

APPENDIX L

Drainage Study

**TENTATIVE MAP
DRAINAGE STUDY**
for
NORTH RIVER FARMS

City of Oceanside, California

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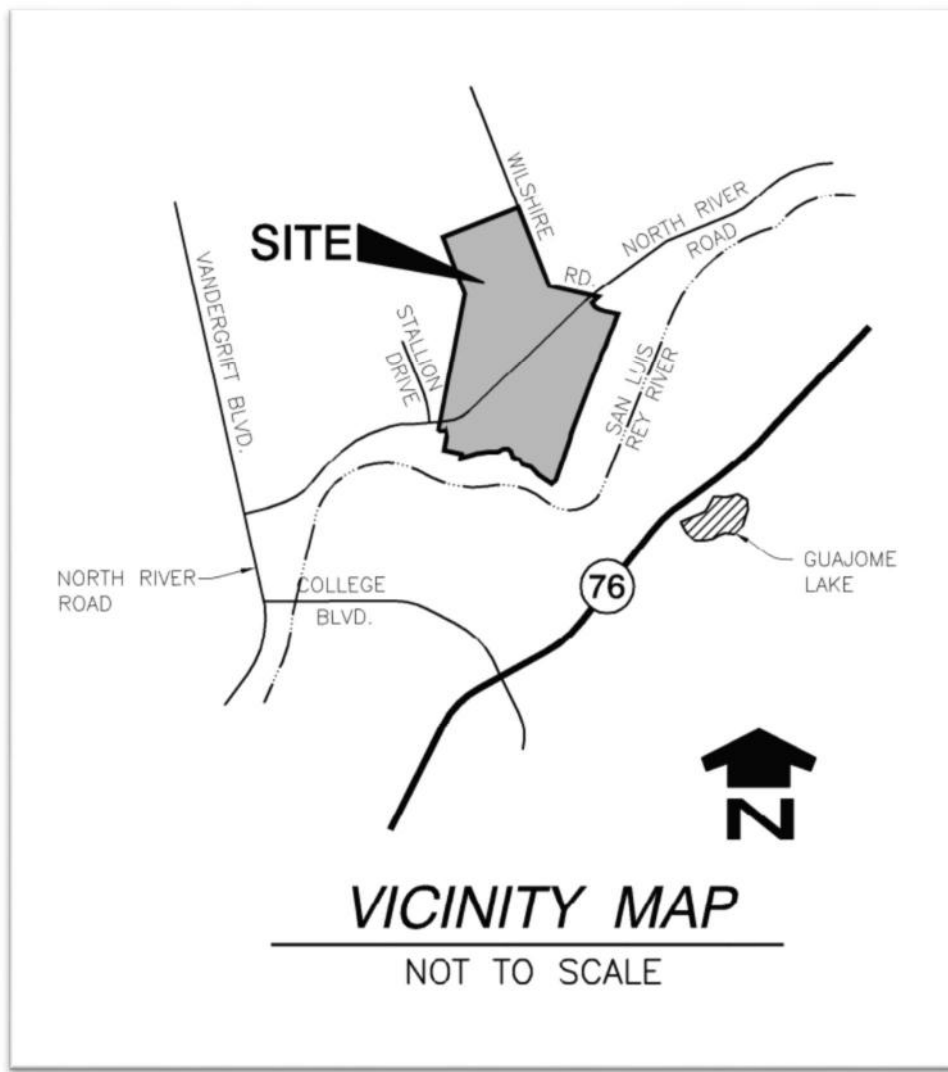
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CHAPTER 1 - EXECUTIVE SUMMARY

1.1 - Introduction

The North River Farms development is located on North River Road adjacent to Wilshire road within the City of Oceanside, California (see Vicinity Map below). The 177-acre site is bounded to the south by the San Luis Rey River, a fence to the north, Wilshire Road to the east, and private lots to the west.

This study analyzes existing and developed conditions for the 100-year peak runoff rates from the proposed North River Farms development.



1.2 – Summary of Existing Conditions

The project site is currently an agricultural farm with gently sloping terrain towards the San Luis Rey River. North River Road runs through the project site, dividing a portion of the site, but the entire site eventually discharges towards the San Luis Rey River.

Series 100 begins at the northeastern portion of the project boundary and flows south parallel to Wilshire Road until discharging into a desilting basin. Series 110 is similar to 100, flowing south towards a desilting basins. It is assumed that the discharge from the two desilting basins will outlet to the east of Wilshire Road together with flow from a portion of North River Road.

Series 200 is located south of North River Road. The area is gently sloping towards the San Luis Rey River.

Series 300 is similar to 200 but discharges downstream of 200.

Series 400 is the southernmost portion of the project site and discharges downstream of 300.

Series 300 begins to offsite and to the north and an elevation of 354 feet.

Hydrologic soils found onsite are A, C, and D. Per 2003 County of San Diego criteria, runoff coefficients of 0.55, 0.57 and 0.87 were assumed respectively. A weighted coefficient was calculated for the embankment and the trailer.

Peak flow from the existing site and adjacent embankment is summarized below in Table 1.

TABLE 1 - Summary of Existing Conditions Hydrology

Outlet Location (AES Node)	Area (Ac)	100 Year Peak Flow* (cfs)
100	22.1	12.5
200	19.2	11.3
300	18.0	9.1
400	18.1	10.9
500	179.5	185.7
Total	256.9	229.5

* total peak flow taken from AES

1.3 – Summary of Developed Conditions

Development of the site will include the development of about 409 multi-family residences lots, along with the associated streets, sidewalks, public open space, utilities and an internal storm drainage system.

Runoff from the site in developed conditions will drain to two water quality basins before discharging to into San Luis Ray River, Basin1 is located north of North River Road along the western edge of the property. Basin 2 is on the southwestern corner of the property boundary. Lots 8 and 9 are mass graded and will drain to San Luis Ray River and the same drainage pattern existing runoff location.

A portion of runoff from offsite tributary areas to the north west are collected in concrete ditches and bypass storm drain system and routed to discharge to San Luis Ray River.

For Storm Water Quality refer to the PDP SWQMP for North River Farms.

Peak flow from the North River Farms project site is summarized below in Table 2.

Table 2 – Summary of Developed Conditions

Outlet Location (AES Node)	Area (Ac)	100 Year Peak Flow (cfs)
100+200	13.5	19.6
300	15	7.6
400	200.3	232.9
500	3.9	6.0
Total	232.7	266.11

* peak flow taken from AES calculations.

1.4 - Summary of Results

In existing conditions, North River Farms receives approximately 42.0 cfs from the project site. As shown in Table 3 on the previous page, the rational method predicts a developed condition peak flow to North River Farms of 38.6 cfs.

Peak flow rates listed were generated based on criteria set forth in "San Diego County Hydrology Manual, 2003" (methodology presented in Chapter II of this report). Rational Method output is located in Chapter IV and V.

The project area south of North River Road is within FEMA Zone AE and map revisions will be addressed by separate CLOMR/LOMR applications.

Final storm drain, inlet and rip rap design details will be provided at the final engineering stage of the development.

Outlet Location (AES Node)	Ex. Area (Ac)	Pr. Area (Ac)	Ex. 100 Year Peak Flow (cfs)	Pr. 100 Year Peak Flow (cfs)
100+200	41.3	13.5	23.8	19.6
300	18.0	15	9.1	7.6
400	18.1	200.3	10.9	232.9
500	179.5	3.9	185.7	6.0
Total	256.9	232.7	229.5	266.1

* peak flow taken from AES calculations.

1.5 - References

"San Diego County Hydrology Manual", County of San Diego Department of Public Works – Flood Control Section; June 2003.

CHAPTER 2

METHODOLOGY

Modified Rational Method Hydrologic Analysis

Computer Software Package – AES-2015

Design Storm - 100-year return interval

Land Use – Multi-family residential onsite;

Soil Type – Hydrologic soil group D was assumed for all areas. Group D soils have very slow infiltration rates when thoroughly wetted. Consisting chiefly of clay soils with a high swelling potential, soils with a high permanent water table, soils with clay pan or clay layer at or near the surface, and shallow soils over nearly impervious materials, Group D soils have a very slow rate of water transmission.

Runoff Coefficient - In accordance with the County of San Diego standards, runoff coefficients were based on land use and slope.

Rainfall Intensity - Initial time of concentration values were determined using the County of San Diego standards. The rainfall intensity-duration-frequency curve for the San Diego County was used to determine rainfall intensities.

Method of Analysis – The Rational Method is the most widely used hydrologic model for estimating peak runoff rates. Applied to small urban and semi-urban areas with drainage areas less than 0.5 square miles, the Rational Method relates storm rainfall intensity, a runoff coefficient, and drainage area to peak runoff rate. This relationship is expressed by the equation:

$Q = CIA$, where:

Q = The peak runoff rate in cubic feet per second at the point of analysis.

C = A runoff coefficient representing the area - averaged ratio of runoff to rainfall intensity.

I = The time-averaged rainfall intensity in inches per hour corresponding to the time of concentration.

A = The drainage basin area in acres.

To perform a node-link study, the total watershed area is divided into subareas which discharge at designated nodes.

