GRD20-0021

Hydrology and Hydraulics

for

Building&Safety: jtyean 3/27/2020
Approval: Project Final Hydrology and Hydraulics
Permits: GRD20-0021

Dana Point Harbor

Commercial Core Area Phase 2 Parking Structure

County of Orange - OC Public Works
OC Development Services
APPROVED
These plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.
Hadi Tabatabaee
BUILDING OFFICIAL

Dana Point, California
February, 2020

This Hydrology Study has been prepared by, and under the direction of, the undersigned, a duly Registered Civil Engineer in the State of California. Except as noted, the undersigned attests to the technical information contained herein, and has judged to be acceptable the qualifications of any technical specialists providing engineering data for this report, upon which findings, conclusions, and recommendations are based.

REGISTERED PROFESSIONAL ENGINEER
JACOB VANDERVIS
No. C46301
EXP. 12-31-20
CIVIL
STATE OF CALIFORNIA

Jacob Vandervis, PE
Registered Civil Engineer No. C46301
Exp.: 12/31/20

Prepared for:

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Prepared by:

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RISING TO THE CHALLENGE

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CONTENTS

SECTION 1 INTRODUCTION AND BACKGROUND

This Hydrology and Hydraulic Report (Report) serves as a basis of design for the proposed drainage system for the Dana Point Harbor (DPH) Commercial Core Area (CCA) Phase 2 Improvements in Dana Point (City), County of Orange (County), California. This study was prepared following the requirements set forth by the Orange County Hydrology Manual (OCHM), dated 1986, and its 1996 Addendum and the Orange County Local Drainage Manual (LDM), dated January 1996. Analysis of the existing drainage patterns and existing storm drainage capacity and overall site analysis can be found in the Master Plan of Drainage under Permit MB19-0039 and GRD19-0177, by TAIT & Associates, Inc. dated January 2020. Any plans and specification in this report are not for construction purposes; the contractor shall refer to final approved construction documents for plans and specifications.

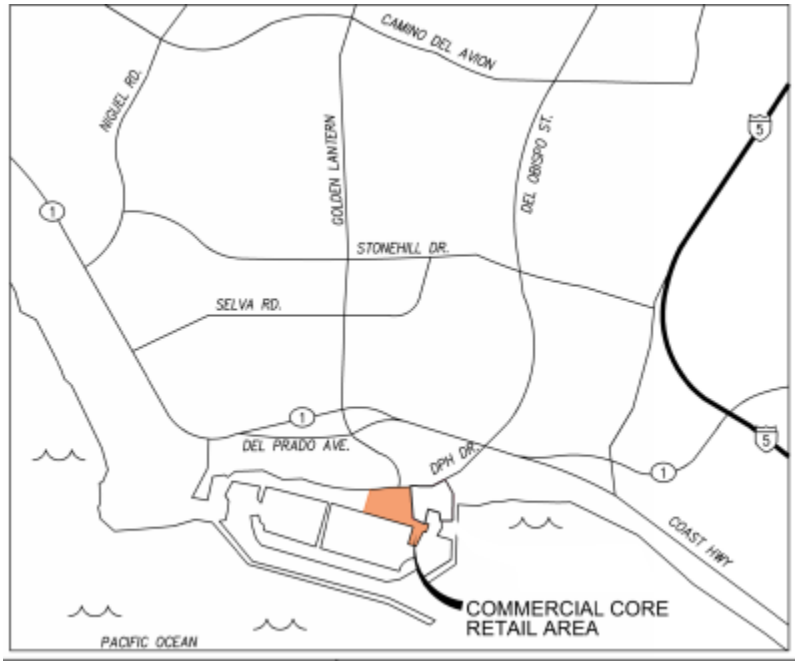
DPH encompasses approximately 276.8 acres, owned by the County of Orange, and located in the southern portion of the City of Dana Point. This Report analyzed the Phase 2B Improvements which encompass an area of 6.9 acres which include proposed storm drain Line C2 (See Section 6 for detailed description) which is a proposed storm drain main lateral that will convey runoff from the project improvements to an existing 60-inch Reinforced Concrete Pipe (RCP) Line C that is located within the site.

DPH is bordered by the Pacific Ocean to the south, Dana Point Headlands and Old Cove Marine Preserve to the west, Doheny State Beach to the east and a variety of commercial, hotel, residential and public park uses to the north. The Interstate-5 freeway is located approximately two miles to the east and provides regional access to the Harbor. The City lies in the southwest portion of Orange County, in the State of California and it is part of the larger Southern California Region. It was incorporated on January 1st, 1989 and comprises of approximately 6.5 square miles. See Figure 1 Vicinity Map for project location.

The Dana Point Harbor Revitalization Plan has been in process since the late 1990's. Currently, the Revitalization Plan includes improvements to the Harbor's boat slips, retail center, boater facilities and parking, and storm water quality treatment. DPH is owned by the County of Orange and it is currently under a 66-year operating and maintenance lease agreement with the DPH Partners, LLC. and DPH Partners Drystack, LLC. which includes: Burnham Ward Properties, R.D. Olson Development and Bellwether Financial Group. Burnham Ward Properties will develop the Commercial Core Retail Area, R.D. Olson will develop the Hotel Area, and Bellwether Financial Group will develop the Marina portion and the Dry Stack Lease Area. The Phase 2B improvements are part of the CCA and are under Burnham Wards Properties responsibility.

Figure 2 DPH Study Area provides an overview of DPH and the CCA. The proposed improvements consist of Phase 2B which will include the construction of the parking structure and adjacent surface parking lots to the east and the south of the parking and improvements to Golden Lantern Street. Future improvements will include twelve commercial buildings and additional surface parking lots.

Figure 1 – Vicinity Map (Not To Scale)



SECTION 2 PROJECT DESCRIPTION

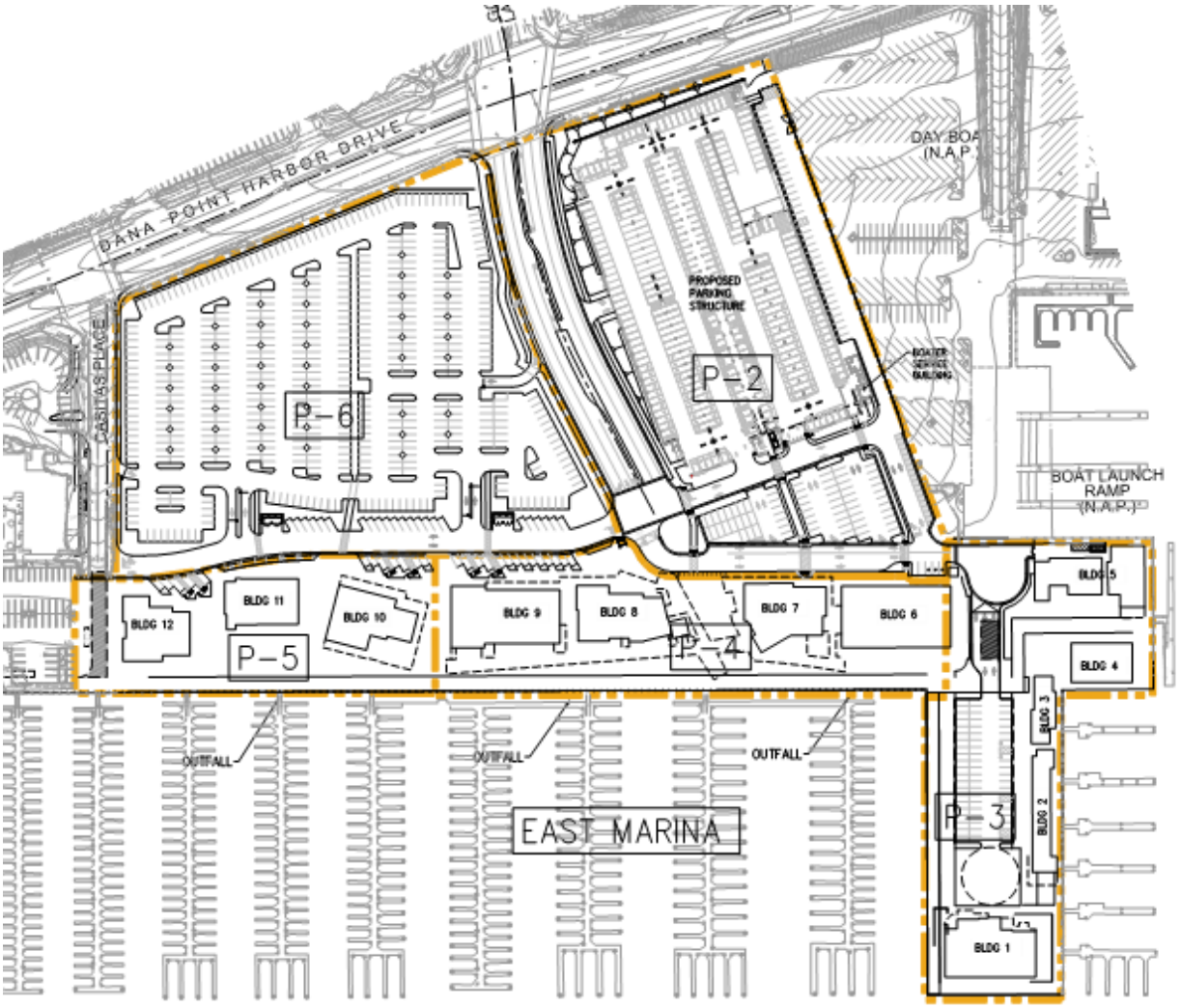
This Hydraulic and Hydrology Analysis studies the proposed Phase 2B of the Commercial Core Area (CCA) which is the first phase of construction development being completed by the DPH Partners, LLC, specifically by Burhan Ward as part of the DPH Revitalization Plan. For the DPH Revitalization Plan, the Environmental Impact Report (EIR) was approved in 2006, in November 18, 2014 the Coastal Development Plan was approved by the Coastal Commission and the City of Dana Point, in May 29, 2019 the Substantial Conformance to the 2014 CDP. The improvements for the CCA will be completed in separate phases as described in the CDP.

Phase 2B includes the construction of a 3-level Parking Structure a parking lot on the south and the needed improvements for vehicular and pedestrian access which after detailed analysis the design team determined best to complete the construction of Golden Lantern which was Phase 6 of the Substantial Conformance CDP. Thus Phase 2B includes the realignment of Golden Lantern Street located west of the parking structure will ultimately serve new buildings along the Harbor. The project stormwater runoff will sheet flow over the surface parking to catch basins and storm drain lines that convey runoff to the existing 60-inch RCP storm drain Line C. In the existing condition runoffs from a portion of this area sheet flow over the existing parking lot and are collected by Outlet 1 as described in the MPD prepared by Tait & Associates and Date January 2020. The drainage pattern change was made for two main reasons: the existing 18-inch RCP Line B located at the Drystack is under capacity, and to avoid drainage crossing the leasing boundary. The MPD analysis of Line C (60-inch RCP) determined that this storm drain has capacity for the increase in drainage area.

The MPD includes overall drainage analysis of the existing and ultimate proposed improvements of both the Commercial Core Area and Dry Stack Lease Areas. The Master Drainage Plan is processed under Orange County Public Works Rough Grading Permit GRD19-0177.

The overall site plan with phasing limits for Phase 2 is included in Figure 2. Phase 2 consist of Phase 2A for the rough grading for the parking structure area only and Phase 2B for the precise grading permit for the parking structure, paved surface parking around the structure, and realignment of Golden Lantern.

Figure 2 – Commercial Core Overall Site Plan /Phasing Plan



SECTION 3 HYDROLOGY DESIGN AND CRITERIA

3.1 Hydrology Criteria

The existing and proposed condition hydrology calculations were prepared in conformance with the Orange County Hydrology Manual (OCHM), dated 1986 and its Addendum No. 1, dated 1996.The hydrology analysis and small area hydrograph were prepared using the Advanced Engineer Software (AES), a computer software approved by the Orange County Flood Control District that follows the hydrology methodology and criteria from the OCHM. For this analysis drainage area delineations were prepared following existing topography and proposed contours for each analysis, flow paths, areas, and elevation were determined, as well as hydrology characteristics such as soil group and land use. The rational method for the existing and proposed conditions for the 10-year, 25-year and 100-year storm were prepared for the Phase 2 Improvements. Per the OCHM, the Antecedent Moisture Content (AMC) is II for the 10-year and 25-year storm event, and III for the 100-year storm event. Sections 4 and 5 provide detailed descriptions for the Existing Condition and Proposed Condition Hydrology analyses.

The OCHM uses the rational method to calculate peak runoff discharge from a drainage area. It utilizes the equation Q=CIA, where Q is discharge, I is intensity, and A is area. The RATSCX module of AES was used to analyze and route runoff through each subarea using elevations, slopes, flow lengths, soil group, land use and area inputs. The rational method analysis was prepared using the high confidence rainfall values as determined by the OCHM. The AES results provide peak discharge and time of concentration. The area being analyzed includes elevation below mean sea level which result in negative numbers. Due to limitations of AES for modeling purposes all elevations were raise by 1,000 to input into the models. Time of concentration and peak flow rates for the 10- and 100-year storm events were obtained.

3.2 Soil Group and Land Use

The OCHM utilizes Hydrologic Soil Groups to develop the rational method calculations. Soils are classified as Hydrologic Soil Groups A, B, C and D. The on-site consists of group D while the off-site consists of groups A, B, C, and D.

The DPH Commercial Core land use types consist mainly of commercial areas. The off-site drainage area to Storm Drain Line C includes the following classifications: commercial, 5-7 dwelling Units/acre, 8-10 dwelling Units/acre, 11+ dwelling Units/acre, apartments, condominiums, and public park land use.

3.3 Regional Hydrology

The Dana Point Harbor lies within the bounds of the Dana Point Coastal Streams Watershed, which includes a number of coastal drains that discharge to the Pacific Ocean through DPH.

Stormwater runoff from the site, sheet flows to different inlets that connect to underground storm drain lines that ultimately discharge to the Harbor through storm drain outlets located within the concrete stone revetment below the seawall.

The CCA includes the existing storm drain main Line C which is a 60-inch Reinforced Concrete Pipes (RCP) bisecting the CCA. Line C receives off-site runoffs from the City of Dana Point and discharge through Outlet 3 as described in the MPD. It receives stormwater runoff from a large off-site area consisting of residential and commercial developments within the City of Dana Point and north of Dana Point Harbor Drive. The MPD provides more detail for these off-site drainage areas. Stormwater runoff from the proposed project areas discharges directly to the Ocean via several County maintained and engineered storm drain systems or as stormwater runoff that sheet flows directly into the Ocean over the seawall.

SECTION 4 EXISTING AND PROPOSED CONDITION HYDROLOGY

The proposed condition hydrology analysis was prepared for Lateral Line C2 for the 10-year, 25-year, and 100-year storm events. Per the MPD, the area tributary to Outlet 3 is increasing and the area tributary to Outlet 1 is decreasing. This change results in adding approximately 5 acres of drainage to storm drain Line C that is accounted for in Lateral Line C2. Appendix A provides the Proposed Condition Hydrology Map, and Appendix B includes the AES Rational Method Results for the 10-year, 25-year, and 100-year storm events.

5.1 Existing Condition Hydrology

The MPD analyzed the existing condition hydrology and drainage patterns for Outlets 1 and 3. Outlet 1 is an existing 18-inch storm drain Line B located in the Dry Stack lease Area, and Outlet 3 is the existing 60-inch storm drain Line C located in the CCA. See Appendix F Section 4 of the Master Drainage Plan has more information regarding the existing project drainage patterns. The existing condition drainage will be altered due to the following:

- The existing 18-inch storm drain system in the Dry Stack Lease Area does not have sufficient capacity (Outlet 1)
- The leasing boundary change associated with the Dry Stack Lease Area and Commercial Core Retail Area.

5.2 Proposed Condition Hydrology

The proposed drainage for the Parking Structure Phase 2B area is designed for the ultimate condition of construction which includes Golden Lantern Street, proposed 3-level parking structure, paved parking area south of the parking structure and portions of buildings 6, 7 and 8. However, the boardwalk and the proposed buildings 6 to 8 will not be constructed as part of this phase.

The proposed drainage was divided into four main drainage areas as described below:

- Areas C2.1, C2.2, C2.4, C2.6, C2.10, C2.11
  These areas consist of parking lot, drive aisles, and future roof drains. The drainage areas are designed to flow to localized catch basin inlets and convey storm flow via storm drain system. All areas to be directed to an underground Stormsafe Filter to provide water quality treatment and contains an internal high flow bypass for higher storm events.
- Areas C2.3 and C2.5
  These areas will consist of the 3rd/upper level of the parking structure and skylights

openings of the parking structure. These areas will drain to localized inlets and trench drains and will be conveyed through the parking structure plumbing system. Plumbing system will connect directly to the proposed storm drain system and will be treated by the underground Stormsafe Filter.

- Areas C2.8 and C9
  These areas will consist of Golden Lantern Street drainage. Golden Lantern will be crowned at the median and adjacent sidewalk will slope towards the street. Street flows will be picked up by a curb opening Modular Wetland System (MWS) on each side of the street for water quality treatment. Catch basin inlets are added alongside the MWS for overflow events.
- Areas C2.7
  These areas will consist of the landscape areas alongside the north and west side of the parking structure. These flows will be captured by 6-inch and 12-inch atrium drains that convey back into stormdrain lateral C2 and will be treated by the underground Stormsafe Filter.

