95	215.95
1	896	240.26	240.26	240.26
1	656	175.08	175.08	175.08
1	481	149.6	149.6	149.6
1	331	206.09	206.09	206.09
1	125	124.97	124.97	124.97

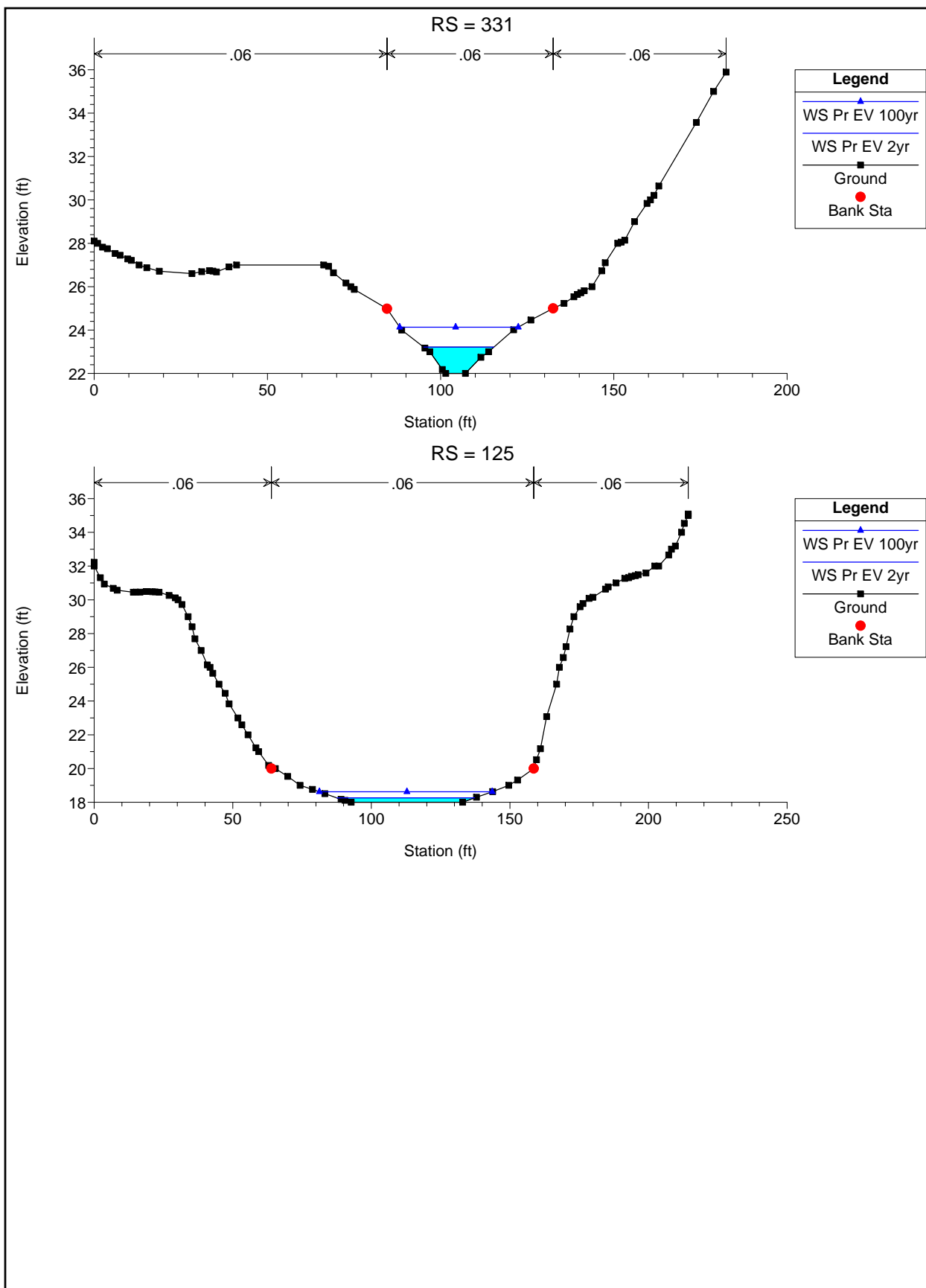
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: S_Arroyo

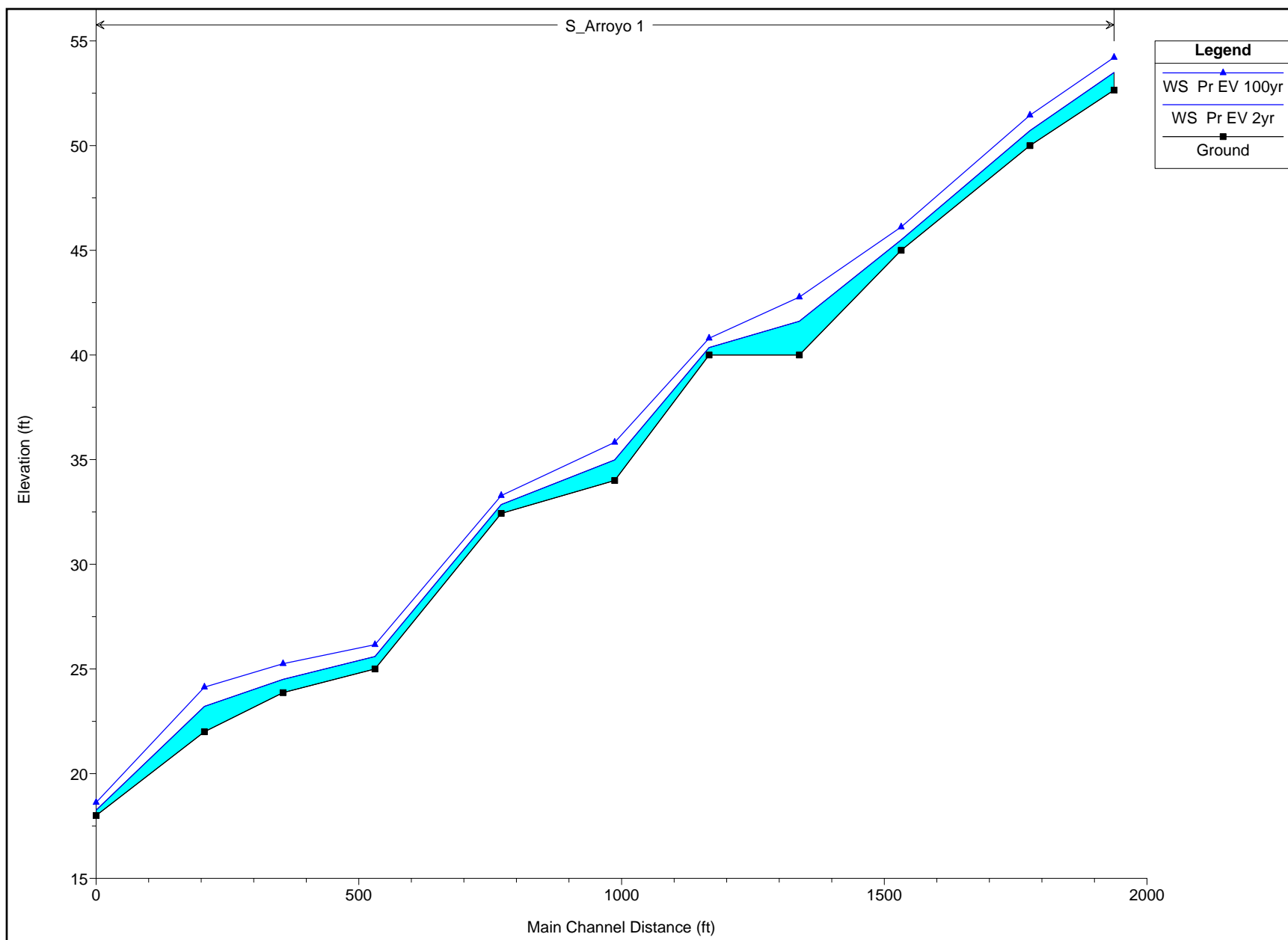
Reach	River Sta.	Contr.	Expan.
1	2062	.1	.3
1	1902	.1	.3
1	1657	.1	.3
1	1463	.1	.3
1	1292	.1	.3
1	1112	.1	.3
1	896	.1	.3
1	656	.1	.3
1	481	.1	.3
1	331	.1	.3
1	125	.1	.3