The procedure for the subarea summation model is as follows:

- (1) Subdivide the watershed into an initial subarea (generally 1 lot) and subsequent subareas, which are generally less than 10 acres in size. Assign upstream and downstream node numbers to each subarea.
- (2) Estimate an initial T_c by using the appropriate nomograph or overland flow velocity estimation.

- (3) Using the initial T_c , determine the corresponding values of I . Then $Q = C I A$.
- (4) Using Q , estimate the travel time between this node and the next by Manning's equation as applied to the particular channel or conduit linking the two nodes. Then, repeat the calculation for Q based on the revised intensity (which is a function of the revised time of concentration)

The nodes are joined together by links, which may be street gutter flows, drainage swales, drainage ditches, pipe flow, or various channel flows. The AES-2003 computer subarea menu is as follows:

SUBAREA HYDROLOGIC PROCESS

1. Confluence analysis at node.
2. Initial subarea analysis (including time of concentration calculation).
3. Pipeflow travel time (computer estimated).
4. Pipeflow travel time (user specified).
5. Trapezoidal channel travel time.
6. Street flow analysis through subarea.
7. User - specified information at node.
8. Addition of subarea runoff to main line.
9. V-gutter flow through area.
10. Copy main stream data to memory bank
11. Confluence main stream data with a memory bank
12. Clear a memory bank

At the confluence point of two or more basins, the following procedure is used to combine peak flow rates to account for differences in the basin's times of concentration. This adjustment is based on the assumption that each basin's hydrographs are triangular in shape.

- (1). If the collection streams have the same times of concentration, then the Q values are directly summed,

$$Q_p = Q_a + Q_b; T_p = T_a = T_b$$

- (2). If the collection streams have different times of concentration, the smaller of the tributary Q values may be adjusted as follows:
 - (i). The most frequent case is where the collection stream with the longer time of concentration has the larger Q . The smaller Q value is adjusted by the ratio of rainfall intensities.

North River Farms
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$$Q_p = Q_a + Q_b (I_a/I_b); T_p = T_a$$

- (ii). In some cases, the collection stream with the shorter time of concentration has the larger Q. Then the smaller Q is adjusted by a ratio of the T values.

$$Q_p = Q_b + Q_a (T_b/T_a); T_p = T_b$$

CHAPTER 2

METHODOLOGY – RATIONAL METHOD PEAK FLOWRATE DETERMINATION (ULTIMATE CONDITIONS)

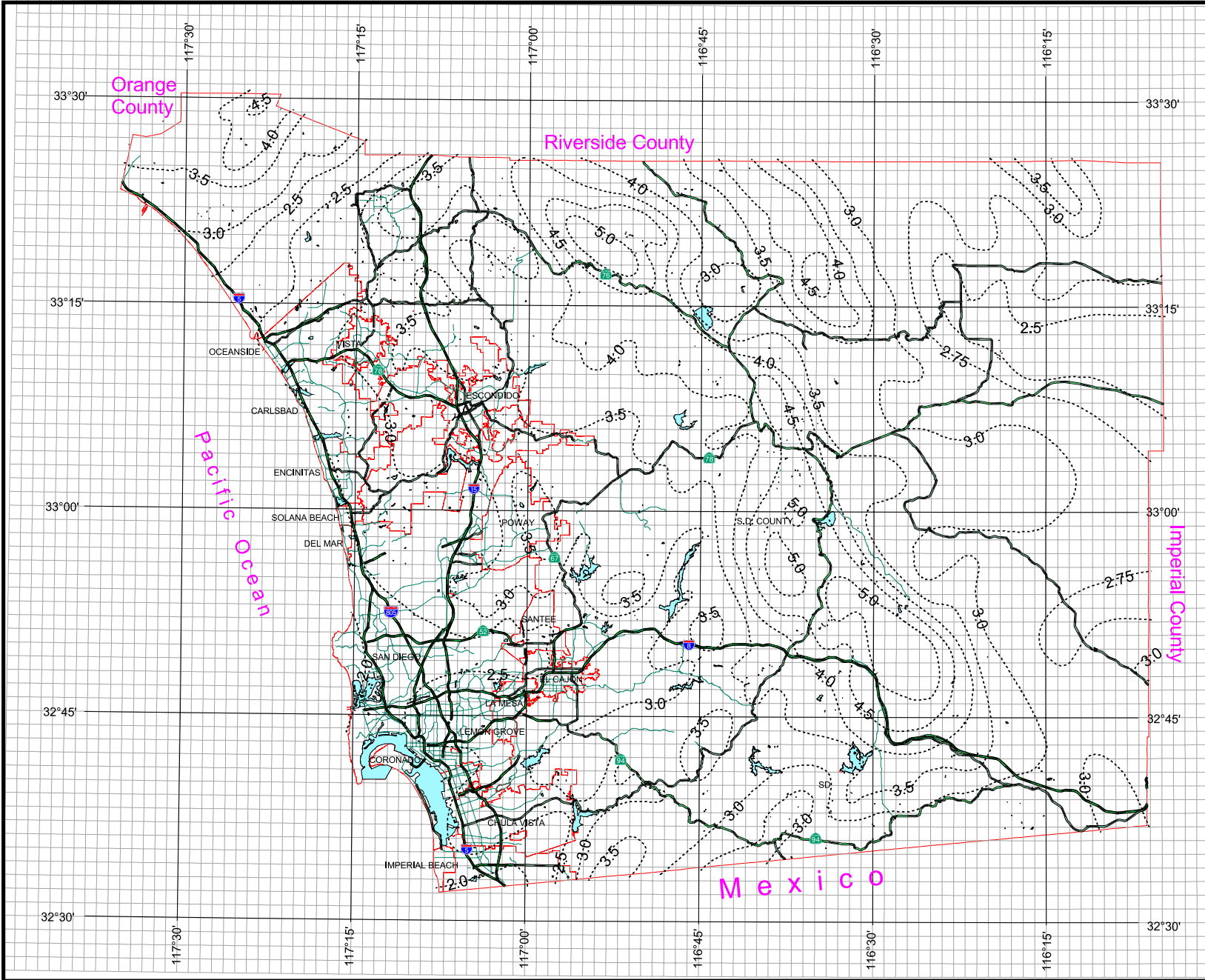
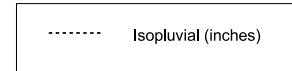
2.1 – 100-Year, 6-Hour Rainfall Isopluvial Map

County of San Diego Hydrology Manual



Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours



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CHAPTER 2

METHODOLOGY – RATIONAL METHOD PEAK FLOWRATE DETERMINATION (ULTIMATE CONDITIONS)

2.2 – Runoff Coefficient Determination

**Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS**

Land Use		Runoff Coefficient "C"				
		% IMPER.	Soil Type			
NRCS Elements	County Elements			A	B	C
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

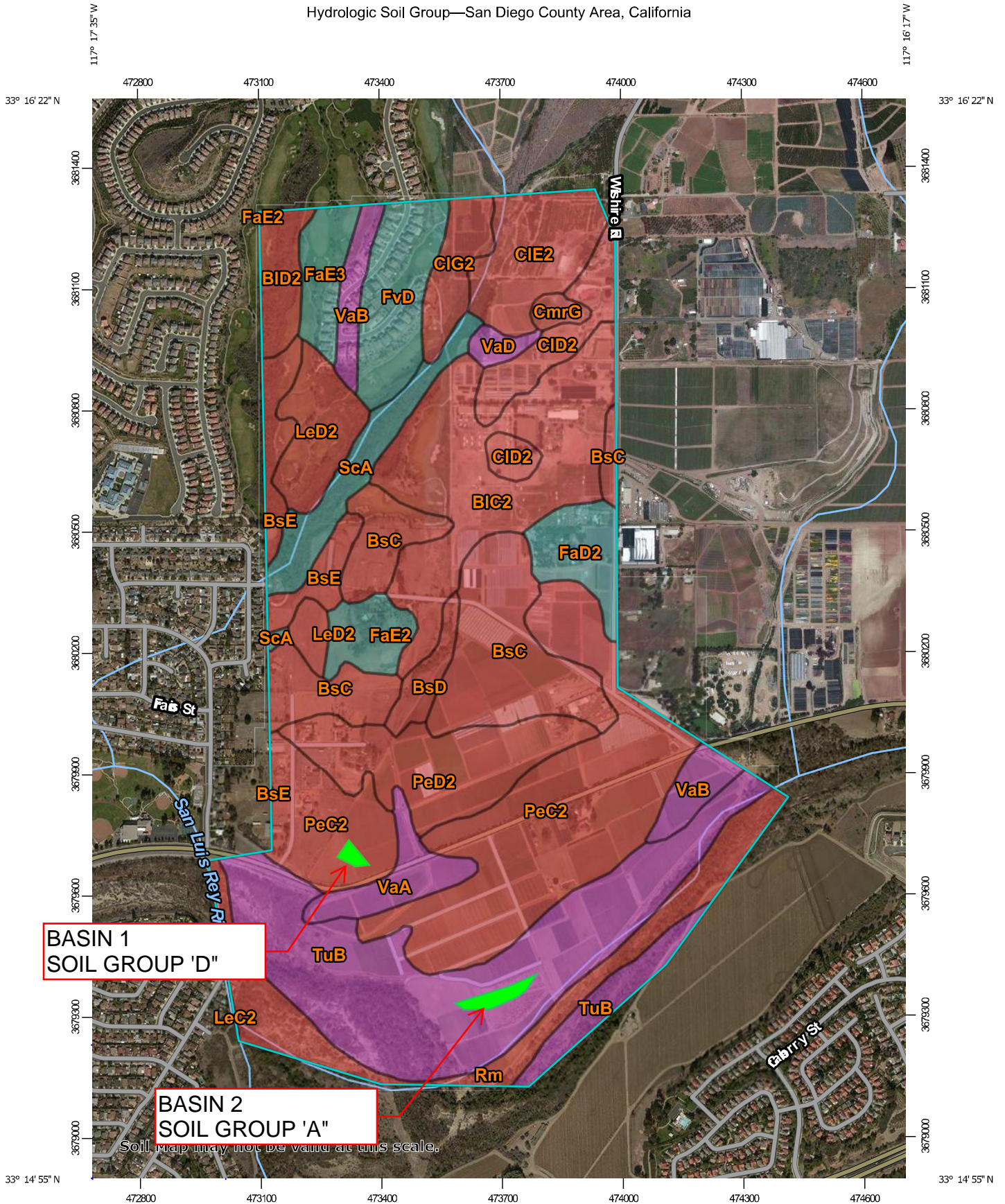
*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).