SECTION 5 HYDRAULIC DESIGN

5.1 Hydraulics Design Criteria

The project storm drain facilities include the on-site storm drain system, catch basin inlets, grated inlets to conform to the standards set forth in the Orange County Local Drainage Manual (LDM), dated 1996. The main line storm drain system, Line C2, was designed using the Water Surface Pressure Gradient (WSPGW), a software developed by the Los Angeles Flood Control District and approved by the County of Orange was utilized to calculate the Hydraulic Grade Line (HGL) for the proposed storm drain lines. WSPG uses the Bernoulli equation to calculate the HGL for each storm drain line utilizing the flow and boundary condition. All other storm drains sizes were designed using computer estimated pipe size model function within AES. The catch basin inlets that will be utilized for flood control purposes were designed to fully capture the 25-year storm events following the recommendation of the LDM. See Reference Plans in Appendix D of this report for detailed information and the location of proposed drainage facilities.

5.2 Storm Drain Design

As described in the MPD, the existing storm drain Outlet 3 was built under the seawall through the concrete stone revetment. Thus, the existing storm drain system is controlled downstream by the seawater elevation, which varies due to tidal influence. Seawater is expected to backflow into the storm drain system and is considered in the hydraulic calculations. The downstream surface water elevation is set to the Mean High Water (MHW) at 4.41-feet taken from the NOAA Tides/Water Levels for La Jolla Monitoring Station per the MPD.

Storm Drain Line C2 was designed using the flows obtained from the hydrology rational method analysis for the 10-year storm event. Line C2 will ultimately discharge to Line C but during the temporary condition will connect to the existing catch basin as seen in the storm drain in Appendix D. Water will pond inside manhole No. 2 until it reaches the invert of the existing catch basin and discharge to the existing Line C.

The HGL throughout the pipe is below the finished surface, and above the storm drain top throughout the entire system. This will cause the pipe to be under pressure in the higher storm events. Line C2-A, C2-B, and C2-C are proposed 15-inch High Density Polyethylene Pipe (HDPE) with water tight joints will be provided for the groundwater condition. Line C2 and Lateral C2-A were sized using WSPG to keep the HGL at least 3-feet below the finished surface to prevent backflow to the proposed Modular Wetland System (see WQMP for Water Quality Design Futures Details). Results are provided on Appendix C of this report.

5.3 Catch Basin Design

The catch basin were designed using the AES HYDRAULIC ELEMENTS I module, approved by the County of Orange. The catch basin design calculations are provided on Appendix E of this report and Appendix D include the locations of the catch basin structures. Majority of the site consists of Inlet Type I (Orange County Public Work (OCPW) Std. 1301) and Inlet Type III and IV were selected for catch basins No. 3 and 9 due to site plan constraints. All catch basins are designed to capture the ultimate condition 25-year storm event. All catch basins are located in a sump condition. Overflows for the 100-year storm will sheetflow over the existing parking lot and the seawall and into the harbor.

SECTION 6 DRAINAGE ANALYSIS RESULTS SUMMARY

This section summarizes the results for the hydrology and hydraulics analyses.

6.1 Hydrology Results

The Rational Method hydrology analysis was prepared for the 10-year, 25-year and 100-year storm events for the proposed conditions. The site has been designed with the connection to the existing Line C, which corresponds to Node 450 of the ultimate condition hydrology. The results summary for the Line C2 Rational Method hydrology analysis are provided in Table 1 below. Although the area tributary to Line C2 has decreased from the MPD, the peak discharge increased by 8.5% from the MPD which is in substantial conformance. This occurs due to the increase of time of concentration with a more detailed model compared to the models used in the MPD. No change in HGL occurred with the increase in stormwater flow.

Table 1: Proposed Detention Basin Summary

Study	Area (AC)	10-Year (CFS)	25-Year (CFS)	100-Year (CFS)
Phase 2B	6.9	20.22	24.19	31.19
MPD	7.6	18.63	--	28.85

The results summary for the Outlet 3 Rational Method hydrology analysis are provided in Table 2 below. Peak discharge from the Ultimate Condition decreases in comparison to the calculations in the MPD designed. Future studies will include analysis of 100-year floodplain for protection for all habitable structures. Further phases of construction will include ultimate proposed hydrology and hydraulics analysis tributary to Outlet 3 and to Outlets 4 and 5 as described in the MPD.

Table 2 –Outlet 3 Rational Method Summary

Analysis	Area (AC)	10-Year (CFS)	100-Year (CFS)
Existing Condition	252.7	356.50	575.64
Phase 2B (Interim) Condition	258.3	367.04	592.54
Ultimate Condition	259.4	370.49	598.04
MPD	259.4	374.28	602.02

TECHNICAL APPENDIX

APPENDIX A – ULTIMATE CONDITION HYDROLOGY MAP

C2.1 0.44
C2.2 0.11
C2.3 1.35
C2.4 0.24
C2.5 1.27
C2.6 0.31
C2.7A 0.05
C2.7B 0.09
C2.7C 0.07
C2.7D 0.07
C2.7E 0.06
C2.8A 0.27
C2.8B 0.20
C2.9A 0.37
C2.9B 0.21
C2.10A 0.26
C2.10B 0.68
C2.11 0.41
C2.12 0.48

DANA POINT HARBOR DRIVE
GOLDEN LANTERN STREET
FUTURE BUILDING 6
FUTURE BUILDING 7
FUTURE BUILDING 8

L=330.00'
L=108.90'
L=101.79'
L=7.89'
L=128.74'
L=119.58'
L=101.36'
L=123.76'
L=14.78'
L=93.75'
L=158.87'
L=202.97'
L=245.35'
L=166.22'
L=330.00'
L=177.72'
L=329.13'
L=89.94'
L=147.22'
L=82.62'
L=65.65'
L=148.80'
L=68.50'
L=62.40'
L=12.06'
L=18.67'
L=92.97'
L=15.33'
L=62.53'
L=133.24'
L=132.30'
L=173.84'
L=18.32'
L=64.51'

1031.43 FS 230
1028.23 FS 232
1026.09 INV
1017.07 INV 236
1015.60 INV 238
1029.13 FS 250
1029.17 FS 260
1018.67 FS 234
1015.71 FS 210
1013.10 FS 214
1011.84 FS 216
1008.34 INV
1012.23 FS 212
1008.55 INV
1007.52 INV 218
1011.95 FS 290
1013.32 FS 220
1011.56 FS 222
1008.06 INV
1005.34 INV 224
SD LAT 'C2-C'
SD LINE 'C2'
1013.03 FS 226
1003.27 INV 280
1006.06 INV 270
1011.48 FS 228
1008.05 INV
1011.17 FS 312
1007.81 INV
SD LAT 'C2-B'
SD LAT 'C2-A'
1008.53 INV 240
1012.78 INV 240
1012.54 FS 264
1008.32 INV
1007.23 INV 268
1007.53 INV 266
1012.78 FS 254
1008.89 INV
1019.96 FS 252
1018.95 FS 262
1011.09 FS 302
1007.59 INV
1006.15 INV 304
1012.80 FS 160
1002.78 INV 320
1010.80 FS 292
1007.32 INV
1002.11 INV 322
TEMP. STORM DRAIN LINE TO CONNECT TO EX. CATCH BASIN
1012.90 FS 310
LINE 'C2' FUTURE 36" RCP
EX. 60" RCP
1001.26 INV 430
999.29 INV 450
OUTLET 3
992.8 INV 460
VALET ONLY

LEGEND

- DRAINAGE AREA BOUNDARY
- DRAINAGE SUB-AREA BOUNDARY
- FLOW PATH
- SD — EXISTING STORM DRAIN LINE
- C1 / 3.0 — SUBAREA ID / SUBAREA ACREAGE
- 32.0 ELEV / 25.64 INV. — NODE ELEVATION

0 20 30 40
(IN FEET)
1 INCH = 20 FEET

PREPARED UNDER THE SUPERVISION OF:
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Los Angeles Sacramento San Francisco Dallas Phoenix
Ontario San Diego Boise Denver Portland
2/13/20
DESIGN ENGINEER R.C.E. No. DATE

DRAWN BY:	DATE
DESIGNED BY:	DATE
CHECKED BY:	DATE
RECOMMENDED BY:	DATE

DANA POINT HARBOR REVITALIZATION

DANA POINT HARBOR PARTNERS, LLC

BWP BURNHAM I WARD PROPERTIES · R.D.OLSON DEVELOPMENT · BELLWETHER FINANCIAL GROUP

PARKING STRUCTURE
ULTIMATE CONDITION HYDROLOGY

SHT 1 OF 1

K:\Drawings\WE\WE038\0 - Dana Point Harbor\ENG\Hydrology\Commercial Core\WE038IC CCA PH 2B - PR HD ULT.dwg PLOTTED: 2/12/2020 12:18:33 PM BY Edwin Medina

APPENDIX B – ULTIMATE CONDITION HYDROLOGY RESULTS (AES)

LINE C2

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1334

                        Analysis prepared by:
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 ************************* DESCRIPTION OF STUDY *************************
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 2B                     *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3        *
* 10-YEAR STORM EVENT  EM                                               *
 ************************************************************************

  FILE NAME: C2P10R.DAT
  TIME/DATE OF STUDY: 12:34 02/12/2020
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  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
  2   10.0      1.0    0.001/0.001/0.005   0.08    0.10 0.0100 0.010 0.0080

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    212.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =   1015.71  DOWNSTREAM(FEET) =   1012.23

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.685
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.173
  SUBAREA Tc 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        0.44     0.20      0.100     75    7.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.25
  TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.25

************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    218.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```



```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.55  DOWNSTREAM(FEET) =  1007.52
  FLOW LENGTH(FEET) =   108.90   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.11
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.25
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    8.13
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    218.00 =     438.90 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 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.) =    8.13
  RAINFALL INTENSITY(INCH/HR) =   3.07
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.44
  TOTAL STREAM AREA(ACRES) =       0.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.25

************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    216.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   101.79
  ELEVATION DATA: UPSTREAM(FEET) =   1013.10  DOWNSTREAM(FEET) =   1011.84

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  D        0.11     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) =      0.40
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.40

************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    218.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.34  DOWNSTREAM(FEET) =  1007.52
  FLOW LENGTH(FEET) =     7.89   MANNING'S N =  0.012
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.51
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.40
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.02
  LONGEST FLOWPATH FROM NODE    214.00 TO NODE    218.00 =     109.68 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 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.) =    5.02
  RAINFALL INTENSITY(INCH/HR) =   4.05
  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 = 0.40

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.25	8.13	3.073	0.20(0.02)	0.10	0.4	210.00
2	0.40	5.02	4.051	0.20(0.02)	0.10	0.1	214.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.42	5.02	4.051	0.20(0.02)	0.10	0.4	214.00
2	1.55	8.13	3.073	0.20(0.02)	0.10	0.6	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 1.55 Tc(MIN.) = 8.13
EFFECTIVE AREA(ACRES) = 0.55 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 210.00 TO NODE 218.00 = 438.90 FEET.

****
FLOW PROCESS FROM NODE 218.00 TO NODE 224.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1007.52 DOWNSTREAM(FEET) = 1005.34
FLOW LENGTH(FEET) = 128.74 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.41
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.55
PIPE TRAVEL TIME(MIN.) = 0.40 Tc(MIN.) = 8.52
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 224.00 = 567.64 FEET.

****
FLOW PROCESS FROM NODE 224.00 TO NODE 224.00 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.) = 8.52
RAINFALL INTENSITY(INCH/HR) = 2.99
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.55
TOTAL STREAM AREA(ACRES) = 0.55
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.55

****
FLOW PROCESS FROM NODE 220.00 TO NODE 222.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========
INITIAL SUBAREA FLOW-LENGTH(FEET) = 101.36
ELEVATION DATA: UPSTREAM(FEET) = 1013.32 DOWNSTREAM(FEET) = 1011.56

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)

COMMERCIAL	D	0.24	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) = 0.87
TOTAL AREA(ACRES) = 0.24 PEAK FLOW RATE(CFS) = 0.87

****
FLOW PROCESS FROM NODE 222.00 TO NODE 224.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1008.06 DOWNSTREAM(FEET) = 1005.34
FLOW LENGTH(FEET) = 13.31 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.95
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.87
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 224.00 = 114.67 FEET.

****
FLOW PROCESS FROM NODE 224.00 TO NODE 224.00 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.) = 5.02
RAINFALL INTENSITY(INCH/HR) = 4.05
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.24
TOTAL STREAM AREA(ACRES) = 0.24
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.87

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.42	5.42	3.876	0.20(0.02)	0.10	0.4	214.00
1	1.55	8.52	2.990	0.20(0.02)	0.10	0.6	210.00
2	0.87	5.02	4.051	0.20(0.02)	0.10	0.2	220.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.24	5.02	4.051	0.20(0.02)	0.10	0.6	220.00
2	2.25	5.42	3.876	0.20(0.02)	0.10	0.6	214.00
3	2.19	8.52	2.990	0.20(0.02)	0.10	0.8	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 2.25 Tc(MIN.) = 5.42
EFFECTIVE AREA(ACRES) = 0.62 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 210.00 TO NODE 224.00 = 567.64 FEET.

****
FLOW PROCESS FROM NODE 224.00 TO NODE 224.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 5.42
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.876
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.27	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     1.27     SUBAREA RUNOFF(CFS) =     4.41
 EFFECTIVE AREA(ACRES) =     1.89   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       6.56

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        6.76    5.02    4.051  0.20( 0.02) 0.10       1.9     220.00
     2        6.56    5.42    3.876  0.20( 0.02) 0.10       1.9     214.00
     3        5.51    8.52    2.990  0.20( 0.02) 0.10       2.1     210.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       6.76  Tc(MIN.) =    5.02
 AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       1.86

****************************************************************************
 FLOW PROCESS FROM NODE    224.00 TO NODE    224.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.02
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.051
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.08      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) =    0.08      SUBAREA RUNOFF(CFS) =    0.29
 EFFECTIVE AREA(ACRES) =      1.94   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       7.05

****************************************************************************
 FLOW PROCESS FROM NODE    224.00 TO NODE    280.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1005.34  DOWNSTREAM(FEET) =  1003.27
 FLOW LENGTH(FEET) =   118.08   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.45
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.05
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    5.28
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    280.00 =     685.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    234.00 TO NODE    236.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    93.75
 ELEVATION DATA: UPSTREAM(FEET) =   1018.67  DOWNSTREAM(FEET) =   1017.07

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 D        0.05      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) =      0.18
 TOTAL AREA(ACRES) =      0.05   PEAK FLOW RATE(CFS) =      0.18

****************************************************************************
 FLOW PROCESS FROM NODE    236.00 TO NODE    238.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1017.07  DOWNSTREAM(FEET) =  1015.60
 FLOW LENGTH(FEET) =   158.87   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.51
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.18
 PIPE TRAVEL TIME(MIN.) =   1.06    Tc(MIN.) =    6.06
 LONGEST FLOWPATH FROM NODE    234.00 TO NODE    238.00 =     252.62 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    238.00 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.) =    6.06
 RAINFALL INTENSITY(INCH/HR) =   3.64
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.05
 TOTAL STREAM AREA(ACRES) =       0.05
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.18

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    232.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    71.78
 ELEVATION DATA: UPSTREAM(FEET) =   1031.43  DOWNSTREAM(FEET) =   1028.23

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 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) =      0.33
 TOTAL AREA(ACRES) =      0.09   PEAK FLOW RATE(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    232.00 TO NODE    238.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.09  DOWNSTREAM(FEET) =  1015.60
 FLOW LENGTH(FEET) =   202.97   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.54
 GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.33
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =    5.61
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    238.00 =     274.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    238.00 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.) =    5.61
 RAINFALL INTENSITY(INCH/HR) =   3.80
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.09
 TOTAL STREAM AREA(ACRES) =       0.09
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.33

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        0.18    6.06    3.638  0.20( 0.02) 0.10       0.1     234.00
     2        0.33    5.61    3.800  0.20( 0.02) 0.10       0.1     230.00

 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        0.50    5.61    3.800  0.20( 0.02) 0.10       0.1     230.00
     2        0.49    6.06    3.638  0.20( 0.02) 0.10       0.1     234.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       0.50    Tc(MIN.) =     5.61
 EFFECTIVE AREA(ACRES) =       0.14   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.1
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    238.00 =     274.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    238.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.61
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.800
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.07      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) =    0.07      SUBAREA RUNOFF(CFS) =    0.24
 EFFECTIVE AREA(ACRES) =      0.21   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.70

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    240.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1015.60  DOWNSTREAM(FEET) =  1012.78
 FLOW LENGTH(FEET) =   160.89   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.70
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =    6.22
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    240.00 =     435.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.22
```



```
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.583
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.07      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) =    0.07      SUBAREA RUNOFF(CFS) =    0.22
 EFFECTIVE AREA(ACRES) =      0.28   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.89

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    242.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1012.78  DOWNSTREAM(FEET) =  1008.53
 FLOW LENGTH(FEET) =   245.35   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.76
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.89
 PIPE TRAVEL TIME(MIN.) =   0.86    Tc(MIN.) =    7.08
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    242.00 =     680.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    242.00 TO NODE    242.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.08
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.327
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 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) =      0.34   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.00

****************************************************************************
 FLOW PROCESS FROM NODE    242.00 TO NODE    268.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    252.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.13
 ELEVATION DATA: UPSTREAM(FEET) =   1029.13  DOWNSTREAM(FEET) =   1019.96

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.322
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.549
 SUBAREA Tc 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        0.27      0.20       0.100    75    6.32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.86
 TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      0.86

****************************************************************************
 FLOW PROCESS FROM NODE    252.00 TO NODE    254.00 IS CODE =  61
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1019.96  DOWNSTREAM ELEVATION(FEET) = 1012.78
  STREET LENGTH(FEET) =   177.72   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 38.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  33.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  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) =       1.15
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.75
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.74
  STREET FLOW TRAVEL TIME(MIN.) =   0.88   Tc(MIN.) =    7.21
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.292
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.20      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.59
  EFFECTIVE AREA(ACRES) =      0.47    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) =       1.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.35
  FLOW VELOCITY(FEET/SEC.) =  3.45   DEPTH*VELOCITY(FT*FT/SEC.) =   0.80
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    254.00 =     506.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    254.00 TO NODE    266.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.89  DOWNSTREAM(FEET) =  1007.53
  FLOW LENGTH(FEET) =    82.44   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.25
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        1.38
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    7.47
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    266.00 =     589.29 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    266.00 TO NODE    266.00 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.) =    7.47
  RAINFALL INTENSITY(INCH/HR) =   3.23
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.47
  TOTAL STREAM AREA(ACRES) =       0.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.38

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    262.00 IS CODE =  21
```



```
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =   1029.17  DOWNSTREAM(FEET) =   1018.95

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.196
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.590
  SUBAREA Tc 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        0.37      0.20     0.100    75    6.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.19
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.19

****************************************************************************
  FLOW PROCESS FROM NODE    262.00 TO NODE    264.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1018.95  DOWNSTREAM ELEVATION(FEET) = 1012.54
  STREET LENGTH(FEET) =   166.22   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 38.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  33.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.019
  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) =       1.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.68
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.44
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.82
  STREET FLOW TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =    7.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.347
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.21      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) =    0.21      SUBAREA RUNOFF(CFS) =    0.63
  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) =       1.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.19
  FLOW VELOCITY(FEET/SEC.) =  3.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.87
  LONGEST FLOWPATH FROM NODE    260.00 TO NODE    264.00 =     496.22 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    266.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.32  DOWNSTREAM(FEET) =  1007.53
  FLOW LENGTH(FEET) =    12.06   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.31
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        1.74
```

PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 7.02
LONGEST FLOWPATH FROM NODE 260.00 TO NODE 266.00 = 508.28 FEET.

