FUSCOE ENGINEERING

CARTWRIGHT APARTMENTS

17861 CARTWRIGHT ROAD, IRVINE, CA

PRELIMINARY HYDROLOGY ANALYSIS

APPROVED
CITY OF IRVINE

ALL REVISIONS MUST RECEIVE CITY APPROVAL PRIOR TO CONSTRUCTION

11/25/2020, 7:57:18 AM

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C&C DEVELOPMENT
14211 YORBA STREET, SUITE 200
TUSTIN, CA 92780

FUSCOE ENGINEERING, INC.
16795 Von Karman, Suite 100
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EXP. 06/30/22
CIVIL
STATE OF CALIFORNIA

PROJECT MANAGER
SHELBY SHIRLOCK, P.E.

DATE PREPARED: JUNE, 2020
DATE REVISED: NOVEMBER, 2020

PROJECT NUMBER: [1339-004-01]

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PRELIMINARY HYDROLOGY ANALYSIS

FOR

CARTWRIGHT APARTMENTS

17861 Cartwright Road, Irvine, CA
County of Orange



Prepared By:

Shelby Shirlock, PE RCE C75912
Fuscoe Engineering, Irvine
16795 Von Karman #100
Irvine, CA 92606

For

C&C DEVELOPMENT
14211 Yorba Street, Suite 200
Tustin, CA 92780

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1.0 INTRODUCTION

1.1 GEOGRAPHIC SETTING

The existing project site for the Cartwright Apartment project consists of about 1.62 acres and is located in the City of Irvine, Orange County, California. The project site is located north of the 405 freeway, east of Von Karman Avenue, west of Jamboree Avenue and South of Main Street. The project site is bounded by private commercial properties to the north, west and south and bounded Cartwright Road to the east. *See Section 1.4 for Location Map.*

The project site is located at FEMA flood zone 'X' per FEMA Flood Insurance Rate Map (FIRM) No. 06059C0286J, map revised December 3, 2009. Flood Zone 'X' represents areas of minimum flood hazard (See Appendix 1).

1.2 PURPOSE OF THIS REPORT

The purpose of this report is to identify and analyze the existing drainage conditions & post development impacts, in order to provide adequate drainage facilities for the proposed development located in the City of Irvine, California.

This drainage study will analyze and compare the 2-year, 25-year & 100-year storm events for the existing and proposed conditions. Outcomes of the analysis will facilitate the conceptual layout of a drainage system to adequately convey storm runoff through the site without adversely impacting surrounding areas.

This analysis will also demonstrate that the storm water and flood protection goals as outlined in the Orange County Design Manual have been met. See Section 4.0 for Design Criteria.

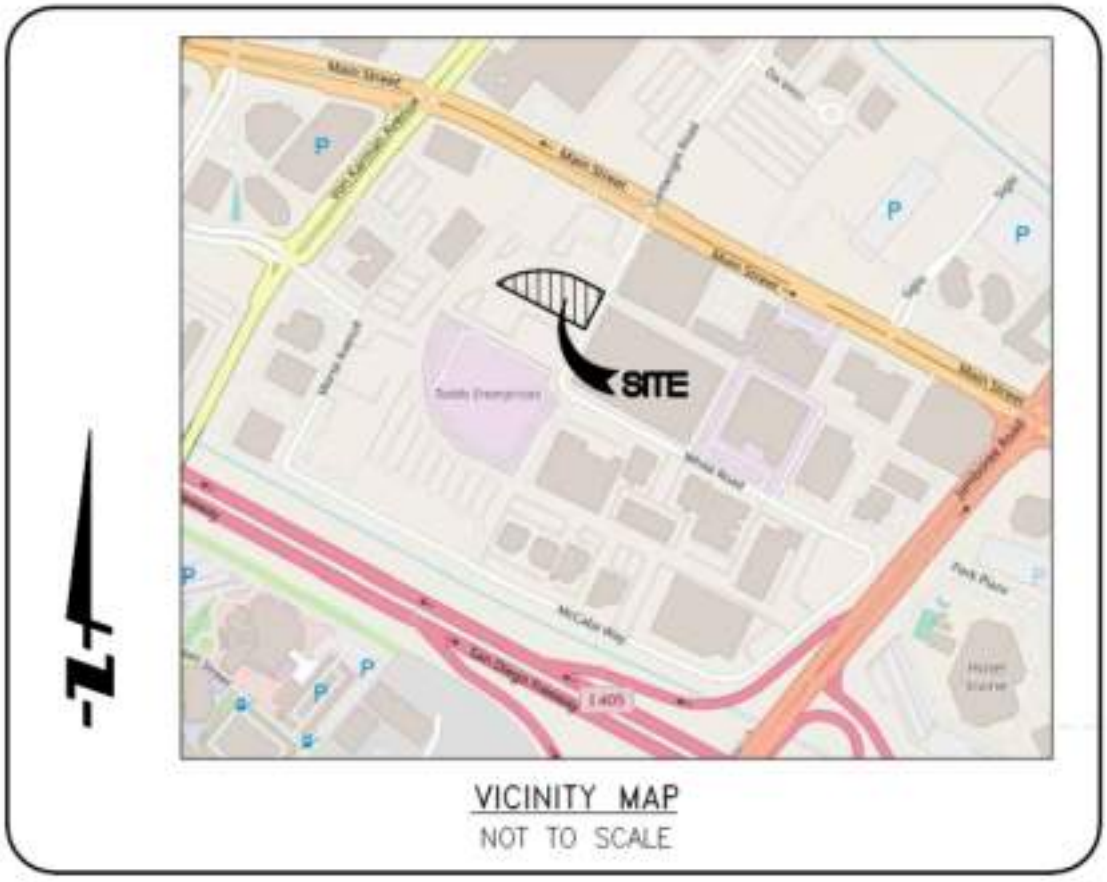
1.3 METHODOLOGY

This study was prepared in conformance with the Orange County Hydrology Manual. A.E.S. Computer Software (Version 21) was utilized to compile the hydrologic data and to determine the peak discharges and unit hydrographs for the Detention Basin Routing. A 100-year Unit Hydrograph was used to analyze site and detention basin storage capacity required.

For reference – *See Appendices 3-5*

1.4 PROJECT SITE LOCATION MAP

The Project Site is identified in the location map shown below.



2.0 EXISTING TOPOGRAPHIC & HYDROLOGIC CONDITIONS

2.1 EXISTING TOPOGRAPHY

The approximate 1.6-acre project site area is an existing commercial structure with surface parking lot which is mostly impervious. Cartwright Road is the traditional street consisting of roadway and parkway with sidewalk and landscape.

2.2 EXISTING DRAINAGE PATTERN AND STORM DRAIN FACILITIES

The existing site is generally flat, as storm drainage surface flows southeasterly from a high area at an average elevation of 40± feet in northwest portion of the site toward the southwest corner of the site at an average elevation of 36± feet. Majority of the southern portion of the site's stormwater runoff drains southeasterly towards Cartwright Road via onsite ribbon gutters. The northern portion of the site's runoff flows easterly towards Cartwright. The onsite runoff joins Cartwright Road's runoff and conveyed southerly via traditional curb & gutters. These runoffs will be captured by a catch basin at White Road.

Refer to *Appendices 2 and 3* for Existing Improvements, Hydrology Map and Calculations.

3.0 PROPOSED PROJECT & HYDROLOGIC CONDITIONS

3.1 PROPOSED PROJECT

The proposed project consists of 4 stories of 60 affordable apartment units, parking lot, drive aisles, and landscaped amenities. The proposed project will be more pervious than the existing conditions and will have project BMP's to mitigate the stormwater runoff.

3.2 PROPOSED DRAINAGE PATTERN AND STORM DRAIN FACILITIES

The proposed development will maintain the historic drainage pattern and drain from the northwest to the southeast. Generally, the onsite stormwater runoff will be captured by localized catch basins and drain inlets and flows will be diverted into high and low flows. The low flows will be routed first to treatment points with Modular Wetlands Systems (MWS) to treat the proposed runoff & high flows will be routed to a larger underground storm drain that leads towards the site's drainage outfall. Once the runoff is treated from the MWS it will join the high flow runoff in the private storm system.

There are essentially 3 proposed drainage management areas delineated for the site. Drainage areas A1 to A3 (DMA A in WQMP), consists of western portion of the apartment structure, parking lot and landscape areas. Runoff will be conveyed via ribbon gutter and captured into catch basins that leads to a MWS system located in the parking lot. Runoff from this system will flow easterly towards the street.

Drainage area A4 (DMA B), consists of the southern portion of apartment structure and landscape courtyard amenities. Runoff will be captured and conveyed via area drain system that leads to a MWS system south of the property. Runoff from this system will flow easterly towards the street and joins the treated runoff from DMA A. The underground storm drain will divert into a junction structure bubbler at the southeast corner of the property. The junction structure will have a low flow outlet that connects to the existing storm drain manhole at Cartwright, and a high flow curb outlet that discharges to the curb & gutter at Cartwright.

Drainage areas B1 to B3 (DMA C), consists of the northern and eastern portion of the apartment structure, parking lot and landscape areas. Runoff will be captured by catch basins and area drain system sized for low flows that leads to a MWS system located east of the site. High flows will flow at the site surface towards driveway opening onto Cartwright Road's curb & gutter system.

The site will be graded as such to have overland runoff for severe storms and the finish floor is set at least a foot over the 100 year-storm.

Refer to *Appendices 2 to 5* for Proposed Hydrology maps and calculations.

4.0 DESIGN CRITERIA

- The proposed storm drain systems will be designed to be consistent with the following goals and guidelines:
- Onsite design storm is based on a 25-year frequency in sump conditions for catch basins and the connecting storm drains also use a 25-year frequency.
- Velocity should not exceed 20 FPS in a standard wall R.C.P.
- Where velocity exceeds 20 FPS, a special wall R.C.P. with a minimum of 1½-inch steel clearance on the inside surface shall be used.
- Maximum velocity in special cover R.C.P. shall be 45 FPS.
- On local streets one lane shall be free of storm water in a 25-year storm event.
- Maximum W.S. in CB's for design conditions shall be 0.5' below inlet (FL.) elevation.
- Once water is picked up in a storm drain, it should remain in the system.
- Pipe size may not be decreased downstream without the City's approval.

5.0 RESULTS AND CONCLUSIONS

A summary of the 2-year, 25-year and 100-year peak flow analysis for existing and proposed conditions are provided below. In addition, additional analyses are provided for the 2-year storm event including Time of Concentration and Volume for existing and proposed conditions. These are calculations for the Hydrologic Conditions of Concern (HCOC) analysis required as part of the Water Quality Management Plan (WQMP).

As a result of the site development and improvements, the proposed conditions flows will not exceed existing condition for the 2-year, 25-year and 100-year events significantly to trigger hydromodifications. The proposed condition peak flows will increase from the existing condition by not more than 5%. The proposed Time of Concentration (Tc) have increased from the existing, as a result on on-site routing from proposed storm drain facilities toward the proposed drainage discharge location in the southwest corner of the site. The proposed 2-year 24-hour hydrograph volume will match the existing 2yr hydrograph volume. *See Tables 5.1 to 5.3*

It is our opinion that the proposed storm drain system will not have an adverse effect on any of the existing or proposed improvements within the project or adjacent public streets. In addition, all design criteria outlined above will be met and provided in the final hydrology report.

Hydrology Calculations for Tables below are provided in Appendices 2, 3, 4 and 5.

Table 5.1

Peak Q Summary				
Event	Existing (CFS)	Proposed (CFS)	Δ (CFS)	Percentage Change
2-Year	2.7	2.8	0.1	3.7%
25-Year	5.9	6.3	0.4	6.8%
100-Year	7.6	8.0	0.4	5.3%

Table 5.2

Time of Concentration Summary				
Event	Existing (minutes)[1]	Proposed (minutes)	Δ (minutes)	Percentage Change
2-Year	7.3	8.4	1.1	15.1%
25-Year	7.4	8.1	0.7	9.5%
100-Year	6.7	7.7	1.0	4.9%

Table 5.3

2 Year Event Volume Summary				
Event	Existing (Acre-Ft)	Proposed (Acre-Ft)	Δ (Acre-Ft)	Percentage Change
2-Year	0.21	0.21	0.0%	0.0%

6.0 APPENDICES

Appendix 1 *Supporting Maps and Plans*

Soil Map, FEMA (FIRM) Map & Existing Improvement Plans

Appendix 2 *Hydrology Maps*

Existing and Proposed Conditions

Appendix 3 *Existing Hydrology Calculations*

2 year, 25 year & 100 year storm frequencies

Appendix 4 *Proposed Hydrology Calculations*

2 year , 25 year & 100 year storm frequencies

Appendix 5 *Hydromod Calculations*

APPENDIX 1

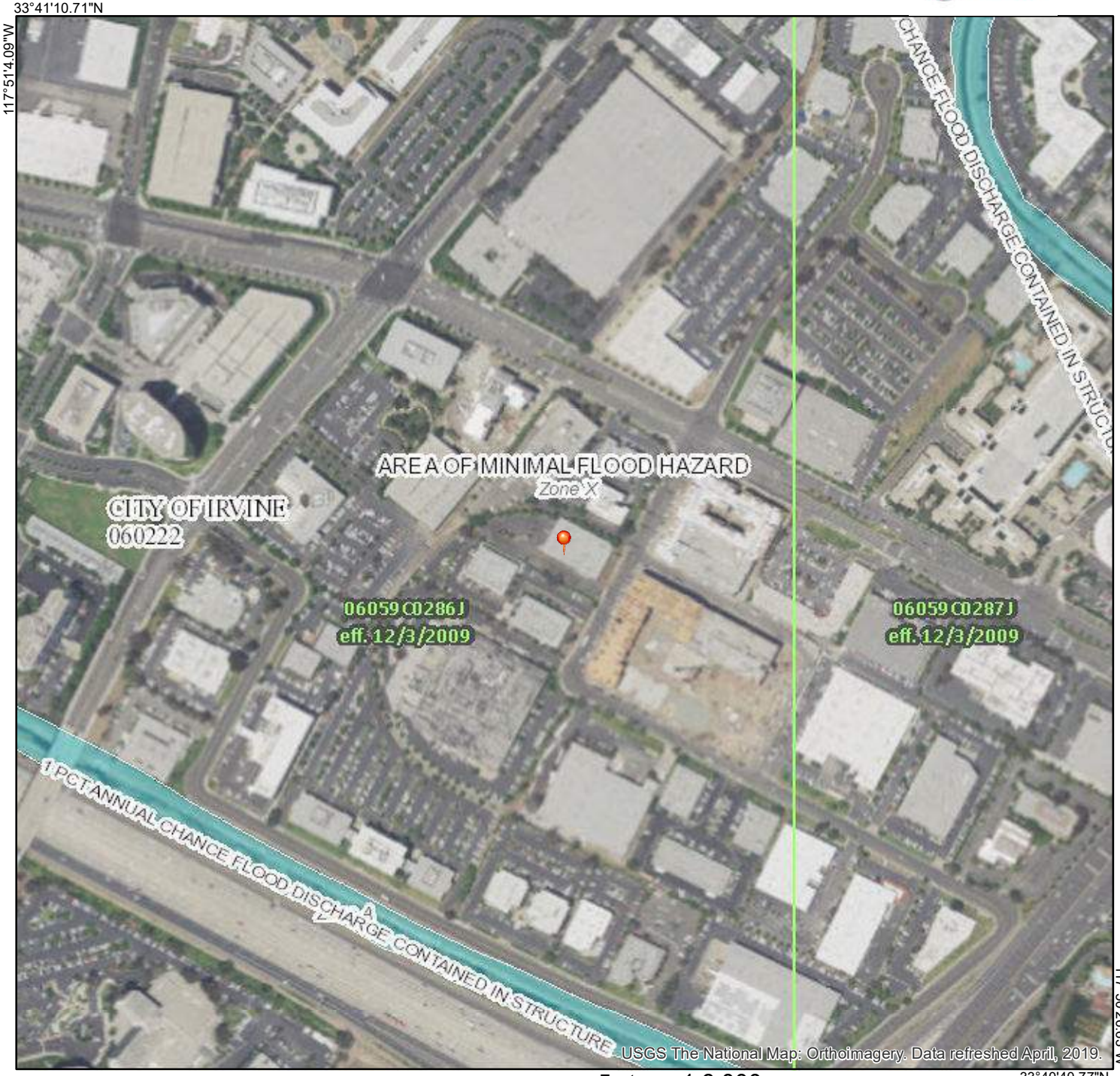
SUPPORTING MAPS AND PLANS

National Flood Hazard Layer FIRMette

FEMA

33°41'10.71"N

117°51'14.09"W



117°50'26.63"W

33°40'40.77"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

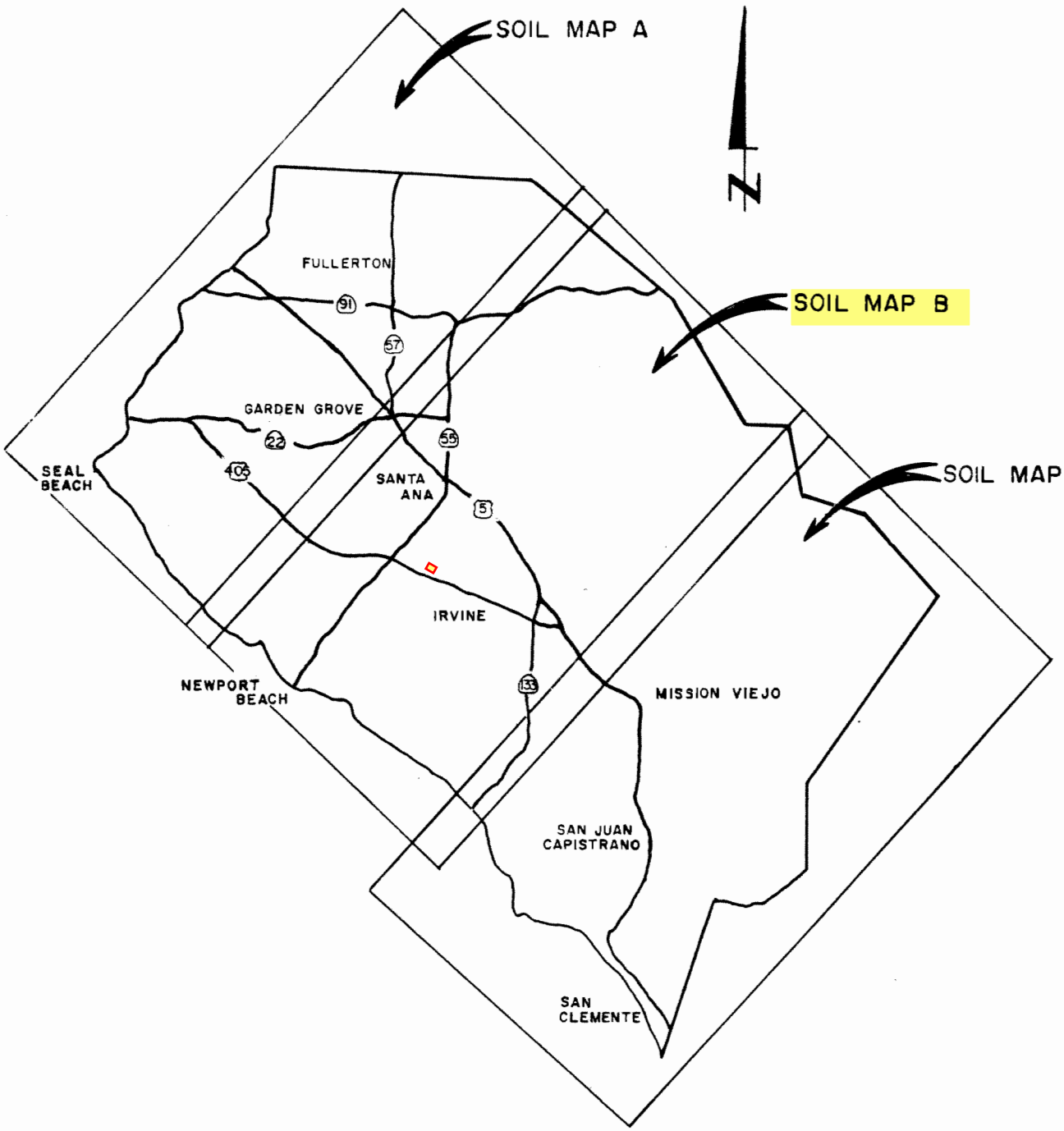
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/7/2020 at 5:33:03 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