DU/A = dwelling units per acre

NRCS = National Resources Conservation Service

CHAPTER 3

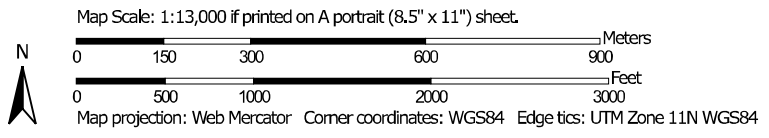
SOILS DATA



**BASIN 1
SOIL GROUP "D"**

**BASIN 2
SOIL GROUP "A"**

Soil map may not be valid at this scale.











MAP LEGEND









Area of Interest (AOI)
 Area of Interest (AOI)

Soils





Soil Rating Polygons

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points

-  A
-  A/D
-  B
-  B/D

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.












Soil Survey Area: San Diego County Area, California
 Survey Area Data: Version 10, Sep 12, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 3, 2010—Nov 22, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

MAP INFORMATION

-  C
 -  C/D
 -  D
 -  Not rated or not available
- Water Features**
-  Streams and Canals
- Transportation**
-  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads
- Background**
-  Aerial Photography

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BIC2	Bonsall sandy loam, 2 to 9 percent slopes, eroded	D	53.4	10.2%
BID2	Bonsall sandy loam, 9 to 15 percent slopes, eroded	D	8.7	1.7%
BsC	Bosanko clay, 2 to 9 percent slopes	D	53.5	10.3%
BsD	Bosanko clay, 9 to 15 percent slopes	D	5.5	1.1%
BsE	Bosanko clay, 15 to 30 percent slopes	D	13.0	2.5%
CID2	Cieneba coarse sandy loam, 5 to 15 percent slopes, eroded	D	14.6	2.8%
CIE2	Cieneba coarse sandy loam, 15 to 30 percent slopes, eroded	D	20.2	3.9%
CIG2	Cieneba coarse sandy loam, 30 to 65 percent slopes, eroded	D	9.8	1.9%
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	D	2.3	0.5%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	C	11.4	2.2%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	8.7	1.7%
FaE3	Fallbrook sandy loam, 9 to 30 percent slopes, severely eroded	C	9.3	1.8%
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes	C	19.2	3.7%
LeC2	Las Flores loamy fine sand, 5 to 9 percent slopes, eroded	D	0.1	0.0%
LeD2	Las Flores loamy fine sand, 9 to 15 percent slopes, eroded	D	17.3	3.3%
PeC2	Placentia sandy loam, 5 to 9 percent slopes, eroded	D	87.7	16.8%

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
PeD2	Placentia sandy loam, 9 to 15 percent slopes, eroded	D	29.6	5.7%
Rm	Riverwash	D	29.7	5.7%
ScA	Salinas clay, 0 to 2 percent slopes	C	15.2	2.9%
TuB	Tujunga sand, 0 to 5 percent slopes	A	86.7	16.6%
VaA	Visalia sandy loam, 0 to 2 percent slopes	A	10.4	2.0%
VaB	Visalia sandy loam, 2 to 5 percent slopes	A	12.2	2.3%
VaD	Visalia sandy loam, 9 to 15 percent slopes	A	2.8	0.5%
Totals for Area of Interest			521.4	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

CHAPTER 4

100 YEAR EXISTING CONDITIONS HYDROLOGY ANALYSIS

EX-100. OUT

SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC 11) = 82
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 94.00
 UPSTREAM ELEVATION(FEET) = 171.00
 DOWNSTREAM ELEVATION(FEET) = 169.00
 ELEVATION DIFFERENCE(FEET) = 2.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 9.003
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 86.91
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.958
 SUBAREA RUNOFF(CFS) = 0.28
 TOTAL AREA(ACRES) = 0.14 TOTAL RUNOFF(CFS) = 0.28

 FLOW PROCESS FROM NODE 112.00 TO NODE 100.00 IS CODE = 53

>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 169.00 DOWNSTREAM(FEET) = 118.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1276.00 CHANNEL SLOPE = 0.0400
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0400 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.28
 FLOW VELOCITY(FEET/SEC) = 1.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 19.00 Tc(MIN.) = 28.00
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 100.00 = 1370.00 FEET.

 FLOW PROCESS FROM NODE 112.00 TO NODE 100.00 IS CODE = 81

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

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.385
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC 11) = 82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
 SUBAREA AREA(ACRES) = 8.26 SUBAREA RUNOFF(CFS) = 8.08
 TOTAL AREA(ACRES) = 8.4 TOTAL RUNOFF(CFS) = 8.21
 TC(MIN.) = 28.00

 FLOW PROCESS FROM NODE 100.00 TO NODE 100.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 28.00
 RAINFALL INTENSITY(INCH/HR) = 2.39
 TOTAL STREAM AREA(ACRES) = 8.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.21

 FLOW PROCESS FROM NODE 120.00 TO NODE 122.00 IS CODE = 21

EX-100. OUT
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC 11) = 97
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 120.80
 DOWNSTREAM ELEVATION(FEET) = 120.60
 ELEVATION DIFFERENCE(FEET) = 0.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.688
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 50.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.246
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.57
 TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.57

 FLOW PROCESS FROM NODE 122.00 TO NODE 100.00 IS CODE = 62

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

 UPSTREAM ELEVATION(FEET) = 120.60 DOWNSTREAM ELEVATION(FEET) = 118.00
 STREET LENGTH(FEET) = 732.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

 **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.06
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.37
 HALFSTREET FLOOD WIDTH(FEET) = 11.84
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.43
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.53
 STREET FLOW TRAVEL TIME(MIN.) = 8.55 Tc(MIN.) = 12.24
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.068

GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC 11) = 97
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
 SUBAREA AREA(ACRES) = 0.81 SUBAREA RUNOFF(CFS) = 2.87
 TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 3.19

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.34
 FLOW VELOCITY(FEET/SEC.) = 1.57 DEPTH*VELOCITY(FT*FT/SEC.) = 0.66
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 100.00 = 832.00 FEET.

 FLOW PROCESS FROM NODE 100.00 TO NODE 100.00 IS CODE = 1

EX-100.OUT
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1777.00 CHANNEL SLOPE = 0.0149
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0149 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.75
 FLOW VELOCITY(FEET/SEC) = 0.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 43.31 Tc(MIN.) = 53.84
 LONGEST FLOWPATH FROM NODE 302.00 TO NODE 300.00 = 1877.00 FEET.

FLOW PROCESS FROM NODE 304.00 TO NODE 300.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.564
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S. C. S. CURVE NUMBER (AMC II) = 65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3220
 SUBAREA AREA(ACRES) = 17.62 SUBAREA RUNOFF(CFS) = 8.82
 TOTAL AREA(ACRES) = 18.0 TOTAL RUNOFF(CFS) = 9.08
 TC(MIN.) = 53.84

BEGIN 400 SERIES

FLOW PROCESS FROM NODE 402.00 TO NODE 404.00 IS CODE = 21

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

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC II) = 82
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 100.00
 DOWNSTREAM ELEVATION(FEET) = 99.00
 ELEVATION DIFFERENCE(FEET) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 10.391
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 70.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.520
 SUBAREA RUNOFF(CFS) = 1.19
 TOTAL AREA(ACRES) = 0.64 TOTAL RUNOFF(CFS) = 1.19

FLOW PROCESS FROM NODE 404.00 TO NODE 400.00 IS CODE = 53

>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM(FEET) = 99.00 DOWNSTREAM(FEET) = 84.10
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1207.00 CHANNEL SLOPE = 0.0123
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0123 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)

EX-100.OUT
 CHANNEL FLOW THRU SUBAREA(CFS) = 1.19
 FLOW VELOCITY(FEET/SEC) = 0.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 30.55 Tc(MIN.) = 40.94
 LONGEST FLOWPATH FROM NODE 402.00 TO NODE 400.00 = 1307.00 FEET.