****
FLOW PROCESS FROM NODE 266.00 TO NODE 266.00 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.) = 7.02
RAINFALL INTENSITY(INCH/HR) = 3.34
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 = 1.74

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.38	7.47	3.226	0.20(0.02)	0.10	0.5	250.00
2	1.74	7.02	3.342	0.20(0.02)	0.10	0.6	260.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.09	7.02	3.342	0.20(0.02)	0.10	1.0	260.00
2	3.06	7.47	3.226	0.20(0.02)	0.10	1.0	250.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 3.09 Tc(MIN.) = 7.02
EFFECTIVE AREA(ACRES) = 1.02 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 250.00 TO NODE 266.00 = 589.29 FEET.

****
FLOW PROCESS FROM NODE 266.00 TO NODE 268.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1007.53 DOWNSTREAM(FEET) = 1007.23
FLOW LENGTH(FEET) = 18.67 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.32
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.09
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 7.07
LONGEST FLOWPATH FROM NODE 250.00 TO NODE 268.00 = 607.96 FEET.

****
FLOW PROCESS FROM NODE 268.00 TO NODE 268.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.09	7.07	3.328	0.20(0.02)	0.10	1.0	260.00
2	3.06	7.52	3.214	0.20(0.02)	0.10	1.0	250.00

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 268.00 = 607.96 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.00	7.08	3.327	0.20(0.02)	0.10	0.3	230.00

2	0.98	7.53	3.210	0.20(0.02)	0.10	0.3	234.00

LONGEST FLOWPATH FROM NODE 230.00 TO NODE 268.00 = 680.99 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.09	7.07	3.328	0.20(0.02)	0.10	1.4	260.00
2	4.09	7.08	3.327	0.20(0.02)	0.10	1.4	230.00
3	4.04	7.52	3.214	0.20(0.02)	0.10	1.4	250.00
4	4.03	7.53	3.210	0.20(0.02)	0.10	1.4	234.00

TOTAL AREA(ACRES) = 1.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 4.09 Tc(MIN.) = 7.077
EFFECTIVE AREA(ACRES) = 1.36 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 268.00 = 680.99 FEET.

****
FLOW PROCESS FROM NODE 268.00 TO NODE 268.00 IS CODE = 12

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

****
FLOW PROCESS FROM NODE 268.00 TO NODE 270.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1007.23 DOWNSTREAM(FEET) = 1006.06
FLOW LENGTH(FEET) = 68.50 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.85
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.09
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 7.24
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 270.00 = 749.49 FEET.

****
FLOW PROCESS FROM NODE 270.00 TO NODE 270.00 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.) = 7.24
RAINFALL INTENSITY(INCH/HR) = 3.28
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.36
TOTAL STREAM AREA(ACRES) = 1.39
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.09

****
FLOW PROCESS FROM NODE 226.00 TO NODE 228.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========
INITIAL SUBAREA FLOW-LENGTH(FEET) = 148.80
ELEVATION DATA: UPSTREAM(FEET) = 1013.03 DOWNSTREAM(FEET) = 1011.48

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.602
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.803
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.31	0.20	0.100	75	5.60

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

```
 SUBAREA RUNOFF(CFS) =      1.06
 TOTAL AREA(ACRES) =      0.31   PEAK FLOW RATE(CFS) =      1.06

****************************************************************************
 FLOW PROCESS FROM NODE    228.00 TO NODE    270.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1008.05  DOWNSTREAM(FEET) =  1006.06
 FLOW LENGTH(FEET) =    15.33   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.64
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.06
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.63
 LONGEST FLOWPATH FROM NODE    226.00 TO NODE    270.00 =     164.13 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 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.) =    5.63
 RAINFALL INTENSITY(INCH/HR) =   3.79
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.31
 TOTAL STREAM AREA(ACRES) =       0.31
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.06

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        4.09    7.24    3.284  0.20( 0.02) 0.10       1.4     260.00
     1        4.09    7.24    3.283  0.20( 0.02) 0.10       1.4     230.00
     1        4.04    7.68    3.173  0.20( 0.02) 0.10       1.4     250.00
     1        4.03    7.70    3.170  0.20( 0.02) 0.10       1.4     234.00
     2        1.06    5.63    3.794  0.20( 0.02) 0.10       0.3     226.00

 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        4.73    5.63    3.794  0.20( 0.02) 0.10       1.4     226.00
     2        5.00    7.24    3.284  0.20( 0.02) 0.10       1.7     260.00
     3        5.00    7.24    3.283  0.20( 0.02) 0.10       1.7     230.00
     4        4.92    7.68    3.173  0.20( 0.02) 0.10       1.7     250.00
     5        4.91    7.70    3.170  0.20( 0.02) 0.10       1.7     234.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.00    Tc(MIN.) =     7.24
 EFFECTIVE AREA(ACRES) =       1.67   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.7
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    270.00 =     749.49 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.24
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.284
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D       1.27      0.20      0.100    75
```



```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    3.73
 EFFECTIVE AREA(ACRES) =      2.94   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       8.63

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        8.95    5.63    3.794  0.20( 0.02) 0.10       2.6     226.00
     2        8.63    7.24    3.284  0.20( 0.02) 0.10       2.9     260.00
     3        8.63    7.24    3.283  0.20( 0.02) 0.10       2.9     230.00
     4        8.43    7.68    3.173  0.20( 0.02) 0.10       3.0     250.00
     5        8.42    7.70    3.170  0.20( 0.02) 0.10       3.0     234.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       8.95  Tc(MIN.) =    5.63
 AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       2.64

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    280.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1006.06  DOWNSTREAM(FEET) =  1003.27
 FLOW LENGTH(FEET) =    65.65   MANNING'S N =  0.012
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.89
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.95
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.72
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    280.00 =     815.14 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 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        8.95    5.72    3.759  0.20( 0.02) 0.10       2.6     226.00
     2        8.63    7.33    3.260  0.20( 0.02) 0.10       2.9     260.00
     3        8.63    7.34    3.259  0.20( 0.02) 0.10       2.9     230.00
     4        8.43    7.78    3.152  0.20( 0.02) 0.10       3.0     250.00
     5        8.42    7.79    3.148  0.20( 0.02) 0.10       3.0     234.00
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    280.00 =     815.14 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        7.05    5.28    3.934  0.20( 0.02) 0.10       1.9     220.00
     2        6.84    5.69    3.771  0.20( 0.02) 0.10       2.0     214.00
     3        5.72    8.80    2.937  0.20( 0.02) 0.10       2.1     210.00
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    280.00 =     685.72 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       15.71    5.28    3.934  0.20( 0.02) 0.10       4.4     220.00
     2       15.77    5.69    3.771  0.20( 0.02) 0.10       4.6     214.00
     3       15.78    5.72    3.759  0.20( 0.02) 0.10       4.6     226.00
     4       14.88    7.33    3.260  0.20( 0.02) 0.10       5.0     260.00
     5       14.88    7.34    3.259  0.20( 0.02) 0.10       5.0     230.00
     6       14.52    7.78    3.152  0.20( 0.02) 0.10       5.1     250.00
     7       14.50    7.79    3.148  0.20( 0.02) 0.10       5.1     234.00
     8       13.57    8.80    2.937  0.20( 0.02) 0.10       5.1     210.00
  TOTAL AREA(ACRES) =         5.1

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       15.78  Tc(MIN.) =    5.718
```

```
 EFFECTIVE AREA(ACRES) =      4.61  AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       5.1
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    280.00 =     815.14 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1003.27  DOWNSTREAM(FEET) =  1002.78
 FLOW LENGTH(FEET) =    82.62   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  14.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.15
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.78
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    5.94
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    320.00 =     897.76 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    290.00 TO NODE    292.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   119.58
 ELEVATION DATA: UPSTREAM(FEET) =   1013.25  DOWNSTREAM(FEET) =   1010.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  D        0.26     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) =      0.95
 TOTAL AREA(ACRES) =      0.26   PEAK FLOW RATE(CFS) =      0.95

****************************************************************************
 FLOW PROCESS FROM NODE    292.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1007.32  DOWNSTREAM(FEET) =  1006.15
 FLOW LENGTH(FEET) =   123.76   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.87
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.95
 PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =    5.53
 LONGEST FLOWPATH FROM NODE    290.00 TO NODE    304.00 =     243.34 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 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.) =    5.53
 RAINFALL INTENSITY(INCH/HR) =   3.83
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.26
 TOTAL STREAM AREA(ACRES) =       0.26
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.95

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   189.94
 ELEVATION DATA: UPSTREAM(FEET) =   1012.80  DOWNSTREAM(FEET) =   1011.09

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.360
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.537
 SUBAREA Tc 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        0.68     0.20       0.100    75    6.36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      2.15
 TOTAL AREA(ACRES) =      0.68   PEAK FLOW RATE(CFS) =      2.15

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1007.59  DOWNSTREAM(FEET) =  1006.15
 FLOW LENGTH(FEET) =    14.78   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.38
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      2.15
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.38
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     204.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.38
 RAINFALL INTENSITY(INCH/HR) =   3.53
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.68
 TOTAL STREAM AREA(ACRES) =       0.68
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.15

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        0.95    5.53    3.831  0.20( 0.02) 0.10       0.3     290.00
     2        2.15    6.38    3.530  0.20( 0.02) 0.10       0.7     300.00

 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	2.97	5.53	3.831	0.20(0.02)	0.10	0.8	290.00
2	3.02	6.38	3.530	0.20(0.02)	0.10	0.9	300.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 3.02 Tc(MIN.) = 6.38
EFFECTIVE AREA(ACRES) = 0.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.9
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 304.00 = 243.34 FEET.

****
FLOW PROCESS FROM NODE 304.00 TO NODE 320.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1006.15 DOWNSTREAM(FEET) = 1002.78
FLOW LENGTH(FEET) = 147.22 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.20
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.02
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 6.72
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 320.00 = 390.56 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 320.00 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.) = 6.72
RAINFALL INTENSITY(INCH/HR) = 3.43
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.94
TOTAL STREAM AREA(ACRES) = 0.94
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.02

****
FLOW PROCESS FROM NODE 310.00 TO NODE 312.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========
INITIAL SUBAREA FLOW-LENGTH(FEET) = 132.30
ELEVATION DATA: UPSTREAM(FEET) = 1012.90 DOWNSTREAM(FEET) = 1011.17

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.107
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.010
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.41	0.20	0.100	75	5.11

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.47
TOTAL AREA(ACRES) = 0.41 PEAK FLOW RATE(CFS) = 1.47

****
FLOW PROCESS FROM NODE 312.00 TO NODE 320.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1007.81 DOWNSTREAM(FEET) = 1003.78
FLOW LENGTH(FEET) = 62.53 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 3.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.84
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 1.47
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.23
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 320.00 = 194.83 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 320.00 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) = 3.96
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.41
TOTAL STREAM AREA(ACRES) = 0.41
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.47

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.97	5.88	3.701	0.20(0.02)	0.10	0.8	290.00
1	3.02	6.72	3.426	0.20(0.02)	0.10	0.9	300.00
2	1.47	5.23	3.958	0.20(0.02)	0.10	0.4	310.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.30	5.23	3.958	0.20(0.02)	0.10	1.2	310.00
2	4.35	5.88	3.701	0.20(0.02)	0.10	1.3	290.00
3	4.30	6.72	3.426	0.20(0.02)	0.10	1.4	300.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 4.35 Tc(MIN.) = 5.88
EFFECTIVE AREA(ACRES) = 1.26 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 320.00 = 390.56 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 320.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.30	5.23	3.958	0.20(0.02)	0.10	1.2	310.00
2	4.35	5.88	3.701	0.20(0.02)	0.10	1.3	290.00
3	4.30	6.72	3.426	0.20(0.02)	0.10	1.4	300.00

LONGEST FLOWPATH FROM NODE 290.00 TO NODE 320.00 = 390.56 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	15.71	5.51	3.841	0.20(0.02)	0.10	4.4	220.00
2	15.77	5.91	3.689	0.20(0.02)	0.10	4.6	214.00
3	15.78	5.94	3.677	0.20(0.02)	0.10	4.6	226.00
4	14.88	7.56	3.204	0.20(0.02)	0.10	5.0	260.00
5	14.88	7.56	3.202	0.20(0.02)	0.10	5.0	230.00
6	14.52	8.01	3.100	0.20(0.02)	0.10	5.1	250.00
7	14.50	8.02	3.097	0.20(0.02)	0.10	5.1	234.00
8	13.57	9.03	2.893	0.20(0.02)	0.10	5.1	210.00

LONGEST FLOWPATH FROM NODE 230.00 TO NODE 320.00 = 897.76 FEET.

** PEAK FLOW RATE TABLE **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)		(ACRES)	NODE
1	19.66	5.23	3.958	0.20(0.02)	0.10	5.3	310.00
2	20.03	5.51	3.841	0.20(0.02)	0.10	5.6	220.00
3	20.11	5.88	3.701	0.20(0.02)	0.10	5.8	290.00
4	20.12	5.91	3.689	0.20(0.02)	0.10	5.9	214.00
5	20.13	5.94	3.677	0.20(0.02)	0.10	5.9	226.00
6	19.64	6.72	3.426	0.20(0.02)	0.10	6.1	300.00
7	18.90	7.56	3.204	0.20(0.02)	0.10	6.3	260.00
8	18.89	7.56	3.202	0.20(0.02)	0.10	6.3	230.00
9	18.40	8.01	3.100	0.20(0.02)	0.10	6.4	250.00
10	18.39	8.02	3.097	0.20(0.02)	0.10	6.4	234.00
11	17.20	9.03	2.893	0.20(0.02)	0.10	6.5	210.00

TOTAL AREA(ACRES) = 6.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 20.13 Tc(MIN.) = 5.942
EFFECTIVE AREA(ACRES) = 5.88 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 6.5
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 320.00 = 897.76 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 325.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1002.78 DOWNSTREAM(FEET) = 1002.11
FLOW LENGTH(FEET) = 133.24 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 16.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.18
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.13
PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 6.30
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 325.00 = 1031.00 FEET.

****
FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 6.30
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.555
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.48	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) = 0.48 SUBAREA RUNOFF(CFS) = 1.53
EFFECTIVE AREA(ACRES) = 6.36 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 20.22

****
FLOW PROCESS FROM NODE 325.00 TO NODE 330.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1002.11 DOWNSTREAM(FEET) = 1001.26
FLOW LENGTH(FEET) = 173.84 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 17.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.12
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.22
PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 6.78
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 330.00 = 1204.84 FEET.

****
FLOW PROCESS FROM NODE 330.00 TO NODE 450.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

==========
ELEVATION DATA: UPSTREAM(FEET) = 1001.26 DOWNSTREAM(FEET) = 999.29
FLOW LENGTH(FEET) = 18.13 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 7.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.70
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.22
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 6.79
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 450.00 = 1222.97 FEET.
==========
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 6.9 TC(MIN.) = 6.79
EFFECTIVE AREA(ACRES) = 6.36 AREA-AVERAGED Fm(INCH/HR)= 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 20.22

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)		Ap	Ae (ACRES)	HEADWATER NODE
1	19.78	6.08	3.629	0.20(0.02)	0.10	5.8	310.00	
2	20.11	6.36	3.538	0.20(0.02)	0.10	6.1	220.00	
3	20.21	6.72	3.426	0.20(0.02)	0.10	6.3	290.00	
4	20.22	6.76	3.416	0.20(0.02)	0.10	6.3	214.00	
5	20.22	6.79	3.406	0.20(0.02)	0.10	6.4	226.00	
6	19.71	7.58	3.199	0.20(0.02)	0.10	6.6	300.00	
7	19.04	8.42	3.011	0.20(0.02)	0.10	6.8	260.00	
8	19.04	8.43	3.010	0.20(0.02)	0.10	6.8	230.00	
9	18.59	8.88	2.922	0.20(0.02)	0.10	6.9	250.00	
10	18.58	8.89	2.919	0.20(0.02)	0.10	6.9	234.00	
11	17.53	9.91	2.742	0.20(0.02)	0.10	6.9	210.00	

==========
==========
END OF RATIONAL METHOD ANALYSIS

♠

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************************************************************************
            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 *************************
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 2B                     *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3        *
* 25-YEAR STORM EVENT  EM                                               *
 ************************************************************************

  FILE NAME: C2P25R.DAT
  TIME/DATE OF STUDY: 12:50 02/13/2020
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   10.0      1.0    0.001/0.001/0.005   0.08    0.10 0.0100 0.010 0.0080

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    212.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =   1015.71  DOWNSTREAM(FEET) =   1012.23

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.685
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.782
  SUBAREA Tc 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        0.44      0.20     0.100    75    7.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.49
  TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.49

************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    218.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```