D WATER BUDGET ANALYSIS

D1 Northerly Arroyo under Existing Condition

WATER BUDGET ANALYSIS
NEWPORT BANNING RANCH
Northerly Arroyo Habitat Under Existing Condition

Average Temperature (F)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	64	64	63	65	66	69	72	73	73	72	67	64
Min	47	48	50	52	56	59	62	64	62	58	52	47

Average Rainfall (inch)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
P	2.08	2.05	1.84	0.9	0.17	0.05	0.01	0.09	0.36	0.18	1.55	1.57	10.85

Potential Evapotranspiration (inches)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
PET	1.44	1.60	1.78	2.16	2.66	3.21	3.68	3.77	3.35	2.77	1.91	1.41	29.74

Offsite Drainage Area:

DA = 129.25 acres

Land Use	Acreage	Imp
Road	5.35	0.9
Ex. Residential	5.94	0.8
Commercial/Industrial	80.09	0.9
School	9.91	0.4
Upland Area	27.96	0.1

Average = 0.68

RV = $0.7 \times \text{Imp} + 0.1$
= 0.58

Habitat Footprint = 5.86 ac

Offsite Surface Inflow Si													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
Vol (ac-ft)	13.0	12.8	11.5	5.6	1.1	0.3	0.1	0.6	2.2	1.1	9.7	9.8	67.6
Depth (in)	26.6	26.2	23.5	11.5	2.2	0.6	0.1	1.1	4.6	2.3	19.8	20.0	138.5

1) Depth (in) = Volume (ac-ft) / Habitat Footprint (ac) *12 (in/ft)

Loss Fraction = 30%

Water Balance (inches)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
P	2.1	2.1	1.8	0.9	0.2	0.1	0.0	0.1	0.4	0.2	1.6	1.6	10.9
Si	26.6	26.2	23.5	11.5	2.2	0.6	0.1	1.1	4.6	2.3	19.8	20.0	138.5
Go	8.6	8.5	7.6	3.7	0.7	0.2	0.0	0.4	1.5	0.7	6.4	6.5	44.8
ET	1.4	1.6	1.8	2.2	2.7	3.2	3.7	3.8	3.4	2.8	1.9	1.4	29.7
Balance	18.6	18.2	16.0	6.5	(1.0)	(2.7)	(3.6)	(2.9)	0.1	(1.0)	13.0	13.7	74.8

1) Balance = P + Si - Go - ET

D2 Northerly Arroyo under Proposed Condition

WATER BUDGET ANALYSIS
NEWPORT BANNING RANCH
Northerly Arroyo Habitat Under Proposed Condition

Average Temperature (F)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	64	64	63	65	66	69	72	73	73	72	67	64
Min	47	48	50	52	56	59	62	64	62	58	52	47

Average Rainfall (inch)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
P	2.08	2.05	1.84	0.9	0.17	0.05	0.01	0.09	0.36	0.18	1.55	1.57	10.85

Potential Evapotranspiration (inches)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
PET	1.44	1.60	1.78	2.16	2.66	3.21	3.68	3.77	3.35	2.77	1.91	1.41	29.74

Offsite Drainage Area:

DA = 122.09 acres

Land Use	Acreage	Imp
Road	5.35	0.90
Ex. Residential	5.94	0.80
Prop. Residential	4.43	0.65
Commercial/Industrial	78.14	0.90
School	9.91	0.40
Upland Area	18.32	0.10

Average= 0.70

RV = 0.7xImp+0.1
= 0.59

Habitat Footprint = 5.86 ac

Offsite Surface Inflow Si													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
Vol (ac-ft)	12.5	12.3	11.1	5.4	1.0	0.3	0.1	0.5	2.2	1.1	9.3	9.4	65.3
Depth (in)	25.6	25.3	22.7	11.1	2.1	0.6	0.1	1.1	4.4	2.2	19.1	19.3	133.7

1) Depth (in) = Volume (ac-ft) / Habitat Footprint (ac) *12 (in/ft)

Loss Fraction = 30%

Water Balance (inches)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
P	2.1	2.1	1.8	0.9	0.2	0.1	0.0	0.1	0.4	0.2	1.6	1.6	10.9
Si	25.6	25.3	22.7	11.1	2.1	0.6	0.1	1.1	4.4	2.2	19.1	19.3	133.7
Go	8.3	8.2	7.4	3.6	0.7	0.2	0.0	0.4	1.4	0.7	6.2	6.3	43.4
ET	1.4	1.6	1.8	2.2	2.7	3.2	3.7	3.8	3.4	2.8	1.9	1.4	29.7
Balance	18.0	17.5	15.4	6.2	(1.1)	(2.7)	(3.6)	(2.9)	0.0	(1.1)	12.5	13.2	71.4

1) Balance = P + Si - Go - ET

D3 Southerly Arroyo under Existing Condition

WATER BUDGET ANALYSIS
NEWPORT BANNING RANCH
Southerly Arroyo Habitat Under Existing Condition