FLOW PROCESS FROM NODE 404.00 TO NODE 400.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.867
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S. C. S. CURVE NUMBER (AMC II) = 65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3232
 SUBAREA AREA(ACRES) = 17.43 SUBAREA RUNOFF(CFS) = 10.41
 TOTAL AREA(ACRES) = 18.1 TOTAL RUNOFF(CFS) = 10.90
 TC(MIN.) = 40.94

BEGIN 500 SERIES

FLOW PROCESS FROM NODE 502.00 TO NODE 504.00 IS CODE = 21

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

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC II) = 82
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 354.00
 DOWNSTREAM ELEVATION(FEET) = 330.00
 ELEVATION DIFFERENCE(FEET) = 24.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.765
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10 %, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.610
 SUBAREA RUNOFF(CFS) = 2.03
 TOTAL AREA(ACRES) = 0.75 TOTAL RUNOFF(CFS) = 2.03

FLOW PROCESS FROM NODE 504.00 TO NODE 506.00 IS CODE = 53

>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM(FEET) = 330.00 DOWNSTREAM(FEET) = 155.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 472.00 CHANNEL SLOPE = 0.3708
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .2089 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) = 2.03
 FLOW VELOCITY(FEET/SEC) = 3.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 2.43 Tc(MIN.) = 8.19
 LONGEST FLOWPATH FROM NODE 502.00 TO NODE 506.00 = 572.00 FEET.

FLOW PROCESS FROM NODE 504.00 TO NODE 506.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.269
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 46.67 SUBAREA RUNOFF(CFS) = 100.83
TOTAL AREA(ACRES) = 47.4 TOTAL RUNOFF(CFS) = 102.45
TC(MIN.) = 8.19

*****
FLOW PROCESS FROM NODE 506.00 TO NODE 508.00 IS CODE = 53
-----
>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 155.00 DOWNSTREAM(FEET) = 118.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1613.00 CHANNEL SLOPE = 0.0229
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0229 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) = 102.45
FLOW VELOCITY(FEET/SEC) = 3.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 6.78 Tc(MIN.) = 14.98
LONGEST FLOWPATH FROM NODE 502.00 TO NODE 508.00 = 2185.00 FEET.

*****
FLOW PROCESS FROM NODE 506.00 TO NODE 508.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.571
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 49.29 SUBAREA RUNOFF(CFS) = 72.16
TOTAL AREA(ACRES) = 96.7 TOTAL RUNOFF(CFS) = 141.58
TC(MIN.) = 14.98

*****
FLOW PROCESS FROM NODE 508.00 TO NODE 522.00 IS CODE = 53
-----
>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 118.00 DOWNSTREAM(FEET) = 98.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1281.00 CHANNEL SLOPE = 0.0156
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0156 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) = 141.58
FLOW VELOCITY(FEET/SEC) = 3.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 5.86 Tc(MIN.) = 20.84
LONGEST FLOWPATH FROM NODE 502.00 TO NODE 522.00 = 3466.00 FEET.

*****
FLOW PROCESS FROM NODE 508.00 TO NODE 522.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.885
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 52.90 SUBAREA RUNOFF(CFS) = 62.58
TOTAL AREA(ACRES) = 149.6 TOTAL RUNOFF(CFS) = 176.99
TC(MIN.) = 20.84

*****
FLOW PROCESS FROM NODE 522.00 TO NODE 522.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 20.84
RAINFALL INTENSITY(INCH/HR) = 2.89
TOTAL STREAM AREA(ACRES) = 149.61
PEAK FLOW RATE(CFS) AT CONFLUENCE = 176.99

*****
FLOW PROCESS FROM NODE 120.00 TO NODE 520.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
-----
GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC II) = 97
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 120.80
DOWNSTREAM ELEVATION(FEET) = 120.00
ELEVATION DIFFERENCE(FEET) = 0.80
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.337
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 56.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.246
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.50
TOTAL AREA(ACRES) = 0.08 TOTAL RUNOFF(CFS) = 0.50

*****
FLOW PROCESS FROM NODE 520.00 TO NODE 522.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
-----
UPSTREAM ELEVATION(FEET) = 120.00 DOWNSTREAM ELEVATION(FEET) = 98.00
STREET LENGTH(FEET) = 1292.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

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EX-100.OUT

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.34
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.66
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.71
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.86
STREET FLOW TRAVEL TIME(MIN.) = 7.95 Tc(MIN.) = 11.28
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.286
GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC 11) = 97
AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 3.54
TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 3.84

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 11.05
FLOW VELOCITY(FEET/SEC.) = 2.99 DEPTH*VELOCITY(FT*FT/SEC.) = 1.08
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 522.00 = 1392.00 FEET.

FLOW PROCESS FROM NODE 522.00 TO NODE 522.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 11.28
RAINFALL INTENSITY(INCH/HR) = 4.29
TOTAL STREAM AREA(ACRES) = 1.03
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.84

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	176.99	20.84	2.885	149.61
2	3.84	11.28	4.286	1.03

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	99.67	11.28	4.286
2	179.58	20.84	2.885

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 179.58 Tc(MIN.) = 20.84
TOTAL AREA(ACRES) = 150.6
LONGEST FLOWPATH FROM NODE 502.00 TO NODE 522.00 = 3466.00 FEET.

FLOW PROCESS FROM NODE 522.00 TO NODE 500.00 IS CODE = 53

>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<

EX-100.OUT

>>>>TRAVELTIME THRU SUBAREA<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 98.00 DOWNSTREAM(FEET) = 90.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1490.00 CHANNEL SLOPE = 0.0054
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0054 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) = 179.58
FLOW VELOCITY(FEET/SEC) = 2.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 10.75 Tc(MIN.) = 31.59
LONGEST FLOWPATH FROM NODE 502.00 TO NODE 500.00 = 4956.00 FEET.

FLOW PROCESS FROM NODE 522.00 TO NODE 500.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.207
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC 11) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4127
SUBAREA AREA(ACRES) = 22.45 SUBAREA RUNOFF(CFS) = 20.31
TOTAL AREA(ACRES) = 173.1 TOTAL RUNOFF(CFS) = 179.58
TC(MIN.) = 31.59
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 500.00 TO NODE 500.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 31.59
RAINFALL INTENSITY(INCH/HR) = 2.21
TOTAL STREAM AREA(ACRES) = 173.09
PEAK FLOW RATE(CFS) AT CONFLUENCE = 179.58

FLOW PROCESS FROM NODE 530.00 TO NODE 532.00 IS CODE = 21

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

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC 11) = 82
INITIAL SUBAREA FLOW-LENGTH(FEET) = 95.00
UPSTREAM ELEVATION(FEET) = 130.00
DOWNSTREAM ELEVATION(FEET) = 126.50
ELEVATION DIFFERENCE(FEET) = 3.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.838
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.422
SUBAREA RUNOFF(CFS) = 0.53
TOTAL AREA(ACRES) = 0.24 TOTAL RUNOFF(CFS) = 0.53

FLOW PROCESS FROM NODE 532.00 TO NODE 534.00 IS CODE = 53

>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<

EX-100. OUT

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=====
ELEVATION DATA: UPSTREAM(FEET) = 126.50 DOWNSTREAM(FEET) = 105.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 771.00 CHANNEL SLOPE = 0.0279
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0279 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) = 0.53
FLOW VELOCITY(FEET/SEC) = 0.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 13.74 Tc(MIN.) = 21.58
LONGEST FLOWPATH FROM NODE 530.00 TO NODE 534.00 = 866.00 FEET.

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*****
FLOW PROCESS FROM NODE 532.00 TO NODE 534.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.821
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 6.20 SUBAREA RUNOFF(CFS) = 7.17
TOTAL AREA(ACRES) = 6.4 TOTAL RUNOFF(CFS) = 7.45
TC(MIN.) = 21.58

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*****
FLOW PROCESS FROM NODE 534.00 TO NODE 500.00 IS CODE = 53

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-----
>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<
-----

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ELEVATION DATA: UPSTREAM(FEET) = 105.00 DOWNSTREAM(FEET) = 90.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 283.00 CHANNEL SLOPE = 0.0530
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0530 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) = 7.45
FLOW VELOCITY(FEET/SEC) = 2.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 1.87 Tc(MIN.) = 23.45
LONGEST FLOWPATH FROM NODE 530.00 TO NODE 500.00 = 1149.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 500.00 TO NODE 500.00 IS CODE = 1

```

```

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

```

```

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 23.45
RAINFALL INTENSITY(INCH/HR) = 2.67
TOTAL STREAM AREA(ACRES) = 6.44
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.45

```

```

** CONFLUENCE DATA **
STREAM   RUNOFF      Tc      INTENSITY      AREA
NUMBER   (CFS)       (MIN.)  (INCH/HOUR)    (ACRE)
1        179.58      31.59   2.207          173.09
2         7.45       23.45   2.674           6.44