```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.55  DOWNSTREAM(FEET) =  1007.52
  FLOW LENGTH(FEET) =   108.90   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.23
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.49
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    8.11
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    218.00 =     438.90 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 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.) =    8.11
  RAINFALL INTENSITY(INCH/HR) =   3.67
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.44
  TOTAL STREAM AREA(ACRES) =       0.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.49

************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    216.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   101.79
  ELEVATION DATA: UPSTREAM(FEET) =   1013.10  DOWNSTREAM(FEET) =   1011.84

  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        0.11      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) =      0.48
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.48

************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    218.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.34  DOWNSTREAM(FEET) =  1007.52
  FLOW LENGTH(FEET) =     7.89   MANNING'S N =  0.012
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.91
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.48
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.02
  LONGEST FLOWPATH FROM NODE    214.00 TO NODE    218.00 =     109.68 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 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.) =    5.02
  RAINFALL INTENSITY(INCH/HR) =   4.81
  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 = 0.48

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.49	8.11	3.667	0.20(0.02)	0.10	0.4	210.00
2	0.48	5.02	4.815	0.20(0.02)	0.10	0.1	214.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.69	5.02	4.815	0.20(0.02)	0.10	0.4	214.00
2	1.85	8.11	3.667	0.20(0.02)	0.10	0.6	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 1.85 Tc(MIN.) = 8.11
EFFECTIVE AREA(ACRES) = 0.55 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 210.00 TO NODE 218.00 = 438.90 FEET.

****
FLOW PROCESS FROM NODE 218.00 TO NODE 224.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1007.52 DOWNSTREAM(FEET) = 1005.34
FLOW LENGTH(FEET) = 128.74 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 6.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.61
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.85
PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 8.50
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 224.00 = 567.64 FEET.

****
FLOW PROCESS FROM NODE 224.00 TO NODE 224.00 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.) = 8.50
RAINFALL INTENSITY(INCH/HR) = 3.57
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.55
TOTAL STREAM AREA(ACRES) = 0.55
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.85

****
FLOW PROCESS FROM NODE 220.00 TO NODE 222.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========
INITIAL SUBAREA FLOW-LENGTH(FEET) = 101.36
ELEVATION DATA: UPSTREAM(FEET) = 1013.32 DOWNSTREAM(FEET) = 1011.56

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/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)

COMMERCIAL	D	0.24	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) = 1.04
TOTAL AREA(ACRES) = 0.24 PEAK FLOW RATE(CFS) = 1.04

****
FLOW PROCESS FROM NODE 222.00 TO NODE 224.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1008.06 DOWNSTREAM(FEET) = 1005.34
FLOW LENGTH(FEET) = 13.31 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.55
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.04
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 224.00 = 114.67 FEET.

****
FLOW PROCESS FROM NODE 224.00 TO NODE 224.00 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.) = 5.02
RAINFALL INTENSITY(INCH/HR) = 4.81
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.24
TOTAL STREAM AREA(ACRES) = 0.24
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.04

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.69	5.41	4.615	0.20(0.02)	0.10	0.4	214.00
1	1.85	8.50	3.573	0.20(0.02)	0.10	0.6	210.00
2	1.04	5.02	4.814	0.20(0.02)	0.10	0.2	220.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.67	5.02	4.814	0.20(0.02)	0.10	0.6	220.00
2	2.68	5.41	4.615	0.20(0.02)	0.10	0.6	214.00
3	2.62	8.50	3.573	0.20(0.02)	0.10	0.8	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 2.68 Tc(MIN.) = 5.41
EFFECTIVE AREA(ACRES) = 0.62 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 210.00 TO NODE 224.00 = 567.64 FEET.

****
FLOW PROCESS FROM NODE 224.00 TO NODE 224.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 5.41
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.615
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.27	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     1.27     SUBAREA RUNOFF(CFS) =     5.25
 EFFECTIVE AREA(ACRES) =     1.89   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       7.82

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        8.05    5.02    4.814  0.20( 0.02) 0.10       1.9     220.00
     2        7.82    5.41    4.615  0.20( 0.02) 0.10       1.9     214.00
     3        6.59    8.50    3.573  0.20( 0.02) 0.10       2.1     210.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       8.05  Tc(MIN.) =    5.02
 AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       1.86

****************************************************************************
 FLOW PROCESS FROM NODE    224.00 TO NODE    224.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.02
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.814
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.08      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) =    0.08      SUBAREA RUNOFF(CFS) =    0.35
 EFFECTIVE AREA(ACRES) =      1.94   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       8.39

****************************************************************************
 FLOW PROCESS FROM NODE    224.00 TO NODE    280.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1005.34  DOWNSTREAM(FEET) =  1003.27
 FLOW LENGTH(FEET) =   118.08   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.91
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.39
 PIPE TRAVEL TIME(MIN.) =    0.25    Tc(MIN.) =    5.27
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    280.00 =     685.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    234.00 TO NODE    236.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    93.75
 ELEVATION DATA: UPSTREAM(FEET) =   1018.67  DOWNSTREAM(FEET) =   1017.07

 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        0.05      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) =      0.22
 TOTAL AREA(ACRES) =      0.05   PEAK FLOW RATE(CFS) =      0.22

****************************************************************************
 FLOW PROCESS FROM NODE    236.00 TO NODE    238.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1017.07  DOWNSTREAM(FEET) =  1015.60
 FLOW LENGTH(FEET) =   158.87   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.67
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.22
 PIPE TRAVEL TIME(MIN.) =   0.99    Tc(MIN.) =    5.99
 LONGEST FLOWPATH FROM NODE    234.00 TO NODE    238.00 =     252.62 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    238.00 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.) =    5.99
 RAINFALL INTENSITY(INCH/HR) =   4.35
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.05
 TOTAL STREAM AREA(ACRES) =       0.05
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.22

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    232.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    71.78
 ELEVATION DATA: UPSTREAM(FEET) =   1031.43  DOWNSTREAM(FEET) =   1028.23

 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    232.00 TO NODE    238.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.09  DOWNSTREAM(FEET) =  1015.60
 FLOW LENGTH(FEET) =   202.97   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.79
 GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.39
 PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =    5.58
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    238.00 =     274.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    238.00 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.) =    5.58
 RAINFALL INTENSITY(INCH/HR) =   4.53
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.09
 TOTAL STREAM AREA(ACRES) =       0.09
 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        0.22    5.99    4.354  0.20( 0.02) 0.10       0.1     234.00
     2        0.39    5.58    4.531  0.20( 0.02) 0.10       0.1     230.00

 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        0.60    5.58    4.531  0.20( 0.02) 0.10       0.1     230.00
     2        0.59    5.99    4.354  0.20( 0.02) 0.10       0.1     234.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       0.60    Tc(MIN.) =     5.58
 EFFECTIVE AREA(ACRES) =       0.14   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.1
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    238.00 =     274.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    238.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.58
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.531
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.07      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) =    0.07      SUBAREA RUNOFF(CFS) =    0.28
 EFFECTIVE AREA(ACRES) =      0.21   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.84

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    240.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1015.60  DOWNSTREAM(FEET) =  1012.78
 FLOW LENGTH(FEET) =   160.89   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.73
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.84
 PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =    6.15
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    240.00 =     435.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.15
```



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 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.290
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.07      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) =    0.07      SUBAREA RUNOFF(CFS) =    0.27
 EFFECTIVE AREA(ACRES) =      0.28   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.06

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    242.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1012.78  DOWNSTREAM(FEET) =  1008.53
 FLOW LENGTH(FEET) =   245.35   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.01
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.06
 PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =    6.97
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    242.00 =     680.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    242.00 TO NODE    242.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.97
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.998
 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) =    0.21
 EFFECTIVE AREA(ACRES) =      0.34   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.21

****************************************************************************
 FLOW PROCESS FROM NODE    242.00 TO NODE    268.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    252.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.13
 ELEVATION DATA: UPSTREAM(FEET) =   1029.13  DOWNSTREAM(FEET) =   1019.96

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.322
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.224
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 D        0.27      0.20       0.100    75    6.32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.02
 TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      1.02

****************************************************************************
 FLOW PROCESS FROM NODE    252.00 TO NODE    254.00 IS CODE =  61
```

```
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) = 1019.96  DOWNSTREAM ELEVATION(FEET) = 1012.78
  STREET LENGTH(FEET) =   177.72   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 38.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  33.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  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) =       1.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =    7.19
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.928
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.20      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.70
  EFFECTIVE AREA(ACRES) =      0.47    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) =       1.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   6.00
  FLOW VELOCITY(FEET/SEC.) =  3.54   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    254.00 =     506.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    254.00 TO NODE    266.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.89  DOWNSTREAM(FEET) =  1007.53
  FLOW LENGTH(FEET) =   82.44   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.44
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        1.65
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    7.44
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    266.00 =     589.29 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    266.00 TO NODE    266.00 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.) =    7.44
  RAINFALL INTENSITY(INCH/HR) =   3.85
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.47
  TOTAL STREAM AREA(ACRES) =       0.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.65

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    262.00 IS CODE =  21
```



```
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =   1029.17  DOWNSTREAM(FEET) =   1018.95

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.196
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.272
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  D        0.37      0.20     0.100    75    6.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.42
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.42

****************************************************************************
  FLOW PROCESS FROM NODE    262.00 TO NODE    264.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) = 1018.95  DOWNSTREAM ELEVATION(FEET) = 1012.54
  STREET LENGTH(FEET) =   166.22   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 38.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  33.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.019
  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) =       1.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.32
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.51
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.88
  STREET FLOW TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =    6.98
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.992
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.21      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) =    0.21      SUBAREA RUNOFF(CFS) =    0.75
  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) =       2.07

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.84
  FLOW VELOCITY(FEET/SEC.) =  3.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.94
  LONGEST FLOWPATH FROM NODE    260.00 TO NODE    264.00 =     496.22 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    266.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.32  DOWNSTREAM(FEET) =  1007.53
  FLOW LENGTH(FEET) =    12.06   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.72
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.07
```

```
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    7.01
 LONGEST FLOWPATH FROM NODE    260.00 TO NODE    266.00 =     508.28 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    266.00 TO NODE    266.00 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.) =    7.01
 RAINFALL INTENSITY(INCH/HR) =   3.99
 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 =       2.07

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        1.65    7.44    3.852  0.20( 0.02) 0.10       0.5     250.00
     2        2.07    7.01    3.986  0.20( 0.02) 0.10       0.6     260.00

 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        3.68    7.01    3.986  0.20( 0.02) 0.10       1.0     260.00
     2        3.66    7.44    3.852  0.20( 0.02) 0.10       1.0     250.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       3.68    Tc(MIN.) =     7.01
 EFFECTIVE AREA(ACRES) =       1.02   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    250.00 TO NODE    266.00 =     589.29 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    266.00 TO NODE    268.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1007.53  DOWNSTREAM(FEET) =  1007.23
 FLOW LENGTH(FEET) =    18.67   MANNING'S N =  0.012
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.56
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.68
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.05
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    268.00 =     607.96 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    268.00 TO NODE    268.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        3.68    7.05    3.970  0.20( 0.02) 0.10       1.0     260.00
     2        3.66    7.49    3.838  0.20( 0.02) 0.10       1.0     250.00
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    268.00 =     607.96 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        1.21    6.97    3.998  0.20( 0.02) 0.10       0.3     230.00
```



```
     2        1.18    7.39    3.868  0.20( 0.02) 0.10       0.3     234.00
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    268.00 =     680.99 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        4.87    6.97    3.998  0.20( 0.02) 0.10       1.3     230.00
     2        4.88    7.05    3.970  0.20( 0.02) 0.10       1.4     260.00
     3        4.84    7.39    3.868  0.20( 0.02) 0.10       1.4     234.00
     4        4.83    7.49    3.838  0.20( 0.02) 0.10       1.4     250.00
   TOTAL AREA(ACRES) =         1.4

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.88  Tc(MIN.) =    7.053
 EFFECTIVE AREA(ACRES) =      1.36  AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       1.4
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    268.00 =     680.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    268.00 TO NODE    268.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    268.00 TO NODE    270.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1007.23  DOWNSTREAM(FEET) =  1006.06
 FLOW LENGTH(FEET) =    68.50   MANNING'S N =  0.012
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.28
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.88
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    7.21
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    270.00 =     749.49 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 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.) =    7.21
 RAINFALL INTENSITY(INCH/HR) =   3.92
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       1.36
 TOTAL STREAM AREA(ACRES) =       1.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.88

****************************************************************************
 FLOW PROCESS FROM NODE    226.00 TO NODE    228.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   148.80
 ELEVATION DATA: UPSTREAM(FEET) =   1013.03  DOWNSTREAM(FEET) =   1011.48

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.602
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.523
 SUBAREA Tc 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        0.31      0.20     0.100    75    5.60
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
 SUBAREA RUNOFF(CFS) =      1.26
 TOTAL AREA(ACRES) =      0.31   PEAK FLOW RATE(CFS) =      1.26

****************************************************************************
 FLOW PROCESS FROM NODE    228.00 TO NODE    270.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1008.05  DOWNSTREAM(FEET) =  1006.06
 FLOW LENGTH(FEET) =    15.33   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.07
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.26
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.63
 LONGEST FLOWPATH FROM NODE    226.00 TO NODE    270.00 =     164.13 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 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.) =    5.63
 RAINFALL INTENSITY(INCH/HR) =   4.51
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.31
 TOTAL STREAM AREA(ACRES) =       0.31
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.26

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        4.87    7.12    3.948  0.20( 0.02) 0.10       1.3     230.00
     1        4.88    7.21    3.921  0.20( 0.02) 0.10       1.4     260.00
     1        4.84    7.54    3.822  0.20( 0.02) 0.10       1.4     234.00
     1        4.83    7.64    3.794  0.20( 0.02) 0.10       1.4     250.00
     2        1.26    5.63    4.512  0.20( 0.02) 0.10       0.3     226.00

 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        5.65    5.63    4.512  0.20( 0.02) 0.10       1.4     226.00
     2        5.97    7.12    3.948  0.20( 0.02) 0.10       1.7     230.00
     3        5.97    7.21    3.921  0.20( 0.02) 0.10       1.7     260.00
     4        5.90    7.54    3.822  0.20( 0.02) 0.10       1.7     234.00
     5        5.88    7.64    3.794  0.20( 0.02) 0.10       1.7     250.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.97    Tc(MIN.) =     7.21
 EFFECTIVE AREA(ACRES) =       1.67   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.7
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    270.00 =     749.49 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.21
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.921
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        1.27      0.20     0.100    75
```



```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    4.46
 EFFECTIVE AREA(ACRES) =      2.94   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =      10.32

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.69    5.63    4.512  0.20( 0.02) 0.10       2.6     226.00
     2       10.35    7.12    3.948  0.20( 0.02) 0.10       2.9     230.00
     3       10.32    7.21    3.921  0.20( 0.02) 0.10       2.9     260.00
     4       10.14    7.54    3.822  0.20( 0.02) 0.10       3.0     234.00
     5       10.09    7.64    3.794  0.20( 0.02) 0.10       3.0     250.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      10.69  Tc(MIN.) =    5.63
 AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       2.64

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    280.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1006.06  DOWNSTREAM(FEET) =  1003.27
 FLOW LENGTH(FEET) =    65.65   MANNING'S N =  0.012
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.33
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.69
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.71
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    280.00 =     815.14 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 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       10.69    5.71    4.473  0.20( 0.02) 0.10       2.6     226.00
     2       10.35    7.21    3.920  0.20( 0.02) 0.10       2.9     230.00
     3       10.32    7.30    3.894  0.20( 0.02) 0.10       2.9     260.00
     4       10.14    7.63    3.796  0.20( 0.02) 0.10       3.0     234.00
     5       10.09    7.73    3.769  0.20( 0.02) 0.10       3.0     250.00
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    280.00 =     815.14 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        8.39    5.27    4.684  0.20( 0.02) 0.10       1.9     220.00
     2        8.16    5.66    4.498  0.20( 0.02) 0.10       2.0     214.00
     3        6.84    8.76    3.511  0.20( 0.02) 0.10       2.1     210.00
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    280.00 =     685.72 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       18.71    5.27    4.684  0.20( 0.02) 0.10       4.4     220.00
     2       18.80    5.66    4.498  0.20( 0.02) 0.10       4.6     214.00
     3       18.82    5.71    4.473  0.20( 0.02) 0.10       4.6     226.00
     4       17.84    7.21    3.920  0.20( 0.02) 0.10       5.0     230.00
     5       17.78    7.30    3.894  0.20( 0.02) 0.10       5.0     260.00
     6       17.46    7.63    3.796  0.20( 0.02) 0.10       5.0     234.00
     7       17.36    7.73    3.769  0.20( 0.02) 0.10       5.1     250.00
     8       16.24    8.76    3.511  0.20( 0.02) 0.10       5.1     210.00
   TOTAL AREA(ACRES) =         5.1

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       18.82  Tc(MIN.) =    5.714
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```
 EFFECTIVE AREA(ACRES) =      4.62  AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       5.1
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    280.00 =     815.14 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1003.27  DOWNSTREAM(FEET) =  1002.78
 FLOW LENGTH(FEET) =    82.62   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.45
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.82
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    5.93
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    320.00 =     897.76 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    290.00 TO NODE    292.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   119.58
 ELEVATION DATA: UPSTREAM(FEET) =   1013.25  DOWNSTREAM(FEET) =   1010.80

 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        0.26     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) =      1.12
 TOTAL AREA(ACRES) =      0.26   PEAK FLOW RATE(CFS) =      1.12

****************************************************************************
 FLOW PROCESS FROM NODE    292.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1007.32  DOWNSTREAM(FEET) =  1006.15
 FLOW LENGTH(FEET) =   123.76   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.02
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.12
 PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =    5.51
 LONGEST FLOWPATH FROM NODE    290.00 TO NODE    304.00 =     243.34 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
```