Average Temperature (F)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	64	64	63	65	66	69	72	73	73	72	67	64
Min	47	48	50	52	56	59	62	64	62	58	52	47

Average Rainfall (inch)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
P	2.08	2.05	1.84	0.9	0.17	0.05	0.01	0.09	0.36	0.18	1.55	1.57	10.85

Potential Evapotranspiration (inches)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
PET	1.44	1.60	1.78	2.16	2.66	3.21	3.68	3.77	3.35	2.77	1.91	1.41	29.74

Offsite Drainage Area:

DA = 114.64 acres

Land Use	Acreage	Imp
Ex. Residential	11.7	0.8
Commercial/Industrial	31.91	0.9
Upland Area	71.03	0.1

Average = 0.39

RV = 0.7xImp+0.1

= 0.38

Habitat Footprint = 25.71 ac

Offsite Surface Inflow Si													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
Vol (ac-ft)	7.5	7.4	6.6	3.2	0.6	0.2	0.04	0.3	1.3	0.6	5.6	5.6	39.0
Depth (in)	3.5	3.4	3.1	1.5	0.3	0.1	0.02	0.2	0.6	0.3	2.6	2.6	18.2

1) Depth (in) = Volume (ac-ft) / Habitat Footprint (ac) *12 (in/ft)

Loss Fraction = 30%

Water Balance (inches)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
P	2.1	2.1	1.8	0.9	0.2	0.1	0.0	0.1	0.4	0.2	1.6	1.6	10.9
Si	3.5	3.4	3.1	1.5	0.3	0.1	0.0	0.2	0.6	0.3	2.6	2.6	18.2
Go	1.7	1.6	1.5	0.7	0.1	0.0	0.0	0.1	0.3	0.1	1.2	1.3	8.7
ET	1.4	1.6	1.8	2.2	2.7	3.2	3.7	3.8	3.4	2.8	1.9	1.4	29.7
Balance	2.5	2.2	1.7	(0.5)	(2.3)	(3.1)	(3.7)	(3.6)	(2.7)	(2.4)	1.0	1.5	(9.4)

1) Balance = P + Si - Go - ET

D4 Southerly Arroyo under Proposed Condition

WATER BUDGET ANALYSIS
NEWPORT BANNING RANCH
Southerly Arroyo Habitat Under Proposed Condition

Average Temperature (F)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	64	64	63	65	66	69	72	73	73	72	67	64
Min	47	48	50	52	56	59	62	64	62	58	52	47

Average Rainfall (inch)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
P	2.08	2.05	1.84	0.9	0.17	0.05	0.01	0.09	0.36	0.18	1.55	1.57	10.85

Potential Evapotranspiration (inches)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
PET	1.44	1.60	1.78	2.16	2.66	3.21	3.68	3.77	3.35	2.77	1.91	1.41	29.74

Offsite Drainage Area:

DA = 57.13 acres

Land Use	Acreage	Imp
Road	2.47	0.9
Ex. Residential	11.7	0.8
Commercial/Industrial	31.91	0.9
Park	6.35	0.15
Upland Area	4.7	0.1

Average= 0.73

RV = 0.7xImp+0.1

= 0.61

Habitat Footprint = 23.5 ac

Offsite Surface Inflow Si													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
Vol (ac-ft)	6.1	6.0	5.4	2.6	0.5	0.1	0.03	0.3	1.0	0.5	4.5	4.6	31.6
Depth (in)	3.1	3.0	2.7	1.3	0.3	0.1	0.01	0.1	0.5	0.3	2.3	2.3	16.1

1) Depth (in) = Volume (ac-ft) / Habitat Footprint (ac) *12 (in/ft)

Loss Fraction = 30%

Water Balance (inches)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (total)
P	2.1	2.1	1.8	0.9	0.2	0.1	0.0	0.1	0.4	0.2	1.6	1.6	10.9
Si	3.1	3.0	2.7	1.3	0.3	0.1	0.0	0.1	0.5	0.3	2.3	2.3	16.1
Go	1.6	1.5	1.4	0.7	0.1	0.0	0.0	0.1	0.3	0.1	1.2	1.2	8.1
ET	1.4	1.6	1.8	2.2	2.7	3.2	3.7	3.8	3.4	2.8	1.9	1.4	29.7
Balance	2.2	2.0	1.4	(0.6)	(2.4)	(3.1)	(3.7)	(3.6)	(2.7)	(2.5)	0.8	1.3	(10.9)

1) Balance = P + Si - Go - ET

D5 ET Reference Material

TABLE 2: THORNTWHAITE EQUATION

The Thornthwaite equation,

$$ET_u = 0.63(10t_c/I)^a$$

$$\text{where } a = 0.000000675(I)^3 - 0.0000771(I)^2 + 0.01792(I) + 0.49239$$

$$t_c = \text{degrees C}$$

is based on an exponential relationship between mean monthly temperature and mean monthly consumptive use. The relationship is based largely on experience in central and eastern United States. The temperature-efficiency index, I, an integral element of the Thornthwaite's classification of climate, is the sum of 12 monthly values of the heat index $i = (t_c/5)^{1.514}$, where t_c is the mean monthly temperature in degrees centigrade. The Thornthwaite equation, however, gives only unadjusted rates (ET_u) of **potential** evapotranspiration. Since the number of days in the month varies from 28 to 31 and since the number of hours in the day between the onset of evapotranspiration in the morning and its termination in the evening varies with the season and with latitude, it becomes necessary to reduce or increase the unadjusted rates by a factor (N) listed in Table 3 which varies with the month and the latitude.

P = precipitation (inches)

t_f = temperature (degrees F)

t_c = temperature (degrees C)

$i = (t_c/5)^{1.514}$

ET_u = unadjusted potential evapotranspiration (inches)

ET_a = adjusted potential evapotranspiration (inches)

N = monthly adjustment factor related to hours of daylight

term	Jan	Feb	Mar	April	May	June
P	1.15	0.67	2.13	1.44	6.57	3.61
t_f	21.8	22.4	32.6	45.0	56.8	66.2
t_c	-5.67	-5.33	0.33	7.22	13.78	19.0
i	-1.21	-1.10	0.016	1.74	4.64	—
ET_u	-0.97	-0.91	0.04	1.30	2.18	—
ET_a	-0.80	-0.74	0.04	1.42	3.24	—

term	July	Aug	Sept	Oct	Nov	Dec
P	0.93	4.90	4.49	1.29	3.65	0.86
t _f	70.8	68.9	61.6	50.3	38.0	26.5
t _c	21.56	20.5	16.44	10.16	3.33	-3.06
i	9.14	8.47	6.06	2.93	0.54	-0.47
ET _u	4.21	3.99	3.13	1.84	0.54	-0.49
ET _a	5.46	4.77	3.25	1.75	0.44	-0.38