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

EX-100. OUT

CONFLUENCE FORMULA USED FOR 2 STREAMS.

```

** PEAK FLOW RATE TABLE **
STREAM   RUNOFF      Tc      INTENSITY
NUMBER   (CFS)       (MIN.)  (INCH/HOUR)
1        155.65      23.45   2.674
2        185.73      31.59   2.207

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 185.73 Tc(MIN.) = 31.59
TOTAL AREA(ACRES) = 179.5
LONGEST FLOWPATH FROM NODE 502.00 TO NODE 500.00 = 4956.00 FEET.

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-----
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 179.5 TC(MIN.) = 31.59
PEAK FLOW RATE(CFS) = 185.73
-----

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END OF RATIONAL METHOD ANALYSIS



CHAPTER 5

100 YEAR DEVELOPED CONDITIONS HYDROLOGY ANALYSIS


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PR-100. OUT
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 19.15
RAINFALL INTENSITY(INCH/HR) = 3.05
TOTAL STREAM AREA(ACRES) = 3.35
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.89
*****
FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC II) = 82
INITIAL SUBAREA FLOW-LENGTH(FEET) = 81.00
UPSTREAM ELEVATION(FEET) = 171.00
DOWNSTREAM ELEVATION(FEET) = 169.00
ELEVATION DIFFERENCE(FEET) = 2.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 8.270
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.237
SUBAREA RUNOFF(CFS) = 0.24
TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.24
*****
FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 53
-----
>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 169.00 DOWNSTREAM(FEET) = 118.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 715.10 CHANNEL SLOPE = 0.0713
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0713 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) = 0.24
FLOW VELOCITY(FEET/SEC) = 1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 7.97 Tc(MIN.) = 16.24
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 112.00 = 796.10 FEET.
*****
FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.389
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 3.20 SUBAREA RUNOFF(CFS) = 4.45
TOTAL AREA(ACRES) = 3.3 TOTAL RUNOFF(CFS) = 4.60
TC(MIN.) = 16.24
*****
FLOW PROCESS FROM NODE 112.00 TO NODE 100.00 IS CODE = 31
-----

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PR-100. OUT
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 118.00 DOWNSTREAM(FEET) = 108.00
FLOW LENGTH(FEET) = 168.48 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.77
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.60
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 16.50
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 100.00 = 964.58 FEET.
*****
FLOW PROCESS FROM NODE 100.00 TO NODE 100.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 16.50
RAINFALL INTENSITY(INCH/HR) = 3.35
TOTAL STREAM AREA(ACRES) = 3.31
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.60
*****
FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC II) = 94
INITIAL SUBAREA FLOW-LENGTH(FEET) = 203.00
UPSTREAM ELEVATION(FEET) = 121.00
DOWNSTREAM ELEVATION(FEET) = 120.70
ELEVATION DIFFERENCE(FEET) = 0.30
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.971
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 50.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.246
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 3.15
TOTAL AREA(ACRES) = 0.55 TOTAL RUNOFF(CFS) = 3.15
*****
FLOW PROCESS FROM NODE 123.00 TO NODE 100.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
UPSTREAM ELEVATION(FEET) = 120.70 DOWNSTREAM ELEVATION(FEET) = 108.00
STREET LENGTH(FEET) = 810.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00
*****
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018

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PR-100. OUT
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.78
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.35
 HALFSTREET FLOOD WIDTH(FEET) = 10.59
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.84
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.00
 STREET FLOW TRAVEL TIME(MIN.) = 4.75 Tc(MIN.) = 9.73
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.718
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC II) = 94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.790
 SUBAREA AREA(ACRES) = 1.92 SUBAREA RUNOFF(CFS) = 7.16
 TOTAL AREA(ACRES) = 2.5 PEAK FLOW RATE(CFS) = 9.21

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38 HALFSTREET FLOOD WIDTH(FEET) = 12.23
 FLOW VELOCITY(FEET/SEC.) = 3.01 DEPTH*VELOCITY(FT*FT/SEC.) = 1.15
 LONGEST FLOWPATH FROM NODE 122.00 TO NODE 100.00 = 1013.00 FEET.

 FLOW PROCESS FROM NODE 100.00 TO NODE 100.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.73
 RAINFALL INTENSITY(INCH/HR) = 4.72
 TOTAL STREAM AREA(ACRES) = 2.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.21

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	7.89	19.15	3.047	3.35
2	4.60	16.50	3.354	3.31
3	9.21	9.73	4.718	2.47

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	15.92	9.73	4.718
2	17.94	16.50	3.354
3	18.01	19.15	3.047

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 18.01 Tc(MIN.) = 19.15

PR-100. OUT
 TOTAL AREA(ACRES) = 9.1
 LONGEST FLOWPATH FROM NODE 102.00 TO NODE 100.00 = 2531.00 FEET.

 FLOW PROCESS FROM NODE 100.00 TO NODE 200.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 108.00 DOWNSTREAM(FEET) = 102.80
 FLOW LENGTH(FEET) = 1781.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.92
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 18.01
 PIPE TRAVEL TIME(MIN.) = 6.03 Tc(MIN.) = 25.18
 LONGEST FLOWPATH FROM NODE 102.00 TO NODE 200.00 = 4312.00 FEET.

 FLOW PROCESS FROM NODE 200.00 TO NODE 200.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 25.18
 RAINFALL INTENSITY(INCH/HR) = 2.55
 TOTAL STREAM AREA(ACRES) = 9.13
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.01

BEGIN 200 SERIES

 FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 21

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

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .2700
 SOIL CLASSIFICATION IS "A"
 S. C. S. CURVE NUMBER (AMC II) = 45
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 92.00
 UPSTREAM ELEVATION(FEET) = 116.60
 DOWNSTREAM ELEVATION(FEET) = 113.60
 ELEVATION DIFFERENCE(FEET) = 3.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 9.664
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.737
 SUBAREA RUNOFF(CFS) = 0.58
 TOTAL AREA(ACRES) = 0.45 TOTAL RUNOFF(CFS) = 0.58

 FLOW PROCESS FROM NODE 204.00 TO NODE 200.00 IS CODE = 53

 >>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<<

PR-100. OUT

ELEVATION DATA: UPSTREAM(FEET) = 113.60 DOWNSTREAM(FEET) = 96.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1261.00 CHANNEL SLOPE = 0.0140
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0140 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.58
 FLOW VELOCITY(FEET/SEC) = 0.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 31.77 Tc(MIN.) = 41.43
 LONGEST FLOWPATH FROM NODE 202.00 TO NODE 200.00 = 1353.00 FEET.

 FLOW PROCESS FROM NODE 204.00 TO NODE 200.00 IS CODE = 81

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

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.852
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S. C. S. CURVE NUMBER (AMC II) = 65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3149
 SUBAREA AREA(ACRES) = 3.94 SUBAREA RUNOFF(CFS) = 2.34
 TOTAL AREA(ACRES) = 4.4 TOTAL RUNOFF(CFS) = 2.56
 TC(MIN.) = 41.43

 FLOW PROCESS FROM NODE 200.00 TO NODE 200.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 41.43
 RAINFALL INTENSITY(INCH/HR) = 1.85
 TOTAL STREAM AREA(ACRES) = 4.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.56

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	18.01	25.18	2.554	9.13
2	2.56	41.43	1.852	4.39

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	19.57	25.18	2.554
2	15.63	41.43	1.852

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 19.57 Tc(MIN.) = 25.18
 TOTAL AREA(ACRES) = 13.5
 LONGEST FLOWPATH FROM NODE 102.00 TO NODE 200.00 = 4312.00 FEET.

PR-100. OUT

BEGIN 300 SERIES

 FLOW PROCESS FROM NODE 302.00 TO NODE 304.00 IS CODE = 21

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

 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC II) = 82
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 120.30
 DOWNSTREAM ELEVATION(FEET) = 119.50
 ELEVATION DIFFERENCE(FEET) = 0.80
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 10.535
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 62.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.480
 SUBAREA RUNOFF(CFS) = 0.75
 TOTAL AREA(ACRES) = 0.41 TOTAL RUNOFF(CFS) = 0.75

 FLOW PROCESS FROM NODE 304.00 TO NODE 300.00 IS CODE = 53

>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 119.50 DOWNSTREAM(FEET) = 93.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1777.00 CHANNEL SLOPE = 0.0149
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0149 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.75
 FLOW VELOCITY(FEET/SEC) = 0.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 43.31 Tc(MIN.) = 53.84
 LONGEST FLOWPATH FROM NODE 302.00 TO NODE 300.00 = 1877.00 FEET.

 FLOW PROCESS FROM NODE 304.00 TO NODE 300.00 IS CODE = 81

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

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.564
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 SOIL CLASSIFICATION IS "B"
 S. C. S. CURVE NUMBER (AMC II) = 65