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 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.51
 RAINFALL INTENSITY(INCH/HR) =   4.56
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.26
 TOTAL STREAM AREA(ACRES) =       0.26
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.12

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   189.94
 ELEVATION DATA: UPSTREAM(FEET) =   1012.80  DOWNSTREAM(FEET) =   1011.09

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.360
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.210
 SUBAREA Tc 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        0.68     0.20       0.100    75    6.36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      2.56
 TOTAL AREA(ACRES) =      0.68   PEAK FLOW RATE(CFS) =      2.56

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1007.59  DOWNSTREAM(FEET) =  1006.15
 FLOW LENGTH(FEET) =    14.78   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.92
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.56
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.38
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     204.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.38
 RAINFALL INTENSITY(INCH/HR) =   4.20
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.68
 TOTAL STREAM AREA(ACRES) =       0.68
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.56

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        1.12    5.51    4.564  0.20( 0.02) 0.10       0.3     290.00
     2        2.56    6.38    4.202  0.20( 0.02) 0.10       0.7     300.00

 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	3.53	5.51	4.564	0.20(0.02)	0.10	0.8	290.00
2	3.60	6.38	4.202	0.20(0.02)	0.10	0.9	300.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 3.60 Tc(MIN.) = 6.38
EFFECTIVE AREA(ACRES) = 0.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.9
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 304.00 = 243.34 FEET.

****
FLOW PROCESS FROM NODE 304.00 TO NODE 320.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1006.15 DOWNSTREAM(FEET) = 1002.78
FLOW LENGTH(FEET) = 147.22 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.52
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.60
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 6.71
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 320.00 = 390.56 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 320.00 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.) = 6.71
RAINFALL INTENSITY(INCH/HR) = 4.08
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.94
TOTAL STREAM AREA(ACRES) = 0.94
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.60

****
FLOW PROCESS FROM NODE 310.00 TO NODE 312.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========
INITIAL SUBAREA FLOW-LENGTH(FEET) = 132.30
ELEVATION DATA: UPSTREAM(FEET) = 1012.90 DOWNSTREAM(FEET) = 1011.17

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.107
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.766
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.41	0.20	0.100	75	5.11

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.75
TOTAL AREA(ACRES) = 0.41 PEAK FLOW RATE(CFS) = 1.75

****
FLOW PROCESS FROM NODE 312.00 TO NODE 320.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1007.81 DOWNSTREAM(FEET) = 1003.78
FLOW LENGTH(FEET) = 62.53 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.26
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 1.75
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 5.22
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 320.00 = 194.83 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 320.00 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) = 0.41
TOTAL STREAM AREA(ACRES) = 0.41
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.75

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.53	5.84	4.417	0.20(0.02)	0.10	0.8	290.00
1	3.60	6.71	4.085	0.20(0.02)	0.10	0.9	300.00
2	1.75	5.22	4.708	0.20(0.02)	0.10	0.4	310.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.12	5.22	4.708	0.20(0.02)	0.10	1.2	310.00
2	5.17	5.84	4.417	0.20(0.02)	0.10	1.3	290.00
3	5.12	6.71	4.085	0.20(0.02)	0.10	1.4	300.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 5.17 Tc(MIN.) = 5.84
EFFECTIVE AREA(ACRES) = 1.26 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 320.00 = 390.56 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 320.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.12	5.22	4.708	0.20(0.02)	0.10	1.2	310.00
2	5.17	5.84	4.417	0.20(0.02)	0.10	1.3	290.00
3	5.12	6.71	4.085	0.20(0.02)	0.10	1.4	300.00

LONGEST FLOWPATH FROM NODE 290.00 TO NODE 320.00 = 390.56 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.71	5.48	4.580	0.20(0.02)	0.10	4.4	220.00
2	18.80	5.87	4.405	0.20(0.02)	0.10	4.6	214.00
3	18.82	5.93	4.381	0.20(0.02)	0.10	4.6	226.00
4	17.84	7.43	3.855	0.20(0.02)	0.10	5.0	230.00
5	17.78	7.52	3.830	0.20(0.02)	0.10	5.0	260.00
6	17.46	7.85	3.736	0.20(0.02)	0.10	5.0	234.00
7	17.36	7.95	3.710	0.20(0.02)	0.10	5.1	250.00
8	16.24	8.98	3.462	0.20(0.02)	0.10	5.1	210.00

LONGEST FLOWPATH FROM NODE 230.00 TO NODE 320.00 = 897.76 FEET.

** PEAK FLOW RATE TABLE **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)		(ACRES)	NODE
1	23.44	5.22	4.708	0.20(0.02)	0.10	5.3	310.00
2	23.85	5.48	4.580	0.20(0.02)	0.10	5.6	220.00
3	23.96	5.84	4.417	0.20(0.02)	0.10	5.8	290.00
4	23.97	5.87	4.405	0.20(0.02)	0.10	5.8	214.00
5	23.99	5.93	4.381	0.20(0.02)	0.10	5.9	226.00
6	23.43	6.71	4.085	0.20(0.02)	0.10	6.2	300.00
7	22.67	7.43	3.855	0.20(0.02)	0.10	6.3	230.00
8	22.58	7.52	3.830	0.20(0.02)	0.10	6.4	260.00
9	22.14	7.85	3.736	0.20(0.02)	0.10	6.4	234.00
10	22.01	7.95	3.710	0.20(0.02)	0.10	6.4	250.00
11	20.57	8.98	3.462	0.20(0.02)	0.10	6.5	210.00

TOTAL AREA(ACRES) = 6.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 23.99 Tc(MIN.) = 5.928
EFFECTIVE AREA(ACRES) = 5.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 6.5
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 320.00 = 897.76 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 325.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1002.78 DOWNSTREAM(FEET) = 1002.11
FLOW LENGTH(FEET) = 133.24 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 18.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.45
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 23.99
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 6.27
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 325.00 = 1031.00 FEET.

****
FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 6.27
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.243
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.48	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) = 0.48 SUBAREA RUNOFF(CFS) = 1.82
EFFECTIVE AREA(ACRES) = 6.37 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 24.19

****
FLOW PROCESS FROM NODE 325.00 TO NODE 330.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1002.11 DOWNSTREAM(FEET) = 1001.26
FLOW LENGTH(FEET) = 173.84 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 19.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.40
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.19
PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 6.72
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 330.00 = 1204.84 FEET.

****
FLOW PROCESS FROM NODE 330.00 TO NODE 450.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

==========
ELEVATION DATA: UPSTREAM(FEET) = 1001.26 DOWNSTREAM(FEET) = 999.29
FLOW LENGTH(FEET) = 18.13 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 8.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.70
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.19
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 6.74
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 450.00 = 1222.97 FEET.
==========
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 6.9 TC(MIN.) = 6.74
EFFECTIVE AREA(ACRES) = 6.37 AREA-AVERAGED Fm(INCH/HR)= 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 24.19

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)		Ap	Ae (ACRES)	HEADWATER NODE
1	23.67	6.04	4.336	0.20(0.02)	0.10		5.8	310.00
2	24.05	6.29	4.235	0.20(0.02)	0.10		6.1	220.00
3	24.18	6.65	4.104	0.20(0.02)	0.10		6.3	290.00
4	24.18	6.68	4.093	0.20(0.02)	0.10		6.3	214.00
5	24.19	6.74	4.074	0.20(0.02)	0.10		6.4	226.00
6	23.60	7.52	3.828	0.20(0.02)	0.10		6.6	300.00
7	22.91	8.25	3.632	0.20(0.02)	0.10		6.8	230.00
8	22.82	8.34	3.611	0.20(0.02)	0.10		6.8	260.00
9	22.42	8.68	3.530	0.20(0.02)	0.10		6.9	234.00
10	22.31	8.78	3.507	0.20(0.02)	0.10		6.9	250.00
11	21.03	9.83	3.291	0.20(0.02)	0.10		6.9	210.00

==========
==========
END OF RATIONAL METHOD ANALYSIS

♠

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**************************************************************************
            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 *************************
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 2B                     *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3        *
* 100-YEAR STORM EVENT  EM                                              *
 ************************************************************************

  FILE NAME: C2P00R.DAT
  TIME/DATE OF STUDY: 14:31 02/13/2020
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  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
  2   10.0      1.0    0.001/0.001/0.005   0.08    0.10 0.0100 0.010 0.0080

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    212.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =   1015.71  DOWNSTREAM(FEET) =   1012.23

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.685
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.836
  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        0.44     0.20      0.100     91    7.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.91
  TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.91