TABLE 3: ADJUSTING FACTOR (N) FOR POTENTIAL EVAPOTRANSPIRATION
COMPUTED BY THE THORNTHWAITTE EQUATION (NORTHERN HEMISPHERE)

Lat. deg.	J	F	M	A	M	J	J	A	S	O	N	D
0	1.04	0.94	1.04	1.01	1.04	1.01	1.04	1.04	1.01	1.04	1.01	1.04
10	1.00	0.91	1.03	1.03	1.08	1.06	1.08	1.07	1.02	1.02	0.98	0.99
20	0.95	0.90	1.03	1.05	1.13	1.11	1.14	1.11	1.02	1.00	0.93	0.94
30	0.90	0.87	1.03	1.08	1.18	1.17	1.20	1.14	1.03	0.98	0.89	0.88
35	0.87	0.85	1.03	1.09	1.21	1.21	1.23	1.16	1.03	0.97	0.86	0.85
40	0.84	0.83	1.03	1.11	1.24	1.25	1.27	1.18	1.04	0.96	0.83	0.81
45	0.80	0.81	1.02	1.13	1.28	1.29	1.31	1.21	1.04	0.94	0.79	0.75
50	0.74	0.78	1.02	1.15	1.33	1.36	1.37	1.25	1.06	0.92	0.76	0.70

E BEST MANAGEMENT PRACTICES

E1 SITE DESIGN / LID BMPS

SITE DESIGN & LOW IMPACT DEVELOPMENT (LID) BEST MANAGEMENT PRACTICES (BMPs)

(excerpted, with minor revision from the Orange County Drainage Area Management Plan (DAMP), Exhibit 7.II, Model Water Quality Management Plan)

DESIGN CONCEPT 1: MINIMIZE STORMWATER RUNOFF, MINIMIZE PROJECT'S IMPERVIOUS FOOTPRINT AND CONSERVE NATURAL AREAS

Minimize and/or control the post-development peak storm water runoff discharge rates, velocities and volumes by utilizing measures that reduce runoff rates and volumes, and increase infiltration. A reduction in the storm water runoff from a development project using properly designed BMPs, can yield a corresponding reduction in the amount of pollutants transported from the site. The undeveloped runoff volume should be determined by considering the project site to be in a natural condition with surface vegetation in place.

The following site design options shall be considered and incorporated where applicable and feasible, during the site planning and approval process consistent with applicable General Plan policies, other development standards and regulations and with any Site Design BMPs included in an applicable regional or watershed program.

1. Maximize the permeable area. This can be achieved in various ways, including, but not limited to increasing building density (number of stories above or below ground) and developing land use regulations seeking to limit impervious surfaces. Decreasing the project's footprint can substantially reduce the project's impacts to water quality and hydrologic conditions, provided that the undeveloped area remains open space.
2. Conserve natural areas. This can be achieved by concentrating or clustering development on the least environmentally sensitive portions of a site while leaving the remaining land in a natural, undisturbed condition. Where available, permittees should also refer to their Multiple Species Conservation Plans or other biological regulations, as appropriate to assist in determining sensitive portions of the site. Sensitive areas include, but are not limited to: areas necessary to maintain the viability of wildlife corridors, occupied habitat of sensitive species and all wetlands, and coastal scrub and other upland communities.
3. Construct walkways, trails, patios, overflow parking lots, alleys, driveways, low -traffic streets and other low-traffic areas with open-jointed paving materials or permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials
4. Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walk able environment for pedestrians are not compromised 3. Incorporate landscaped buffer areas between sidewalks and streets.
5. Reduce widths of street where off-street parking is available 4

6. Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs
7. Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design
8. Use natural drainage systems.
9. Where soils conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration 5
10. Construct onsite ponding areas or retention facilities to increase opportunities for infiltration
11. Other site design options that are comparable, and equally effective

DESIGN CONCEPT 2: MINIMIZE DIRECTLY CONNECTED IMPERVIOUS AREAS (DCIAs)

Priority Projects shall incorporate the following design characteristics, as appropriate, and incorporate any Site Design BMPs included in any regional or watershed program that the project relies upon for Treatment Control BMPs.

1. Where landscaping is proposed, drain rooftops into adjacent landscaping prior to discharging to the storm drain
2. Where landscaping is proposed, drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping
3. Increase the use of vegetated drainage swales in lieu of underground piping or imperviously lined swales
4. Use one or more of the following (for further guidance, see Start at the Source [1999]):
 - Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings
 - Urban curb/swale system: street slopes to curb; periodic swale inlets drain to vegetated swale/biofilter
 - Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to municipal storm drain systems d. Other design concepts that are comparable and equally effective
5. Use one or more of the following features for design of driveways and private residential parking areas:
 - Design driveways with shared access, flared (single lane at street) or wheel strips (paving only under tires); or, drain into landscaping prior to discharging to the municipal storm drain system
 - Uncovered temporary or guest parking on private residential lots may be: paved with a permeable surface; or, designed to drain into landscaping prior to discharging to the municipal storm drain system

- Other design concepts that are comparable and equally effective
6. Use one or more of the following design concepts for the design of parking areas:
 - Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design
 - Overflow parking (parking stalls provided in excess of the City's minimum parking requirements) may be constructed with permeable paving
 - Other design concepts that are comparable and equally effective
 7. Other design characteristics that are comparable and equally effective

E2 SOURCE CONTROL BMPS

SOURCE CONTROL BEST MANAGEMENT PRACTICES (BMPs)

(excerpted, with minor revision from the Orange County Drainage Area Management Plan (DAMP), Exhibit 7.II, Model Water Quality Management Plan)

N1 Education for Property Owners, Tenants and Occupants

For developments with no Property Owners Association (POA) or with POAs of less than fifty (50) dwelling units, practical information materials will be provided to the first residents/occupants/tenants on general housekeeping practices that contribute to the protection of stormwater quality. These materials will be initially developed and provided to first residents/occupants/tenants by the developer. Thereafter such materials will be available through the City's education program. Different materials for residential, office commercial, retail commercial, vehicle-related commercial and industrial uses will be involved.

For developments with POA and residential projects of more than fifty (50) dwelling units, project conditions of approval will require that the POA provide environmental awareness education materials, made available by the municipalities, to all member periodically. Among other things, these materials will describe the use of chemicals (including household type) that should be limited to the property, with no discharge of wastes via hosing or other direct discharge to gutters, catch basins and storm drains.