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3225
 SUBAREA AREA(ACRES) = 14.62 SUBAREA RUNOFF(CFS) = 7.32
 TOTAL AREA(ACRES) = 15.0 TOTAL RUNOFF(CFS) = 7.58
 TC(MIN.) = 53.84

 BEGIN 500 SERIES

PR-100. OUT

-----+-----

FLOW PROCESS FROM NODE 502.00 TO NODE 504.00 IS CODE = 21

-----+-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC 11) = 82
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 354.00
DOWNSTREAM ELEVATION(FEET) = 330.00
ELEVATION DIFFERENCE(FEET) = 24.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.765
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.610
SUBAREA RUNOFF(CFS) = 2.03
TOTAL AREA(ACRES) = 0.75 TOTAL RUNOFF(CFS) = 2.03

FLOW PROCESS FROM NODE 504.00 TO NODE 506.00 IS CODE = 53

-----+-----
>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 330.00 DOWNSTREAM(FEET) = 155.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 472.00 CHANNEL SLOPE = 0.3708
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2089 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) = 2.03
FLOW VELOCITY(FEET/SEC) = 3.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 2.43 Tc(MIN.) = 8.19
LONGEST FLOWPATH FROM NODE 502.00 TO NODE 506.00 = 572.00 FEET.

FLOW PROCESS FROM NODE 504.00 TO NODE 506.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.269
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC 11) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 46.67 SUBAREA RUNOFF(CFS) = 100.83
TOTAL AREA(ACRES) = 47.4 TOTAL RUNOFF(CFS) = 102.45
TC(MIN.) = 8.19

FLOW PROCESS FROM NODE 506.00 TO NODE 508.00 IS CODE = 53

-----+-----
>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 155.00 DOWNSTREAM(FEET) = 118.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1613.00 CHANNEL SLOPE = 0.0229
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0229 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)

PR-100. OUT

CHANNEL FLOW THRU SUBAREA(CFS) = 102.45
FLOW VELOCITY(FEET/SEC) = 3.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 6.78 Tc(MIN.) = 14.98
LONGEST FLOWPATH FROM NODE 502.00 TO NODE 508.00 = 2185.00 FEET.

FLOW PROCESS FROM NODE 506.00 TO NODE 508.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.571
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC 11) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 15.25 SUBAREA RUNOFF(CFS) = 22.33
TOTAL AREA(ACRES) = 62.7 TOTAL RUNOFF(CFS) = 102.45
TC(MIN.) = 14.98
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 508.00 TO NODE 534.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 115.00 DOWNSTREAM(FEET) = 97.50
FLOW LENGTH(FEET) = 1015.55 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.51
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 102.45
PIPE TRAVEL TIME(MIN.) = 1.17 Tc(MIN.) = 16.14
LONGEST FLOWPATH FROM NODE 502.00 TO NODE 534.00 = 3200.55 FEET.

FLOW PROCESS FROM NODE 534.00 TO NODE 534.00 IS CODE = 1

-----+-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 16.14
RAINFALL INTENSITY(INCH/HR) = 3.40
TOTAL STREAM AREA(ACRES) = 62.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 102.45

FLOW PROCESS FROM NODE 1004.00 TO NODE 534.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 98.50 DOWNSTREAM(FEET) = 97.50
FLOW LENGTH(FEET) = 71.40 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.62
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 102.45

PR-100. OUT
 PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 16.23
 LONGEST FLOWPATH FROM NODE 202.00 TO NODE 534.00 = 1424.40 FEET.

 FLOW PROCESS FROM NODE 534.00 TO NODE 534.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 16.23
 RAINFALL INTENSITY(INCH/HR) = 3.39
 TOTAL STREAM AREA(ACRES) = 62.67
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 102.45

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	102.45	16.14	3.402	62.67
2	102.45	16.23	3.390	62.67

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	204.34	16.14	3.402
2	204.54	16.23	3.390

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 204.54 Tc(MIN.) = 16.23
 TOTAL AREA(ACRES) = 125.3
 LONGEST FLOWPATH FROM NODE 502.00 TO NODE 534.00 = 3200.55 FEET.

 FLOW PROCESS FROM NODE 534.00 TO NODE 539.00 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(FEET) = 97.50 DOWNSTREAM(FEET) = 95.50
 FLOW LENGTH(FEET) = 830.64 MANNING'S N = 0.013
 DEPTH OF FLOW IN 75.0 INCH PIPE IS 55.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.34
 ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 204.54
 PIPE TRAVEL TIME(MIN.) = 1.66 Tc(MIN.) = 17.89
 LONGEST FLOWPATH FROM NODE 502.00 TO NODE 539.00 = 4031.19 FEET.

 FLOW PROCESS FROM NODE 539.00 TO NODE 539.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 5
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 17.89

PR-100. OUT
 RAINFALL INTENSITY(INCH/HR) = 3.18
 TOTAL STREAM AREA(ACRES) = 125.34
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 204.54

 FLOW PROCESS FROM NODE 530.00 TO NODE 532.00 IS CODE = 21

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

 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) = 94
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 95.00
 UPSTREAM ELEVATION(FEET) = 130.00
 DOWNSTREAM ELEVATION(FEET) = 126.50
 ELEVATION DIFFERENCE(FEET) = 3.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.397
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 88.42
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.246
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 1.37
 TOTAL AREA(ACRES) = 0.24 TOTAL RUNOFF(CFS) = 1.37

 FLOW PROCESS FROM NODE 532.00 TO NODE 535.00 IS CODE = 53

 >>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 126.50 DOWNSTREAM(FEET) = 106.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 650.00 CHANNEL SLOPE = 0.0315
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0315 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) = 1.37
 FLOW VELOCITY(FEET/SEC) = 1.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 9.80 Tc(MIN.) = 13.20
 LONGEST FLOWPATH FROM NODE 530.00 TO NODE 535.00 = 745.00 FEET.

 FLOW PROCESS FROM NODE 532.00 TO NODE 535.00 IS CODE = 81

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

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.874
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) = 82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4435
 SUBAREA AREA(ACRES) = 2.48 SUBAREA RUNOFF(CFS) = 3.94
 TOTAL AREA(ACRES) = 2.7 TOTAL RUNOFF(CFS) = 4.67
 TC(MIN.) = 13.20

 FLOW PROCESS FROM NODE 535.00 TO NODE 539.00 IS CODE = 31

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

PR-100. OUT

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

ELEVATION DATA: UPSTREAM(FEET) = 106.00 DOWNSTREAM(FEET) = 95.50
FLOW LENGTH(FEET) = 737.72 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.45
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.67
PIPE TRAVEL TIME(MIN.) = 1.91 Tc(MIN.) = 15.10
LONGEST FLOWPATH FROM NODE 530.00 TO NODE 539.00 = 1482.72 FEET.

FLOW PROCESS FROM NODE 539.00 TO NODE 539.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 5
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.10
RAINFALL INTENSITY(INCH/HR) = 3.55
TOTAL STREAM AREA(ACRES) = 2.72
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.67

FLOW PROCESS FROM NODE 535.00 TO NODE 536.00 IS CODE = 21

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

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC II) = 82
INITIAL SUBAREA FLOW-LENGTH(FEET) = 60.00
UPSTREAM ELEVATION(FEET) = 106.00
DOWNSTREAM ELEVATION(FEET) = 103.00
ELEVATION DIFFERENCE(FEET) = 3.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.626
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.714
SUBAREA RUNOFF(CFS) = 0.28
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.28

FLOW PROCESS FROM NODE 535.00 TO NODE 536.00 IS CODE = 53

>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM(FEET) = 106.00 DOWNSTREAM(FEET) = 103.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 509.00 CHANNEL SLOPE = 0.0059
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0059 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) = 0.28
FLOW VELOCITY(FEET/SEC) = 0.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 19.73 Tc(MIN.) = 25.36
LONGEST FLOWPATH FROM NODE 535.00 TO NODE 536.00 = 569.00 FEET.

FLOW PROCESS FROM NODE 535.00 TO NODE 536.00 IS CODE = 81

PR-100. OUT

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.542
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 0.64 SUBAREA RUNOFF(CFS) = 0.67
TOTAL AREA(ACRES) = 0.7 TOTAL RUNOFF(CFS) = 0.77
TC(MIN.) = 25.36

FLOW PROCESS FROM NODE 536.00 TO NODE 539.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 103.00 DOWNSTREAM(FEET) = 95.50
FLOW LENGTH(FEET) = 222.24 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.25
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.77
PIPE TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 26.06
LONGEST FLOWPATH FROM NODE 535.00 TO NODE 539.00 = 791.24 FEET.

FLOW PROCESS FROM NODE 539.00 TO NODE 539.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 5
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 26.06
RAINFALL INTENSITY(INCH/HR) = 2.50
TOTAL STREAM AREA(ACRES) = 0.74
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.77

FLOW PROCESS FROM NODE 540.00 TO NODE 541.00 IS CODE = 21

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

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S. C. S. CURVE NUMBER (AMC II) = 82
INITIAL SUBAREA FLOW-LENGTH(FEET) = 140.14
UPSTREAM ELEVATION(FEET) = 118.60