**************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    218.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```



```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.55  DOWNSTREAM(FEET) =  1007.52
  FLOW LENGTH(FEET) =   108.90   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.61
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.91
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    8.08
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    218.00 =     438.90 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 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.) =    8.08
  RAINFALL INTENSITY(INCH/HR) =   4.70
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.44
  TOTAL STREAM AREA(ACRES) =       0.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.91

**************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    216.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   101.79
  ELEVATION DATA: UPSTREAM(FEET) =   1013.10  DOWNSTREAM(FEET) =   1011.84

  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        0.11     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) =      0.61
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.61

**************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    218.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.34  DOWNSTREAM(FEET) =  1007.52
  FLOW LENGTH(FEET) =     7.89   MANNING'S N =  0.012
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.49
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.61
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.02
  LONGEST FLOWPATH FROM NODE    214.00 TO NODE    218.00 =     109.68 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    218.00 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.) =    5.02
  RAINFALL INTENSITY(INCH/HR) =   6.18
  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 NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.91	8.08	4.700	0.20(0.02)	0.10	0.4	210.00
2	0.61	5.02	6.176	0.20(0.02)	0.10	0.1	214.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.17	5.02	6.176	0.20(0.02)	0.10	0.4	214.00
2	2.37	8.08	4.700	0.20(0.02)	0.10	0.6	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 2.37 Tc(MIN.) = 8.08
EFFECTIVE AREA(ACRES) = 0.55 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 210.00 TO NODE 218.00 = 438.90 FEET.

****
FLOW PROCESS FROM NODE 218.00 TO NODE 224.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1007.52 DOWNSTREAM(FEET) = 1005.34
FLOW LENGTH(FEET) = 128.74 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.06
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.37
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 8.43
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 224.00 = 567.64 FEET.

****
FLOW PROCESS FROM NODE 224.00 TO NODE 224.00 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.) = 8.43
RAINFALL INTENSITY(INCH/HR) = 4.59
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.55
TOTAL STREAM AREA(ACRES) = 0.55
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.37

****
FLOW PROCESS FROM NODE 220.00 TO NODE 222.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========
INITIAL SUBAREA FLOW-LENGTH(FEET) = 101.36
ELEVATION DATA: UPSTREAM(FEET) = 1013.32 DOWNSTREAM(FEET) = 1011.56

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/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.24	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) = 1.33
TOTAL AREA(ACRES) = 0.24 PEAK FLOW RATE(CFS) = 1.33

****
FLOW PROCESS FROM NODE 222.00 TO NODE 224.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1008.06 DOWNSTREAM(FEET) = 1005.34
FLOW LENGTH(FEET) = 13.31 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.36
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.33
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 224.00 = 114.67 FEET.

****
FLOW PROCESS FROM NODE 224.00 TO NODE 224.00 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.) = 5.02
RAINFALL INTENSITY(INCH/HR) = 6.18
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.24
TOTAL STREAM AREA(ACRES) = 0.24
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.33

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.17	5.39	5.926	0.20(0.02)	0.10	0.4	214.00
1	2.37	8.43	4.586	0.20(0.02)	0.10	0.6	210.00
2	1.33	5.02	6.176	0.20(0.02)	0.10	0.2	220.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.43	5.02	6.176	0.20(0.02)	0.10	0.6	220.00
2	3.45	5.39	5.926	0.20(0.02)	0.10	0.6	214.00
3	3.36	8.43	4.586	0.20(0.02)	0.10	0.8	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 3.45 Tc(MIN.) = 5.39
EFFECTIVE AREA(ACRES) = 0.62 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 210.00 TO NODE 224.00 = 567.64 FEET.

****
FLOW PROCESS FROM NODE 224.00 TO NODE 224.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 5.39
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.926
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.27	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     1.27     SUBAREA RUNOFF(CFS) =     6.75
 EFFECTIVE AREA(ACRES) =     1.89   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =      10.06

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.34    5.02    6.176  0.20( 0.02) 0.10       1.9     220.00
     2       10.06    5.39    5.926  0.20( 0.02) 0.10       1.9     214.00
     3        8.47    8.43    4.586  0.20( 0.02) 0.10       2.1     210.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      10.34  Tc(MIN.) =    5.02
 AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       1.87

****************************************************************************
 FLOW PROCESS FROM NODE    224.00 TO NODE    224.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.02
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.176
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.08      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) =    0.08      SUBAREA RUNOFF(CFS) =    0.44
 EFFECTIVE AREA(ACRES) =      1.95   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =      10.78

****************************************************************************
 FLOW PROCESS FROM NODE    224.00 TO NODE    280.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1005.34  DOWNSTREAM(FEET) =  1003.27
 FLOW LENGTH(FEET) =   118.08   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.33
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.78
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    5.25
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    280.00 =     685.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    234.00 TO NODE    236.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    93.75
 ELEVATION DATA: UPSTREAM(FEET) =   1018.67  DOWNSTREAM(FEET) =   1017.07

 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        0.05      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) =      0.28
 TOTAL AREA(ACRES) =      0.05   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
 FLOW PROCESS FROM NODE    236.00 TO NODE    238.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1017.07  DOWNSTREAM(FEET) =  1015.60
 FLOW LENGTH(FEET) =   158.87   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.81
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.28
 PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =    5.94
 LONGEST FLOWPATH FROM NODE    234.00 TO NODE    238.00 =     252.62 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    238.00 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.) =    5.94
 RAINFALL INTENSITY(INCH/HR) =   5.61
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.05
 TOTAL STREAM AREA(ACRES) =       0.05
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.28

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    232.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    71.78
 ELEVATION DATA: UPSTREAM(FEET) =   1031.43  DOWNSTREAM(FEET) =   1028.23

 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    232.00 TO NODE    238.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.09  DOWNSTREAM(FEET) =  1015.60
 FLOW LENGTH(FEET) =   202.97   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.25
 GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.50
 PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =    5.54
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    238.00 =     274.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    238.00 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.) =    5.54
 RAINFALL INTENSITY(INCH/HR) =   5.83
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.09
 TOTAL STREAM AREA(ACRES) =       0.09
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.50

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        0.28    5.94    5.605  0.20( 0.02) 0.10       0.1     234.00
     2        0.50    5.54    5.833  0.20( 0.02) 0.10       0.1     230.00

 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        0.77    5.54    5.833  0.20( 0.02) 0.10       0.1     230.00
     2        0.76    5.94    5.605  0.20( 0.02) 0.10       0.1     234.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       0.77    Tc(MIN.) =     5.54
 EFFECTIVE AREA(ACRES) =       0.14   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.1
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    238.00 =     274.75 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    238.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.54
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.833
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.07      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) =    0.07      SUBAREA RUNOFF(CFS) =    0.37
 EFFECTIVE AREA(ACRES) =      0.21   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       1.08

****************************************************************************
 FLOW PROCESS FROM NODE    238.00 TO NODE    240.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1015.60  DOWNSTREAM(FEET) =  1012.78
 FLOW LENGTH(FEET) =   160.89   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.04
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.08
 PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =    6.07
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    240.00 =     435.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.07
```



```
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.535
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.07      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) =    0.07      SUBAREA RUNOFF(CFS) =    0.35
 EFFECTIVE AREA(ACRES) =      0.28   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.37

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    242.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1012.78  DOWNSTREAM(FEET) =  1008.53
 FLOW LENGTH(FEET) =   245.35   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.33
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.37
 PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =    6.84
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    242.00 =     680.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    242.00 TO NODE    242.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.84
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.170
 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) =    0.28
 EFFECTIVE AREA(ACRES) =      0.34   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.56

****************************************************************************
 FLOW PROCESS FROM NODE    242.00 TO NODE    268.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    252.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.13
 ELEVATION DATA: UPSTREAM(FEET) =   1029.13  DOWNSTREAM(FEET) =   1019.96

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.322
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.409
 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        0.27      0.20       0.100    91    6.32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.31
 TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =       1.31

****************************************************************************
 FLOW PROCESS FROM NODE    252.00 TO NODE    254.00 IS CODE =  61
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1019.96  DOWNSTREAM ELEVATION(FEET) = 1012.78
  STREET LENGTH(FEET) =   177.72   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 38.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  33.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  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) =       1.76
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.26
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.88
  STREET FLOW TRAVEL TIME(MIN.) =   0.83   Tc(MIN.) =    7.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.039
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.20      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.90
  EFFECTIVE AREA(ACRES) =      0.47    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) =       2.12

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.97
  FLOW VELOCITY(FEET/SEC.) =  3.66   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    254.00 =     506.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    254.00 TO NODE    266.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.89  DOWNSTREAM(FEET) =  1007.53
  FLOW LENGTH(FEET) =   82.44   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.64
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.12
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    7.40
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    266.00 =     589.29 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    266.00 TO NODE    266.00 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.) =    7.40
  RAINFALL INTENSITY(INCH/HR) =   4.94
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.47
  TOTAL STREAM AREA(ACRES) =       0.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.12

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    262.00 IS CODE =  21
```



```
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =   1029.17  DOWNSTREAM(FEET) =   1018.95

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.196
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.472
  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        0.37      0.20     0.100    91    6.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.82
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.82

****************************************************************************
  FLOW PROCESS FROM NODE    262.00 TO NODE    264.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1018.95  DOWNSTREAM ELEVATION(FEET) = 1012.54
  STREET LENGTH(FEET) =   166.22   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 38.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  33.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.019
  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) =       2.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.16
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
  STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    6.94
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.127
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.21      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) =    0.21      SUBAREA RUNOFF(CFS) =    0.97
  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) =       2.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.74
  FLOW VELOCITY(FEET/SEC.) =  3.81   DEPTH*VELOCITY(FT*FT/SEC.) =   1.06
  LONGEST FLOWPATH FROM NODE    260.00 TO NODE    264.00 =     496.22 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    264.00 TO NODE    266.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1008.32  DOWNSTREAM(FEET) =  1007.53
  FLOW LENGTH(FEET) =    12.06   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.34
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.67
```

```
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.96
 LONGEST FLOWPATH FROM NODE    260.00 TO NODE    266.00 =     508.28 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    266.00 TO NODE    266.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.96
 RAINFALL INTENSITY(INCH/HR) =   5.12
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.58
 TOTAL STREAM AREA(ACRES) =       0.58
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.67

 ** CONFLUENCE DATA **
  STREAM        Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1         2.12    7.40    4.943  0.20( 0.02) 0.10       0.5     250.00
     2         2.67    6.96    5.119  0.20( 0.02) 0.10       0.6     260.00

 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         4.73    6.96    5.119  0.20( 0.02) 0.10       1.0     260.00
     2         4.70    7.40    4.943  0.20( 0.02) 0.10       1.0     250.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.73    Tc(MIN.) =     6.96
 EFFECTIVE AREA(ACRES) =       1.02   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    250.00 TO NODE    266.00 =     589.29 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    266.00 TO NODE    268.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1007.53  DOWNSTREAM(FEET) =  1007.23
 FLOW LENGTH(FEET) =    18.67   MANNING'S N =  0.012
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.06
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.73
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.00
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    268.00 =     607.96 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    268.00 TO NODE    268.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM        Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1         4.73    7.00    5.101  0.20( 0.02) 0.10       1.0     260.00
     2         4.70    7.44    4.926  0.20( 0.02) 0.10       1.0     250.00
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    268.00 =     607.96 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM        Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1         1.56    6.84    5.170  0.20( 0.02) 0.10       0.3     230.00
```



```
     2         1.52    7.25    5.001  0.20( 0.02) 0.10       0.3     234.00
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    268.00 =     680.99 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM        Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1         6.25    6.84    5.170  0.20( 0.02) 0.10       1.3     230.00
     2         6.28    7.00    5.101  0.20( 0.02) 0.10       1.4     260.00
     3         6.24    7.25    5.001  0.20( 0.02) 0.10       1.4     234.00
     4         6.20    7.44    4.926  0.20( 0.02) 0.10       1.4     250.00
   TOTAL AREA(ACRES) =         1.4

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.28  Tc(MIN.) =    7.004
 EFFECTIVE AREA(ACRES) =      1.36  AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       1.4
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    268.00 =     680.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    268.00 TO NODE    268.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    268.00 TO NODE    270.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1007.23  DOWNSTREAM(FEET) =  1006.06
 FLOW LENGTH(FEET) =    68.50   MANNING'S N =  0.012
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.70
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.28
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.15
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    270.00 =     749.49 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 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.) =    7.15
 RAINFALL INTENSITY(INCH/HR) =   5.04
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       1.36
 TOTAL STREAM AREA(ACRES) =       1.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.28

****************************************************************************
 FLOW PROCESS FROM NODE    226.00 TO NODE    228.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   148.80
 ELEVATION DATA: UPSTREAM(FEET) =   1013.03  DOWNSTREAM(FEET) =   1011.48

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.602
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.797
 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        0.31      0.20      0.100    91    5.60
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

SUBAREA RUNOFF(CFS) = 1.61
TOTAL AREA(ACRES) = 0.31 PEAK FLOW RATE(CFS) = 1.61

****
FLOW PROCESS FROM NODE 228.00 TO NODE 270.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1008.05 DOWNSTREAM(FEET) = 1006.06
FLOW LENGTH(FEET) = 15.33 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.67
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.61
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.62
LONGEST FLOWPATH FROM NODE 226.00 TO NODE 270.00 = 164.13 FEET.

****
FLOW PROCESS FROM NODE 270.00 TO NODE 270.00 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.) = 5.62
RAINFALL INTENSITY(INCH/HR) = 5.78
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.31
TOTAL STREAM AREA(ACRES) = 0.31
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.61

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.25	6.99	5.107	0.20(0.02)	0.10	1.3	230.00
1	6.28	7.15	5.040	0.20(0.02)	0.10	1.4	260.00
1	6.24	7.40	4.944	0.20(0.02)	0.10	1.4	234.00
1	6.20	7.59	4.871	0.20(0.02)	0.10	1.4	250.00
2	1.61	5.62	5.784	0.20(0.02)	0.10	0.3	226.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.31	5.62	5.784	0.20(0.02)	0.10	1.4	226.00
2	7.67	6.99	5.107	0.20(0.02)	0.10	1.6	230.00
3	7.68	7.15	5.040	0.20(0.02)	0.10	1.7	260.00
4	7.61	7.40	4.944	0.20(0.02)	0.10	1.7	234.00
5	7.55	7.59	4.871	0.20(0.02)	0.10	1.7	250.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 7.68 Tc(MIN.) = 7.15
EFFECTIVE AREA(ACRES) = 1.67 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.7
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 270.00 = 749.49 FEET.

****
FLOW PROCESS FROM NODE 270.00 TO NODE 270.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 7.15
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.040
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.27	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.27 SUBAREA RUNOFF(CFS) = 5.74
EFFECTIVE AREA(ACRES) = 2.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.0 PEAK FLOW RATE(CFS) = 13.28

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	13.77	5.62	5.784	0.20(0.02)	0.10	2.7	226.00
2	13.35	6.99	5.107	0.20(0.02)	0.10	2.9	230.00
3	13.28	7.15	5.040	0.20(0.02)	0.10	2.9	260.00
4	13.11	7.40	4.944	0.20(0.02)	0.10	3.0	234.00
5	12.97	7.59	4.871	0.20(0.02)	0.10	3.0	250.00

NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) = 13.77 Tc(MIN.) = 5.62
AREA-AVERAGED Fm(INCH/HR) = 0.02 AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10 EFFECTIVE AREA(ACRES) = 2.65

****
FLOW PROCESS FROM NODE 270.00 TO NODE 280.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1006.06 DOWNSTREAM(FEET) = 1003.27
FLOW LENGTH(FEET) = 65.65 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.26
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.77
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 5.71
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 280.00 = 815.14 FEET.

****
FLOW PROCESS FROM NODE 280.00 TO NODE 280.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	13.77	5.71	5.736	0.20(0.02)	0.10	2.7	226.00
2	13.35	7.08	5.071	0.20(0.02)	0.10	2.9	230.00
3	13.28	7.24	5.006	0.20(0.02)	0.10	2.9	260.00
4	13.11	7.48	4.911	0.20(0.02)	0.10	3.0	234.00
5	12.97	7.68	4.839	0.20(0.02)	0.10	3.0	250.00

LONGEST FLOWPATH FROM NODE 230.00 TO NODE 280.00 = 815.14 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.78	5.25	6.015	0.20(0.02)	0.10	1.9	220.00
2	10.49	5.63	5.781	0.20(0.02)	0.10	2.0	214.00
3	8.79	8.68	4.511	0.20(0.02)	0.10	2.1	210.00

LONGEST FLOWPATH FROM NODE 210.00 TO NODE 280.00 = 685.72 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	24.08	5.25	6.015	0.20(0.02)	0.10	4.4	220.00
2	24.18	5.63	5.781	0.20(0.02)	0.10	4.6	214.00
3	24.21	5.71	5.736	0.20(0.02)	0.10	4.6	226.00
4	23.03	7.08	5.071	0.20(0.02)	0.10	5.0	230.00
5	22.88	7.24	5.006	0.20(0.02)	0.10	5.0	260.00
6	22.56	7.48	4.911	0.20(0.02)	0.10	5.0	234.00
7	22.32	7.68	4.839	0.20(0.02)	0.10	5.1	250.00
8	20.88	8.68	4.511	0.20(0.02)	0.10	5.1	210.00

TOTAL AREA(ACRES) = 5.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 24.21 Tc(MIN.) = 5.707

```
 EFFECTIVE AREA(ACRES) =      4.63  AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =      5.1
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    280.00 =     815.14 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    280.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1003.27  DOWNSTREAM(FEET) =  1002.78
 FLOW LENGTH(FEET) =    82.62   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.88
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      24.21
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    5.91
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    320.00 =     897.76 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    290.00 TO NODE    292.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   119.58
 ELEVATION DATA: UPSTREAM(FEET) =   1013.25  DOWNSTREAM(FEET) =   1010.80

 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        0.26      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) =      1.44
 TOTAL AREA(ACRES) =      0.26   PEAK FLOW RATE(CFS) =      1.44

****************************************************************************
 FLOW PROCESS FROM NODE    292.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1007.32  DOWNSTREAM(FEET) =  1006.15
 FLOW LENGTH(FEET) =   123.76   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.22
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.44
 PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =    5.49
 LONGEST FLOWPATH FROM NODE    290.00 TO NODE    304.00 =     243.34 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
```



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 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.49
 RAINFALL INTENSITY(INCH/HR) =   5.86
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.26
 TOTAL STREAM AREA(ACRES) =       0.26
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.44

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   189.94
 ELEVATION DATA: UPSTREAM(FEET) =   1012.80  DOWNSTREAM(FEET) =   1011.09

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.360
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.391
 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        0.68      0.20       0.100    91    6.36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      3.29
 TOTAL AREA(ACRES) =      0.68   PEAK FLOW RATE(CFS) =      3.29

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1007.59  DOWNSTREAM(FEET) =  1006.15
 FLOW LENGTH(FEET) =    14.78   MANNING'S N =  0.012
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.66
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.29
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.38
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     204.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.38
 RAINFALL INTENSITY(INCH/HR) =   5.38
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.68
 TOTAL STREAM AREA(ACRES) =       0.68
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.29

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        1.44    5.49    5.865  0.20( 0.02) 0.10       0.3     290.00
     2        3.29    6.38    5.381  0.20( 0.02) 0.10       0.7     300.00

 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	4.53	5.49	5.865	0.20(0.02)	0.10	0.8	290.00
2	4.61	6.38	5.381	0.20(0.02)	0.10	0.9	300.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 4.61 Tc(MIN.) = 6.38
EFFECTIVE AREA(ACRES) = 0.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.9
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 304.00 = 243.34 FEET.

****
FLOW PROCESS FROM NODE 304.00 TO NODE 320.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1006.15 DOWNSTREAM(FEET) = 1002.78
FLOW LENGTH(FEET) = 147.22 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.89
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.61
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 6.69
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 320.00 = 390.56 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 320.00 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.) = 6.69
RAINFALL INTENSITY(INCH/HR) = 5.24
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.94
TOTAL STREAM AREA(ACRES) = 0.94
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.61

****
FLOW PROCESS FROM NODE 310.00 TO NODE 312.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========
INITIAL SUBAREA FLOW-LENGTH(FEET) = 132.30
ELEVATION DATA: UPSTREAM(FEET) = 1012.90 DOWNSTREAM(FEET) = 1011.17

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.107
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.112
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.41	0.20	0.100	91	5.11

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.25
TOTAL AREA(ACRES) = 0.41 PEAK FLOW RATE(CFS) = 2.25

****
FLOW PROCESS FROM NODE 312.00 TO NODE 320.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1007.81 DOWNSTREAM(FEET) = 1003.78
FLOW LENGTH(FEET) = 62.53 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.85
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 2.25
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 5.21
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 320.00 = 194.83 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 320.00 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) = 0.41
TOTAL STREAM AREA(ACRES) = 0.41
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.25

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.53	5.80	5.682	0.20(0.02)	0.10	0.8	290.00
1	4.61	6.69	5.236	0.20(0.02)	0.10	0.9	300.00
2	2.25	5.21	6.041	0.20(0.02)	0.10	0.4	310.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.57	5.21	6.041	0.20(0.02)	0.10	1.2	310.00
2	6.64	5.80	5.682	0.20(0.02)	0.10	1.3	290.00
3	6.56	6.69	5.236	0.20(0.02)	0.10	1.4	300.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 6.64 Tc(MIN.) = 5.80
EFFECTIVE AREA(ACRES) = 1.26 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 320.00 = 390.56 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 320.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.57	5.21	6.041	0.20(0.02)	0.10	1.2	310.00
2	6.64	5.80	5.682	0.20(0.02)	0.10	1.3	290.00
3	6.56	6.69	5.236	0.20(0.02)	0.10	1.4	300.00

LONGEST FLOWPATH FROM NODE 290.00 TO NODE 320.00 = 390.56 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	24.08	5.45	5.887	0.20(0.02)	0.10	4.4	220.00
2	24.18	5.83	5.667	0.20(0.02)	0.10	4.6	214.00
3	24.21	5.91	5.624	0.20(0.02)	0.10	4.6	226.00
4	23.03	7.28	4.990	0.20(0.02)	0.10	5.0	230.00
5	22.88	7.44	4.927	0.20(0.02)	0.10	5.0	260.00
6	22.56	7.69	4.836	0.20(0.02)	0.10	5.0	234.00
7	22.32	7.88	4.767	0.20(0.02)	0.10	5.1	250.00
8	20.88	8.89	4.450	0.20(0.02)	0.10	5.1	210.00

LONGEST FLOWPATH FROM NODE 230.00 TO NODE 320.00 = 897.76 FEET.

** PEAK FLOW RATE TABLE **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)		(ACRES)	NODE
1	30.19	5.21	6.041	0.20(0.02)	0.10	5.4	310.00
2	30.68	5.45	5.887	0.20(0.02)	0.10	5.6	220.00
3	30.81	5.80	5.682	0.20(0.02)	0.10	5.8	290.00
4	30.81	5.83	5.667	0.20(0.02)	0.10	5.8	214.00
5	30.84	5.91	5.624	0.20(0.02)	0.10	5.9	226.00
6	30.10	6.69	5.236	0.20(0.02)	0.10	6.2	300.00
7	29.28	7.28	4.990	0.20(0.02)	0.10	6.3	230.00
8	29.05	7.44	4.927	0.20(0.02)	0.10	6.4	260.00
9	28.62	7.69	4.836	0.20(0.02)	0.10	6.4	234.00
10	28.28	7.88	4.767	0.20(0.02)	0.10	6.4	250.00
11	26.45	8.89	4.450	0.20(0.02)	0.10	6.5	210.00

TOTAL AREA(ACRES) = 6.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 30.84 Tc(MIN.) = 5.907
EFFECTIVE AREA(ACRES) = 5.90 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 6.5
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 320.00 = 897.76 FEET.

****
FLOW PROCESS FROM NODE 320.00 TO NODE 325.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1002.78 DOWNSTREAM(FEET) = 1002.11
FLOW LENGTH(FEET) = 133.24 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 21.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.84
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 30.84
PIPE TRAVEL TIME(MIN.) = 0.32 Tc(MIN.) = 6.23
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 325.00 = 1031.00 FEET.

****
FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 6.23
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.454
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.48	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) = 0.48 SUBAREA RUNOFF(CFS) = 2.35
EFFECTIVE AREA(ACRES) = 6.38 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 31.19

****
FLOW PROCESS FROM NODE 325.00 TO NODE 330.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1002.11 DOWNSTREAM(FEET) = 1001.26
FLOW LENGTH(FEET) = 173.84 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 22.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.78
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.19
PIPE TRAVEL TIME(MIN.) = 0.43 Tc(MIN.) = 6.66
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 330.00 = 1204.84 FEET.

****
FLOW PROCESS FROM NODE 330.00 TO NODE 450.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

==========
ELEVATION DATA: UPSTREAM(FEET) = 1001.26 DOWNSTREAM(FEET) = 999.29
FLOW LENGTH(FEET) = 18.13 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 9.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.21
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.19
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 6.67
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 450.00 = 1222.97 FEET.
==========
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 6.9 TC(MIN.) = 6.67
EFFECTIVE AREA(ACRES) = 6.38 AREA-AVERAGED Fm(INCH/HR)= 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 31.19

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)		Ap	Ae (ACRES)	HEADWATER NODE
1	30.59	5.98	5.583	0.20(0.02)	0.10		5.8	310.00
2	31.02	6.22	5.460	0.20(0.02)	0.10		6.1	220.00
3	31.17	6.57	5.292	0.20(0.02)	0.10		6.3	290.00
4	31.18	6.60	5.279	0.20(0.02)	0.10		6.3	214.00
5	31.19	6.67	5.244	0.20(0.02)	0.10		6.4	226.00
6	30.39	7.46	4.919	0.20(0.02)	0.10		6.7	300.00
7	29.64	8.05	4.709	0.20(0.02)	0.10		6.8	230.00
8	29.43	8.22	4.655	0.20(0.02)	0.10		6.8	260.00
9	29.03	8.47	4.576	0.20(0.02)	0.10		6.9	234.00
10	28.73	8.66	4.516	0.20(0.02)	0.10		6.9	250.00
11	27.09	9.68	4.238	0.20(0.02)	0.10		6.9	210.00

==========
==========
END OF RATIONAL METHOD ANALYSIS

♠

OUTLET 3
INTERIM

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1334

                         Analysis prepared by:
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 ************************* DESCRIPTION OF STUDY *************************
* DANA POINT HARBOR COMMERCIAL CORE AREA - Phase 2B Interim             *
* RATIONAL METHOD EXISTING CONDITION HYDROLOGY OUTLET 3                 *
* 10-YEAR STORM EVENT  EM                                               *
 ************************************************************************

  FILE NAME: 3E10R.DAT
  TIME/DATE OF STUDY: 15:14 02/13/2020
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  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
  2   30.0     25.0    0.017/0.017/0.017   0.67    1.50 0.0313 0.125 0.0150
  3   50.0     45.0    0.017/0.017/0.017   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   326.73
  ELEVATION DATA: UPSTREAM(FEET) =   1332.32  DOWNSTREAM(FEET) =   1331.94

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.223
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.145
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.21      0.30      0.500    56   15.22
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.55      0.20      0.500    75   15.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.23
  TOTAL AREA(ACRES) =      1.76   PEAK FLOW RATE(CFS) =      3.23
```



```
************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1331.94  DOWNSTREAM ELEVATION(FEET) = 1328.22
  STREET LENGTH(FEET) =   177.44   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.017
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.017

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL) =  0.017
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.56
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   16.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.062
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.93      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      2.69    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       2.7        PEAK FLOW RATE(CFS) =       4.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.15
  FLOW VELOCITY(FEET/SEC.) =  2.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     504.17 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1328.22  DOWNSTREAM(FEET) =  1260.18
  FLOW LENGTH(FEET) =   960.76   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.35
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.74
  PIPE TRAVEL TIME(MIN.) =   1.41    Tc(MIN.) =   17.72
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1464.93 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   17.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.966
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        5.09      0.20      0.500    75
  COMMERCIAL                  D        0.54      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.462
```