N2 Activity Restrictions

If a POA is formed, conditions, covenants and restrictions (CCRs) shall be prepared by the developer for the purpose of surface water quality protection. An example would be not allowing car washing outside of established community car wash areas in multi-unit complexes. Alternatively, use restrictions may be developed by a building operator through lease terms, etc. These restrictions must be included in the Project WQMP.

N3 Common Area Landscape Management

On-going maintenance consistent with County Water Conservation Resolution or city equivalent, plus fertilizer and/or pesticide usage consistent with Management Guidelines for Use of Fertilizers (DAMP Section 5.5). Statements regarding the specific applicable guidelines must be included in the Project WQMP.

N4 BMP Maintenance

Identify responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities.

N5 Title 22 CCR Compliance

Compliance with Title 22 of the California Code of Regulations (CCR) and relevant sections of the California Health & Safety Code regarding hazardous waste management shall be enforced by County Environmental Health on behalf of the State. The Project WQMP must describe how the development will comply with the applicable hazardous waste management section(s) of Title 22.

N6 Local Water Quality Permit Compliance

The City, under the Water Quality Ordinance, may issue permits to ensure clean storm water discharges from fuel dispensing areas and other areas of concern to public properties.

N7 Spill Contingency Plan

Prepared by building operator for use by specified types of building or suite occupancies and which mandates stockpiling of cleanup materials, notification of responsible agencies, disposal of cleanup materials, documentation, etc.

N8 Underground Storage Tank Compliance

Compliance with State regulations dealing with underground storage tanks, enforced by County Environmental Health on behalf of State.

N9 Hazardous Materials Disclosure Compliance

Compliance with City ordinances typically enforced by respective fire protection agency for the management of hazardous materials. The Orange County, health care agencies, and/or other appropriate agencies (i.e. Department of Toxics Substances Control are typically responsible for enforcing hazardous materials and hazardous waste handling and disposal regulations.

N10 Uniform Fire Code Implementation

Compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency.

N11 Common Area Litter Control

For industrial/commercial developments and for developments with POAs, the owner/POA shall be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. The owner/POA may contract with their landscape maintenance firms to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations by tenants/homeowners or businesses and reporting the violations to the owner/POA for investigation.

N12 Employee Training

Education program (see N1) as it would apply to future employees of individual businesses. Developer either prepares manual(s) for initial purchasers of business site

or for development that is constructed for an unspecified use makes commitment on behalf of POA or future business owner to prepare.

N13 Housekeeping of Loading Docks

Loading docks typically found at large retail and warehouse-type commercial and industrial facilities shall be kept in a clean and orderly condition through a regular program of sweeping and litter control and immediate cleanup of spills and broken containers. Cleanup procedures should minimize or eliminate the use of water. If washdown water is used, it must be disposed of in an approved manner and not discharged to the storm drain system. If there are no other alternatives, discharge of non-storm water flow to the sanitary sewer may be considered only if allowed by the local sewerage agency through a permitted connection.

N14 Common Area Catch Basin Inspection

For industrial/commercial developments and for developments with privately maintained drainage systems, the owner is required to have at least 80 percent of drainage facilities inspected, cleaned and maintained on an annual basis with 100 percent of the facilities included in a two-year period. Cleaning should take place in the late summer/early fall prior to the start of the rainy season. Drainage facilities include catch basins (storm drain inlets) detention basins, retention basins, sediment basins, open drainage channels and lift stations.

N15 Street Sweeping Private Streets and Parking Lots

Streets and parking lots are required to be swept prior to the storm season, in late summer or early fall, prior to the start of the rainy season.

N16 Commercial Vehicle Washing

This BMP Has Been Removed.

N17 Retail Gasoline Outlets

Retail gasoline outlets (RGOs) are required to follow operations and maintenance best management practices shown in the California Stormwater Quality Association (CASQA, formerly California Stormwater Quality Task Force) Best Management Practice Guide for Retail Gasoline Outlets. This document may be obtained by downloading from the CASQA website at <http://www.stormwatertaskforce.org/swqtf/RGOGuide.htm> or from forthcoming CASQA website.

Provide Storm Drain System Stenciling and Signage

Storm drain stencils are highly visible source control messages, typically placed directly adjacent to storm drain inlets. The stencils contain a brief statement that prohibits the dumping of improper materials into the municipal storm drain system. Graphical icons, either illustrating anti-dumping symbols or images of receiving water fauna, are effective supplements to the anti-dumping message. Stencils and signs alert the public to the destination of pollutants discharged into stormwater.

The following requirements shall be included in the project design and shown on the project plans:

1. Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language (such as: "NO DUMPING-DRAINS TO OCEAN") and/or graphical icons to discourage illegal dumping.
2. Post signs and prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.
3. Maintain legibility of stencils and signs.

Design Outdoor Hazardous Material Storage Areas to Reduce Pollutant Introduction

Improper storage of materials outdoors may increase the potential for toxic compounds, oil and grease, fuels, solvents, coolants, wastes, heavy metals, nutrients, suspended solids, and other pollutants to enter the municipal storm drain system. Where the plan of development includes outdoor areas for storage of hazardous materials that may contribute pollutants to the municipal storm drain system, the following storm water BMPs are required:

1. Hazardous materials with the potential to contaminate urban runoff shall either be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the municipal storm drain system; or (2) protected by secondary containment structures (not double wall containers) such as berms, dikes, or curbs.
2. The storage area shall be paved and sufficiently impervious to contain leaks and spills.
3. The storage area shall have a roof or awning to minimize direct precipitation and collection of storm water within the secondary containment area.
4. Any storm water retained within the containment structure must not be discharged to the street or storm drain system. Location(s) of installations of where these preventative measures will be employed must be included on the map or plans identifying BMPs.

Design Trash Storage Areas To Reduce Pollutant Introduction

All trash container areas shall meet the following requirements (limited exclusion: detached residential homes):

1. Paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements diverted around the area, screened or walled to prevent off-site transport of trash; and
2. Provide attached lids on all trash containers that exclude rain, or roof or awning to minimize direct precipitation.

3. Connection of trash area drains to the municipal storm drain system is prohibited.

Use Efficient Irrigation Systems and Landscape Design

Projects shall design the timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the municipal storm drain system. (Limited exclusion: detached residential homes.) The following methods to reduce excessive irrigation runoff shall be considered, and incorporated on common areas of development and other areas where determined applicable and feasible by the City:

1. Employing rain shutoff devices to prevent irrigation after precipitation.
2. Designing irrigation systems to each landscape area's specific water requirements.
3. Using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
4. Implementing landscape plan consistent with County Water Conservation Resolution or city equivalent, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.
5. The timing and application methods of irrigation water shall be designed to minimize the runoff of excess irrigation water into the municipal storm drain system.
6. Employing other comparable, equally effective, methods to reduce irrigation water runoff.
7. Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider other design features, such as:
 - Use mulches (such as wood chips or shredded wood products) in planter areas without ground cover to minimize sediment in runoff.
 - Install appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant material where possible and/or as recommended by the landscape architect.
 - Leave a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible.
 - Choose plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth.