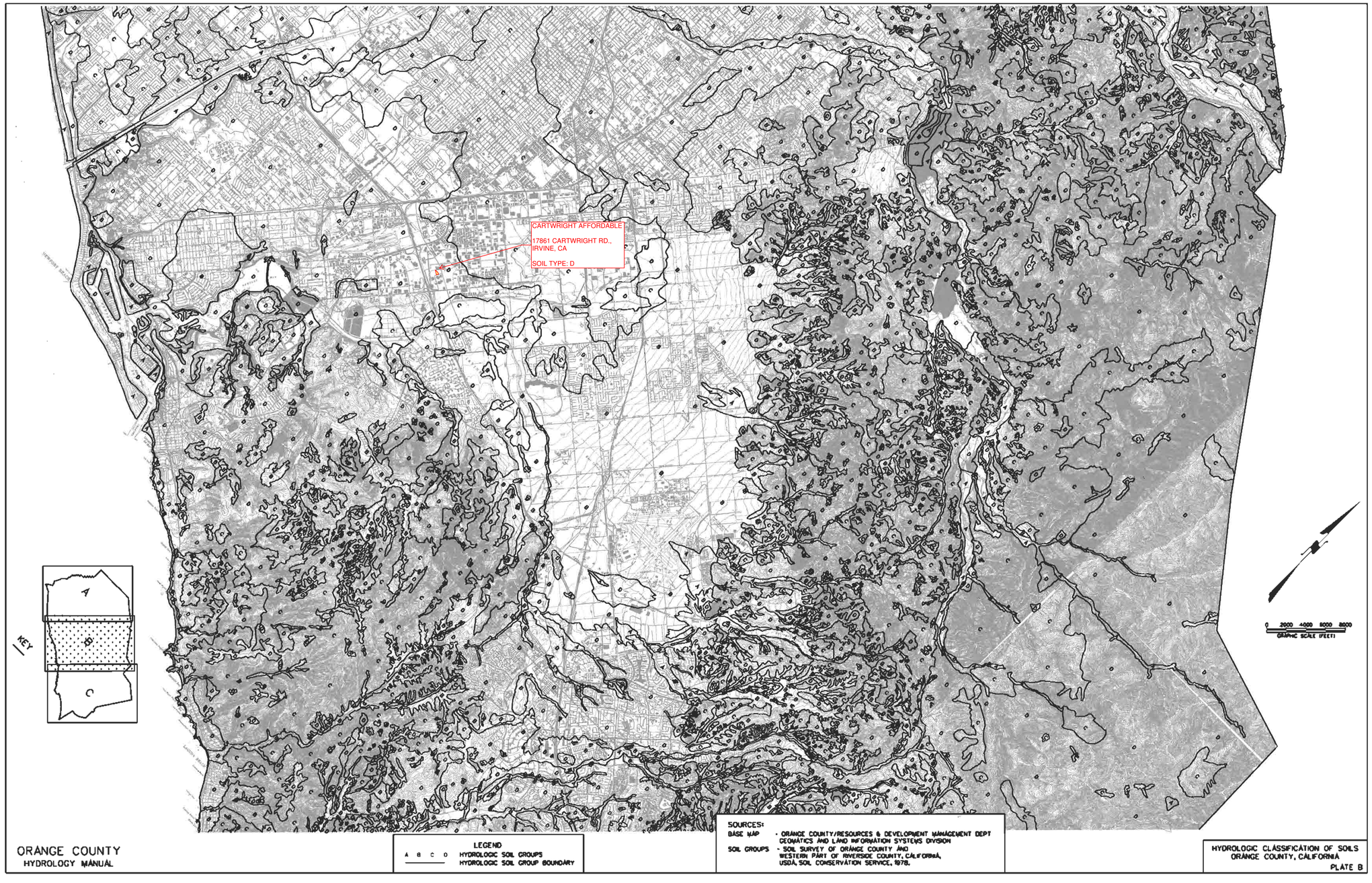


(SEE SOIL MAPS IN POCKET)

ORANGE COUNTY
HYDROLOGY MANUAL

ORANGE COUNTY
SOIL MAP INDEX

Figure C-1



ORANGE COUNTY
HYDROLOGY MANUAL

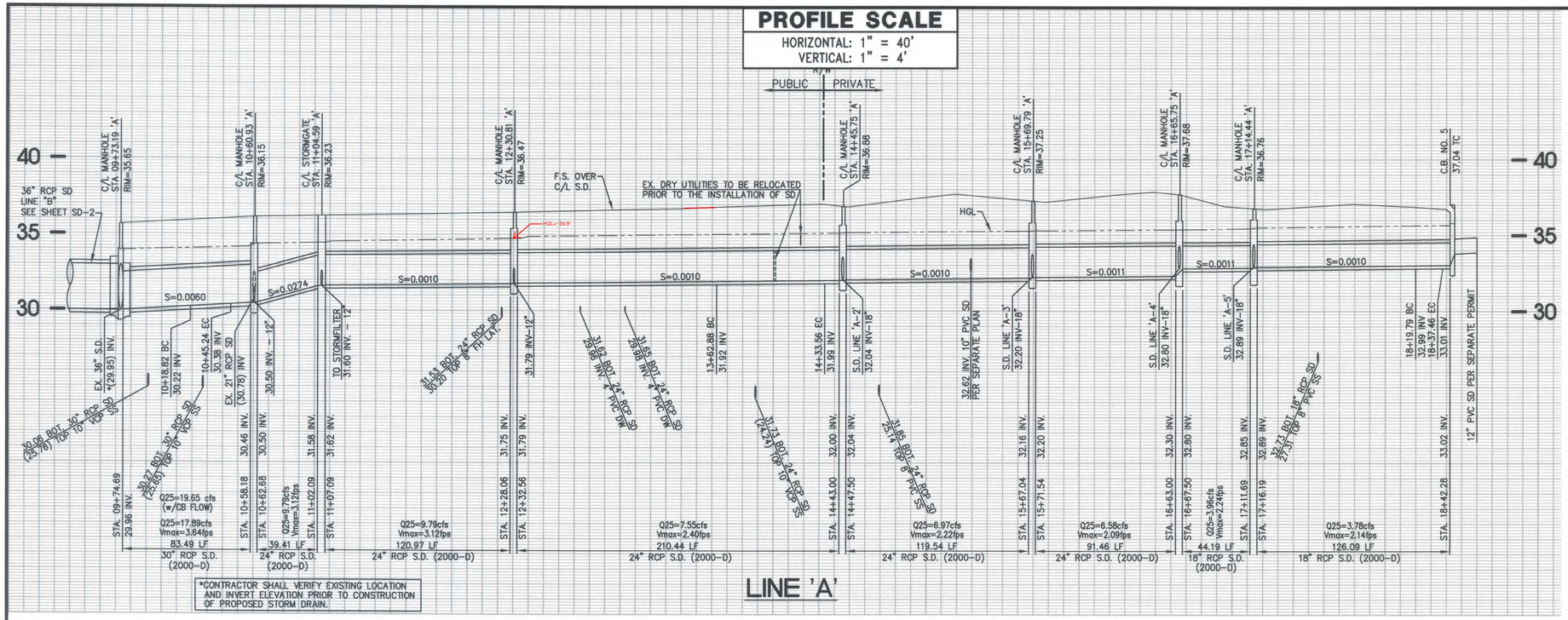
LEGEND
A B C D HYDROLOGIC SOIL GROUPS
HYDROLOGIC SOIL GROUP BOUNDARY

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

HYDROLOGIC CLASSIFICATION OF SOILS
ORANGE COUNTY, CALIFORNIA
PLATE B

PROFILE SCALE

HORIZONTAL: 1" = 40'
VERTICAL: 1" = 4'

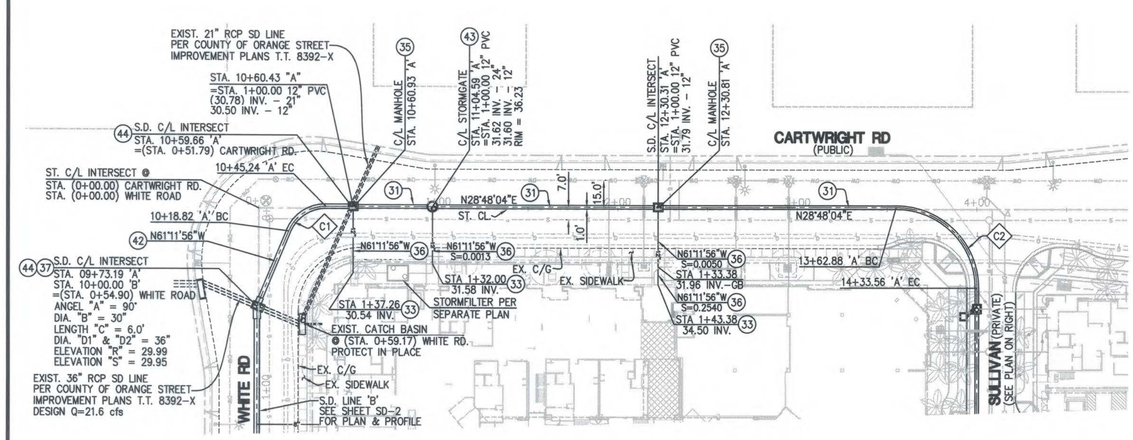


*CONTRACTOR SHALL VERIFY EXISTING LOCATION AND INVERT ELEVATION PRIOR TO CONSTRUCTION OF PROPOSED STORM DRAIN.

LINE 'A'

STORM DRAIN NOTES

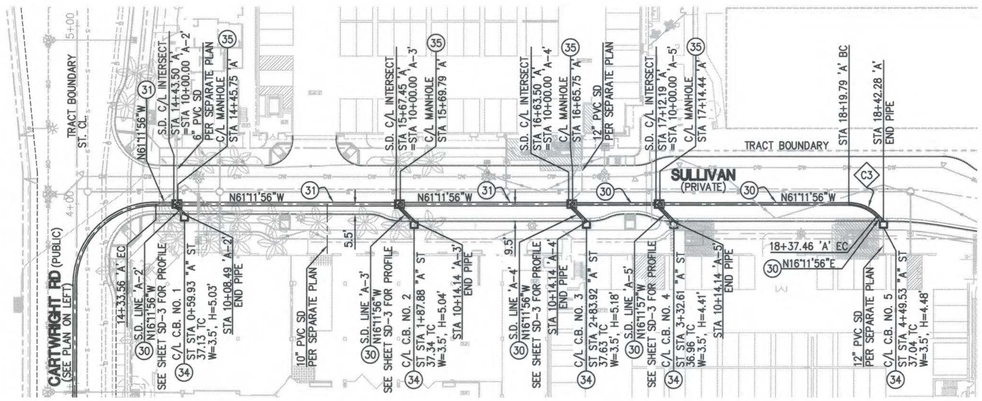
(30) INSTALL 18" RCP SD PIPE (D-LOAD PER PROFILE). STORM DRAIN BEDDING PER CITY OF IRVINE STD. DWG. NO. 318
(31) INSTALL 24" RCP SD PIPE (D-LOAD PER PROFILE). STORM DRAIN BEDDING PER CITY OF IRVINE STD. DWG. NO. 318
(32) INSTALL 36" RCP SD PIPE (D-LOAD PER PROFILE). STORM DRAIN BEDDING PER CITY OF IRVINE STD. DWG. NO. 318
(33) INSTALL PVC END CAP FOR FUTURE CONNECTION.
(34) CONSTRUCT CATCH BASIN TYPE I PER CITY OF IRVINE STD. DWG. NO. 300
(35) CONSTRUCT JUNCTION STRUCTURE TYPE I PER CITY OF IRVINE STD. DWG. NO. 306
(36) INSTALL 12" PVC SDR 35 STORM DRAIN LINE.
(37) CONSTRUCT JUNCTION STRUCTURE TYPE III PER CITY OF IRVINE STD. DWG. NO. 308
(38) INSTALL BRICK AND MORTAR PLUG FOR FUTURE CONNECTION.
(39) CONSTRUCT CONCRETE COLLAR PER CITY OF IRVINE STD. DWG. NO. 310
(40) INSTALL 8" PVC SDR 35 STORM DRAIN LINE.
(41) CORE DRILL AND CONNECT TO EXISTING CATCH BASIN PER DETAIL 41 ON SHEET 3.
(42) INSTALL 30" RCP SD PIPE (D-LOAD PER PROFILE). STORM DRAIN BEDDING PER CITY OF IRVINE STD. DWG. NO. 318.
(43) INSTALL 60" CONTECH STORMGATE MANHOLE. INVERT AND RIM ELEVATION PER PLAN.
(44) REMOVE PORTION OF INTERFERING EXISTING STORM DRAIN PIPE AND JOIN.



LINE 'A'

STA 10+00.00 TO STA 14+25.07
(PUBLIC)

CURVE TABLE				
CURVE #	LENGTH (FT)	RADIUS (FT)	DELTA	TANGENT (FT)
C1	26.42	22.50	67°17'24"	14.97
C2	70.69	45.00	90°00'00"	45.00
C3	17.67	22.50	45°00'00"	17.22



LINE 'A'

STA 14+25.07 TO STA 18+42.28
(PUBLIC)

GRAPHIC SCALE
40 0 20 40 80
(IN FEET)
1 inch = 40 feet

GRAPHIC SCALE
40 0 20 40 80
(IN FEET)
1 inch = 40 feet

PLAN CONTROL | PLAN SET: PC4
GARDEN COMMUNITIES | DATE: 08/11/2014

P:\242.400\IMPROVEMENTS\OFFSITE_STREET\400-OFF-IMP-SD.dwg
PLOT DATE - Aug 11, 2014 - 12:10PM

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TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NO.	DATE	REVISIONS	ENGR	APPROV	DATE
A/B	8/8/17	RECORD DRAWING		JNL	8/11/17

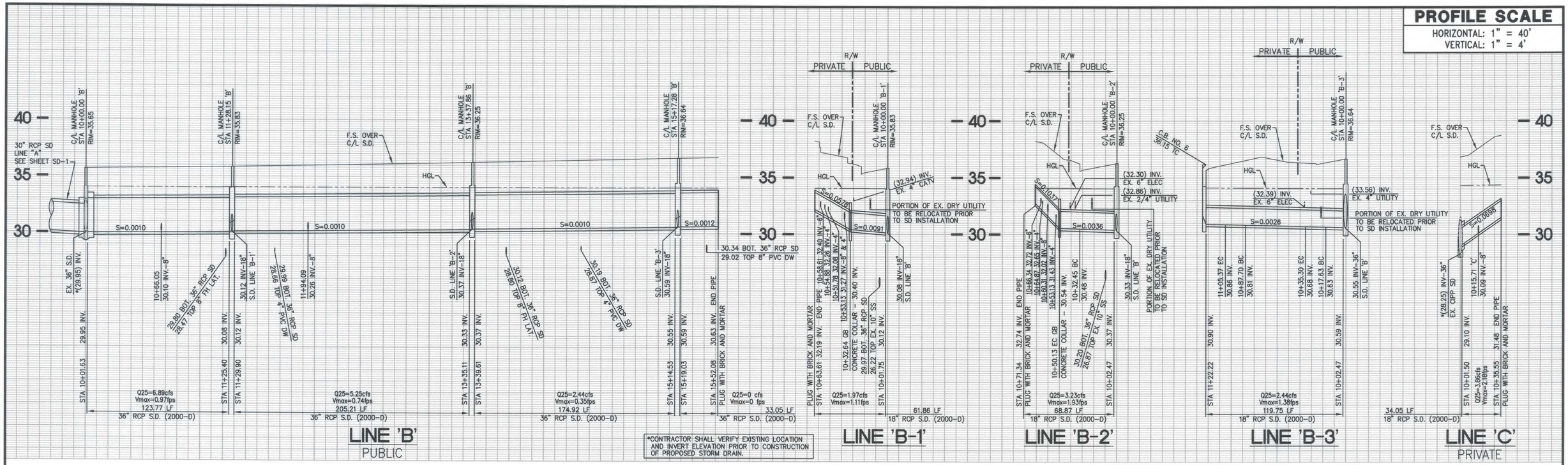
PLAN PREPARED BY:
URBAN RESOURCE
CONSULTING CIVIL ENGINEERS
23 Mauchly, Suite 110
Irvine, CA 92618
Phone: 949-727-9093
Fax: 949-727-9098
TERRY P. AU R.C.E. No. 68466 DATE 8-21-14

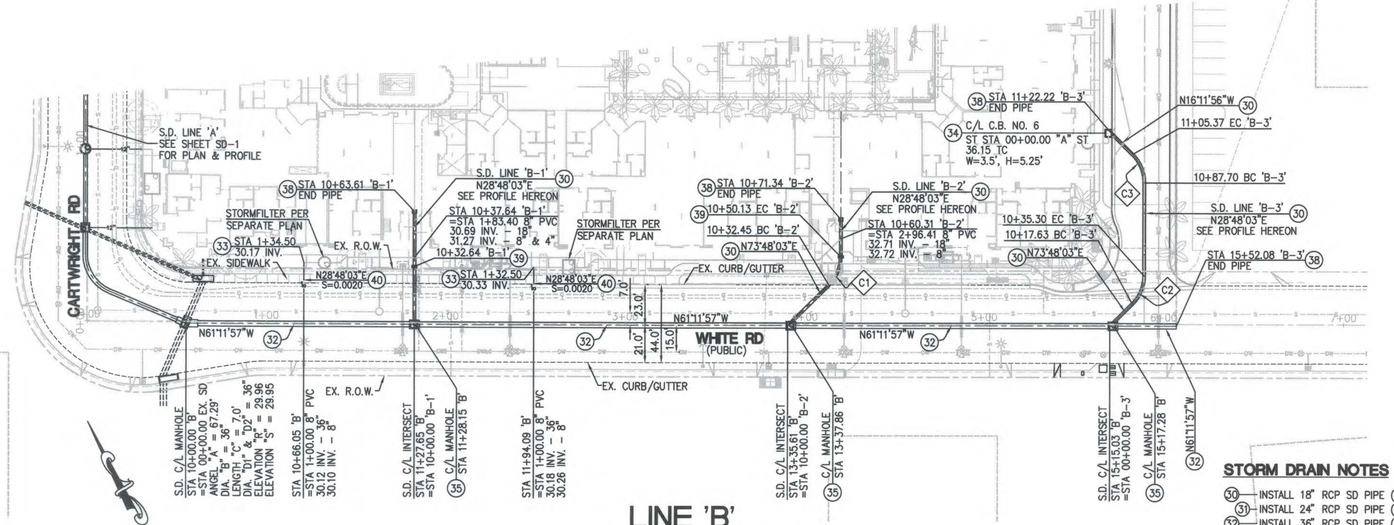
DRAWN BY: BB	DATE 3/17/2014	
DESIGNED BY: BB	DATE 3/17/2014	
CHECKED BY: TA	DATE 3/17/2014	