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 SUBAREA AREA(ACRES) =    5.63      SUBAREA RUNOFF(CFS) =    9.49
 EFFECTIVE AREA(ACRES) =      8.32   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      14.00

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    105.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1260.18  DOWNSTREAM(FEET) =  1245.52
 FLOW LENGTH(FEET) =   775.08   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.92
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.00
 PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =   19.35
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    2240.01 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.35
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.869
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        3.73      0.20     0.500    75
 COMMERCIAL                 D        0.65      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.441
 SUBAREA AREA(ACRES) =    4.38      SUBAREA RUNOFF(CFS) =    7.02
 EFFECTIVE AREA(ACRES) =     12.70   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       12.7       PEAK FLOW RATE(CFS) =      20.30

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    107.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1245.52  DOWNSTREAM(FEET) =  1240.60
 FLOW LENGTH(FEET) =    98.55   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.63
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.30
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   19.46
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    2338.56 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.46
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.863
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        4.20      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.16      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D       12.06      0.20     0.500    75
 COMMERCIAL                 C        0.60      0.25     0.100    69
 COMMERCIAL                 D        0.97      0.20     0.100    75
```



```
 PUBLIC PARK                C        0.70      0.25     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.481
 SUBAREA AREA(ACRES) =   19.69      SUBAREA RUNOFF(CFS) =   31.07
 EFFECTIVE AREA(ACRES) =     32.39   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =       32.4       PEAK FLOW RATE(CFS) =      51.30

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.46
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.863
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                D        0.53      0.20     0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    0.81
 EFFECTIVE AREA(ACRES) =     32.92   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       32.9       PEAK FLOW RATE(CFS) =      52.11

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    109.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1240.60  DOWNSTREAM(FEET) =  1239.01
 FLOW LENGTH(FEET) =    81.43   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.59
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      52.11
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   19.55
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    2419.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.55
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.859
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.52      0.25     0.100    69
 COMMERCIAL                 D        0.97      0.20     0.100    75
 CONDOMINIUMS               C        1.00      0.25     0.350    69
 CONDOMINIUMS               D       10.74      0.20     0.350    75
 PUBLIC PARK                D        0.07      0.20     0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   13.30      SUBAREA RUNOFF(CFS) =   21.45
 EFFECTIVE AREA(ACRES) =     46.22   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.43
 TOTAL AREA(ACRES) =       46.2       PEAK FLOW RATE(CFS) =      73.43

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    111.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1239.07  DOWNSTREAM(FEET) =  1210.33
 FLOW LENGTH(FEET) =   407.01   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  17.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.99
```

GIVEN PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 73.43
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 19.84
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 111.00 = 2827.00 FEET.

****
FLOW PROCESS FROM NODE 111.00 TO NODE 111.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 19.84
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.843
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.69	0.20	0.100	75
CONDOMINIUMS	D	0.09	0.20	0.350	75
PUBLIC PARK	D	0.85	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.505
SUBAREA AREA(ACRES) = 1.63 SUBAREA RUNOFF(CFS) = 2.56
EFFECTIVE AREA(ACRES) = 47.85 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 47.8 PEAK FLOW RATE(CFS) = 75.32

****
FLOW PROCESS FROM NODE 111.00 TO NODE 113.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1210.33 DOWNSTREAM(FEET) = 1210.00
FLOW LENGTH(FEET) = 18.70 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.45
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 75.32
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 19.86
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 113.00 = 2845.70 FEET.

****
FLOW PROCESS FROM NODE 113.00 TO NODE 113.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 19.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.842
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	13.30	0.20	0.350	75
PUBLIC PARK	D	3.90	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA AREA(ACRES) = 17.20 SUBAREA RUNOFF(CFS) = 27.07
EFFECTIVE AREA(ACRES) = 65.05 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 65.1 PEAK FLOW RATE(CFS) = 102.34

****
FLOW PROCESS FROM NODE 113.00 TO NODE 119.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1210.00 DOWNSTREAM(FEET) = 1159.95
FLOW LENGTH(FEET) = 1078.02 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 23.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.17
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 102.34
PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 20.71
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.

****
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 20.71
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	1.51	0.25	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	5.27	0.20	0.200	75
COMMERCIAL	D	0.27	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 11.15
EFFECTIVE AREA(ACRES) = 72.10 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 72.1 PEAK FLOW RATE(CFS) = 110.93

****
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 20.71
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	1.27	0.25	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	3.23	0.20	0.200	75
COMMERCIAL	D	0.27	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.194
SUBAREA AREA(ACRES) = 4.77 SUBAREA RUNOFF(CFS) = 7.54
EFFECTIVE AREA(ACRES) = 76.87 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 76.9 PEAK FLOW RATE(CFS) = 118.47

****
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 20.71
RAINFALL INTENSITY(INCH/HR) = 1.80
AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.41
EFFECTIVE STREAM AREA(ACRES) = 76.87
TOTAL STREAM AREA(ACRES) = 76.87
PEAK FLOW RATE(CFS) AT CONFLUENCE = 118.47

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

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========
INITIAL SUBAREA FLOW-LENGTH(FEET) = 331.01
ELEVATION DATA: UPSTREAM(FEET) = 1332.00 DOWNSTREAM(FEET) = 1330.74

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.172
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.561
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS	Tc

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
CONDOMINIUMS                D       1.42      0.20      0.350    75   11.17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
SUBAREA RUNOFF(CFS) =      3.18
TOTAL AREA(ACRES) =      1.42   PEAK FLOW RATE(CFS) =      3.18

****************************************************************************
FLOW PROCESS FROM NODE    201.00 TO NODE    203.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) = 1330.74  DOWNSTREAM ELEVATION(FEET) = 1308.01
STREET LENGTH(FEET) =   789.61   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 50.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  45.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.017
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.017
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.92
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.42
  HALFSTREET FLOOD WIDTH(FEET) =   15.33
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.52
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.92
STREET FLOW TRAVEL TIME(MIN.) =   2.91   Tc(MIN.) =   14.08
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.243
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        1.91      0.20     0.400    75
CONDOMINIUMS                D        4.97      0.20     0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.364
SUBAREA AREA(ACRES) =    6.88      SUBAREA RUNOFF(CFS) =   13.44
EFFECTIVE AREA(ACRES) =      8.30    AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
TOTAL AREA(ACRES) =        8.3        PEAK FLOW RATE(CFS) =      16.22

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.84
FLOW VELOCITY(FEET/SEC.) =  5.05   DEPTH*VELOCITY(FT*FT/SEC.) =   2.45
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =    1120.62 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    203.00 TO NODE    205.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) = 1308.01  DOWNSTREAM ELEVATION(FEET) = 1245.00
STREET LENGTH(FEET) =   901.07   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      27.50
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.50
```



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  HALFSTREET FLOOD WIDTH(FEET) =   18.87
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.15
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.07
STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   15.92
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.090
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"       D        0.07      0.20     0.400    75
COMMERCIAL                  D        0.73      0.20     0.100    75
CONDOMINIUMS                D       11.58      0.20     0.350    75
PUBLIC PARK                 D        0.01      0.20     0.850    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.336
SUBAREA AREA(ACRES) =   12.39      SUBAREA RUNOFF(CFS) =   22.56
EFFECTIVE AREA(ACRES) =     20.69    AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
TOTAL AREA(ACRES) =       20.7        PEAK FLOW RATE(CFS) =      37.64

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.54   HALFSTREET FLOOD WIDTH(FEET) =  21.37
FLOW VELOCITY(FEET/SEC.) =  8.81   DEPTH*VELOCITY(FT*FT/SEC.) =   4.80
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    2021.69 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1245.00  DOWNSTREAM(FEET) =  1229.65
FLOW LENGTH(FEET) =   135.30   MANNING'S N =  0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  21.30
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      37.64
PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   16.03
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =    2156.99 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    206.00 TO NODE    210.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) = 1229.65  DOWNSTREAM ELEVATION(FEET) = 1166.68
STREET LENGTH(FEET) =  1205.30   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 30.00

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

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      48.52
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.50
  HALFSTREET FLOOD WIDTH(FEET) =   19.02
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.08
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.56
STREET FLOW TRAVEL TIME(MIN.) =   2.84   Tc(MIN.) =   18.86
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.897
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"        C        3.38      0.25     0.200    69
RESIDENTIAL
```

```
"11+ DWELLINGS/ACRE"       D        9.23      0.20     0.200    75
COMMERCIAL                 D        0.42      0.20     0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.197
SUBAREA AREA(ACRES) =   13.03     SUBAREA RUNOFF(CFS) =   21.75
EFFECTIVE AREA(ACRES) =    33.72    AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
TOTAL AREA(ACRES) =       33.7       PEAK FLOW RATE(CFS) =      55.78

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.12
FLOW VELOCITY(FEET/SEC.) =  7.33   DEPTH*VELOCITY(FT*FT/SEC.) =   3.82
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =    3362.29 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    210.00 TO NODE    119.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1166.68  DOWNSTREAM(FEET) =  1159.95
FLOW LENGTH(FEET) =   307.60   MANNING'S N =  0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  17.76
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      55.78
PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   19.15
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    119.00 =    3669.89 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =   19.15
RAINFALL INTENSITY(INCH/HR) =   1.88
AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.20
AREA-AVERAGED Ap =  0.29
EFFECTIVE STREAM AREA(ACRES) =      33.72
TOTAL STREAM AREA(ACRES) =      33.72
PEAK FLOW RATE(CFS) AT CONFLUENCE =      55.78

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1      118.47   20.71    1.798  0.21( 0.09) 0.41      76.9     100.00
    2       55.78   19.15    1.880  0.20( 0.06) 0.29      33.7     200.00