Protect Slopes and Channels

Project plans shall include Source Control BMPs to decrease the potential for erosion of slopes and/or channels, consistent with local codes and ordinances and with the approval of all agencies with jurisdiction, e.g., the U.S. Army Corps of Engineers, the Regional Boards and the California Department of Fish and Game. The following design principles shall be considered, and incorporated and implemented where determined applicable and feasible by the City:

1. Convey runoff safely from the tops of slopes.
2. Avoid disturbing steep or unstable slopes.
3. Avoid disturbing natural channels.
4. Install permanent stabilization BMPs on disturbed slopes as quickly as possible.
5. Vegetate slopes with native or drought tolerant vegetation.
6. Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
7. Install permanent stabilization BMPs in channel crossings as quickly as possible, and ensure that increases in runoff velocity and frequency caused by the project do not erode the channel.
8. Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
9. Onsite conveyance channels should be lined, where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are large enough to erode grass or other vegetative linings, riprap, concrete soil cement or geo-grid stabilization may be substituted or used in combination with grass or other vegetation stabilization.
10. Other design principles that are comparable and equally effective.

Loading Dock Areas

Loading/unloading dock areas shall include the following:

1. Cover loading dock areas, or design drainage to preclude urban run-on and runoff.
2. Direct connections to the municipal storm drain system from below grade loading docks (truck wells) or similar structures are prohibited. Storm water can be discharged through a permitted connection to the storm drain system with a Treatment Control BMP applicable to the use.
3. Other comparable and equally effective features that prevent unpermitted discharges to the municipal storm drain system.
4. Housekeeping of loading docks shall be consistent with N13.

Maintenance Bays

Maintenance bays shall include the following:

1. Repair/maintenance bays shall be indoors; or, designed to preclude urban run-on and runoff.

2. Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash -down waters from entering the storm drain system. Connect drains to a sump for collection and disposal. Discharge from the repair/maintenance bays to the municipal storm drain system is prohibited. If there are no other alternatives, discharge of non-storm water flow to the sanitary sewer may be considered, but only when allowed by the local sewerage agency through permitted connection.
3. Other comparable and equally effective features, that prevent discharges to the municipal storm drain system.

Vehicle Wash Areas

Projects that include areas for washing/steam cleaning of vehicles shall use the following:

1. Self-contained or covered with a roof or overhang.
2. Equipped with a wash racks constructed in accordance with the guidelines in Attachment C, and with the prior approval of the sewerage agency (Note: Discharge monitoring may be required by the sewerage agency).
3. Equipped with a clarifier or other pretreatment facility.
4. Other comparable and equally effective features that prevent unpermitted discharges, to the municipal storm drain system.

Outdoor Processing Areas

Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, landfills, waste piles, and wastewater and solid waste handling, treatment, and disposal, and other operations determined to be a potential threat to water quality by the City shall adhere to the following requirements.

1. Cover or enclose areas that would be the sources of pollutants; or, slope the area toward a sump that will provide infiltration or evaporation with no discharge; or, if there are no other alternatives, discharge of non-storm water flow to the sanitary sewer may be considered only when allowed by the local sewerage agency through permitted connection
2. Grade or berm area to prevent run-on from surrounding areas.
3. Installation of storm drains in areas of equipment repair is prohibited.
4. Other comparable or equally effective features that prevent unpermitted discharges to the municipal storm drain system.
5. Where wet material processing occurs (e.g. electroplating), secondary containment structures (not double wall containers) shall be provided to hold spills resulting from accidents, leaking tanks or equipment, or any other unplanned releases (Note: If these are plumbed to the sanitary sewer, the structures and plumbing shall be in accordance with Section 7.II-Attachment C, and with the

prior approval of the sewerage agency). See also Section 7.II-3.4.2, N10. Design of secondary containment structures shall be consistent with Design of Outdoor Material Storage Areas To Reduce Pollutant Introduction.

Some of these land uses (e.g. landfills, waste piles, wastewater and solid waste handling, treatment and disposal) may be subject to other permits including Phase I Industrial Permits that may require additional BMPs.

Equipment Wash Areas

Outdoor equipment/accessory washing and steam cleaning activities shall use the following:

1. Be self-contained or covered with a roof or overhang.
2. Design an equipment wash area drainage system to capture all wash water. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around equipment wash areas to prevent wash -down waters from entering the storm drain system. Connect drains to a sump for collection and disposal. Discharge from equipment wash areas to the municipal storm drain system is prohibited. If there are no other alternatives, discharge of non-storm water flow to the sanitary sewer may be considered, but only when allowed by the local sewerage agency through a permitted connection.
3. Other comparable or equally effective features that prevent unpermitted discharges to the municipal storm drain system.

Fueling Areas

Fuel dispensing areas shall contain the following:

1. At a minimum, the fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.
2. The fuel dispensing area shall be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited.
3. The fuel dispensing area shall have an appropriate slope (2% -4%) to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water.
4. An overhanging roof structure or canopy shall be provided. The cover's minimum dimensions must be equal to or greater than the area of the fuel dispensing area in #1 above. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area shall drain to the project's Treatment Control BMP(s) prior to discharging to the municipal storm drain system.

Hillside Landscaping

Hillside areas that are disturbed by project development shall be landscaped with deep-rooted, drought tolerant plant species selected for erosion control, satisfactory to the City.

Wash Water Controls For Food Preparation Areas

Food establishments (per State Health & Safety Code 27520) shall have either contained areas or sinks, each with sanitary sewer connections for disposal of wash waters containing kitchen and food wastes. If located outside, the contained areas or sinks shall also be structurally covered to prevent entry of storm water. Adequate signs shall be provided and appropriately placed stating the prohibition of discharging washwater to the storm drain system.

Community Car Wash Racks

In complexes larger than 100 dwelling units where car washing is allowed, a designated car wash area that does not drain to a storm drain system shall be provided for common usage. Wash waters from this area may be directed to the sanitary sewer (in accordance with Attachment C, and with the prior approval of the sewerage agency); to an engineered infiltration system; or to an equally effective alternative. Pre-treatment may also be required. Signage shall be provided prohibiting discharges of washwater outside of the designated area.