IMPROVEMENT PLAN
TRACT 17109
STORM DRAIN PLAN AND PROFILE
LINE 'A'
CITY OF IRVINE
PUBLIC WORKS DEPARTMENT

PLAN CHECK NO. 00602303-EMC
PERMIT NO. 00603146-MCE
PROJECT NO. 242.400
SHEET SD-1
SHEET 11 OF 19

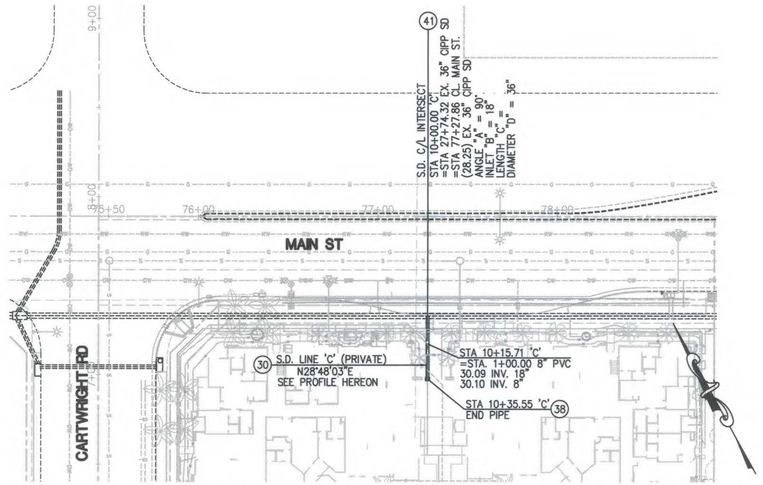
PROFILE SCALE
HORIZONTAL: 1" = 40'
VERTICAL: 1" = 4'





LINE 'B'
STA 10+00.00 TO STA 15+46.22
(PUBLIC)

CURVE TABLE				
CURVE #	LENGTH (FT)	RADIUS (FT)	DELTA	TANGENT (FT)
C1	17.67	22.50	45°00'00"	9.32
C2	17.67	22.50	45°00'00"	9.32
C3	17.67	22.50	45°00'00"	17.22



LINE 'C'
STA 10+00.00 TO STA 10+35.55
(PUBLIC)

GRAPHIC SCALE
40 0 20 40 80
(IN FEET)
1 inch = 40 feet

STORM DRAIN NOTES

30 INSTALL 18" RCP SD PIPE (D-LOAD PER PROFILE). STORM DRAIN BEDDING PER CITY OF IRVINE STD. DWG. NO. 318
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NO.	DATE	REVISIONS	ENGR	APPROV	DATE
8	8/3/17	RECORD DRAWING		KA/L	8/11/17

PLAN PREPARED BY:
URBAN RESOURCE
CONSULTING CIVIL ENGINEERS
23 Mauchly, Suite 110
Irvine, CA 92618
Phone: 949-727-9093
Fax: 949-727-9098

TERRY P. AU R.C.E. No. 68466 DATE 8-24-14

DRAWN BY: BB	DATE 3/17/2014
DESIGNED BY: BB	DATE 3/17/2014
CHECKED BY: TA	DATE 3/17/2014

PLAN CHECK NO. 00602303-EMC
PERMIT NO. 00603146-MCE
PROJECT NO. 242.400
SHEET SD-2
SHEET 12 OF 19

IMPROVEMENT PLAN
TRACT 17109
STORM DRAIN PLAN AND PROFILE
LINE 'B' AND LINE 'C'
CITY OF IRVINE
PUBLIC WORKS DEPARTMENT

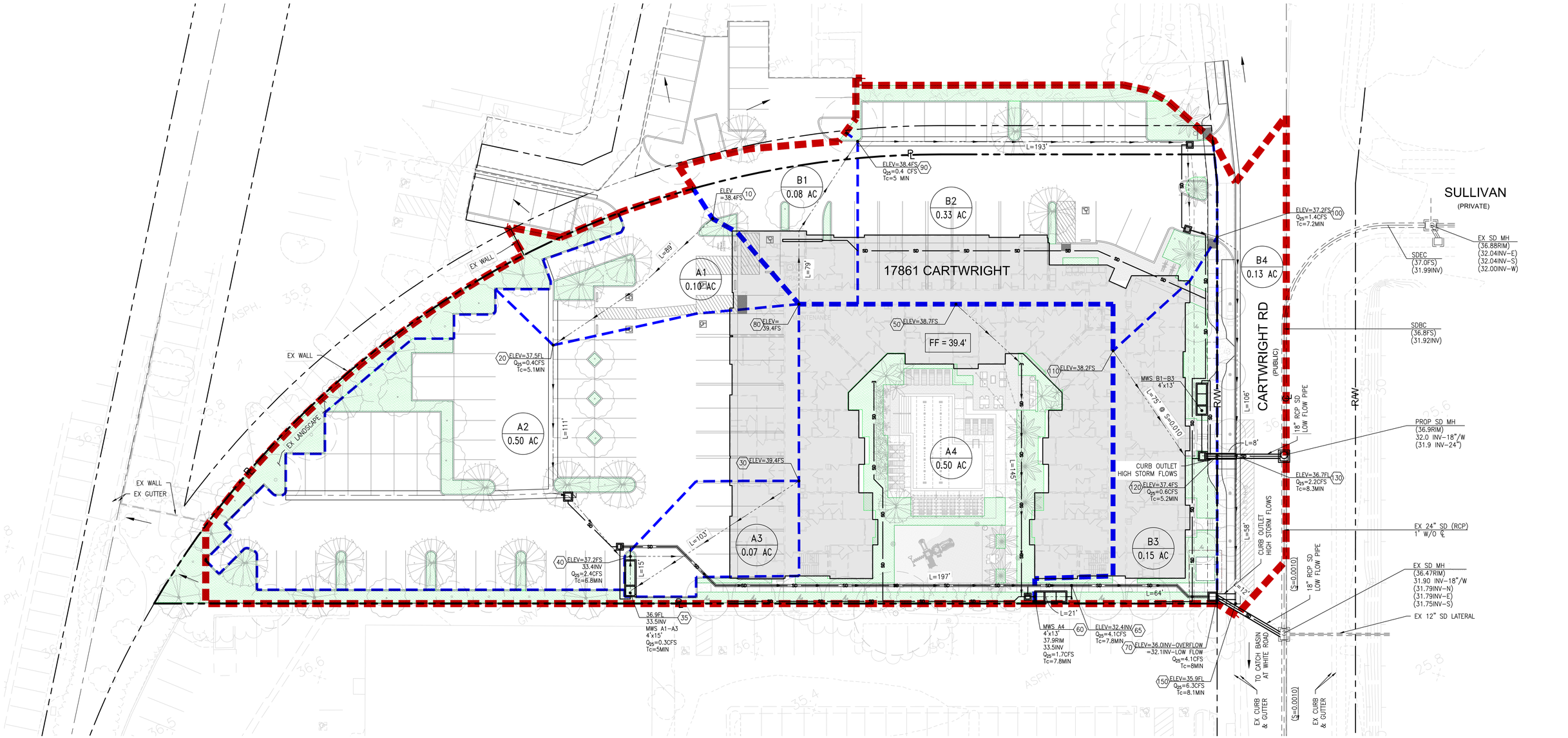
PLAN CONTROL: GARDEN COMMUNITIES | PLAN SET: PC4 | DATE: 08/11/2014

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PLOT DATE - Aug 11, 2014 - 12:38PM

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APPENDIX 2

HYDROLOGY MAPS



LEGEND & ABBREVIATIONS

- CENTERLINE
- ADJACENT RIGHT OF WAY/PROPERTY LINE
- PROJECT SITE BOUNDARY
- DRAINAGE BOUNDARY
- MAJOR DRAINAGE TRIBUTARY BOUNDARY
- MINOR DRAINAGE TRIBUTARY BOUNDARY
- FLOW DIRECTION / FLOW LENGTH (L=100')
- EX. STORM DRAIN LINE
- X1 / X.XX AC — TRIBUTARY AREA NUMBER / TRIBUTARY AREA ACREAGE
- ELEV=X.XX / Qxx=X CFS / X MIN — NODE ELEVATION (FT) / STORM FREQUENCY = FLOW RATE (CFS) / Tc (MIN)
- 100 — HYDROLOGY NODE #
- PERVIOUS AREAS

SITE PARAMETERS

HYDROLOGY SOIL GROUP: D

PROPERTY SITE ACREAGE: 1.62 ACRES

FEMA FLOOD ZONE X PER FIRM MAP 06059C0286J
ZONE X – AREA OF MINIMAL FLOOD HAZARD

TOTAL DRAINAGE STUDY AREA: 1.86 Ac

HYDROMOD CALCULATIONS

SITE POTENTIALLY SUSCEPTIBLE TO HYDROMOD DETENTION REQUIREMENTS DUE TO DISCHARGE TO PETER'S CANYON CHANNEL

AREA (ACRES)		2 YR-24 HR STORM VOLUME (AC-FT)				2-YEAR TIME OF CONCENTRATION (MIN)				2-YEAR PEAK RUNOFF (CFS)			
EXISTING	PROPOSED	EXISTING	PROPOSED	INCREASE	% INCREASE	EXISTING	PROPOSED	DIFFERENCE	%	EXISTING	PROPOSED	INCREASE	% INCREASE
1.86	1.86	0.21	0.21	0	0	7.3	8.1	0.8	9.8%	2.7	2.8	0.1	3.7%

FUSCOE ENGINEERING
16795 Von Karman, Suite 100
Irvine, California 92606
tel 949.474.1960 • fax 949.474.5315
www.fuscoe.com

CARTWRIGHT APARTMENTS
PROPOSED HYDROLOGY MAP
IRVINE, CA
November 6, 2020

F:\Projects\1339\09A_Support Files\Reports\Hydrology\Exhibits\1339-004sh Proposed Hydrology.dwg (11/6/2020 10:18 AM) Plotted by: Jason Castro

APPENDIX 3

EXISTING HYDROLOGY CALCULATIONS

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            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************* DESCRIPTION OF STUDY *************************
*                           CARTWRIGHT APARTMENTS                          *
*                            EXISTING HYDROLOGY                            *
*                               2 YEAR STORM                               *
 ******************************************************************************

  FILE NAME: CARTEX.DAT
  TIME/DATE OF STUDY: 15:45 06/11/2020
==============================================================================
  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
  *DATA BANK RAINFALL USED*
  *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     10.00 TO NODE     20.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    69.00
  ELEVATION DATA: UPSTREAM(FEET) =     41.50  DOWNSTREAM(FEET) =     37.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  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.)
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  COMMERCIAL                  D        0.09      0.20     0.100    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.09   PEAK FLOW RATE(CFS) =      0.18

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     37.80
  DOWNSTREAM NODE ELEVATION(FEET) =     37.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.638
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.34      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.88
  AVERAGE FLOW DEPTH(FEET) =   0.17   FLOOD WIDTH(FEET) =    8.77
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.78   Tc(MIN.) =    8.78
  SUBAREA AREA(ACRES) =    0.34       SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =    0.43     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.63

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOOD WIDTH(FEET) =   10.70
  FLOW VELOCITY(FEET/SEC.) =   0.93   DEPTH*VELOCITY(FT*FT/SEC) =   0.17
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     60.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     37.30  DOWNSTREAM(FEET) =     37.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   109.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.63
  FLOW VELOCITY(FEET/SEC.) =   1.47   FLOW DEPTH(FEET) =   0.18
  TRAVEL TIME(MIN.) =   1.23   Tc(MIN.) =   10.02
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 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.) =   10.02
  RAINFALL INTENSITY(INCH/HR) =   1.52
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  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.43
  TOTAL STREAM AREA(ACRES) =       0.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.63

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 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) =     61.60  DOWNSTREAM(FEET) =     60.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.025
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.257
  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        0.12      0.20     0.100    57    5.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.12   PEAK FLOW RATE(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     41.50
  DOWNSTREAM NODE ELEVATION(FEET) =     37.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    56.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.207
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.46      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.64
  AVERAGE FLOW DEPTH(FEET) =   0.11   FLOOD WIDTH(FEET) =    3.14
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.20   Tc(MIN.) =    5.23
  SUBAREA AREA(ACRES) =    0.46       SUBAREA RUNOFF(CFS) =    0.91
  EFFECTIVE AREA(ACRES) =    0.58     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.14

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOOD WIDTH(FEET) =    5.25
  FLOW VELOCITY(FEET/SEC.) =   4.80   DEPTH*VELOCITY(FT*FT/SEC) =   0.64
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     60.00 =     176.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =   1
```

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----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.23
  RAINFALL INTENSITY(INCH/HR) =   2.21
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.58
  TOTAL STREAM AREA(ACRES) =       0.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.14

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.63   10.02    1.519  0.20( 0.02) 0.10       0.4      10.00
      2        1.14    5.23    2.207  0.20( 0.02) 0.10       0.6      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.62    5.23    2.207  0.20( 0.02) 0.10       0.8      40.00
      2        1.41   10.02    1.519  0.20( 0.02) 0.10       1.0      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.62    Tc(MIN.) =     5.23
  EFFECTIVE AREA(ACRES) =       0.80   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     70.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     37.00  DOWNSTREAM(FEET) =     36.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   197.00   CHANNEL SLOPE =  0.0015
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.62
  FLOW VELOCITY(FEET/SEC.) =   1.63   FLOW DEPTH(FEET) =   0.36
  TRAVEL TIME(MIN.) =   2.01   Tc(MIN.) =    7.24
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     70.00 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.70  DOWNSTREAM(FEET) =    36.50
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.27
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
```

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  GIVEN PIPE DIAMETER(INCH) =   4.00    NUMBER OF PIPES =   2
  PIPE-FLOW(CFS) =       1.62
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.28
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     80.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   138.00
  ELEVATION DATA: UPSTREAM(FEET) =     61.60  DOWNSTREAM(FEET) =     60.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.465
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.151
  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        0.12      0.20      0.100    57    5.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.12   PEAK FLOW RATE(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE    100.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     41.50
  DOWNSTREAM NODE ELEVATION(FEET) =     36.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.853
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.26      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.36
  AVERAGE FLOW DEPTH(FEET) =   0.12   FLOOD WIDTH(FEET) =    4.20
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.62   Tc(MIN.) =    7.09
  SUBAREA AREA(ACRES) =    0.26       SUBAREA RUNOFF(CFS) =    0.43
  EFFECTIVE AREA(ACRES) =    0.38     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.63

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOOD WIDTH(FEET) =    5.60
  FLOW VELOCITY(FEET/SEC.) =   2.44   DEPTH*VELOCITY(FT*FT/SEC) =   0.33
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 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    100.00 =     368.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    110.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   36.90  DOWNSTREAM ELEVATION(FEET) =   36.80
 STREET LENGTH(FEET) =    80.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.71
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.31
   HALFSTREET FLOOD WIDTH(FEET) =    9.07
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.75
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.23
 STREET FLOW TRAVEL TIME(MIN.) =   1.78   Tc(MIN.) =    8.87
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.629
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.11      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) =    0.11      SUBAREA RUNOFF(CFS) =    0.16
 EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       0.71

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.07
 FLOW VELOCITY(FEET/SEC.) =  0.75   DEPTH*VELOCITY(FT*FT/SEC.) =   0.23
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    110.00 =     448.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.87
 RAINFALL INTENSITY(INCH/HR) =   1.63
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.49
 TOTAL STREAM AREA(ACRES) =       0.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.71

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     90.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   138.00
  ELEVATION DATA: UPSTREAM(FEET) =     61.60  DOWNSTREAM(FEET) =     60.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.465
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.151
  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        0.12      0.20     0.100    57    5.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.12   PEAK FLOW RATE(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    38.10  DOWNSTREAM(FEET) =    36.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.09
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.23
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    5.90
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    110.00 =     218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 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.) =    5.90
  RAINFALL INTENSITY(INCH/HR) =   2.06
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.12
  TOTAL STREAM AREA(ACRES) =       0.12
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.23

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.71    8.87    1.629  0.20( 0.02) 0.10       0.5      40.00
      2        0.23    5.90    2.059  0.20( 0.02) 0.10       0.1      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
     1        0.83    5.90    2.059  0.20( 0.02) 0.10       0.4      40.00
     2        0.89    8.87    1.629  0.20( 0.02) 0.10       0.6      40.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.89    Tc(MIN.) =     8.87
  EFFECTIVE AREA(ACRES) =       0.61   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    110.00 =     448.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    130.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   36.80  DOWNSTREAM ELEVATION(FEET) =   36.70
  STREET LENGTH(FEET) =    45.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.93
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.31
  STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    9.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.556
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.06      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) =    0.06      SUBAREA RUNOFF(CFS) =    0.08
  EFFECTIVE AREA(ACRES) =      0.67    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       0.93

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.99
  FLOW VELOCITY(FEET/SEC.) =  1.00   DEPTH*VELOCITY(FT*FT/SEC.) =   0.31
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    130.00 =     493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.61
  RAINFALL INTENSITY(INCH/HR) =   1.56
  AREA-AVERAGED Fm(INCH/HR) =  0.02
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.67
 TOTAL STREAM AREA(ACRES) =       0.67
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.93

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE    120.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   122.00
 ELEVATION DATA: UPSTREAM(FEET) =     61.60  DOWNSTREAM(FEET) =     60.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.075
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.244
 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        0.11      0.20     0.100    57    5.08
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.22
 TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.22

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     39.00  DOWNSTREAM(FEET) =     36.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =    38.00   CHANNEL SLOPE =  0.0605
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   0.020
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.22
 FLOW VELOCITY(FEET/SEC.) =   2.68   FLOW DEPTH(FEET) =   0.04
 TRAVEL TIME(MIN.) =   0.24   Tc(MIN.) =    5.31
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    130.00 =     160.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 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.) =    5.31
 RAINFALL INTENSITY(INCH/HR) =   2.19
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.11
 TOTAL STREAM AREA(ACRES) =       0.11
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.22

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        0.87    6.66    1.920  0.20( 0.02) 0.10       0.5      40.00
```

```
    1        0.93    9.61    1.556  0.20( 0.02) 0.10       0.7      40.00
    2        0.22    5.31    2.187  0.20( 0.02) 0.10       0.1      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.01    5.31    2.187  0.20( 0.02) 0.10       0.5      40.00
      2        1.06    6.66    1.920  0.20( 0.02) 0.10       0.6      40.00
      3        1.08    9.61    1.556  0.20( 0.02) 0.10       0.8      40.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.08    Tc(MIN.) =     9.61
  EFFECTIVE AREA(ACRES) =       0.78   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.8
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    130.00 =     493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    150.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   36.70  DOWNSTREAM ELEVATION(FEET) =   36.60
  STREET LENGTH(FEET) =    63.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.54
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.92
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.31
  STREET FLOW TRAVEL TIME(MIN.) =   1.15   Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.07      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.07      SUBAREA RUNOFF(CFS) =    0.09
  EFFECTIVE AREA(ACRES) =      0.85    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.12
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       1.10

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.36
  FLOW VELOCITY(FEET/SEC.) =  0.92   DEPTH*VELOCITY(FT*FT/SEC.) =   0.31
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    150.00 =     556.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 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        1.01    6.47    1.953  0.20( 0.03) 0.14       0.6      40.00
     2        1.07    7.80    1.753  0.20( 0.03) 0.13       0.7      40.00
     3        1.10   10.76    1.458  0.20( 0.02) 0.12       0.9      40.00
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    150.00 =     556.00 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        1.62    7.28    1.824  0.20( 0.02) 0.10       0.8      40.00
     2        1.41   12.18    1.358  0.20( 0.02) 0.10       1.0      10.00
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     600.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.55    6.47    1.953  0.20( 0.02) 0.12       1.3      40.00
     2        2.66    7.28    1.824  0.20( 0.02) 0.11       1.5      40.00
     3        2.66    7.80    1.753  0.20( 0.02) 0.11       1.5      40.00
     4        2.57   10.76    1.458  0.20( 0.02) 0.11       1.8      40.00
     5        2.43   12.18    1.358  0.20( 0.02) 0.11       1.9      10.00
   TOTAL AREA(ACRES) =         1.9