DOWNSTREAM ELEVATION(FEET) = 116.00
ELEVATION DIFFERENCE(FEET) = 2.60
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 9.199
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 82.83
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.890
SUBAREA RUNOFF(CFS) = 0.42

PR-100. OUT
 TOTAL AREA(ACRES) = 0.21 TOTAL RUNOFF(CFS) = 0.42

 FLOW PROCESS FROM NODE 541.00 TO NODE 537.00 IS CODE = 53

>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 116.00 DOWNSTREAM(FEET) = 104.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 727.48 CHANNEL SLOPE = 0.0165
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0165 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.42
 FLOW VELOCITY(FEET/SEC) = 0.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 16.86 Tc(MIN.) = 26.06
 LONGEST FLOWPATH FROM NODE 540.00 TO NODE 537.00 = 867.62 FEET.

 FLOW PROCESS FROM NODE 537.00 TO NODE 541.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.498
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC II) = 82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
 SUBAREA AREA(ACRES) = 3.89 SUBAREA RUNOFF(CFS) = 3.98
 TOTAL AREA(ACRES) = 4.1 TOTAL RUNOFF(CFS) = 4.20
 TC(MIN.) = 26.06

 FLOW PROCESS FROM NODE 537.00 TO NODE 539.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 104.00 DOWNSTREAM(FEET) = 95.50
 FLOW LENGTH(FEET) = 252.47 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.57
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.20
 PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 26.55
 LONGEST FLOWPATH FROM NODE 540.00 TO NODE 539.00 = 1120.09 FEET.

 FLOW PROCESS FROM NODE 539.00 TO NODE 539.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 5
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 4 ARE:
 TIME OF CONCENTRATION(MIN.) = 26.55
 RAINFALL INTENSITY(INCH/HR) = 2.47
 TOTAL STREAM AREA(ACRES) = 4.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.20

PR-100. OUT

 FLOW PROCESS FROM NODE 542.00 TO NODE 538.00 IS CODE = 21

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

=====

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC II) = 82
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 539.60
 UPSTREAM ELEVATION(FEET) = 104.00
 DOWNSTREAM ELEVATION(FEET) = 103.00
 ELEVATION DIFFERENCE(FEET) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 11.065
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 50.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.341
 SUBAREA RUNOFF(CFS) = 1.14
 TOTAL AREA(ACRES) = 0.64 TOTAL RUNOFF(CFS) = 1.14

 FLOW PROCESS FROM NODE 538.00 TO NODE 539.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 103.00 DOWNSTREAM(FEET) = 95.50
 FLOW LENGTH(FEET) = 1323.17 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.12
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.14
 PIPE TRAVEL TIME(MIN.) = 7.07 Tc(MIN.) = 18.14
 LONGEST FLOWPATH FROM NODE 542.00 TO NODE 539.00 = 1862.77 FEET.

 FLOW PROCESS FROM NODE 539.00 TO NODE 539.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 5
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 5 ARE:
 TIME OF CONCENTRATION(MIN.) = 18.14
 RAINFALL INTENSITY(INCH/HR) = 3.16
 TOTAL STREAM AREA(ACRES) = 0.64
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.14

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	204.54	17.89	3.184	125.34
2	4.67	15.10	3.551	2.72
3	0.77	26.06	2.498	0.74
4	4.20	26.55	2.468	4.10
5	1.14	18.14	3.156	0.64

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 5 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	191.83	15.10	3.551
2	213.21	17.89	3.184
3	211.46	18.14	3.156
4	169.55	26.06	2.498
5	167.67	26.55	2.468

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 213.21 Tc(MIN.) = 17.89
TOTAL AREA(ACRES) = 133.5
LONGEST FLOWPATH FROM NODE 502.00 TO NODE 539.00 = 4031.19 FEET.

FLOW PROCESS FROM NODE 539.00 TO NODE 546.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 17.89
RAINFALL INTENSITY(INCH/HR) = 3.18
TOTAL STREAM AREA(ACRES) = 133.54
PEAK FLOW RATE(CFS) AT CONFLUENCE = 213.21

FLOW PROCESS FROM NODE 120.00 TO NODE 520.00 IS CODE = 21

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

=====

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 82
INITIAL SUBAREA FLOW-LENGTH(FEET) = 472.00
UPSTREAM ELEVATION(FEET) = 121.30
DOWNSTREAM ELEVATION(FEET) = 118.60
ELEVATION DIFFERENCE(FEET) = 2.70
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 10.880
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 52.88
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.388
SUBAREA RUNOFF(CFS) = 1.37
TOTAL AREA(ACRES) = 0.76 TOTAL RUNOFF(CFS) = 1.37

FLOW PROCESS FROM NODE 520.00 TO NODE 545.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.388
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
SOIL CLASSIFICATION IS "D"

S.C.S. CURVE NUMBER (AMC II) = 94
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7545
SUBAREA AREA(ACRES) = 7.38 SUBAREA RUNOFF(CFS) = 25.58
TOTAL AREA(ACRES) = 8.1 TOTAL RUNOFF(CFS) = 26.95
Tc(MIN.) = 10.88

FLOW PROCESS FROM NODE 520.00 TO NODE 545.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 188.60 DOWNSTREAM(FEET) = 95.00
FLOW LENGTH(FEET) = 1173.95 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.58
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.95
PIPE TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 11.93
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 545.00 = 1645.95 FEET.

FLOW PROCESS FROM NODE 545.00 TO NODE 545.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 11.93
RAINFALL INTENSITY(INCH/HR) = 4.13
TOTAL STREAM AREA(ACRES) = 8.14
PEAK FLOW RATE(CFS) AT CONFLUENCE = 26.95

FLOW PROCESS FROM NODE 543.00 TO NODE 544.00 IS CODE = 21

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

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RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 82
INITIAL SUBAREA FLOW-LENGTH(FEET) = 686.00
UPSTREAM ELEVATION(FEET) = 104.00
DOWNSTREAM ELEVATION(FEET) = 100.00
ELEVATION DIFFERENCE(FEET) = 4.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 10.856
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 53.32
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.394
SUBAREA RUNOFF(CFS) = 1.80
TOTAL AREA(ACRES) = 1.00 TOTAL RUNOFF(CFS) = 1.80

FLOW PROCESS FROM NODE 544.00 TO NODE 545.00 IS CODE = 31

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

PR-100. OUT

ELEVATION DATA: UPSTREAM(FEET) = 100.00 DOWNSTREAM(FEET) = 95.00
FLOW LENGTH(FEET) = 80.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.35
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.80
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 11.02
LONGEST FLOWPATH FROM NODE 543.00 TO NODE 545.00 = 766.00 FEET.

FLOW PROCESS FROM NODE 545.00 TO NODE 546.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 11.02
RAINFALL INTENSITY(INCH/HR) = 4.35
TOTAL STREAM AREA(ACRES) = 1.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.80

** CONFLUENCE DATA **
Table with 5 columns: STREAM NUMBER, RUNOFF (CFS), Tc (MIN.), INTENSITY (INCH/HOUR), AREA (ACRE). Rows 1-3.

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **
Table with 5 columns: STREAM NUMBER, RUNOFF (CFS), Tc (MIN.), INTENSITY (INCH/HOUR). Rows 1-3.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 235.29 Tc(MIN.) = 17.89
TOTAL AREA(ACRES) = 142.7
LONGEST FLOWPATH FROM NODE 502.00 TO NODE 546.00 = 4031.19 FEET.

FLOW PROCESS FROM NODE 546.00 TO NODE 400.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 94.50 DOWNSTREAM(FEET) = 88.00
FLOW LENGTH(FEET) = 1400.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 53.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.99
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 235.29
PIPE TRAVEL TIME(MIN.) = 2.12 Tc(MIN.) = 20.01

PR-100. OUT

LONGEST FLOWPATH FROM NODE 502.00 TO NODE 400.00 = 5431.19 FEET.

FLOW PROCESS FROM NODE 400.00 TO NODE 400.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 1001.00 TO NODE 1002.00 IS CODE = 21

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

NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 94
INITIAL SUBAREA FLOW-LENGTH(FEET) = 487.32
UPSTREAM ELEVATION(FEET) = 216.40
DOWNSTREAM ELEVATION(FEET) = 213.50
ELEVATION DIFFERENCE(FEET) = 2.90
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.779
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 51.90
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.246
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 6.64
TOTAL AREA(ACRES) = 1.16 TOTAL RUNOFF(CFS) = 6.64

FLOW PROCESS FROM NODE 1002.00 TO NODE 1003.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 213.50 DOWNSTREAM ELEVATION(FEET) = 139.00
STREET LENGTH(FEET) = 2226.40 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET 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) = 82.36
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.62
HALFSTREET FLOOD WIDTH(FEET) = 25.59
AVERAGE FLOW VELOCITY(FEET/SEC.) = 6.82
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 4.22
STREET FLOW TRAVEL TIME(MIN.) = 5.44 Tc(MIN.) = 10.22
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.568
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
SOIL CLASSIFICATION IS "D"

PR-100. OUT

S. C. S. CURVE NUMBER (AMC 11) = 94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.790
 SUBAREA AREA(ACRES) = 40.63 SUBAREA RUNOFF(CFS) = 146.63
 TOTAL AREA(ACRES) = 41.8 PEAK FLOW RATE(CFS) = 150.82

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.73 HALFSTREET FLOOD WIDTH(FEET) = 33.26
 FLOW VELOCITY(FEET/SEC.) = 8.07 DEPTH*VELOCITY(FT*FT/SEC.) = 5.91