E3 LID / TREATMENT CONTROL BMP CALCULATIONS

LID / TREATMENT CONTROL BMP SIZING CALCULATIONS

Date: April 17, 2008

Project: Newport Banning Ranch

Job: 821.01.02

Stormwater Quality Design Volume (SQDV) Calculation

(Source: Orange County Drainage Area Management Plan (DAMP), Exhibit 7.11 – Model Water Quality Management Plan, September 26, 2003)

Calculate the storm water quality design volume for the site (or each sub-drainage area that will discharge to a separate BMP) produced by a 24-hour, 85th percentile storm event using the following equation:

$$SQDV = C * I * A * (\text{unit conversion})$$

Where:

- C = runoff coefficient obtained from Table A-1
- I = rainfall intensity (see map on following page)
- A = area of the site treated by the BMP, in acres

Vegetated Biocell Sizing

(Source: Los Angeles Regional Water Quality Control Board (RWQCB). Example Standard Urban Storm Water Management Plan [SUSMP]; Appendix A: Water Quality Volume Calculations. Website: http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/general/sams_club/Appendix%20A.pdf)

Calculate the volume of water treated by each biocell based on the depths and properties of the various layers of the biocell:

$$V_{BC} = V_P + V_{MGS} + V_{SO} + V_1$$

Where:

- V_{BC} = volume treated by biocell in ft³ (must be equal to or greater than SQDV)
- V_P = volume ponded in biocell in ft³
- V_{MGS} = volume stored in mulch, gravel, and topsoil in ft³
- V_1 = volume infiltrated in ft³

The volumes in the equation above can be determined by the following sequence of equations:

Volume Ponded in Biocell (V_p):

$$V_p = [(A_T + A_B) * P] / 2$$

Where:

A_T = area of top of biocell, in square feet

A_B = area of bottom of biocell, in square feet

P = ponding depth, in feet

Volume in Mulch, Topsoil and Gravel Layer (V_{MGS})

$$V_{MGS} = A_T * [(M * \eta_M) + (G * \eta_G) + (S * \eta_S)]$$

Where:

A_T = area of top of biocell, in square feet

M = depth of mulch, in feet

η_M = porosity of mulch, in percent void space

G = depth of gravel layer, in feet

η_G = porosity of gravel layer, in percent void space

S = depth of topsoil

η_S = porosity of top soil, in percent void space

Velocity of Water in Amended Soil Layer (v_i)

$$V_i = F_p / [12 * \eta_{SO} * (1-w)]$$

Where:

F_p = infiltration capacity of the amended soil, or hydraulic conductivity (in inches per hour)

η_{SO} =

w = soil water content before rain event, in percent of voids assumed saturated

Duration of Infiltration During 24 hr Storm Event (T)

$$T = 24 - (S_O / v_i)$$

Where:

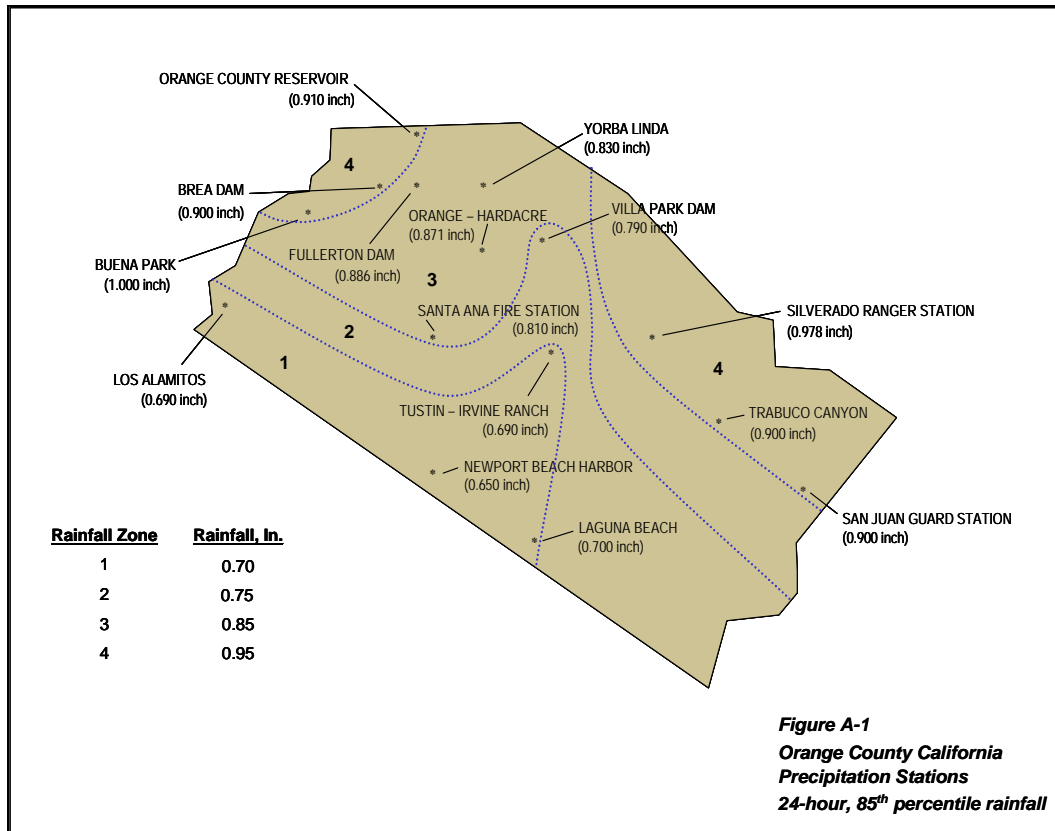
S_O = depth of amended soil layer, in feet

Volume Infiltrated (V_1)

$$V_1 = T * A_T * [F_p / (12 * SF)]$$

Where:

SF = safety factor for infiltration capacity. Assumed to be 1 if overflow drain is provided.



% Impervious	% Pervious	C
0	100	0.15
5	95	0.19
10	90	0.23
15	85	0.26
20	80	0.30
25	75	0.34
30	70	0.38
35	65	0.41
40	60	0.45
45	55	0.49
50	50	0.53
55	45	0.56
60	40	0.60
65	35	0.64
70	30	0.68
75	25	0.71
80	20	0.75
85	15	0.79
90	10	0.83
95	5	0.86
100	0	0.90

Storm Water Quality Design Volume Calculations - Newport Banning Ranch

SQDV = C * I * A * (Conversion)

C = Runoff Coefficient depth = volume / area
 I = Rainfall Intensity I = volume / C * A * conversion
 conversion = (1/12)*(43560)