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        2.66  Tc(MIN.) =    7.281
 EFFECTIVE AREA(ACRES) =      1.45  AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.11
 TOTAL AREA(ACRES) =        1.9
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     600.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.9  TC(MIN.) =      7.28
 EFFECTIVE AREA(ACRES) =      1.45  AREA-AVERAGED Fm(INCH/HR)=  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.115
 PEAK FLOW RATE(CFS)   =       2.66

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.55    6.47    1.953  0.20( 0.02) 0.12       1.3      40.00
     2        2.66    7.28    1.824  0.20( 0.02) 0.11       1.5      40.00
     3        2.66    7.80    1.753  0.20( 0.02) 0.11       1.5      40.00
     4        2.57   10.76    1.458  0.20( 0.02) 0.11       1.8      40.00
     5        2.43   12.18    1.358  0.20( 0.02) 0.11       1.9      10.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
*                           CARTWRIGHT APARTMENTS                        *
*                            EXISTING HYDROLOGY                          *
*                              25 YEAR STORM                             *
 ************************************************************************

  FILE NAME: CARTEX.DAT
  TIME/DATE OF STUDY: 15:46 06/11/2020
========================================================================
  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     10.00 TO NODE     20.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    69.00
  ELEVATION DATA: UPSTREAM(FEET) =     41.50  DOWNSTREAM(FEET) =     37.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc 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        0.09      0.20     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.09   PEAK FLOW RATE(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     37.80
  DOWNSTREAM NODE ELEVATION(FEET) =     37.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.599
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.34      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.98
  AVERAGE FLOW DEPTH(FEET) =   0.21   FLOOD WIDTH(FEET) =   12.99
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.39   Tc(MIN.) =    8.39
  SUBAREA AREA(ACRES) =    0.34       SUBAREA RUNOFF(CFS) =    1.10
  EFFECTIVE AREA(ACRES) =    0.43     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.39

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOOD WIDTH(FEET) =   15.45
  FLOW VELOCITY(FEET/SEC.) =   1.07   DEPTH*VELOCITY(FT*FT/SEC) =   0.25
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     60.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     37.30  DOWNSTREAM(FEET) =     37.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   109.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.39
  FLOW VELOCITY(FEET/SEC.) =   1.89   FLOW DEPTH(FEET) =   0.29
  TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =    9.35
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.35
  RAINFALL INTENSITY(INCH/HR) =   3.38
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.43
  TOTAL STREAM AREA(ACRES) =       0.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.39

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 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) =     61.60  DOWNSTREAM(FEET) =     60.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.025
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.810
  SUBAREA Tc 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        0.12      0.20     0.100    75    5.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.12   PEAK FLOW RATE(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     41.50
  DOWNSTREAM NODE ELEVATION(FEET) =     37.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    56.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.708
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.46      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.79
  AVERAGE FLOW DEPTH(FEET) =   0.14   FLOOD WIDTH(FEET) =    6.48
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =    5.22
  SUBAREA AREA(ACRES) =    0.46       SUBAREA RUNOFF(CFS) =    1.94
  EFFECTIVE AREA(ACRES) =    0.58     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       2.45

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOOD WIDTH(FEET) =    8.77
  FLOW VELOCITY(FEET/SEC.) =   5.05   DEPTH*VELOCITY(FT*FT/SEC) =   0.85
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     60.00 =     176.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 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.) =    5.22
  RAINFALL INTENSITY(INCH/HR) =   4.71
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.58
  TOTAL STREAM AREA(ACRES) =       0.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.45

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.39    9.35    3.385  0.20( 0.02) 0.10       0.4      10.00
      2        2.45    5.22    4.708  0.20( 0.02) 0.10       0.6      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        3.52    5.22    4.708  0.20( 0.02) 0.10       0.8      40.00
      2        3.14    9.35    3.385  0.20( 0.02) 0.10       1.0      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.52    Tc(MIN.) =     5.22
  EFFECTIVE AREA(ACRES) =       0.82   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     70.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     37.00  DOWNSTREAM(FEET) =     36.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   197.00   CHANNEL SLOPE =  0.0015
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.52
  FLOW VELOCITY(FEET/SEC.) =   2.05   FLOW DEPTH(FEET) =   0.55
  TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =    6.82
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     70.00 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.70  DOWNSTREAM(FEET) =    36.50
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.19
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
```

```
  GIVEN PIPE DIAMETER(INCH) =   4.00    NUMBER OF PIPES =   2
  PIPE-FLOW(CFS) =       3.52
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.84
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     80.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   138.00
  ELEVATION DATA: UPSTREAM(FEET) =     61.60  DOWNSTREAM(FEET) =     60.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.465
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.587
  SUBAREA Tc 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        0.12      0.20     0.100    75    5.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.49
  TOTAL AREA(ACRES) =      0.12   PEAK FLOW RATE(CFS) =      0.49

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE    100.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     41.50
  DOWNSTREAM NODE ELEVATION(FEET) =     36.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.986
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.26      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.49
  AVERAGE FLOW DEPTH(FEET) =   0.16   FLOOD WIDTH(FEET) =    7.54
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.54   Tc(MIN.) =    7.00
  SUBAREA AREA(ACRES) =    0.26       SUBAREA RUNOFF(CFS) =    0.93
  EFFECTIVE AREA(ACRES) =    0.38     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.4          PEAK FLOW RATE(CFS) =       1.36

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOOD WIDTH(FEET) =    9.29
  FLOW VELOCITY(FEET/SEC.) =   2.55   DEPTH*VELOCITY(FT*FT/SEC) =   0.44
```

```
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    100.00 =     368.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    110.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   36.90  DOWNSTREAM ELEVATION(FEET) =   36.80
 STREET LENGTH(FEET) =    80.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.53
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.38
   HALFSTREET FLOOD WIDTH(FEET) =   12.60
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.90
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.34
 STREET FLOW TRAVEL TIME(MIN.) =   1.48   Tc(MIN.) =    8.49
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.575
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.11      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) =    0.11      SUBAREA RUNOFF(CFS) =    0.35
 EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       1.57

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.68
 FLOW VELOCITY(FEET/SEC.) =  0.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.34
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    110.00 =     448.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.49
 RAINFALL INTENSITY(INCH/HR) =   3.58
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.49
 TOTAL STREAM AREA(ACRES) =       0.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.57

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     90.00 IS CODE =  21
```

```
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   138.00
  ELEVATION DATA: UPSTREAM(FEET) =     61.60  DOWNSTREAM(FEET) =     60.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.465
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.587
  SUBAREA Tc 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        0.12      0.20     0.100    75    5.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.49
  TOTAL AREA(ACRES) =      0.12   PEAK FLOW RATE(CFS) =      0.49

********************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE    110.00 IS CODE =  41
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    38.10  DOWNSTREAM(FEET) =    36.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.77
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.49
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    5.82
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    110.00 =     218.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 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.) =    5.82
  RAINFALL INTENSITY(INCH/HR) =   4.43
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.12
  TOTAL STREAM AREA(ACRES) =       0.12
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.49

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.57    8.49    3.575  0.20( 0.02) 0.10       0.5      40.00
      2        0.49    5.82    4.427  0.20( 0.02) 0.10       0.1      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
     1        1.83    5.82    4.427  0.20( 0.02) 0.10       0.5      40.00
     2        1.97    8.49    3.575  0.20( 0.02) 0.10       0.6      40.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.97    Tc(MIN.) =     8.49
  EFFECTIVE AREA(ACRES) =       0.61   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    110.00 =     448.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    130.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   36.80  DOWNSTREAM ELEVATION(FEET) =   36.70
  STREET LENGTH(FEET) =    45.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.06
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.60
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.46
  STREET FLOW TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =    9.11
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.435
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.06      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) =    0.06      SUBAREA RUNOFF(CFS) =    0.18
  EFFECTIVE AREA(ACRES) =      0.67    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       2.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.60
  FLOW VELOCITY(FEET/SEC.) =  1.21   DEPTH*VELOCITY(FT*FT/SEC.) =   0.46
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    130.00 =     493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.11
  RAINFALL INTENSITY(INCH/HR) =   3.44
  AREA-AVERAGED Fm(INCH/HR) =  0.02
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.67
  TOTAL STREAM AREA(ACRES) =       0.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.06

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE    120.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   122.00
  ELEVATION DATA: UPSTREAM(FEET) =     61.60  DOWNSTREAM(FEET) =     60.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.075
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.783
  SUBAREA Tc 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        0.11      0.20     0.100    75    5.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     39.00  DOWNSTREAM(FEET) =     36.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =    38.00   CHANNEL SLOPE =  0.0605
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   0.020
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.47
  FLOW VELOCITY(FEET/SEC.) =   3.69   FLOW DEPTH(FEET) =   0.06
  TRAVEL TIME(MIN.) =   0.17   Tc(MIN.) =    5.25
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    130.00 =     160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 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.) =    5.25
  RAINFALL INTENSITY(INCH/HR) =   4.69
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.11
  TOTAL STREAM AREA(ACRES) =       0.11
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.47

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.93    6.45    4.175  0.20( 0.02) 0.10       0.5      40.00
```

```
    1        2.06    9.11    3.435  0.20( 0.02) 0.10       0.7      40.00
    2        0.47    5.25    4.694  0.20( 0.02) 0.10       0.1      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.24    5.25    4.694  0.20( 0.02) 0.10       0.5      40.00
      2        2.35    6.45    4.175  0.20( 0.02) 0.10       0.6      40.00
      3        2.40    9.11    3.435  0.20( 0.02) 0.10       0.8      40.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.40    Tc(MIN.) =     9.11
  EFFECTIVE AREA(ACRES) =       0.78   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.8
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    130.00 =     493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    150.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   36.70  DOWNSTREAM ELEVATION(FEET) =   36.60
  STREET LENGTH(FEET) =    63.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.57
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.12
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =   10.05
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.249
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.07      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.07      SUBAREA RUNOFF(CFS) =    0.20
  EFFECTIVE AREA(ACRES) =      0.85    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.12
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       2.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.49
  FLOW VELOCITY(FEET/SEC.) =  1.11   DEPTH*VELOCITY(FT*FT/SEC.) =   0.46
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    150.00 =     556.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 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        2.29    6.21    4.268  0.20( 0.03) 0.14       0.6      40.00
     2        2.40    7.40    3.865  0.20( 0.03) 0.13       0.7      40.00
     3        2.47   10.05    3.249  0.20( 0.02) 0.12       0.9      40.00
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    150.00 =     556.00 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        3.52    6.84    4.038  0.20( 0.02) 0.10       0.8      40.00
     2        3.14   11.03    3.082  0.20( 0.02) 0.10       1.0      10.00
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     600.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.67    6.21    4.268  0.20( 0.02) 0.12       1.3      40.00
     2        5.87    6.84    4.038  0.20( 0.02) 0.11       1.5      40.00
     3        5.88    7.40    3.865  0.20( 0.02) 0.11       1.5      40.00
     4        5.70   10.05    3.249  0.20( 0.02) 0.11       1.8      40.00
     5        5.48   11.03    3.082  0.20( 0.02) 0.11       1.9      10.00
   TOTAL AREA(ACRES) =         1.9

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        5.88  Tc(MIN.) =    7.397
 EFFECTIVE AREA(ACRES) =      1.54  AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.11
 TOTAL AREA(ACRES) =        1.9
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     600.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.9  TC(MIN.) =      7.40
 EFFECTIVE AREA(ACRES) =      1.54  AREA-AVERAGED Fm(INCH/HR)=  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.114
 PEAK FLOW RATE(CFS)   =       5.88

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.67    6.21    4.268  0.20( 0.02) 0.12       1.3      40.00
     2        5.87    6.84    4.038  0.20( 0.02) 0.11       1.5      40.00
     3        5.88    7.40    3.865  0.20( 0.02) 0.11       1.5      40.00
     4        5.70   10.05    3.249  0.20( 0.02) 0.11       1.8      40.00
     5        5.48   11.03    3.082  0.20( 0.02) 0.11       1.9      10.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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                             Irvine, CA 92606

 ************************* DESCRIPTION OF STUDY *************************
*                           CARTWRIGHT APARTMENTS                        *
*                            EXISTING HYDROLOGY                          *
*                             100 YEAR STORM                             *
 **************************************************************************

  FILE NAME: CARTEX.DAT
  TIME/DATE OF STUDY: 15:47 06/11/2020
==========================================================================
  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     10.00 TO NODE     20.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    69.00
  ELEVATION DATA: UPSTREAM(FEET) =     41.50  DOWNSTREAM(FEET) =     37.80

  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.)
```

```
  COMMERCIAL                  D        0.09      0.20     0.100    91    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.50
  TOTAL AREA(ACRES) =      0.09   PEAK FLOW RATE(CFS) =      0.50

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     37.80
  DOWNSTREAM NODE ELEVATION(FEET) =     37.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.650
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.34      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.03
  AVERAGE FLOW DEPTH(FEET) =   0.23   FLOOD WIDTH(FEET) =   14.57
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.23   Tc(MIN.) =    8.23
  SUBAREA AREA(ACRES) =    0.34       SUBAREA RUNOFF(CFS) =    1.42
  EFFECTIVE AREA(ACRES) =    0.43     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.79

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOOD WIDTH(FEET) =   17.38
  FLOW VELOCITY(FEET/SEC.) =   1.11   DEPTH*VELOCITY(FT*FT/SEC) =   0.28
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     60.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     37.30  DOWNSTREAM(FEET) =     37.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   109.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.79
  FLOW VELOCITY(FEET/SEC.) =   2.08   FLOW DEPTH(FEET) =   0.33
  TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =    9.10
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.10
  RAINFALL INTENSITY(INCH/HR) =   4.39
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.43
  TOTAL STREAM AREA(ACRES) =       0.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.79

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 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) =     61.60  DOWNSTREAM(FEET) =     60.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.025
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.169
  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        0.12      0.20      0.100    91    5.03
  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) =      0.12   PEAK FLOW RATE(CFS) =      0.66

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     41.50
  DOWNSTREAM NODE ELEVATION(FEET) =     37.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    56.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.041
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.46      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.97
  AVERAGE FLOW DEPTH(FEET) =   0.16   FLOOD WIDTH(FEET) =    7.54
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =    5.21
  SUBAREA AREA(ACRES) =    0.46       SUBAREA RUNOFF(CFS) =    2.49
  EFFECTIVE AREA(ACRES) =    0.58     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       3.14

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOOD WIDTH(FEET) =   10.00
  FLOW VELOCITY(FEET/SEC.) =   5.24   DEPTH*VELOCITY(FT*FT/SEC) =   0.94
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     60.00 =     176.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 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.) =    5.21
  RAINFALL INTENSITY(INCH/HR) =   6.04
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.58
  TOTAL STREAM AREA(ACRES) =       0.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.14

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.79    9.10    4.389  0.20( 0.02) 0.10       0.4      10.00
      2        3.14    5.21    6.041  0.20( 0.02) 0.10       0.6      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.56    5.21    6.041  0.20( 0.02) 0.10       0.8      40.00
      2        4.07    9.10    4.389  0.20( 0.02) 0.10       1.0      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.56    Tc(MIN.) =     5.21
  EFFECTIVE AREA(ACRES) =       0.83   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     70.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     37.00  DOWNSTREAM(FEET) =     36.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   197.00   CHANNEL SLOPE =  0.0015
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.56
  FLOW VELOCITY(FEET/SEC.) =   2.19   FLOW DEPTH(FEET) =   0.64
  TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =    6.71
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     70.00 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.70  DOWNSTREAM(FEET) =    36.50
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.11
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
```

```
  GIVEN PIPE DIAMETER(INCH) =   4.00    NUMBER OF PIPES =   2
  PIPE-FLOW(CFS) =       4.56
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.73
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     80.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   138.00
  ELEVATION DATA: UPSTREAM(FEET) =     61.60  DOWNSTREAM(FEET) =     60.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.465
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.880
  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        0.12      0.20      0.100    91    5.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.63
  TOTAL AREA(ACRES) =      0.12   PEAK FLOW RATE(CFS) =      0.63

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE    100.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     41.50
  DOWNSTREAM NODE ELEVATION(FEET) =     36.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.111
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.26      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.53
  AVERAGE FLOW DEPTH(FEET) =   0.17   FLOOD WIDTH(FEET) =    8.77
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.51   Tc(MIN.) =    6.98
  SUBAREA AREA(ACRES) =    0.26       SUBAREA RUNOFF(CFS) =    1.19
  EFFECTIVE AREA(ACRES) =    0.38     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.74

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOOD WIDTH(FEET) =   10.53
  FLOW VELOCITY(FEET/SEC.) =   2.66   DEPTH*VELOCITY(FT*FT/SEC) =   0.49
```

```
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    100.00 =     368.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    110.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   36.90  DOWNSTREAM ELEVATION(FEET) =   36.80
 STREET LENGTH(FEET) =    80.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.97
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   13.89
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.96
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.39
 STREET FLOW TRAVEL TIME(MIN.) =   1.39   Tc(MIN.) =    8.36
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.607
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.11      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) =    0.11      SUBAREA RUNOFF(CFS) =    0.45
 EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.02

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.06
 FLOW VELOCITY(FEET/SEC.) =  0.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.39
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    110.00 =     448.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.36
 RAINFALL INTENSITY(INCH/HR) =   4.61
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.49
 TOTAL STREAM AREA(ACRES) =       0.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.02

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     90.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   138.00
  ELEVATION DATA: UPSTREAM(FEET) =     61.60  DOWNSTREAM(FEET) =     60.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.465
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.880
  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        0.12      0.20     0.100    91    5.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.63
  TOTAL AREA(ACRES) =      0.12   PEAK FLOW RATE(CFS) =      0.63

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    38.10  DOWNSTREAM(FEET) =    36.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.94
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.63
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    5.80
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    110.00 =     218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 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.) =    5.80
  RAINFALL INTENSITY(INCH/HR) =   5.68
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.12
  TOTAL STREAM AREA(ACRES) =       0.12
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.63

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.02    8.36    4.607  0.20( 0.02) 0.10       0.5      40.00
      2        0.63    5.80    5.681  0.20( 0.02) 0.10       0.1      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
     1        2.36    5.80    5.681  0.20( 0.02) 0.10       0.5      40.00
     2        2.54    8.36    4.607  0.20( 0.02) 0.10       0.6      40.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.54    Tc(MIN.) =     8.36
  EFFECTIVE AREA(ACRES) =       0.61   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    110.00 =     448.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    130.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   36.80  DOWNSTREAM ELEVATION(FEET) =   36.70
  STREET LENGTH(FEET) =    45.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   13.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.28
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.52
  STREET FLOW TRAVEL TIME(MIN.) =   0.58   Tc(MIN.) =    8.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.432
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.06      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) =    0.06      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      0.67    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       2.66