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
 AND L = 2226.4 FT WITH ELEVATION-DROP = 74.5 FT, IS 232.6 CFS,
 WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 1003.00
 LONGEST FLOWPATH FROM NODE 1001.00 TO NODE 1003.00 = 2713.72 FEET.

 FLOW PROCESS FROM NODE 1003.00 TO NODE 1004.00 IS CODE = 62

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

 UPSTREAM ELEVATION(FEET) = 139.00 DOWNSTREAM ELEVATION(FEET) = 98.50
 STREET LENGTH(FEET) = 1769.58 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 191.85
 STREET FLOWING FULL
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.82
 HALFSTREET FLOOD WIDTH(FEET) = 37.72
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 7.67
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 6.30
 STREET FLOW TRAVEL TIME(MIN.) = 3.85 Tc(MIN.) = 14.07
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.718
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC 11) = 94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.790
 SUBAREA AREA(ACRES) = 27.87 SUBAREA RUNOFF(CFS) = 81.86
 TOTAL AREA(ACRES) = 69.7 PEAK FLOW RATE(CFS) = 204.61

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.84 HALFSTREET FLOOD WIDTH(FEET) = 38.45
 FLOW VELOCITY(FEET/SEC.) = 7.83 DEPTH*VELOCITY(FT*FT/SEC.) = 6.54
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
 AND L = 1769.6 FT WITH ELEVATION-DROP = 40.5 FT, IS 159.5 CFS,
 WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 1004.00
 LONGEST FLOWPATH FROM NODE 1001.00 TO NODE 1004.00 = 4483.30 FEET.

 FLOW PROCESS FROM NODE 1004.00 TO NODE 534.00 IS CODE = 1

PR-100. OUT

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 14.07
 RAINFALL INTENSITY(INCH/HR) = 3.72
 TOTAL STREAM AREA(ACRES) = 69.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 204.61

 FLOW PROCESS FROM NODE 2001.00 TO NODE 2002.00 IS CODE = 21

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

 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC 11) = 94
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 168.90
 UPSTREAM ELEVATION(FEET) = 141.40
 DOWNSTREAM ELEVATION(FEET) = 138.00
 ELEVATION DIFFERENCE(FEET) = 3.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.831
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 75.13
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.246
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 1.37
 TOTAL AREA(ACRES) = 0.24 TOTAL RUNOFF(CFS) = 1.37

 FLOW PROCESS FROM NODE 2002.00 TO NODE 2003.00 IS CODE = 62

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

 UPSTREAM ELEVATION(FEET) = 138.00 DOWNSTREAM ELEVATION(FEET) = 118.50
 STREET LENGTH(FEET) = 1142.58 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 38.84
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.55
 HALFSTREET FLOOD WIDTH(FEET) = 21.76
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.39
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.42
 STREET FLOW TRAVEL TIME(MIN.) = 4.34 Tc(MIN.) = 8.17
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.280
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900

PR-100. OUT
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC 11) = 94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.790
 SUBAREA AREA(ACRES) = 17.55 SUBAREA RUNOFF(CFS) = 73.21
 TOTAL AREA(ACRES) = 17.8 PEAK FLOW RATE(CFS) = 74.21

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.66 HALFSTREET FLOOD WIDTH(FEET) = 28.01
 FLOW VELOCITY(FEET/SEC.) = 5.15 DEPTH*VELOCITY(FT*FT/SEC.) = 3.42
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
 AND L = 1142.6 FT WITH ELEVATION-DROP = 19.5 FT, IS 100.5 CFS,
 WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 2003.00
 LONGEST FLOWPATH FROM NODE 2001.00 TO NODE 2003.00 = 1311.48 FEET.

 FLOW PROCESS FROM NODE 2003.00 TO NODE 2006.00 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(FEET) = 118.50 DOWNSTREAM(FEET) = 115.00
 FLOW LENGTH(FEET) = 4441.36 MANNING'S N = 0.013
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.25
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 74.21
 PIPE TRAVEL TIME(MIN.) = 17.41 Tc(MIN.) = 25.58
 LONGEST FLOWPATH FROM NODE 2001.00 TO NODE 2006.00 = 5752.84 FEET.

 FLOW PROCESS FROM NODE 2006.00 TO NODE 2006.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 25.58
 RAINFALL INTENSITY(INCH/HR) = 2.53
 TOTAL STREAM AREA(ACRES) = 17.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 74.21

 FLOW PROCESS FROM NODE 2004.00 TO NODE 2005.00 IS CODE = 21

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

 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC 11) = 94
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 85.30
 UPSTREAM ELEVATION(FEET) = 123.20
 DOWNSTREAM ELEVATION(FEET) = 122.00
 ELEVATION DIFFERENCE(FEET) = 1.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.049
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 66.10
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.246

PR-100. OUT
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 6.12
 TOTAL AREA(ACRES) = 1.07 TOTAL RUNOFF(CFS) = 6.12

 FLOW PROCESS FROM NODE 2005.00 TO NODE 2006.00 IS CODE = 62

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

 UPSTREAM ELEVATION(FEET) = 122.00 DOWNSTREAM ELEVATION(FEET) = 115.00
 STREET LENGTH(FEET) = 1382.58 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.018
 OUTSIDE STREET 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) = 16.65
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.52
 HALFSTREET FLOOD WIDTH(FEET) = 19.80
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.25
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.16
 STREET FLOW TRAVEL TIME(MIN.) = 10.23 Tc(MIN.) = 14.28
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.682
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S. C. S. CURVE NUMBER (AMC 11) = 94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.790
 SUBAREA AREA(ACRES) = 6.89 SUBAREA RUNOFF(CFS) = 20.04
 TOTAL AREA(ACRES) = 8.0 PEAK FLOW RATE(CFS) = 23.16

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 22.54
 FLOW VELOCITY(FEET/SEC.) = 2.45 DEPTH*VELOCITY(FT*FT/SEC.) = 1.38
 LONGEST FLOWPATH FROM NODE 2004.00 TO NODE 2006.00 = 1467.88 FEET.

 FLOW PROCESS FROM NODE 2006.00 TO NODE 2006.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 14.28
 RAINFALL INTENSITY(INCH/HR) = 3.68
 TOTAL STREAM AREA(ACRES) = 7.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 23.16

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
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PR-100. OUT
 LONGEST FLOWPATH FROM NODE 2007.00 TO NODE 2010.00 = 1716.00 FEET.

 FLOW PROCESS FROM NODE 2009.00 TO NODE 2010.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.613
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) = 94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) = 29.10 SUBAREA RUNOFF(CFS) = 106.05
 TOTAL AREA(ACRES) = 31.9 TOTAL RUNOFF(CFS) = 116.07
 TC(MIN.) = 10.07

 FLOW PROCESS FROM NODE 2010.00 TO NODE 2010.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.07
 RAINFALL INTENSITY(INCH/HR) = 4.61
 TOTAL STREAM AREA(ACRES) = 31.85
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 116.07

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	90.11	27.99	2.386	25.75
2	116.07	10.07	4.613	31.85

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	162.67	10.07	4.613
2	150.13	27.99	2.386

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 162.67 Tc(MIN.) = 10.07
 TOTAL AREA(ACRES) = 57.6
 LONGEST FLOWPATH FROM NODE 1001.00 TO NODE 2010.00 = 6371.81 FEET.

 FLOW PROCESS FROM NODE 2010.00 TO NODE 400.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.07
 RAINFALL INTENSITY(INCH/HR) = 4.61
 TOTAL STREAM AREA(ACRES) = 57.60

PR-100. OUT
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 162.67

 FLOW PROCESS FROM NODE 542.00 TO NODE 547.00 IS CODE = 21

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

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) = 82
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 57.00
 UPSTREAM ELEVATION(FEET) = 104.00
 DOWNSTREAM ELEVATION(FEET) = 103.00
 ELEVATION DIFFERENCE(FEET) = 1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.775
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.450
 SUBAREA RUNOFF(CFS) = 0.20
 TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.20

 FLOW PROCESS FROM NODE 547.00 TO NODE 500.00 IS CODE = 53

>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM(FEET) = 103.00 DOWNSTREAM(FEET) = 84.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 421.00 CHANNEL SLOPE = 0.0451
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0451 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.20
 FLOW VELOCITY(FEET/SEC) = 1.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 5.90 Tc(MIN.) = 13.67
 LONGEST FLOWPATH FROM NODE 542.00 TO NODE 500.00 = 478.00 FEET.

 FLOW PROCESS FROM NODE 547.00 TO NODE 500.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.787
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) = 82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
 SUBAREA AREA(ACRES) = 3.78 SUBAREA RUNOFF(CFS) = 5.87
 TOTAL AREA(ACRES) = 3.9 TOTAL RUNOFF(CFS) = 6.01
 TC(MIN.) = 13.67

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 3.9 TC(MIN.) = 13.67
 PEAK FLOW RATE(CFS) = 6.01

END OF RATIONAL METHOD ANALYSIS



CHAPTER 6

ATTACHMENTS

ATTACHMENT A

Existing Condition Hydrology Map

~~3025 cubic feet~~

North River Farms
Tentative Map Drainage Study

ATTACHMENT B

Proposed Condition Hydrology Map