Drainage Area	Development Area	% impervious	Runoff Coefficient	Rainfall Intensity (in)	Drainage Area (acres)	Conversion Factor	Treatment Required (ft ³)	Treatment Required (acre-ft)
A19.1	Road	90%	0.83	0.7	2.81	3630	5,901.38	0.135
A19.11	Park (4b)	10%	0.23	0.7	2.21	3630	1,271.94	0.029
A17	Park (4b)	10%	0.23	0.7	1.6	3630	920.86	0.021
A16.4	Park (4b)	10%	0.23	0.7	3.71	3630	2,135.24	0.049
A19.8	Road	90%	0.83	0.7	1.85	3630	3,885.25	0.089
A12.12	Resort Colony (5a/6a)	65%	0.64	0.7	7.17	3630	11,641.92	0.267
A12.9	Road	90%	0.83	0.7	1.01	3630	2,121.14	0.049
A12.14	Resort Colony (6a/6b)	65%	0.64	0.7	6.6	3630	10,716.41	0.246
A12.13	Road	90%	0.83	0.7	0.44	3630	924.06	0.021
A12.11	Townhomes (9a)	75%	0.71	0.7	1.33	3630	2,412.98	0.055
A12.8	Townhomes (9a)	75%	0.71	0.7	0.48	3630	870.85	0.020
A19.9	Townhomes (9a)	75%	0.71	0.7	2.51	3630	4,553.83	0.105
A12.7	Townhomes (9a)	75%	0.71	0.7	0.62	3630	1,124.85	0.026
A12.4	Townhomes (9a)	75%	0.71	0.7	4.05	3630	7,347.81	0.169
A12.2	Road	90%	0.83	0.7	0.43	3630	903.06	0.021
A12.1	Townhomes (9a)	75%	0.71	0.7	1.54	3630	2,793.98	0.064
A12.3	Bluff Top Homes (9b)	60%	0.60	0.7	1.14	3630	1,742.39	0.040
A12.5	Road	90%	0.83	0.7	0.41	3630	861.06	0.020
A12.6	Bluff Top Homes (9b)	60%	0.60	0.7	1.13	3630	1,727.10	0.040
A12.10	Bluff Top Homes (9b)	60%	0.60	0.7	2.1	3630	3,209.66	0.074
A7.4	Road	90%	0.83	0.7	2.47	3630	5,187.34	0.119
A7.3	Park (4a)	10%	0.23	0.7	6.35	3630	3,654.66	0.084
A19.6	Park (4a)	10%	0.23	0.7	2.54	3630	1,461.86	0.034
A19.5	Road	90%	0.83	0.7	3.09	3630	6,489.42	0.149
A19.1	Park Flats (7c)	75%	0.71	0.7	1.8	3630	3,265.69	0.075
A19.2	Park Flats (7c)	75%	0.71	0.7	2.42	3630	4,390.54	0.101
A19.3	Road	90%	0.83	0.7	0.9	3630	1,890.12	0.043
A19.4	Park (4a)	10%	0.23	0.7	1.92	3630	1,105.03	0.025
A19.7	Park (4a)	10%	0.23	0.7	2.54	3630	1,461.86	0.034
A11.2	Road	90%	0.83	0.7	0.25	3630	525.03	0.012
A11.5	Road	90%	0.83	0.7	1.18	3630	2,478.16	0.057

Drainage Area	Development Area	% impervious	Runoff Coefficient	Rainfall Intensity (in)	Drainage Area (acres)	Conversion Factor	Treatment Required (ft ³)	Treatment Required (acre-ft)
A11.6	Bluff Traditional (9c)	75%	0.71	0.7	1.15	3630	2,086.42	0.048
A11.4	Park (4e)	10%	0.23	0.7	1.84	3630	1,058.99	0.024
A11.7	Bluff Traditional (9c)	75%	0.71	0.7	4.75	3630	8,617.80	0.198
A11.8	Bluff Top Homes (8a)	60%	0.60	0.7	6.1	3630	9,323.31	0.214
A11.1	Road	90%	0.83	0.7	0.19	3630	399.03	0.009
B11.2	North Terrace Lofts (7a)	75%	0.71	0.7	4.43	3630	8,037.23	0.185
C3.3	Bluff Traditional (9c)	75%	0.71	0.7	3.05	3630	5,533.54	0.127
C4.1	Road	90%	0.83	0.7	0.73	3630	1,533.10	0.035
C5.2	Bluff Traditional (9c)	75%	0.71	0.7	2.49	3630	4,517.54	0.104
C6.1	Road	90%	0.83	0.7	0.62	3630	1,302.08	0.030
C6.2	Bluff Traditional (9c)	75%	0.71	0.7	3.14	3630	5,696.82	0.131
C3.2	Coastal Beach (8b)	75%	0.71	0.7	2.09	3630	3,791.83	0.087
C4.2	Coastal Beach (8b)	75%	0.71	0.7	1.21	3630	2,195.27	0.050
C5.1	Road	90%	0.83	0.7	0.32	3630	672.04	0.015
C6.3	Park (4f)	10%	0.23	0.7	1.37	3630	788.49	0.018
C7.3	Coastal Beach (8b)	75%	0.71	0.7	3.51	3630	6,368.10	0.146
C7.1	Road	90%	0.83	0.7	1.12	3630	2,352.15	0.054
C8.2	Coastal Beach (8b)	75%	0.71	0.7	5.34	3630	9,688.22	0.222
C8.1	Road	90%	0.83	0.7	0.48	3630	1,008.07	0.023
C8.3	Bluff Top Homes (8a)	60%	0.60	0.7	2.16	3630	3,301.37	0.076
C9.1	Road	90%	0.83	0.7	2.55	3630	5,355.35	0.123
C9.2	Coastal Beach (8b)	75%	0.71	0.7	2.41	3630	4,372.40	0.100
C14.2	Coastal Beach (8b)	75%	0.71	0.7	2.24	3630	4,063.97	0.093
C13.2	Park (4j)	10%	0.23	0.7	3.8	3630	2,187.04	0.050
C14.1	Road	90%	0.83	0.7	0.2	3630	420.03	0.010
C3.1	Road	90%	0.83	0.7	2.81	3630	5,901.38	0.135
C12.3	South Terrace Lofts (7b)	75%	0.71	0.7	8.66	3630	15,711.61	0.361
C12.1	Road	90%	0.83	0.7	2.34	3630	4,914.32	0.113
C12.2	South Terrace Lofts (7b)	75%	0.71	0.7	5.84	3630	10,595.36	0.243
C13.1	Road	90%	0.83	0.7	0.27	3630	567.04	0.013
C15	Eco-Guest Retreat	15%	0.26	0.7	5.07	3630	3,401.08	0.078
C11	Off-site drainage	90%	0.83	0.7	1.06	3630	2,226.14	0.051
C10	Off-site drainage	90%	0.83	0.7	0.88	3630	1,848.12	0.042
	Total	62%	0.62	0.7	152.82	3630	238,814.11	5.482