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.97
  FLOW VELOCITY(FEET/SEC.) =  1.29   DEPTH*VELOCITY(FT*FT/SEC.) =   0.52
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    130.00 =     493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.95
  RAINFALL INTENSITY(INCH/HR) =   4.43
  AREA-AVERAGED Fm(INCH/HR) =  0.02
```

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 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.67
 TOTAL STREAM AREA(ACRES) =       0.67
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.66

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE    120.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   122.00
 ELEVATION DATA: UPSTREAM(FEET) =     61.60  DOWNSTREAM(FEET) =     60.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.075
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.134
 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        0.11      0.20     0.100    91    5.08
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.61
 TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.61

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     39.00  DOWNSTREAM(FEET) =     36.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =    38.00   CHANNEL SLOPE =  0.0605
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   0.020
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.61
 FLOW VELOCITY(FEET/SEC.) =   4.12   FLOW DEPTH(FEET) =   0.07
 TRAVEL TIME(MIN.) =   0.15   Tc(MIN.) =    5.23
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    130.00 =     160.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 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.) =    5.23
 RAINFALL INTENSITY(INCH/HR) =   6.03
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.11
 TOTAL STREAM AREA(ACRES) =       0.11
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.61

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.51    6.39    5.374  0.20( 0.02) 0.10        0.5      40.00
```

```
    1        2.66    8.95    4.432  0.20( 0.02) 0.10       0.7      40.00
    2        0.61    5.23    6.030  0.20( 0.02) 0.10       0.1      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.91    5.23    6.030  0.20( 0.02) 0.10       0.5      40.00
      2        3.04    6.39    5.374  0.20( 0.02) 0.10       0.6      40.00
      3        3.10    8.95    4.432  0.20( 0.02) 0.10       0.8      40.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.10    Tc(MIN.) =     8.95
  EFFECTIVE AREA(ACRES) =       0.78   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.8
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    130.00 =     493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    150.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   36.70  DOWNSTREAM ELEVATION(FEET) =   36.60
  STREET LENGTH(FEET) =    63.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.23
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   16.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.18
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.53
  STREET FLOW TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =    9.84
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.198
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.07      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.07      SUBAREA RUNOFF(CFS) =    0.26
  EFFECTIVE AREA(ACRES) =      0.85    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.12
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.19

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.12
  FLOW VELOCITY(FEET/SEC.) =  1.17   DEPTH*VELOCITY(FT*FT/SEC.) =   0.53
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE    150.00 =     556.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 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        2.98    6.13    5.506  0.20( 0.03) 0.13       0.6      40.00
     2        3.13    7.29    4.987  0.20( 0.03) 0.13       0.7      40.00
     3        3.19    9.84    4.198  0.20( 0.02) 0.12       0.9      40.00
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE    150.00 =     556.00 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        4.56    6.73    5.219  0.20( 0.02) 0.10       0.8      40.00
     2        4.07   10.66    4.009  0.20( 0.02) 0.10       1.0      10.00
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     600.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        7.36    6.13    5.506  0.20( 0.02) 0.12       1.4      40.00
     2        7.61    6.73    5.219  0.20( 0.02) 0.11       1.5      40.00
     3        7.61    7.29    4.987  0.20( 0.02) 0.11       1.6      40.00
     4        7.37    9.84    4.198  0.20( 0.02) 0.11       1.8      40.00
     5        7.12   10.66    4.009  0.20( 0.02) 0.11       1.9      10.00
   TOTAL AREA(ACRES) =         1.9

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        7.61  Tc(MIN.) =    6.729
 EFFECTIVE AREA(ACRES) =      1.48  AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.11
 TOTAL AREA(ACRES) =        1.9
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     600.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.9  TC(MIN.) =      6.73
 EFFECTIVE AREA(ACRES) =      1.48  AREA-AVERAGED Fm(INCH/HR)=  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.114
 PEAK FLOW RATE(CFS)   =       7.61

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        7.36    6.13    5.506  0.20( 0.02) 0.12       1.4      40.00
     2        7.61    6.73    5.219  0.20( 0.02) 0.11       1.5      40.00
     3        7.61    7.29    4.987  0.20( 0.02) 0.11       1.6      40.00
     4        7.37    9.84    4.198  0.20( 0.02) 0.11       1.8      40.00
     5        7.12   10.66    4.009  0.20( 0.02) 0.11       1.9      10.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

APPENDIX 4

PROPOSED HYDROLOGY CALCULATIONS

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2014 Advanced Engineering Software (aes)
             Ver. 21.0  Release Date: 06/01/2014  License ID 1355

                          Analysis prepared by:

                            Fuscoe Engineering
                             16795 Von Karman
                                Suite 100
                             Irvine, CA 92606

 ************************* DESCRIPTION OF STUDY *************************
*                           CARTWRIGHT APARTMENTS                        *
*                            PROPOSED CONDITIONS                         *
*                              2 YEAR STORM                              *
 **************************************************************************

  FILE NAME: CARTPR.DAT
  TIME/DATE OF STUDY: 15:49 06/11/2020
==========================================================================
  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
  *DATA BANK RAINFALL USED*
  *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     10.00 TO NODE     20.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    89.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.40  DOWNSTREAM(FEET) =     37.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.071
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.245
  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.)
```

```
  MOBILE HOME PARK           D        0.10      0.20     0.250    57    5.07
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     40.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     37.50
  DOWNSTREAM NODE ELEVATION(FEET) =     37.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   111.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.870
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  MOBILE HOME PARK           D        0.50      0.20     0.250    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.97
  AVERAGE FLOW DEPTH(FEET) =   0.18   FLOOD WIDTH(FEET) =   10.17
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    6.97
  SUBAREA AREA(ACRES) =    0.50       SUBAREA RUNOFF(CFS) =    0.82
  EFFECTIVE AREA(ACRES) =    0.60     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.25
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       0.98

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOOD WIDTH(FEET) =   12.99
  FLOW VELOCITY(FEET/SEC.) =   1.04   DEPTH*VELOCITY(FT*FT/SEC) =   0.22
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =    6.97
  RAINFALL INTENSITY(INCH/HR) =   1.87
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.25
  EFFECTIVE STREAM AREA(ACRES) =       0.60
  TOTAL STREAM AREA(ACRES) =       0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.98

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     35.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   103.00
  ELEVATION DATA: UPSTREAM(FEET) =     39.40  DOWNSTREAM(FEET) =     36.90
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  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        0.07      0.20     0.100    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     40.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.50  DOWNSTREAM(FEET) =    33.40
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.01
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.14
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    5.12
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =     118.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =    5.12
  RAINFALL INTENSITY(INCH/HR) =   2.23
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.07
  TOTAL STREAM AREA(ACRES) =       0.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.14

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.98    6.97    1.870  0.20( 0.05) 0.25       0.6      10.00
      2        0.14    5.12    2.232  0.20( 0.02) 0.10       0.1      30.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.01    5.12    2.232  0.20( 0.05) 0.23       0.5      30.00
      2        1.10    6.97    1.870  0.20( 0.05) 0.23       0.7      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.10    Tc(MIN.) =     6.97
  EFFECTIVE AREA(ACRES) =       0.67   AREA-AVERAGED Fm(INCH/HR) =  0.05
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =        0.7
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     200.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     65.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.40  DOWNSTREAM(FEET) =    32.40
 FLOW LENGTH(FEET) =   197.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.99
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.10
 PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =    8.07
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     65.00 =     397.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.07
 RAINFALL INTENSITY(INCH/HR) =   1.72
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.23
 EFFECTIVE STREAM AREA(ACRES) =       0.67
 TOTAL STREAM AREA(ACRES) =       0.67
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.10

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
 ELEVATION DATA: UPSTREAM(FEET) =     38.70  DOWNSTREAM(FEET) =     37.90

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.746
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.761
 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
 "8-10 DWELLINGS/ACRE"      D        0.50      0.20     0.400    57    7.75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE     60.00 TO NODE     65.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    33.50  DOWNSTREAM(FEET) =    32.40
 FLOW LENGTH(FEET) =    21.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   2.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.53
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.76
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.80
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     65.00 =     166.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.80
 RAINFALL INTENSITY(INCH/HR) =   1.75
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.40
 EFFECTIVE STREAM AREA(ACRES) =       0.50
 TOTAL STREAM AREA(ACRES) =       0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.76

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        1.01    6.25    1.992  0.20( 0.05) 0.23       0.5      30.00
     1        1.10    8.07    1.720  0.20( 0.05) 0.23       0.7      10.00
     2        0.76    7.80    1.754  0.20( 0.08) 0.40       0.5      50.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        1.70    6.25    1.992  0.20( 0.06) 0.30       0.9      30.00
     2        1.84    7.80    1.754  0.20( 0.06) 0.31       1.1      50.00
     3        1.84    8.07    1.720  0.20( 0.06) 0.31       1.2      10.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       1.84    Tc(MIN.) =     7.80
 EFFECTIVE AREA(ACRES) =       1.15   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =        1.2
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     65.00 =     397.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     65.00 TO NODE     70.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    32.40  DOWNSTREAM(FEET) =    32.10
 FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.27
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.84
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    8.13
```

```
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     70.00 =     461.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     70.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    36.70  DOWNSTREAM(FEET) =    36.50
 FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.33
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.84
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    8.16
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     473.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     80.00 TO NODE     90.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    79.00
 ELEVATION DATA: UPSTREAM(FEET) =     39.40  DOWNSTREAM(FEET) =     38.40

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
 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        0.08      0.20      0.100    57    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.08   PEAK FLOW RATE(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE     90.00 TO NODE    100.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =     38.40
 DOWNSTREAM NODE ELEVATION(FEET) =     37.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00
 "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
 PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
 MAXIMUM DEPTH(FEET) =   1.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.809
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        0.33      0.20      0.350    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.35
  AVERAGE FLOW DEPTH(FEET) =   0.14   FLOOD WIDTH(FEET) =    6.48
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =    7.39
  SUBAREA AREA(ACRES) =    0.33       SUBAREA RUNOFF(CFS) =    0.52
  EFFECTIVE AREA(ACRES) =    0.41     AREA-AVERAGED Fm(INCH/HR) =   0.06
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.30
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.65

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOOD WIDTH(FEET) =    8.42
  FLOW VELOCITY(FEET/SEC.) =   1.42   DEPTH*VELOCITY(FT*FT/SEC) =   0.23
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE    100.00 =     272.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    130.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   37.20  DOWNSTREAM ELEVATION(FEET) =   36.70
  STREET LENGTH(FEET) =   106.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.74
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.33
  STREET FLOW TRAVEL TIME(MIN.) =   1.39   Tc(MIN.) =    8.78
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.639
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.19
  EFFECTIVE AREA(ACRES) =      0.54    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       0.77

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.91
  FLOW VELOCITY(FEET/SEC.) =  1.30   DEPTH*VELOCITY(FT*FT/SEC.) =   0.34
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE    130.00 =     378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.78
  RAINFALL INTENSITY(INCH/HR) =   1.64
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.25
  EFFECTIVE STREAM AREA(ACRES) =       0.54
  TOTAL STREAM AREA(ACRES) =       0.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.77

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.20  DOWNSTREAM(FEET) =     37.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.215
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.210
  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
  "8-10 DWELLINGS/ACRE"      D        0.15      0.20     0.400    57    5.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.15   PEAK FLOW RATE(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.40  DOWNSTREAM(FEET) =    36.70
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.91
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.29
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.24
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    130.00 =      83.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 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.) =    5.24
  RAINFALL INTENSITY(INCH/HR) =   2.20
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       0.15
  TOTAL STREAM AREA(ACRES) =       0.15
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.29
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        0.77    8.78    1.639  0.20( 0.05) 0.25       0.5      80.00
     2        0.29    5.24    2.204  0.20( 0.08) 0.40       0.2     110.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        0.91    5.24    2.204  0.20( 0.06) 0.30       0.5     110.00
     2        0.98    8.78    1.639  0.20( 0.06) 0.28       0.7      80.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       0.98    Tc(MIN.) =     8.78
 EFFECTIVE AREA(ACRES) =       0.69   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =        0.7
 LONGEST FLOWPATH FROM NODE     80.00 TO NODE    130.00 =     378.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     36.70  DOWNSTREAM(FEET) =     36.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =    58.00   CHANNEL SLOPE =  0.0034
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.98
 FLOW VELOCITY(FEET/SEC.) =   1.85   FLOW DEPTH(FEET) =   0.22
 TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    9.30
 LONGEST FLOWPATH FROM NODE     80.00 TO NODE    150.00 =     436.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 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        0.91    5.77    2.084  0.20( 0.06) 0.30       0.5     110.00
     2        0.98    9.30    1.585  0.20( 0.06) 0.28       0.7      80.00
 LONGEST FLOWPATH FROM NODE     80.00 TO NODE    150.00 =     436.00 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        1.70    6.61    1.928  0.20( 0.06) 0.30       0.9      30.00
     2        1.84    8.16    1.708  0.20( 0.06) 0.31       1.1      50.00
     3        1.84    8.43    1.677  0.20( 0.06) 0.31       1.2      10.00
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     473.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.52    5.77    2.084  0.20( 0.06) 0.30       1.3     110.00
```

```
     2        2.63    6.61    1.928  0.20( 0.06) 0.30       1.4      30.00
     3        2.80    8.16    1.708  0.20( 0.06) 0.30       1.8      50.00
     4        2.81    8.43    1.677  0.20( 0.06) 0.30       1.8      10.00
     5        2.72    9.30    1.585  0.20( 0.06) 0.30       1.9      80.00
   TOTAL AREA(ACRES) =         1.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        2.81  Tc(MIN.) =    8.433
  EFFECTIVE AREA(ACRES) =      1.81  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =        1.9
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     473.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.9  TC(MIN.) =      8.43
  EFFECTIVE AREA(ACRES) =      1.81  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.299
  PEAK FLOW RATE(CFS)   =       2.81

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.52    5.77    2.084  0.20( 0.06) 0.30       1.3     110.00
     2        2.63    6.61    1.928  0.20( 0.06) 0.30       1.4      30.00
     3        2.80    8.16    1.708  0.20( 0.06) 0.30       1.8      50.00
     4        2.81    8.43    1.677  0.20( 0.06) 0.30       1.8      10.00
     5        2.72    9.30    1.585  0.20( 0.06) 0.30       1.9      80.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
*                           CARTWRIGHT APARTMENTS                          *
*                            PROPOSED CONDITIONS                           *
*                             25 YEAR STORM                                *
 ******************************************************************************

  FILE NAME: CARTPR.DAT
  TIME/DATE OF STUDY: 15:50 06/11/2020
==============================================================================
  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     10.00 TO NODE     20.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    89.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.40  DOWNSTREAM(FEET) =     37.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.071
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.785
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
  MOBILE HOME PARK           D        0.10      0.20     0.250    75    5.07
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  SUBAREA RUNOFF(CFS) =      0.43
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.43

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     40.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     37.50
  DOWNSTREAM NODE ELEVATION(FEET) =     37.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   111.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.061
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  MOBILE HOME PARK           D        0.50      0.20     0.250    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.08
  AVERAGE FLOW DEPTH(FEET) =   0.23   FLOOD WIDTH(FEET) =   14.92
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.71   Tc(MIN.) =    6.78
  SUBAREA AREA(ACRES) =    0.50       SUBAREA RUNOFF(CFS) =    1.80
  EFFECTIVE AREA(ACRES) =    0.60     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.25
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       2.17

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOOD WIDTH(FEET) =   18.44
  FLOW VELOCITY(FEET/SEC.) =   1.20   DEPTH*VELOCITY(FT*FT/SEC) =   0.32
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =    6.78
  RAINFALL INTENSITY(INCH/HR) =   4.06
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.25
  EFFECTIVE STREAM AREA(ACRES) =       0.60
  TOTAL STREAM AREA(ACRES) =       0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.17

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     35.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   103.00
  ELEVATION DATA: UPSTREAM(FEET) =     39.40  DOWNSTREAM(FEET) =     36.90
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc 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        0.07      0.20     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     40.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.50  DOWNSTREAM(FEET) =    33.40
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.39
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.30
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    5.10
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =     118.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =    5.10
  RAINFALL INTENSITY(INCH/HR) =   4.77
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.07
  TOTAL STREAM AREA(ACRES) =       0.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.30

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.17    6.78    4.061  0.20( 0.05) 0.25       0.6      10.00
      2        0.30    5.10    4.767  0.20( 0.02) 0.10       0.1      30.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.22    5.10    4.767  0.20( 0.05) 0.23       0.5      30.00
      2        2.42    6.78    4.061  0.20( 0.05) 0.23       0.7      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.42    Tc(MIN.) =     6.78
  EFFECTIVE AREA(ACRES) =       0.67   AREA-AVERAGED Fm(INCH/HR) =  0.05
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        0.7
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     65.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.40  DOWNSTREAM(FEET) =    32.40
  FLOW LENGTH(FEET) =   197.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.09
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.42
  PIPE TRAVEL TIME(MIN.) =   1.06    Tc(MIN.) =    7.84
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     65.00 =     397.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.84
  RAINFALL INTENSITY(INCH/HR) =   3.74
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =       0.67
  TOTAL STREAM AREA(ACRES) =       0.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.42

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.70  DOWNSTREAM(FEET) =     37.90

  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
  "8-10 DWELLINGS/ACRE"      D        0.50      0.20     0.400    75    7.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.66
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.66

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     65.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.50  DOWNSTREAM(FEET) =    32.40
  FLOW LENGTH(FEET) =    21.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.95
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.66
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.79
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     65.00 =     166.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.79
  RAINFALL INTENSITY(INCH/HR) =   3.75
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       0.50
  TOTAL STREAM AREA(ACRES) =       0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.66

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.22    6.05    4.331  0.20( 0.05) 0.23       0.5      30.00
      1        2.42    7.84    3.739  0.20( 0.05) 0.23       0.7      10.00
      2        1.66    7.79    3.753  0.20( 0.08) 0.40       0.5      50.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.71    6.05    4.331  0.20( 0.06) 0.30       0.9      30.00
      2        4.08    7.79    3.753  0.20( 0.06) 0.31       1.2      50.00
      3        4.08    7.84    3.739  0.20( 0.06) 0.31       1.2      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.08    Tc(MIN.) =     7.79
  EFFECTIVE AREA(ACRES) =       1.17   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =        1.2
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     65.00 =     397.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     70.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    32.40  DOWNSTREAM(FEET) =    32.10
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.19
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       4.08
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    8.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     70.00 =     461.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.70  DOWNSTREAM(FEET) =    36.50
  FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.31
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.08
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    8.03
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     473.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     90.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    79.00
  ELEVATION DATA: UPSTREAM(FEET) =     39.40  DOWNSTREAM(FEET) =     38.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc 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        0.08      0.20      0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.08   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE    100.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     38.40
  DOWNSTREAM NODE ELEVATION(FEET) =     37.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.932
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        0.33      0.20      0.350    75
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.48
  AVERAGE FLOW DEPTH(FEET) =   0.18   FLOOD WIDTH(FEET) =   10.17
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.17   Tc(MIN.) =    7.17
  SUBAREA AREA(ACRES) =    0.33       SUBAREA RUNOFF(CFS) =    1.15
  EFFECTIVE AREA(ACRES) =    0.41     AREA-AVERAGED Fm(INCH/HR) =   0.06
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.30
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.43

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOOD WIDTH(FEET) =   12.81
  FLOW VELOCITY(FEET/SEC.) =   1.55   DEPTH*VELOCITY(FT*FT/SEC) =   0.32
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE    100.00 =     272.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    130.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   37.20  DOWNSTREAM ELEVATION(FEET) =   36.70
  STREET LENGTH(FEET) =   106.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.76
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.49
  STREET FLOW TRAVEL TIME(MIN.) =   1.15   Tc(MIN.) =    8.33
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.614
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.42
  EFFECTIVE AREA(ACRES) =      0.54    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.73

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.02
  FLOW VELOCITY(FEET/SEC.) =  1.54   DEPTH*VELOCITY(FT*FT/SEC.) =   0.50
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE    130.00 =     378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.33
  RAINFALL INTENSITY(INCH/HR) =   3.61
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.25
  EFFECTIVE STREAM AREA(ACRES) =       0.54
  TOTAL STREAM AREA(ACRES) =       0.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.73

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.20  DOWNSTREAM(FEET) =     37.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.215
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.710
  SUBAREA Tc 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
  "8-10 DWELLINGS/ACRE"      D        0.15      0.20     0.400    75    5.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.63
  TOTAL AREA(ACRES) =      0.15   PEAK FLOW RATE(CFS) =      0.63

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.40  DOWNSTREAM(FEET) =    36.70
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.38
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.63
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.23
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    130.00 =      83.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 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.) =    5.23
  RAINFALL INTENSITY(INCH/HR) =   4.70
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       0.15
```

```
 TOTAL STREAM AREA(ACRES) =       0.15
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.63

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        1.73    8.33    3.614  0.20( 0.05) 0.25       0.5      80.00
     2        0.63    5.23    4.701  0.20( 0.08) 0.40       0.2     110.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.05    5.23    4.701  0.20( 0.06) 0.30       0.5     110.00
     2        2.21    8.33    3.614  0.20( 0.06) 0.28       0.7      80.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.21    Tc(MIN.) =     8.33
 EFFECTIVE AREA(ACRES) =       0.69   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =        0.7
 LONGEST FLOWPATH FROM NODE     80.00 TO NODE    130.00 =     378.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     36.70  DOWNSTREAM(FEET) =     36.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =    58.00   CHANNEL SLOPE =  0.0034
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.21
 FLOW VELOCITY(FEET/SEC.) =   2.37   FLOW DEPTH(FEET) =   0.35
 TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =    8.74
 LONGEST FLOWPATH FROM NODE     80.00 TO NODE    150.00 =     436.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 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        2.05    5.65    4.501  0.20( 0.06) 0.30       0.5     110.00
     2        2.21    8.74    3.517  0.20( 0.06) 0.28       0.7      80.00
 LONGEST FLOWPATH FROM NODE     80.00 TO NODE    150.00 =     436.00 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        3.71    6.31    4.229  0.20( 0.06) 0.30       0.9      30.00
     2        4.08    8.03    3.690  0.20( 0.06) 0.31       1.2      50.00
     3        4.08    8.08    3.676  0.20( 0.06) 0.31       1.2      10.00
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     473.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)		(ACRES)	NODE
1	5.59	5.65	4.501	0.20(0.06)	0.30	1.3	110.00
2	5.79	6.31	4.229	0.20(0.06)	0.30	1.4	30.00
3	6.25	8.03	3.690	0.20(0.06)	0.30	1.8	50.00
4	6.25	8.08	3.676	0.20(0.06)	0.30	1.8	10.00
5	6.11	8.74	3.517	0.20(0.06)	0.30	1.9	80.00

TOTAL AREA(ACRES) = 1.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 6.25 Tc(MIN.) = 8.080
EFFECTIVE AREA(ACRES) = 1.82 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 1.9
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 150.00 = 473.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.9 TC(MIN.) = 8.08
EFFECTIVE AREA(ACRES) = 1.82 AREA-AVERAGED Fm(INCH/HR)= 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.299
PEAK FLOW RATE(CFS) = 6.25

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)		Ap (ACRES)	Ae	HEADWATER NODE
1	5.59	5.65	4.501	0.20(0.06)	0.30	1.3		110.00
2	5.79	6.31	4.229	0.20(0.06)	0.30	1.4		30.00
3	6.25	8.03	3.690	0.20(0.06)	0.30	1.8		50.00
4	6.25	8.08	3.676	0.20(0.06)	0.30	1.8		10.00
5	6.11	8.74	3.517	0.20(0.06)	0.30	1.9		80.00

==========

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END OF RATIONAL METHOD ANALYSIS

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

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                             Irvine, CA 92606

 ************************* DESCRIPTION OF STUDY *************************
*                           CARTWRIGHT APARTMENTS                        *
*                            PROPOSED CONDITIONS                         *
*                            100 YEAR STORM                              *
 ******************************************************************************

  FILE NAME: CARTPR.DAT
  TIME/DATE OF STUDY: 15:51 06/11/2020
==============================================================================
  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     10.00 TO NODE     20.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    89.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.40  DOWNSTREAM(FEET) =     37.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.071
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.137
  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.)
```

```
  MOBILE HOME PARK           D        0.10      0.20     0.250    91    5.07
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     40.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     37.50
  DOWNSTREAM NODE ELEVATION(FEET) =     37.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   111.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.232
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  MOBILE HOME PARK           D        0.50      0.20     0.250    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.14
  AVERAGE FLOW DEPTH(FEET) =   0.25   FLOOD WIDTH(FEET) =   16.68
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.63   Tc(MIN.) =    6.70
  SUBAREA AREA(ACRES) =    0.50       SUBAREA RUNOFF(CFS) =    2.33
  EFFECTIVE AREA(ACRES) =    0.60     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.25
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       2.80

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOOD WIDTH(FEET) =   20.54
  FLOW VELOCITY(FEET/SEC.) =   1.27   DEPTH*VELOCITY(FT*FT/SEC) =   0.36
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =    6.70
  RAINFALL INTENSITY(INCH/HR) =   5.23
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.25
  EFFECTIVE STREAM AREA(ACRES) =       0.60
  TOTAL STREAM AREA(ACRES) =       0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.80

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     35.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   103.00
  ELEVATION DATA: UPSTREAM(FEET) =     39.40  DOWNSTREAM(FEET) =     36.90
```

```
  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.)
  COMMERCIAL                  D        0.07      0.20      0.100    91    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     40.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.50  DOWNSTREAM(FEET) =    33.40
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.52
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.39
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    5.10
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =     118.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 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.) =    5.10
  RAINFALL INTENSITY(INCH/HR) =   6.12
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.07
  TOTAL STREAM AREA(ACRES) =       0.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.39

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.80    6.70    5.232  0.20( 0.05) 0.25       0.6      10.00
      2        0.39    5.10    6.118  0.20( 0.02) 0.10       0.1      30.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.88    5.10    6.118  0.20( 0.05) 0.23       0.5      30.00
      2        3.13    6.70    5.232  0.20( 0.05) 0.23       0.7      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.13    Tc(MIN.) =     6.70
  EFFECTIVE AREA(ACRES) =       0.67   AREA-AVERAGED Fm(INCH/HR) =  0.05
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        0.7
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     65.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.40  DOWNSTREAM(FEET) =    32.40
  FLOW LENGTH(FEET) =   197.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.99
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.13
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =    7.52
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     65.00 =     397.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.52
  RAINFALL INTENSITY(INCH/HR) =   4.90
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =       0.67
  TOTAL STREAM AREA(ACRES) =       0.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.13

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.70  DOWNSTREAM(FEET) =     37.90

  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/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.50      0.20     0.400    91    7.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.13
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      2.13

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     65.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.50  DOWNSTREAM(FEET) =    32.40
  FLOW LENGTH(FEET) =    21.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.39
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.13
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.79
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     65.00 =     166.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.79
  RAINFALL INTENSITY(INCH/HR) =   4.80
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       0.50
  TOTAL STREAM AREA(ACRES) =       0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.13

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.88    5.99    5.577  0.20( 0.05) 0.23       0.5      30.00
      1        3.13    7.52    4.896  0.20( 0.05) 0.23       0.7      10.00
      2        2.13    7.79    4.800  0.20( 0.08) 0.40       0.5      50.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.79    5.99    5.577  0.20( 0.06) 0.30       0.9      30.00
      2        5.23    7.52    4.896  0.20( 0.06) 0.30       1.2      10.00
      3        5.20    7.79    4.800  0.20( 0.06) 0.31       1.2      50.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.23    Tc(MIN.) =     7.52
  EFFECTIVE AREA(ACRES) =       1.15   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =        1.2
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     65.00 =     397.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     70.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    32.40  DOWNSTREAM(FEET) =    32.10
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.66
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       5.23
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    7.68
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     70.00 =     461.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.70  DOWNSTREAM(FEET) =    36.50
  FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.66
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.23
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.71
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     473.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     90.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    79.00
  ELEVATION DATA: UPSTREAM(FEET) =     39.40  DOWNSTREAM(FEET) =     38.40

  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.)
  COMMERCIAL                 D        0.08      0.20      0.100    91    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.08   PEAK FLOW RATE(CFS) =      0.44

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE    100.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     38.40
  DOWNSTREAM NODE ELEVATION(FEET) =     37.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.057
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  CONDOMINIUMS                D        0.33      0.20     0.350    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.53
  AVERAGE FLOW DEPTH(FEET) =   0.20   FLOOD WIDTH(FEET) =   11.58
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.11   Tc(MIN.) =    7.11
  SUBAREA AREA(ACRES) =    0.33       SUBAREA RUNOFF(CFS) =    1.48
  EFFECTIVE AREA(ACRES) =    0.41     AREA-AVERAGED Fm(INCH/HR) =   0.06
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.30
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.84

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOOD WIDTH(FEET) =   14.39
  FLOW VELOCITY(FEET/SEC.) =   1.62   DEPTH*VELOCITY(FT*FT/SEC) =   0.36
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE    100.00 =     272.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    130.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   37.20  DOWNSTREAM ELEVATION(FEET) =   36.70
  STREET LENGTH(FEET) =   106.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.12
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.63
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.56
  STREET FLOW TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =    8.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.661
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.54
  EFFECTIVE AREA(ACRES) =      0.54    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.24

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.14
  FLOW VELOCITY(FEET/SEC.) =  1.65   DEPTH*VELOCITY(FT*FT/SEC.) =   0.58
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE    130.00 =     378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.20
  RAINFALL INTENSITY(INCH/HR) =   4.66
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.25
  EFFECTIVE STREAM AREA(ACRES) =       0.54
  TOTAL STREAM AREA(ACRES) =       0.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.24

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.20  DOWNSTREAM(FEET) =     37.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.215
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.040
  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
  "8-10 DWELLINGS/ACRE"      D        0.15      0.20     0.400    91    5.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.15   PEAK FLOW RATE(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.40  DOWNSTREAM(FEET) =    36.70
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.99
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.80
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.23
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    130.00 =      83.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 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.) =    5.23
  RAINFALL INTENSITY(INCH/HR) =   6.03
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.40
```

```
 EFFECTIVE STREAM AREA(ACRES) =       0.15
 TOTAL STREAM AREA(ACRES) =       0.15
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.80

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.24    8.20    4.661  0.20( 0.05) 0.25       0.5      80.00
     2        0.80    5.23    6.028  0.20( 0.08) 0.40       0.2     110.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.66    5.23    6.028  0.20( 0.06) 0.30       0.5     110.00
     2        2.86    8.20    4.661  0.20( 0.06) 0.28       0.7      80.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.86    Tc(MIN.) =     8.20
 EFFECTIVE AREA(ACRES) =       0.69   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =        0.7
 LONGEST FLOWPATH FROM NODE     80.00 TO NODE    130.00 =     378.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     36.70  DOWNSTREAM(FEET) =     36.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =    58.00   CHANNEL SLOPE =  0.0034
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.86
 FLOW VELOCITY(FEET/SEC.) =   2.56   FLOW DEPTH(FEET) =   0.40
 TRAVEL TIME(MIN.) =   0.38   Tc(MIN.) =    8.57
 LONGEST FLOWPATH FROM NODE     80.00 TO NODE    150.00 =     436.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 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        2.66    5.62    5.787  0.20( 0.06) 0.30       0.5     110.00
     2        2.86    8.57    4.543  0.20( 0.06) 0.28       0.7      80.00
 LONGEST FLOWPATH FROM NODE     80.00 TO NODE    150.00 =     436.00 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        4.79    6.20    5.469  0.20( 0.06) 0.30       0.9      30.00
     2        5.23    7.71    4.826  0.20( 0.06) 0.30       1.2      10.00
     3        5.20    7.98    4.734  0.20( 0.06) 0.31       1.2      50.00
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE    150.00 =     473.00 FEET.

 ** PEAK FLOW RATE TABLE **
```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.26	5.62	5.787	0.20(0.06)	0.30	1.3	110.00
2	7.49	6.20	5.469	0.20(0.06)	0.30	1.4	30.00
3	8.03	7.71	4.826	0.20(0.06)	0.30	1.8	10.00
4	8.02	7.98	4.734	0.20(0.06)	0.30	1.8	50.00
5	7.85	8.57	4.543	0.20(0.06)	0.30	1.9	80.00

TOTAL AREA(ACRES) = 1.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 8.03 Tc(MIN.) = 7.713
EFFECTIVE AREA(ACRES) = 1.79 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 1.9
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 150.00 = 473.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.9 TC(MIN.) = 7.71
EFFECTIVE AREA(ACRES) = 1.79 AREA-AVERAGED Fm(INCH/HR)= 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.298
PEAK FLOW RATE(CFS) = 8.03

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.26	5.62	5.787	0.20(0.06)	0.30	1.3	110.00
2	7.49	6.20	5.469	0.20(0.06)	0.30	1.4	30.00
3	8.03	7.71	4.826	0.20(0.06)	0.30	1.8	10.00
4	8.02	7.98	4.734	0.20(0.06)	0.30	1.8	50.00
5	7.85	8.57	4.543	0.20(0.06)	0.30	1.9	80.00

==========
==========

END OF RATIONAL METHOD ANALYSIS

APPENDIX 5

HYDROMOD CALCULATIONS

HYDROMOD CALCULATIONS

SITE POTENTIALLY SUSCEPTIBLE TO HYDROMOD DETENTION REQUIREMENTS DUE TO DISCHARGE TO PETER'S CANYON CHANNEL

AREA (ACRES)		2 YR–24 HR STORM VOLUME (AC–FT)				2–YEAR TIME OF CONCENTRATION (MIN)				2–YEAR PEAK RUNOFF (CFS)			
EXISTING	PROPOSED	EXISTING	PROPOSED	INCREASE	% INCREASE	EXISTING	PROPOSED	DIFFERENCE	%	EXISTING	PROPOSED	INCREASE	% INCREASE
1.86	1.86	0.21	0.21	0	0	7.3	8.1	0.8	9.8%	2.7	2.8	0.1	3.7%

```
**************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
==========================================================================
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                           Analysis prepared by:

                             Fuscoe Engineering
                              16795 Von Karman
                                 Suite 100
                              Irvine, CA 92606

**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  CARTWRIGHT APARTMENTS
  EXISTING CONDITIONS
  2 YEAR Y-BAR
==========================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          1.86       10.00       75.(AMC II)     0.200       0.803

    TOTAL AREA (Acres) =      1.86

                                  _
    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.020

                                  _
    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.197
==========================================================================
```

```
**************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==========================================================================
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             Ver. 21.0  Release Date: 06/01/2014  License ID 1355

                          Analysis prepared by:

                            Fuscoe Engineering
                             16795 Von Karman
                                Suite 100
                             Irvine, CA 92606

**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  CARTWRIGHT EXISTING CONDITIONS
  EXISTING CONDITIONS
  2 YEAR HYDROGRAPH VOLUME
--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.79
    TOTAL CATCHMENT AREA(ACRES) =    1.86
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.020
    LOW LOSS FRACTION = 0.197
    TIME OF CONCENTRATION(MIN.) =  7.28
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

--------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.21
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.10

**************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------
  0.11      0.0002      0.04  Q         .         .         .         .
  0.23      0.0005      0.04  Q         .         .         .         .
  0.35      0.0009      0.04  Q         .         .         .         .
  0.47      0.0013      0.04  Q         .         .         .         .
  0.59      0.0017      0.04  Q         .         .         .         .
  0.71      0.0021      0.04  Q         .         .         .         .
  0.83      0.0025      0.04  Q         .         .         .         .
  0.95      0.0029      0.04  Q         .         .         .         .
  1.08      0.0033      0.04  Q         .         .         .         .
  1.20      0.0036      0.04  Q         .         .         .         .
  1.32      0.0040      0.04  Q         .         .         .         .
  1.44      0.0044      0.04  Q         .         .         .         .
  1.56      0.0048      0.04  Q         .         .         .         .
  1.68      0.0052      0.04  Q         .         .         .         .
  1.80      0.0056      0.04  Q         .         .         .         .
```

1.93	0.0061	0.04	Q	.	.	.	.
2.05	0.0065	0.04	Q	.	.	.	.
2.17	0.0069	0.04	Q	.	.	.	.
2.29	0.0073	0.04	Q	.	.	.	.
2.41	0.0077	0.04	Q	.	.	.	.
2.53	0.0081	0.04	Q	.	.	.	.
2.65	0.0085	0.04	Q	.	.	.	.
2.77	0.0090	0.04	Q	.	.	.	.
2.90	0.0094	0.04	Q	.	.	.	.
3.02	0.0098	0.04	Q	.	.	.	.
3.14	0.0103	0.04	Q	.	.	.	.
3.26	0.0107	0.04	Q	.	.	.	.
3.38	0.0111	0.04	Q	.	.	.	.
3.50	0.0116	0.04	Q	.	.	.	.
3.62	0.0120	0.04	Q	.	.	.	.
3.75	0.0124	0.04	Q	.	.	.	.
3.87	0.0129	0.04	Q	.	.	.	.
3.99	0.0133	0.04	Q	.	.	.	.
4.11	0.0138	0.05	Q	.	.	.	.
4.23	0.0142	0.05	Q	.	.	.	.
4.35	0.0147	0.05	Q	.	.	.	.
4.47	0.0152	0.05	Q	.	.	.	.
4.59	0.0156	0.05	Q	.	.	.	.
4.72	0.0161	0.05	Q	.	.	.	.
4.84	0.0166	0.05	Q	.	.	.	.
4.96	0.0170	0.05	Q	.	.	.	.
5.08	0.0175	0.05	Q	.	.	.	.
5.20	0.0180	0.05	Q	.	.	.	.
5.32	0.0185	0.05	Q	.	.	.	.
5.44	0.0190	0.05	Q	.	.	.	.
5.57	0.0194	0.05	Q	.	.	.	.
5.69	0.0199	0.05	Q	.	.	.	.
5.81	0.0204	0.05	Q	.	.	.	.
5.93	0.0209	0.05	Q	.	.	.	.
6.05	0.0214	0.05	Q	.	.	.	.
6.17	0.0220	0.05	Q	.	.	.	.
6.29	0.0225	0.05	Q	.	.	.	.
6.41	0.0230	0.05	Q	.	.	.	.
6.54	0.0235	0.05	Q	.	.	.	.
6.66	0.0240	0.05	Q	.	.	.	.
6.78	0.0246	0.05	Q	.	.	.	.
6.90	0.0251	0.05	Q	.	.	.	.
7.02	0.0256	0.05	Q	.	.	.	.
7.14	0.0262	0.05	Q	.	.	.	.
7.26	0.0267	0.05	Q	.	.	.	.
7.39	0.0273	0.06	Q	.	.	.	.
7.51	0.0278	0.06	Q	.	.	.	.
7.63	0.0284	0.06	Q	.	.	.	.
7.75	0.0289	0.06	Q	.	.	.	.
7.87	0.0295	0.06	Q	.	.	.	.
7.99	0.0301	0.06	Q	.	.	.	.
8.11	0.0307	0.06	Q	.	.	.	.
8.23	0.0313	0.06	Q	.	.	.	.
8.36	0.0319	0.06	Q	.	.	.	.
8.48	0.0324	0.06	Q	.	.	.	.
8.60	0.0331	0.06	Q	.	.	.	.
8.72	0.0337	0.06	Q	.	.	.	.
8.84	0.0343	0.06	Q	.	.	.	.
8.96	0.0349	0.06	Q	.	.	.	.
9.08	0.0355	0.06	Q	.	.	.	.
9.21	0.0362	0.06	Q	.	.	.	.
9.33	0.0368	0.06	Q	.	.	.	.
9.45	0.0375	0.07	Q	.	.	.	.

9.57	0.0381	0.07	Q	.	.	.	.
9.69	0.0388	0.07	Q	.	.	.	.
9.81	0.0395	0.07	Q	.	.	.	.
9.93	0.0402	0.07	Q	.	.	.	.
10.05	0.0408	0.07	Q	.	.	.	.
10.18	0.0415	0.07	Q	.	.	.	.
10.30	0.0423	0.07	Q	.	.	.	.
10.42	0.0430	0.07	Q	.	.	.	.
10.54	0.0437	0.07	Q	.	.	.	.
10.66	0.0444	0.07	Q	.	.	.	.
10.78	0.0452	0.08	Q	.	.	.	.
10.90	0.0459	0.08	Q	.	.	.	.
11.03	0.0467	0.08	Q	.	.	.	.
11.15	0.0475	0.08	Q	.	.	.	.
11.27	0.0483	0.08	Q	.	.	.	.
11.39	0.0491	0.08	Q	.	.	.	.
11.51	0.0499	0.08	Q	.	.	.	.
11.63	0.0507	0.08	Q	.	.	.	.
11.75	0.0516	0.09	Q	.	.	.	.
11.87	0.0525	0.09	Q	.	.	.	.
12.00	0.0533	0.09	Q	.	.	.	.
12.12	0.0543	0.10	Q	.	.	.	.
12.24	0.0553	0.11	Q	.	.	.	.
12.36	0.0565	0.11	Q	.	.	.	.
12.48	0.0576	0.12	Q	.	.	.	.
12.60	0.0588	0.12	Q	.	.	.	.
12.72	0.0600	0.12	Q	.	.	.	.
12.85	0.0612	0.12	Q	.	.	.	.
12.97	0.0624	0.13	Q	.	.	.	.
13.09	0.0637	0.13	Q	.	.	.	.
13.21	0.0650	0.13	Q	.	.	.	.
13.33	0.0664	0.14	Q	.	.	.	.
13.45	0.0678	0.14	Q	.	.	.	.
13.57	0.0692	0.14	Q	.	.	.	.
13.69	0.0707	0.15	Q	.	.	.	.
13.82	0.0722	0.15	Q	.	.	.	.
13.94	0.0738	0.16	Q	.	.	.	.
14.06	0.0754	0.17	Q	.	.	.	.
14.18	0.0772	0.18	Q	.	.	.	.
14.30	0.0790	0.19	Q	.	.	.	.
14.42	0.0809	0.20	Q	.	.	.	.
14.54	0.0830	0.20	Q	.	.	.	.
14.67	0.0851	0.22	Q	.	.	.	.
14.79	0.0873	0.23	Q	.	.	.	.
14.91	0.0896	0.24	Q	.	.	.	.
15.03	0.0921	0.25	.Q	.	.	.	.
15.15	0.0948	0.28	.Q	.	.	.	.
15.27	0.0977	0.29	.Q	.	.	.	.
15.39	0.1007	0.32	.Q	.	.	.	.
15.51	0.1039	0.31	.Q	.	.	.	.
15.64	0.1073	0.37	.Q	.	.	.	.
15.76	0.1113	0.43	.Q	.	.	.	.
15.88	0.1166	0.63	. Q	.	.	.	.
16.00	0.1241	0.87	. Q	.	.	.	.
16.12	0.1418	2.66	.	Q	.	.	.
16.24	0.1577	0.51	. Q	.	.	.	.
16.36	0.1619	0.34	.Q	.	.	.	.
16.49	0.1651	0.31	.Q	.	.	.	.
16.61	0.1680	0.27	.Q	.	.	.	.
16.73	0.1705	0.23	Q	.	.	.	.
16.85	0.1728	0.21	Q	.	.	.	.
16.97	0.1748	0.19	Q	.	.	.	.
17.09	0.1766	0.18	Q	.	.	.	.

17.21	0.1783	0.16	Q	.	.	.	.
17.33	0.1798	0.15	Q	.	.	.	.
17.46	0.1813	0.14	Q	.	.	.	.
17.58	0.1826	0.13	Q	.	.	.	.
17.70	0.1839	0.12	Q	.	.	.	.
17.82	0.1851	0.12	Q	.	.	.	.
17.94	0.1863	0.11	Q	.	.	.	.
18.06	0.1874	0.11	Q	.	.	.	.
18.18	0.1884	0.09	Q	.	.	.	.
18.31	0.1893	0.08	Q	.	.	.	.
18.43	0.1901	0.08	Q	.	.	.	.
18.55	0.1909	0.08	Q	.	.	.	.
18.67	0.1917	0.08	Q	.	.	.	.
18.79	0.1924	0.07	Q	.	.	.	.
18.91	0.1932	0.07	Q	.	.	.	.
19.03	0.1939	0.07	Q	.	.	.	.
19.15	0.1946	0.07	Q	.	.	.	.
19.28	0.1953	0.07	Q	.	.	.	.
19.40	0.1960	0.07	Q	.	.	.	.
19.52	0.1966	0.06	Q	.	.	.	.
19.64	0.1972	0.06	Q	.	.	.	.
19.76	0.1979	0.06	Q	.	.	.	.
19.88	0.1985	0.06	Q	.	.	.	.
20.00	0.1991	0.06	Q	.	.	.	.
20.13	0.1997	0.06	Q	.	.	.	.
20.25	0.2002	0.06	Q	.	.	.	.
20.37	0.2008	0.06	Q	.	.	.	.
20.49	0.2014	0.05	Q	.	.	.	.
20.61	0.2019	0.05	Q	.	.	.	.
20.73	0.2024	0.05	Q	.	.	.	.
20.85	0.2030	0.05	Q	.	.	.	.
20.97	0.2035	0.05	Q	.	.	.	.
21.10	0.2040	0.05	Q	.	.	.	.
21.22	0.2045	0.05	Q	.	.	.	.
21.34	0.2050	0.05	Q	.	.	.	.
21.46	0.2055	0.05	Q	.	.	.	.
21.58	0.2060	0.05	Q	.	.	.	.
21.70	0.2065	0.05	Q	.	.	.	.
21.82	0.2069	0.05	Q	.	.	.	.
21.95	0.2074	0.05	Q	.	.	.	.
22.07	0.2078	0.05	Q	.	.	.	.
22.19	0.2083	0.04	Q	.	.	.	.
22.31	0.2087	0.04	Q	.	.	.	.
22.43	0.2092	0.04	Q	.	.	.	.
22.55	0.2096	0.04	Q	.	.	.	.
22.67	0.2100	0.04	Q	.	.	.	.
22.79	0.2105	0.04	Q	.	.	.	.
22.92	0.2109	0.04	Q	.	.	.	.
23.04	0.2113	0.04	Q	.	.	.	.
23.16	0.2117	0.04	Q	.	.	.	.
23.28	0.2121	0.04	Q	.	.	.	.
23.40	0.2125	0.04	Q	.	.	.	.
23.52	0.2129	0.04	Q	.	.	.	.
23.64	0.2133	0.04	Q	.	.	.	.
23.77	0.2137	0.04	Q	.	.	.	.
23.89	0.2141	0.04	Q	.	.	.	.
24.01	0.2145	0.04	Q	.	.	.	.
24.13	0.2147	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1441.4
10%	87.4
20%	21.8
30%	14.6
40%	7.3
50%	7.3
60%	7.3
70%	7.3
80%	7.3
90%	7.3

Problem Descriptions:
CARTWRIGHT APARTMENTS
EXISTING CONDITIONS
2 YEAR HYDROGRAPH VOLUME

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.79
TOTAL CATCHMENT AREA(ACRES) = 1.86
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.020
LOW LOSS FRACTION = 0.197
TIME OF CONCENTRATION(MIN.) = 7.28
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 2
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.19
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.53
3-HOUR POINT RAINFALL VALUE(INCHES) = 0.89
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.22
24-HOUR POINT RAINFALL VALUE(INCHES) = 2.05

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.21
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	.	.	.	.
0.23	0.0005	0.04	Q	.	.	.	.
0.35	0.0009	0.04	Q	.	.	.	.
0.47	0.0013	0.04	Q	.	.	.	.
0.59	0.0017	0.04	Q	.	.	.	.
0.71	0.0021	0.04	Q	.	.	.	.
0.83	0.0025	0.04	Q	.	.	.	.
0.95	0.0029	0.04	Q	.	.	.	.
1.08	0.0033	0.04	Q	.	.	.	.
1.20	0.0036	0.04	Q	.	.	.	.
1.32	0.0040	0.04	Q	.	.	.	.
1.44	0.0044	0.04	Q	.	.	.	.
1.56	0.0048	0.04	Q	.	.	.	.
1.68	0.0052	0.04	Q	.	.	.	.
1.80	0.0056	0.04	Q	.	.	.	.
1.93	0.0061	0.04	Q	.	.	.	.
2.05	0.0065	0.04	Q	.	.	.	.

2.17	0.0069	0.04	Q	.	.	.	.
2.29	0.0073	0.04	Q	.	.	.	.
2.41	0.0077	0.04	Q	.	.	.	.
2.53	0.0081	0.04	Q	.	.	.	.
2.65	0.0085	0.04	Q	.	.	.	.
2.77	0.0090	0.04	Q	.	.	.	.
2.90	0.0094	0.04	Q	.	.	.	.
3.02	0.0098	0.04	Q	.	.	.	.
3.14	0.0103	0.04	Q	.	.	.	.
3.26	0.0107	0.04	Q	.	.	.	.
3.38	0.0111	0.04	Q	.	.	.	.
3.50	0.0116	0.04	Q	.	.	.	.
3.62	0.0120	0.04	Q	.	.	.	.
3.75	0.0124	0.04	Q	.	.	.	.
3.87	0.0129	0.04	Q	.	.	.	.
3.99	0.0133	0.04	Q	.	.	.	.
4.11	0.0138	0.05	Q	.	.	.	.
4.23	0.0142	0.05	Q	.	.	.	.
4.35	0.0147	0.05	Q	.	.	.	.
4.47	0.0152	0.05	Q	.	.	.	.
4.59	0.0156	0.05	Q	.	.	.	.
4.72	0.0161	0.05	Q	.	.	.	.
4.84	0.0166	0.05	Q	.	.	.	.
4.96	0.0170	0.05	Q	.	.	.	.
5.08	0.0175	0.05	Q	.	.	.	.
5.20	0.0180	0.05	Q	.	.	.	.
5.32	0.0185	0.05	Q	.	.	.	.
5.44	0.0190	0.05	Q	.	.	.	.
5.57	0.0194	0.05	Q	.	.	.	.
5.69	0.0199	0.05	Q	.	.	.	.
5.81	0.0204	0.05	Q	.	.	.	.
5.93	0.0209	0.05	Q	.	.	.	.
6.05	0.0214	0.05	Q	.	.	.	.
6.17	0.0220	0.05	Q	.	.	.	.
6.29	0.0225	0.05	Q	.	.	.	.
6.41	0.0230	0.05	Q	.	.	.	.
6.54	0.0235	0.05	Q	.	.	.	.
6.66	0.0240	0.05	Q	.	.	.	.
6.78	0.0246	0.05	Q	.	.	.	.
6.90	0.0251	0.05	Q	.	.	.	.
7.02	0.0256	0.05	Q	.	.	.	.
7.14	0.0262	0.05	Q	.	.	.	.
7.26	0.0267	0.05	Q	.	.	.	.
7.39	0.0273	0.06	Q	.	.	.	.
7.51	0.0278	0.06	Q	.	.	.	.
7.63	0.0284	0.06	Q	.	.	.	.
7.75	0.0289	0.06	Q	.	.	.	.
7.87	0.0295	0.06	Q	.	.	.	.
7.99	0.0301	0.06	Q	.	.	.	.
8.11	0.0307	0.06	Q	.	.	.	.
8.23	0.0313	0.06	Q	.	.	.	.
8.36	0.0319	0.06	Q	.	.	.	.
8.48	0.0324	0.06	Q	.	.	.	.
8.60	0.0331	0.06	Q	.	.	.	.
8.72	0.0337	0.06	Q	.	.	.	.
8.84	0.0343	0.06	Q	.	.	.	.
8.96	0.0349	0.06	Q	.	.	.	.
9.08	0.0355	0.06	Q	.	.	.	.
9.21	0.0362	0.06	Q	.	.	.	.
9.33	0.0368	0.06	Q	.	.	.	.
9.45	0.0375	0.07	Q	.	.	.	.
9.57	0.0381	0.07	Q	.	.	.	.
9.69	0.0388	0.07	Q	.	.	.	.

9.81	0.0395	0.07	Q	.	.	.	.
9.93	0.0402	0.07	Q	.	.	.	.
10.05	0.0408	0.07	Q	.	.	.	.
10.18	0.0415	0.07	Q	.	.	.	.
10.30	0.0423	0.07	Q	.	.	.	.
10.42	0.0430	0.07	Q	.	.	.	.
10.54	0.0437	0.07	Q	.	.	.	.
10.66	0.0444	0.07	Q	.	.	.	.
10.78	0.0452	0.08	Q	.	.	.	.
10.90	0.0459	0.08	Q	.	.	.	.
11.03	0.0467	0.08	Q	.	.	.	.
11.15	0.0475	0.08	Q	.	.	.	.
11.27	0.0483	0.08	Q	.	.	.	.
11.39	0.0491	0.08	Q	.	.	.	.
11.51	0.0499	0.08	Q	.	.	.	.
11.63	0.0507	0.08	Q	.	.	.	.
11.75	0.0516	0.09	Q	.	.	.	.
11.87	0.0525	0.09	Q	.	.	.	.
12.00	0.0533	0.09	Q	.	.	.	.
12.12	0.0543	0.10	Q	.	.	.	.
12.24	0.0553	0.11	Q	.	.	.	.
12.36	0.0565	0.11	Q	.	.	.	.
12.48	0.0576	0.12	Q	.	.	.	.
12.60	0.0588	0.12	Q	.	.	.	.
12.72	0.0600	0.12	Q	.	.	.	.
12.85	0.0612	0.12	Q	.	.	.	.
12.97	0.0624	0.13	Q	.	.	.	.
13.09	0.0637	0.13	Q	.	.	.	.
13.21	0.0650	0.13	Q	.	.	.	.
13.33	0.0664	0.14	Q	.	.	.	.
13.45	0.0678	0.14	Q	.	.	.	.
13.57	0.0692	0.14	Q	.	.	.	.
13.69	0.0707	0.15	Q	.	.	.	.
13.82	0.0722	0.15	Q	.	.	.	.
13.94	0.0738	0.16	Q	.	.	.	.
14.06	0.0754	0.17	Q	.	.	.	.
14.18	0.0772	0.18	Q	.	.	.	.
14.30	0.0790	0.19	Q	.	.	.	.
14.42	0.0809	0.20	Q	.	.	.	.
14.54	0.0830	0.20	Q	.	.	.	.
14.67	0.0851	0.22	Q	.	.	.	.
14.79	0.0873	0.23	Q	.	.	.	.
14.91	0.0896	0.24	Q	.	.	.	.
15.03	0.0921	0.25	.Q	.	.	.	.
15.15	0.0948	0.28	.Q	.	.	.	.
15.27	0.0977	0.29	.Q	.	.	.	.
15.39	0.1007	0.32	.Q	.	.	.	.
15.51	0.1039	0.31	.Q	.	.	.	.
15.64	0.1073	0.37	.Q	.	.	.	.
15.76	0.1113	0.43	.Q	.	.	.	.
15.88	0.1166	0.63	. Q	.	.	.	.
16.00	0.1241	0.87	. Q	.	.	.	.
16.12	0.1418	2.66	.	Q	.	.	.
16.24	0.1577	0.51	. Q	.	.	.	.
16.36	0.1619	0.34	.Q	.	.	.	.
16.49	0.1651	0.31	.Q	.	.	.	.
16.61	0.1680	0.27	.Q	.	.	.	.
16.73	0.1705	0.23	Q	.	.	.	.
16.85	0.1728	0.21	Q	.	.	.	.
16.97	0.1748	0.19	Q	.	.	.	.
17.09	0.1766	0.18	Q	.	.	.	.
17.21	0.1783	0.16	Q	.	.	.	.
17.33	0.1798	0.15	Q	.	.	.	.

17.46	0.1813	0.14	Q	.	.	.	.
17.58	0.1826	0.13	Q	.	.	.	.
17.70	0.1839	0.12	Q	.	.	.	.
17.82	0.1851	0.12	Q	.	.	.	.
17.94	0.1863	0.11	Q	.	.	.	.
18.06	0.1874	0.11	Q	.	.	.	.
18.18	0.1884	0.09	Q	.	.	.	.
18.31	0.1893	0.08	Q	.	.	.	.
18.43	0.1901	0.08	Q	.	.	.	.
18.55	0.1909	0.08	Q	.	.	.	.
18.67	0.1917	0.08	Q	.	.	.	.
18.79	0.1924	0.07	Q	.	.	.	.
18.91	0.1932	0.07	Q	.	.	.	.
19.03	0.1939	0.07	Q	.	.	.	.
19.15	0.1946	0.07	Q	.	.	.	.
19.28	0.1953	0.07	Q	.	.	.	.
19.40	0.1960	0.07	Q	.	.	.	.
19.52	0.1966	0.06	Q	.	.	.	.
19.64	0.1972	0.06	Q	.	.	.	.
19.76	0.1979	0.06	Q	.	.	.	.
19.88	0.1985	0.06	Q	.	.	.	.
20.00	0.1991	0.06	Q	.	.	.	.
20.13	0.1997	0.06	Q	.	.	.	.
20.25	0.2002	0.06	Q	.	.	.	.
20.37	0.2008	0.06	Q	.	.	.	.
20.49	0.2014	0.05	Q	.	.	.	.
20.61	0.2019	0.05	Q	.	.	.	.
20.73	0.2024	0.05	Q	.	.	.	.
20.85	0.2030	0.05	Q	.	.	.	.
20.97	0.2035	0.05	Q	.	.	.	.
21.10	0.2040	0.05	Q	.	.	.	.
21.22	0.2045	0.05	Q	.	.	.	.
21.34	0.2050	0.05	Q	.	.	.	.
21.46	0.2055	0.05	Q	.	.	.	.
21.58	0.2060	0.05	Q	.	.	.	.
21.70	0.2065	0.05	Q	.	.	.	.
21.82	0.2069	0.05	Q	.	.	.	.
21.95	0.2074	0.05	Q	.	.	.	.
22.07	0.2078	0.05	Q	.	.	.	.
22.19	0.2083	0.04	Q	.	.	.	.
22.31	0.2087	0.04	Q	.	.	.	.
22.43	0.2092	0.04	Q	.	.	.	.
22.55	0.2096	0.04	Q	.	.	.	.
22.67	0.2100	0.04	Q	.	.	.	.
22.79	0.2105	0.04	Q	.	.	.	.
22.92	0.2109	0.04	Q	.	.	.	.
23.04	0.2113	0.04	Q	.	.	.	.
23.16	0.2117	0.04	Q	.	.	.	.
23.28	0.2121	0.04	Q	.	.	.	.
23.40	0.2125	0.04	Q	.	.	.	.
23.52	0.2129	0.04	Q	.	.	.	.
23.64	0.2133	0.04	Q	.	.	.	.
23.77	0.2137	0.04	Q	.	.	.	.
23.89	0.2141	0.04	Q	.	.	.	.
24.01	0.2145	0.04	Q	.	.	.	.
24.13	0.2147	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Duration

Peak Flow Rate	(minutes)
0%	1441.4
10%	87.4
20%	21.8
30%	14.6
40%	7.3
50%	7.3
60%	7.3
70%	7.3
80%	7.3
90%	7.3

```
******************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
==============================================================================
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             Ver. 21.0  Release Date: 06/01/2014  License ID 1355

                          Analysis prepared by:

                            Fuscoe Engineering
                             16795 Von Karman
                                Suite 100
                             Irvine, CA 92606

******************************************************************************
------------------------------------------------------------------------------

 Problem Descriptions:
  CARTWRIGHT APARTMENTS
  PROPOSED CONDITIONS
  2 YEAR Y-BAR
==============================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          1.86       30.00       75.(AMC II)     0.200       0.628

    TOTAL AREA (Acres) =      1.86

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.060

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.372
==============================================================================
```

```
**************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==========================================================================
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             Ver. 21.0  Release Date: 06/01/2014  License ID 1355

                          Analysis prepared by:

                            Fuscoe Engineering
                             16795 Von Karman
                                Suite 100
                             Irvine, CA 92606

**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  CARTWRIGHT APARTMENTS
  PROPOSED CONDITIONS
  2 YEAR HYDROGRAPH VOLUME
--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.93
    TOTAL CATCHMENT AREA(ACRES) =    1.86
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.060
    LOW LOSS FRACTION = 0.372
    TIME OF CONCENTRATION(MIN.) =  8.43
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

--------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.21
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.11

**************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------
  0.12      0.0002      0.03  Q         .         .         .         .
  0.26      0.0006      0.04  Q         .         .         .         .
  0.40      0.0010      0.04  Q         .         .         .         .
  0.54      0.0014      0.04  Q         .         .         .         .
  0.69      0.0018      0.04  Q         .         .         .         .
  0.83      0.0022      0.04  Q         .         .         .         .
  0.97      0.0027      0.04  Q         .         .         .         .
  1.11      0.0031      0.04  Q         .         .         .         .
  1.25      0.0035      0.04  Q         .         .         .         .
  1.39      0.0039      0.04  Q         .         .         .         .
  1.53      0.0043      0.04  Q         .         .         .         .
  1.67      0.0048      0.04  Q         .         .         .         .
  1.81      0.0052      0.04  Q         .         .         .         .
  1.95      0.0056      0.04  Q         .         .         .         .
  2.09      0.0061      0.04  Q         .         .         .         .
```

2.23	0.0065	0.04	Q	.	.	.	.
2.37	0.0070	0.04	Q	.	.	.	.
2.51	0.0074	0.04	Q	.	.	.	.
2.65	0.0079	0.04	Q	.	.	.	.
2.79	0.0083	0.04	Q	.	.	.	.
2.93	0.0088	0.04	Q	.	.	.	.
3.07	0.0092	0.04	Q	.	.	.	.
3.21	0.0097	0.04	Q	.	.	.	.
3.35	0.0102	0.04	Q	.	.	.	.
3.50	0.0106	0.04	Q	.	.	.	.
3.64	0.0111	0.04	Q	.	.	.	.
3.78	0.0116	0.04	Q	.	.	.	.
3.92	0.0121	0.04	Q	.	.	.	.
4.06	0.0125	0.04	Q	.	.	.	.
4.20	0.0130	0.04	Q	.	.	.	.
4.34	0.0135	0.04	Q	.	.	.	.
4.48	0.0140	0.04	Q	.	.	.	.
4.62	0.0145	0.04	Q	.	.	.	.
4.76	0.0150	0.04	Q	.	.	.	.
4.90	0.0155	0.04	Q	.	.	.	.
5.04	0.0160	0.04	Q	.	.	.	.
5.18	0.0165	0.04	Q	.	.	.	.
5.32	0.0170	0.04	Q	.	.	.	.
5.46	0.0176	0.05	Q	.	.	.	.
5.60	0.0181	0.05	Q	.	.	.	.
5.74	0.0186	0.05	Q	.	.	.	.
5.88	0.0191	0.05	Q	.	.	.	.
6.02	0.0197	0.05	Q	.	.	.	.
6.16	0.0202	0.05	Q	.	.	.	.
6.31	0.0208	0.05	Q	.	.	.	.
6.45	0.0213	0.05	Q	.	.	.	.
6.59	0.0219	0.05	Q	.	.	.	.
6.73	0.0224	0.05	Q	.	.	.	.
6.87	0.0230	0.05	Q	.	.	.	.
7.01	0.0236	0.05	Q	.	.	.	.
7.15	0.0242	0.05	Q	.	.	.	.
7.29	0.0248	0.05	Q	.	.	.	.
7.43	0.0253	0.05	Q	.	.	.	.
7.57	0.0259	0.05	Q	.	.	.	.
7.71	0.0265	0.05	Q	.	.	.	.
7.85	0.0272	0.05	Q	.	.	.	.
7.99	0.0278	0.05	Q	.	.	.	.
8.13	0.0284	0.05	Q	.	.	.	.
8.27	0.0290	0.05	Q	.	.	.	.
8.41	0.0297	0.06	Q	.	.	.	.
8.55	0.0303	0.06	Q	.	.	.	.
8.69	0.0310	0.06	Q	.	.	.	.
8.83	0.0316	0.06	Q	.	.	.	.
8.98	0.0323	0.06	Q	.	.	.	.
9.12	0.0330	0.06	Q	.	.	.	.
9.26	0.0336	0.06	Q	.	.	.	.
9.40	0.0343	0.06	Q	.	.	.	.
9.54	0.0350	0.06	Q	.	.	.	.
9.68	0.0357	0.06	Q	.	.	.	.
9.82	0.0365	0.06	Q	.	.	.	.
9.96	0.0372	0.06	Q	.	.	.	.
10.10	0.0379	0.06	Q	.	.	.	.
10.24	0.0387	0.07	Q	.	.	.	.
10.38	0.0395	0.07	Q	.	.	.	.
10.52	0.0402	0.07	Q	.	.	.	.
10.66	0.0410	0.07	Q	.	.	.	.
10.80	0.0418	0.07	Q	.	.	.	.
10.94	0.0426	0.07	Q	.	.	.	.

11.08	0.0435	0.07	Q	.	.	.	.
11.22	0.0443	0.07	Q	.	.	.	.
11.36	0.0452	0.07	Q	.	.	.	.
11.50	0.0460	0.08	Q	.	.	.	.
11.64	0.0469	0.08	Q	.	.	.	.
11.78	0.0478	0.08	Q	.	.	.	.
11.93	0.0488	0.08	Q	.	.	.	.
12.07	0.0497	0.08	Q	.	.	.	.
12.21	0.0508	0.10	Q	.	.	.	.
12.35	0.0520	0.10	Q	.	.	.	.
12.49	0.0532	0.11	Q	.	.	.	.
12.63	0.0544	0.11	Q	.	.	.	.
12.77	0.0557	0.11	Q	.	.	.	.
12.91	0.0570	0.11	Q	.	.	.	.
13.05	0.0584	0.12	Q	.	.	.	.
13.19	0.0597	0.12	Q	.	.	.	.
13.33	0.0611	0.12	Q	.	.	.	.
13.47	0.0626	0.13	Q	.	.	.	.
13.61	0.0641	0.13	Q	.	.	.	.
13.75	0.0656	0.13	Q	.	.	.	.
13.89	0.0672	0.14	Q	.	.	.	.
14.03	0.0689	0.14	Q	.	.	.	.
14.17	0.0706	0.16	Q	.	.	.	.
14.31	0.0724	0.16	Q	.	.	.	.
14.45	0.0743	0.17	Q	.	.	.	.
14.60	0.0763	0.18	Q	.	.	.	.
14.74	0.0785	0.19	Q	.	.	.	.
14.88	0.0808	0.21	Q	.	.	.	.
15.02	0.0834	0.23	Q	.	.	.	.
15.16	0.0862	0.25	Q	.	.	.	.
15.30	0.0893	0.29	.Q	.	.	.	.
15.44	0.0928	0.31	.Q	.	.	.	.
15.58	0.0965	0.33	.Q	.	.	.	.
15.72	0.1007	0.39	.Q	.	.	.	.
15.86	0.1065	0.61	. Q	.	.	.	.
16.00	0.1151	0.87	. Q	.	.	.	.
16.14	0.1365	2.81	.	.Q	.	.	.
16.28	0.1556	0.47	.Q	.	.	.	.
16.42	0.1600	0.29	.Q	.	.	.	.
16.56	0.1633	0.27	.Q	.	.	.	.
16.70	0.1661	0.22	Q	.	.	.	.
16.84	0.1684	0.18	Q	.	.	.	.
16.98	0.1705	0.16	Q	.	.	.	.
17.12	0.1723	0.15	Q	.	.	.	.
17.26	0.1739	0.14	Q	.	.	.	.
17.41	0.1755	0.13	Q	.	.	.	.
17.55	0.1769	0.12	Q	.	.	.	.
17.69	0.1783	0.12	Q	.	.	.	.
17.83	0.1796	0.11	Q	.	.	.	.
17.97	0.1809	0.11	Q	.	.	.	.
18.11	0.1820	0.10	Q	.	.	.	.
18.25	0.1830	0.08	Q	.	.	.	.
18.39	0.1840	0.08	Q	.	.	.	.
18.53	0.1848	0.07	Q	.	.	.	.
18.67	0.1857	0.07	Q	.	.	.	.
18.81	0.1865	0.07	Q	.	.	.	.
18.95	0.1873	0.07	Q	.	.	.	.
19.09	0.1880	0.06	Q	.	.	.	.
19.23	0.1888	0.06	Q	.	.	.	.
19.37	0.1895	0.06	Q	.	.	.	.
19.51	0.1902	0.06	Q	.	.	.	.
19.65	0.1909	0.06	Q	.	.	.	.
19.79	0.1916	0.06	Q	.	.	.	.

19.93	0.1922	0.06	Q	.	.	.	.
20.07	0.1928	0.05	Q	.	.	.	.
20.22	0.1935	0.05	Q	.	.	.	.
20.36	0.1941	0.05	Q	.	.	.	.
20.50	0.1947	0.05	Q	.	.	.	.
20.64	0.1953	0.05	Q	.	.	.	.
20.78	0.1958	0.05	Q	.	.	.	.
20.92	0.1964	0.05	Q	.	.	.	.
21.06	0.1969	0.05	Q	.	.	.	.
21.20	0.1975	0.05	Q	.	.	.	.
21.34	0.1980	0.05	Q	.	.	.	.
21.48	0.1985	0.04	Q	.	.	.	.
21.62	0.1991	0.04	Q	.	.	.	.
21.76	0.1996	0.04	Q	.	.	.	.
21.90	0.2001	0.04	Q	.	.	.	.
22.04	0.2006	0.04	Q	.	.	.	.
22.18	0.2010	0.04	Q	.	.	.	.
22.32	0.2015	0.04	Q	.	.	.	.
22.46	0.2020	0.04	Q	.	.	.	.
22.60	0.2025	0.04	Q	.	.	.	.
22.74	0.2029	0.04	Q	.	.	.	.
22.88	0.2034	0.04	Q	.	.	.	.
23.02	0.2038	0.04	Q	.	.	.	.
23.17	0.2043	0.04	Q	.	.	.	.
23.31	0.2047	0.04	Q	.	.	.	.
23.45	0.2051	0.04	Q	.	.	.	.
23.59	0.2056	0.04	Q	.	.	.	.
23.73	0.2060	0.04	Q	.	.	.	.
23.87	0.2064	0.04	Q	.	.	.	.
24.01	0.2068	0.04	Q	.	.	.	.
24.15	0.2070	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1441.5
10%	75.9
20%	25.3
30%	16.9
40%	8.4
50%	8.4
60%	8.4
70%	8.4
80%	8.4
90%	8.4

FUSCOE ENGINEERING

CARTWRIGHT APARTMENTS

17861 CARTWRIGHT ROAD, IRVINE, CA

PRELIMINARY HYDROLOGY ANALYSIS

PREPARED FOR
C&C DEVELOPMENT
14211 YORBA STREET, SUITE 200
TUSTIN, CA 92780

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PROJECT MANAGER
SHELBY SHIRLOCK, P.E.

DATE PREPARED: JUNE, 2020
DATE REVISED: NOVEMBER, 2020

PROJECT NUMBER: [1339-004-01]

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PRELIMINARY HYDROLOGY ANALYSIS

FOR

CARTWRIGHT APARTMENTS

17861 Cartwright Road, Irvine, CA
County of Orange

Prepared By:

Shelby Shirlock, PE RCE C75912
Fuscoe Engineering, Irvine
16795 Von Karman #100
Irvine, CA 92606

For

C&C DEVELOPMENT
14211 Yorba Street, Suite 200
Tustin, CA 92780

1.0 INTRODUCTION

1.1 GEOGRAPHIC SETTING

The existing project site for the Cartwright Apartment project consists of about 1.62 acres and is located in the City of Irvine, Orange County, California. The project site is located north of the 405 freeway, east of Von Karman Avenue, west of Jamboree Avenue and South of Main Street. The project site is bounded by private commercial properties to the north, west and south and bounded Cartwright Road to the east. *See Section 1.4 for Location Map.*

The project site is located at FEMA flood zone 'X' per FEMA Flood Insurance Rate Map (FIRM) No. 06059C0286J, map revised December 3, 2009. Flood Zone 'X' represents areas of minimum flood hazard (See Appendix 1).

1.2 PURPOSE OF THIS REPORT

The purpose of this report is to identify and analyze the existing drainage conditions & post development impacts, in order to provide adequate drainage facilities for the proposed development located in the City of Irvine, California.

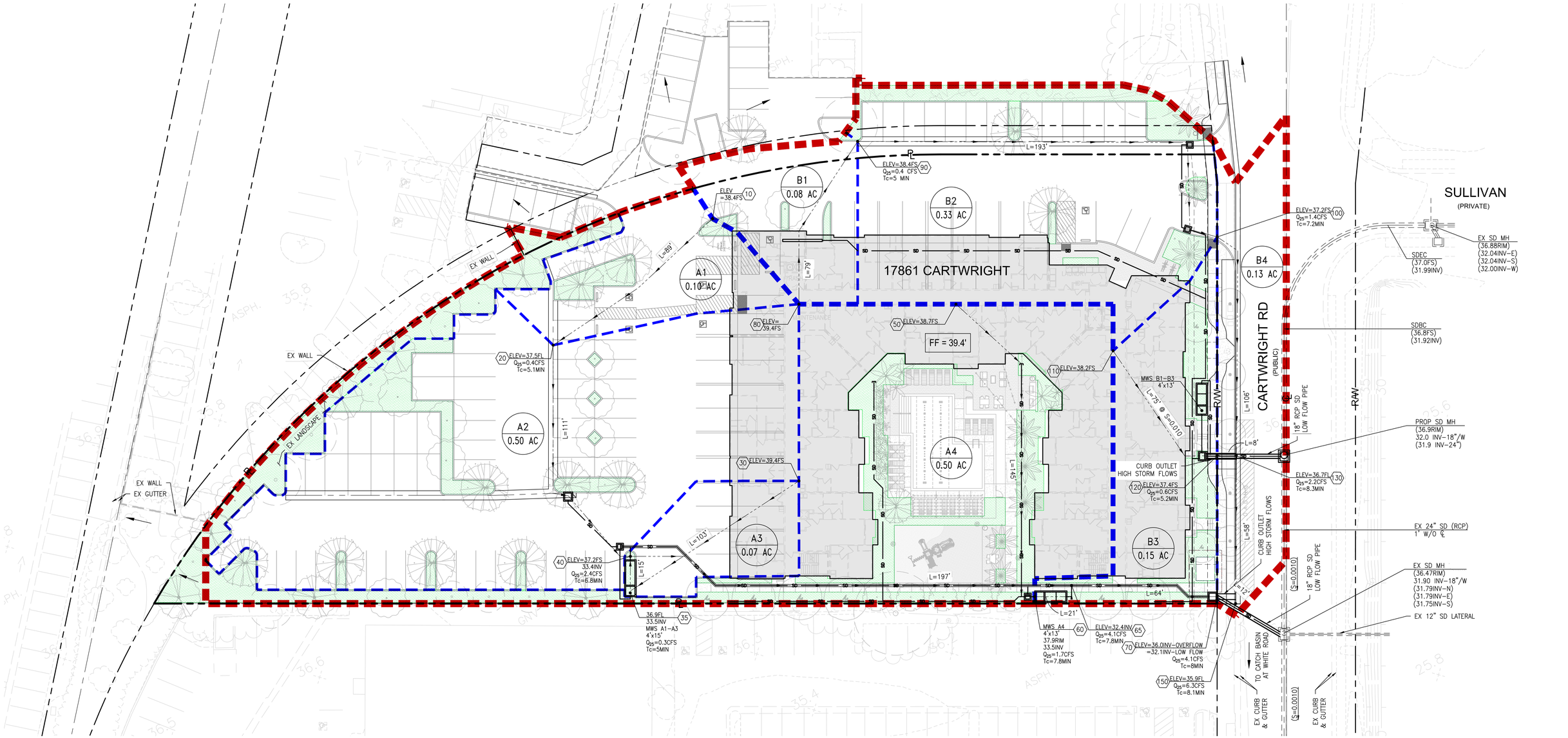
This drainage study will analyze and compare the 2-year, 25-year & 100-year storm events for the existing and proposed conditions. Outcomes of the analysis will facilitate the conceptual layout of a drainage system to adequately convey storm runoff through the site without adversely impacting surrounding areas.

This analysis will also demonstrate that the storm water and flood protection goals as outlined in the Orange County Design Manual have been met. See Section 4.0 for Design Criteria.

1.3 METHODOLOGY

This study was prepared in conformance with the Orange County Hydrology Manual. A.E.S. Computer Software (Version 21) was utilized to compile the hydrologic data and to determine the peak discharges and unit hydrographs for the Detention Basin Routing. A 100-year Unit Hydrograph was used to analyze site and detention basin storage capacity required.

For reference – *See Appendices 3-5*



LEGEND & ABBREVIATIONS

- CENTERLINE
- ADJACENT RIGHT OF WAY/PROPERTY LINE
- PROJECT SITE BOUNDARY
- DRAINAGE BOUNDARY
- MAJOR DRAINAGE TRIBUTARY BOUNDARY
- MINOR DRAINAGE TRIBUTARY BOUNDARY
- FLOW DIRECTION / FLOW LENGTH (L=100')
- EX. STORM DRAIN LINE
- X1 / X.XX AC — TRIBUTARY AREA NUMBER / TRIBUTARY AREA ACREAGE
- ELEV=X.XX / Qxx=X CFS / X MIN — NODE ELEVATION (FT) / STORM FREQUENCY = FLOW RATE (CFS) / Tc (MIN)
- 100 — HYDROLOGY NODE #
- PERVIOUS AREAS

SITE PARAMETERS

HYDROLOGY SOIL GROUP: D

PROPERTY SITE ACREAGE: 1.62 ACRES

FEMA FLOOD ZONE X PER FIRM MAP 06059C0286J
ZONE X – AREA OF MINIMAL FLOOD HAZARD

TOTAL DRAINAGE STUDY AREA: 1.86 Ac

HYDROMOD CALCULATIONS

SITE POTENTIALLY SUSCEPTIBLE TO HYDROMOD DETENTION REQUIREMENTS DUE TO DISCHARGE TO PETER'S CANYON CHANNEL

AREA (ACRES)		2 YR-24 HR STORM VOLUME (AC-FT)				2-YEAR TIME OF CONCENTRATION (MIN)				2-YEAR PEAK RUNOFF (CFS)			
EXISTING	PROPOSED	EXISTING	PROPOSED	INCREASE	% INCREASE	EXISTING	PROPOSED	DIFFERENCE	%	EXISTING	PROPOSED	INCREASE	% INCREASE
1.86	1.86	0.21	0.21	0	0	7.3	8.1	0.8	9.8%	2.7	2.8	0.1	3.7%

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CARTWRIGHT APARTMENTS
PROPOSED HYDROLOGY MAP
IRVINE, CA
November 6, 2020

F:\Projects\1339\09A_Support Files\Reports\Hydrology\Exhibits\1339-004sh Proposed Hydrology.dwg (11/6/2020 10:18 AM) Plotted by: Jason Castro

PRELIMINARY HYDROLOGY ANALYSIS

CARTWRIGHT APARTMENTS

17861 CARTWRIGHT ROAD, IRVINE, CA 92614

NOVEMBER, 2020

PRELIMINARY HYDROLOGY ANALYSIS

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PRELIMINARY HYDROLOGY ANALYSIS

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