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      170.61   19.15    1.880  0.21( 0.08) 0.37     104.8     200.00
    2      171.73   20.71    1.798  0.21( 0.08) 0.37     110.6     100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     171.73    Tc(MIN.) =    20.71
EFFECTIVE AREA(ACRES) =     110.59   AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.37
TOTAL AREA(ACRES) =      110.6
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    119.00 =    3923.72 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    119.00 TO NODE    121.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```



```
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1159.95  DOWNSTREAM(FEET) =  1150.00
FLOW LENGTH(FEET) =   321.11   MANNING'S N =  0.013
DEPTH OF FLOW IN  54.0 INCH PIPE IS  27.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  20.88
GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     171.73
PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   20.97
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    121.00 =    4244.83 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    121.00 TO NODE    121.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   20.97
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.785
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       C        6.04      0.25     0.200    69
RESIDENTIAL
"11+ DWELLINGS/ACRE"       D        8.06      0.20     0.200    75
COMMERCIAL                 C        0.97      0.25     0.100    69
COMMERCIAL                 D        1.54      0.20     0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.185
SUBAREA AREA(ACRES) =   16.61     SUBAREA RUNOFF(CFS) =   26.08
EFFECTIVE AREA(ACRES) =   127.20   AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.35
TOTAL AREA(ACRES) =      127.2       PEAK FLOW RATE(CFS) =     196.08

****************************************************************************
FLOW PROCESS FROM NODE    121.00 TO NODE    123.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1150.00  DOWNSTREAM(FEET) =  1140.00
FLOW LENGTH(FEET) =   798.79   MANNING'S N =  0.013
DEPTH OF FLOW IN  60.0 INCH PIPE IS  37.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  15.28
GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     196.08
PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   21.84
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    123.00 =    5043.62 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   21.84
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.744
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       C        6.79      0.25     0.200    69
RESIDENTIAL
"11+ DWELLINGS/ACRE"       D       17.92      0.20     0.200    75
APARTMENTS                 C        4.46      0.25     0.200    69
APARTMENTS                 D        0.69      0.20     0.200    75
COMMERCIAL                 C        0.78      0.25     0.100    69
COMMERCIAL                 D        1.88      0.20     0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.192
SUBAREA AREA(ACRES) =   32.52     SUBAREA RUNOFF(CFS) =   49.82
EFFECTIVE AREA(ACRES) =   159.72   AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
TOTAL AREA(ACRES) =      159.7       PEAK FLOW RATE(CFS) =     241.18

** PEAK FLOW RATE TABLE **
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```
 STREAM        Q      Tc    Intensity    Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1       243.02   20.28    1.820  0.21( 0.07) 0.31     153.9      200.00
    2       241.18   21.84    1.744  0.21( 0.07) 0.31     159.7      100.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     243.02  Tc(MIN.) =   20.28
 AREA-AVERAGED Fm(INCH/HR) =  0.07  AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.31  EFFECTIVE AREA(ACRES) =     153.93

****************************************************************************
 FLOW PROCESS FROM NODE    123.00 TO NODE    129.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1140.00  DOWNSTREAM(FEET) =  1122.00
 FLOW LENGTH(FEET) =   579.78   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.38
 GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     243.02
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   20.71
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    129.00 =    5623.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.798
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.85      0.25      0.200    69
 COMMERCIAL                 C        0.56      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.184
 SUBAREA AREA(ACRES) =    3.41      SUBAREA RUNOFF(CFS) =    5.38
 EFFECTIVE AREA(ACRES) =    157.34   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      163.1       PEAK FLOW RATE(CFS) =     245.37

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.798
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.54      0.25      0.200    69
 COMMERCIAL                 C        0.97      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.172
 SUBAREA AREA(ACRES) =    3.51      SUBAREA RUNOFF(CFS) =    5.54
 EFFECTIVE AREA(ACRES) =    160.85   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      166.6       PEAK FLOW RATE(CFS) =     250.91

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.71
 RAINFALL INTENSITY(INCH/HR) =   1.80
 AREA-AVERAGED Fm(INCH/HR) =  0.06
```



```
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.31
 EFFECTIVE STREAM AREA(ACRES) =     160.85
 TOTAL STREAM AREA(ACRES) =     166.64
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     250.91

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.55
 ELEVATION DATA: UPSTREAM(FEET) =   1163.74  DOWNSTREAM(FEET) =   1148.43

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.616
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.798
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.29      0.25      0.200    69    5.99
 COMMERCIAL                 C        1.36      0.25      0.100    69    5.62
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.118
 SUBAREA RUNOFF(CFS) =      5.60
 TOTAL AREA(ACRES) =      1.65   PEAK FLOW RATE(CFS) =      5.60

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1148.43  DOWNSTREAM ELEVATION(FEET) = 1141.94
 STREET LENGTH(FEET) =   235.77   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 50.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  45.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.017
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.017

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.017
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.31
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.39
   HALFSTREET FLOOD WIDTH(FEET) =   13.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.05
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.56
 STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =    6.59
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.467
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.47      0.25      0.200    69
 COMMERCIAL                 C        4.51      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.109
 SUBAREA AREA(ACRES) =    4.98      SUBAREA RUNOFF(CFS) =   15.42
 EFFECTIVE AREA(ACRES) =      6.63    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.11
 TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      20.52

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.68
 FLOW VELOCITY(FEET/SEC.) =  4.49   DEPTH*VELOCITY(FT*FT/SEC.) =   1.93
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     556.32 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1141.94  DOWNSTREAM(FEET) =  1122.13
 FLOW LENGTH(FEET) =   643.31   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.99
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.52
 PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =    7.48
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =    1199.63 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =    7.48
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.223
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.51      0.25     0.200    69
 COMMERCIAL                 C        3.05      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.145
 SUBAREA AREA(ACRES) =    5.56      SUBAREA RUNOFF(CFS) =   15.95
 EFFECTIVE AREA(ACRES) =     12.19   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.13
 TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      35.01

**************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    129.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1122.13  DOWNSTREAM(FEET) =  1122.00
 FLOW LENGTH(FEET) =    81.38   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  28.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.60
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      35.01
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    7.77
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    129.00 =    1281.01 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 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.) =    7.77
 RAINFALL INTENSITY(INCH/HR) =   3.15
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.13
 EFFECTIVE STREAM AREA(ACRES) =      12.19
 TOTAL STREAM AREA(ACRES) =      12.19
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      35.01

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      250.91   20.71    1.798  0.21( 0.06) 0.31     160.9     200.00
     1      248.85   22.27    1.725  0.21( 0.07) 0.31     166.6     100.00
     2       35.01    7.77    3.152  0.25( 0.03) 0.13      12.2     300.00
```



```
 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      202.77    7.77    3.152  0.21( 0.06) 0.28      72.6     300.00
     2      270.73   20.71    1.798  0.21( 0.06) 0.29     173.0     200.00
     3      267.84   22.27    1.725  0.21( 0.06) 0.30     178.8     100.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     270.73    Tc(MIN.) =    20.71
 EFFECTIVE AREA(ACRES) =     173.04   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      178.8
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    129.00 =    5623.40 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    131.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1105.04  DOWNSTREAM(FEET) =  1103.76
 FLOW LENGTH(FEET) =    35.44   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  30.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.77
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     270.73
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   20.74
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    131.00 =    5658.84 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    131.00 TO NODE    131.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.74
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.797
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        1.86      0.25     0.100    69
 COMMERCIAL                 D        0.14      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    3.19
 EFFECTIVE AREA(ACRES) =   175.04   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      180.8       PEAK FLOW RATE(CFS) =     273.30

**************************************************************************
 FLOW PROCESS FROM NODE    131.00 TO NODE    133.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1103.76  DOWNSTREAM(FEET) =  1101.65
 FLOW LENGTH(FEET) =   503.15   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.50
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     273.30
 PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   21.47
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    133.00 =    6161.99 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   21.47
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.762
```

```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        1.00      0.25      0.100    69
 COMMERCIAL                  D        0.87      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     1.87      SUBAREA RUNOFF(CFS) =     2.93
 EFFECTIVE AREA(ACRES) =    176.91   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      182.7       PEAK FLOW RATE(CFS) =     273.30
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1101.65  DOWNSTREAM(FEET) =  1101.33
 FLOW LENGTH(FEET) =    60.37   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.50
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     273.30
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   21.55
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =    6222.36 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   21.55
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.757
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.36      0.25      0.100    69
 COMMERCIAL                  D        0.44      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.80      SUBAREA RUNOFF(CFS) =     1.25
 EFFECTIVE AREA(ACRES) =    177.71   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      183.5       PEAK FLOW RATE(CFS) =     273.30
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    137.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1101.33  DOWNSTREAM(FEET) =  1098.66
 FLOW LENGTH(FEET) =   408.71   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.50
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     273.30
 PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   22.15
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    137.00 =    6631.07 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    137.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.15
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.730
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
```



```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        4.06      0.25      0.100    69
 COMMERCIAL                  D        1.08      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     5.14      SUBAREA RUNOFF(CFS) =     7.89
 EFFECTIVE AREA(ACRES) =    182.85   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      188.6       PEAK FLOW RATE(CFS) =     274.83

****************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    141.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1098.66  DOWNSTREAM(FEET) =  1093.99
 FLOW LENGTH(FEET) =   318.57   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  41.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.63
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     274.83
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   22.45
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    141.00 =    6949.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.45
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.717
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        5.78      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     5.78      SUBAREA RUNOFF(CFS) =     8.80
 EFFECTIVE AREA(ACRES) =    188.63   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      194.4       PEAK FLOW RATE(CFS) =     281.44

****************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.45
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.717
 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"       C        0.87      0.25      0.400    69
 COMMERCIAL                  C        0.68      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.268
 SUBAREA AREA(ACRES) =     1.55      SUBAREA RUNOFF(CFS) =     2.30
 EFFECTIVE AREA(ACRES) =    190.18   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      196.0       PEAK FLOW RATE(CFS) =     283.74

****************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1093.99  DOWNSTREAM(FEET) =  1076.30
 FLOW LENGTH(FEET) =   504.72   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  34.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.75
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =     283.74
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   22.79
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =    7454.36 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.79
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.702
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                C        0.71      0.25     0.100    69
 COMMERCIAL                D        0.32      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.03      SUBAREA RUNOFF(CFS) =    1.56
 EFFECTIVE AREA(ACRES) =    191.21   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      197.0       PEAK FLOW RATE(CFS) =     283.74
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.79
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.702
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS              C        1.02      0.25     0.350    69
 CONDOMINIUMS              D        4.41      0.20     0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    5.43      SUBAREA RUNOFF(CFS) =    7.96
 EFFECTIVE AREA(ACRES) =    196.64   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      202.4       PEAK FLOW RATE(CFS) =     290.74

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    149.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1076.30  DOWNSTREAM(FEET) =  1053.58
 FLOW LENGTH(FEET) =   289.89   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  27.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  33.70
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     290.74
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   22.93
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    149.00 =    7744.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    149.00 TO NODE    149.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.93
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.696
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS              C        4.75      0.25     0.350    69
 CONDOMINIUMS              D        1.68      0.20     0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    6.43      SUBAREA RUNOFF(CFS) =    9.34
 EFFECTIVE AREA(ACRES) =    203.07   AREA-AVERAGED Fm(INCH/HR) =  0.06
```



```
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      208.9       PEAK FLOW RATE(CFS) =     298.99

****************************************************************************
 FLOW PROCESS FROM NODE    149.00 TO NODE    149.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.93
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.696
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                C        0.40      0.25     0.100    69
 PUBLIC PARK               C        0.62      0.25     0.850    69
 PUBLIC PARK               D        0.03      0.20     0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.564
 SUBAREA AREA(ACRES) =    1.05      SUBAREA RUNOFF(CFS) =    1.47
 EFFECTIVE AREA(ACRES) =    204.12   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      209.9       PEAK FLOW RATE(CFS) =     300.46

****************************************************************************
 FLOW PROCESS FROM NODE    149.00 TO NODE    151.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1053.58  DOWNSTREAM(FEET) =  1023.54
 FLOW LENGTH(FEET) =   305.05   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  25.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  36.98
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     300.46
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   23.07
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    151.00 =    8049.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    151.00 TO NODE    151.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   23.07
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.690
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                C        0.41      0.25     0.100    69
 COMMERCIAL                D        1.11      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.52      SUBAREA RUNOFF(CFS) =    2.28
 EFFECTIVE AREA(ACRES) =    205.64   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      211.4       PEAK FLOW RATE(CFS) =     301.68

****************************************************************************
 FLOW PROCESS FROM NODE    151.00 TO NODE    153.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1023.54  DOWNSTREAM(FEET) =  1007.62
 FLOW LENGTH(FEET) =   210.38   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  28.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  33.58
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     301.68
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   23.17
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    153.00 =    8259.68 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    153.00 TO NODE    153.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   23.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.85      0.20     0.100    75
  PUBLIC PARK                D        2.01      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.627
  SUBAREA AREA(ACRES) =     2.86      SUBAREA RUNOFF(CFS) =     4.02
  EFFECTIVE AREA(ACRES) =    208.50   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      214.3       PEAK FLOW RATE(CFS) =     304.89

************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    153.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   23.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.27      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) =     0.27      SUBAREA RUNOFF(CFS) =     0.40
  EFFECTIVE AREA(ACRES) =    208.77   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      214.6       PEAK FLOW RATE(CFS) =     305.29

************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    153.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   23.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        5.30      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.58      0.20     0.500    75
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        9.75      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.01      0.20     0.400    75
  APARTMENTS                 C        2.16      0.25     0.200    69
  COMMERCIAL                 C        2.28      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.375
  SUBAREA AREA(ACRES) =    21.08      SUBAREA RUNOFF(CFS) =    30.24
  EFFECTIVE AREA(ACRES) =    229.85   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      235.6       PEAK FLOW RATE(CFS) =     335.53

************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    153.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   23.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        4.68      0.20     0.100    75
  PUBLIC PARK                C        4.30      0.25     0.850    69
```



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  PUBLIC PARK                D        0.67      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.486
  SUBAREA AREA(ACRES) =     9.65      SUBAREA RUNOFF(CFS) =    13.63
  EFFECTIVE AREA(ACRES) =    239.50   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      245.3       PEAK FLOW RATE(CFS) =     349.17

************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    155.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1007.62  DOWNSTREAM(FEET) =  1004.25
  FLOW LENGTH(FEET) =   568.89   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.78
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     349.17
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   23.71
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    155.00 =    8828.57 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.71
  RAINFALL INTENSITY(INCH/HR) =   1.66
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22
  AREA-AVERAGED Ap =  0.30
  EFFECTIVE STREAM AREA(ACRES) =     239.50
  TOTAL STREAM AREA(ACRES) =     245.29
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     349.17

************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   295.31
  ELEVATION DATA: UPSTREAM(FEET) =   1025.50  DOWNSTREAM(FEET) =   1017.82

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.137
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.610
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        0.15      0.25     0.100    69    6.14
  COMMERCIAL                 D        0.73      0.20     0.100    75    6.14
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.84
  TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      2.84

************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    403.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1017.82  DOWNSTREAM(FEET) =  1017.71
  FLOW LENGTH(FEET) =   249.58   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.48
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.84
```

```
 PIPE TRAVEL TIME(MIN.) =   2.81    Tc(MIN.) =    8.94
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    403.00 =     544.89 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    403.00 TO NODE    403.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.94
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.909
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.27      0.25      0.100    69
 COMMERCIAL                  D        0.80      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    2.78
 EFFECTIVE AREA(ACRES) =      1.95   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       5.07

****************************************************************************
 FLOW PROCESS FROM NODE    403.00 TO NODE    405.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1017.71  DOWNSTREAM(FEET) =  1016.04
 FLOW LENGTH(FEET) =   247.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.07
 PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =    9.79
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    405.00 =     792.39 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.79
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.50      0.25      0.100    69
 COMMERCIAL                  D        2.45      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    2.95      SUBAREA RUNOFF(CFS) =    7.28
 EFFECTIVE AREA(ACRES) =      4.90   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      12.09

****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    155.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1016.04  DOWNSTREAM(FEET) =  1014.57
 FLOW LENGTH(FEET) =    96.59   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.93
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.09
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.99
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    155.00 =     888.98 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =   1
----------------------------------------------------------------------------
```



```
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.99
 RAINFALL INTENSITY(INCH/HR) =   2.73
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       4.90
 TOTAL STREAM AREA(ACRES) =       4.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.09

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      323.47   11.08    2.573  0.23( 0.07) 0.30     139.0     300.00
     1      349.17   23.71    1.664  0.22( 0.07) 0.30     239.5     200.00
     1      343.72   25.29    1.604  0.22( 0.07) 0.30     245.3     100.00
     2       12.09    9.99    2.730  0.21( 0.02) 0.10       4.9     400.00

 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      322.02    9.99    2.730  0.23( 0.07) 0.29     130.2     400.00
     2      334.85   11.08    2.573  0.23( 0.07) 0.29     143.9     300.00
     3      356.50   23.71    1.664  0.22( 0.07) 0.30     244.4     200.00
     4      350.78   25.29    1.604  0.22( 0.07) 0.30     250.2     100.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     356.50    Tc(MIN.) =    23.71
 EFFECTIVE AREA(ACRES) =     244.40   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      250.2
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    155.00 =    8828.57 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    158.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1004.25  DOWNSTREAM(FEET) =  1002.32
 FLOW LENGTH(FEET) =   180.04   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.16
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     356.50
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   23.87
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    158.00 =    9008.61 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    158.00 TO NODE    158.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   23.87
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.658
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        1.19      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.19      SUBAREA RUNOFF(CFS) =    1.75
 EFFECTIVE AREA(ACRES) =    245.59   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      251.4       PEAK FLOW RATE(CFS) =     356.50
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    158.00 TO NODE    158.00 IS CODE = 15.1
--------------------------------------------------------------------------
 >>>>>DEFINE MEMORY BANK # 1 <<<<<
==========================================================================
 PEAK FLOWRATE TABLE FILE NAME: c2p10r.DNA
 MEMORY BANK #  1 DEFINED AS FOLLOWS:
  STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS) (MIN.)  (INCH/HR)          (ACRES)    NODE
     1       19.78    6.08  0.20( 0.02) 0.10       5.8     310.00
     2       20.11    6.36  0.20( 0.02) 0.10       6.1     220.00
     3       20.21    6.72  0.20( 0.02) 0.10       6.3     290.00
     4       20.22    6.76  0.20( 0.02) 0.10       6.3     214.00
     5       20.22    6.79  0.20( 0.02) 0.10       6.4     226.00
     6       19.71    7.58  0.20( 0.02) 0.10       6.6     300.00
     7       19.04    8.42  0.20( 0.02) 0.10       6.8     260.00
     8       19.04    8.43  0.20( 0.02) 0.10       6.8     230.00
     9       18.59    8.88  0.20( 0.02) 0.10       6.9     250.00
    10       18.58    8.89  0.20( 0.02) 0.10       6.9     234.00
    11       17.53    9.91  0.20( 0.02) 0.10       6.9     210.00
   TOTAL AREA(ACRES) =        6.9

**************************************************************************
 FLOW PROCESS FROM NODE    158.00 TO NODE    158.00 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      322.02   10.17    2.702  0.23( 0.06) 0.29     131.4     400.00
     2      334.85   11.26    2.550  0.23( 0.07) 0.29     145.1     300.00
     3      356.50   23.87    1.658  0.22( 0.06) 0.30     245.6     200.00
     4      350.78   25.46    1.597  0.22( 0.07) 0.30     251.4     100.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    158.00 =    9008.61 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       19.78    6.08    3.629  0.20( 0.02) 0.10       5.8     310.00
     2       20.11    6.36    3.538  0.20( 0.02) 0.10       6.1     220.00
     3       20.21    6.72    3.426  0.20( 0.02) 0.10       6.3     290.00
     4       20.22    6.76    3.416  0.20( 0.02) 0.10       6.3     214.00
     5       20.22    6.79    3.406  0.20( 0.02) 0.10       6.4     226.00
     6       19.71    7.58    3.199  0.20( 0.02) 0.10       6.6     300.00
     7       19.04    8.42    3.011  0.20( 0.02) 0.10       6.8     260.00
     8       19.04    8.43    3.010  0.20( 0.02) 0.10       6.8     230.00
     9       18.59    8.88    2.922  0.20( 0.02) 0.10       6.9     250.00
    10       18.58    8.89    2.919  0.20( 0.02) 0.10       6.9     234.00
    11       17.53    9.91    2.742  0.20( 0.02) 0.10       6.9     210.00
 LONGEST FLOWPATH FROM NODE    230.00 TO NODE    158.00 =    1222.97 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      279.87    6.08    3.629  0.22( 0.06) 0.28      84.3     310.00
     2      285.08    6.36    3.538  0.22( 0.06) 0.28      88.2     220.00
     3      291.45    6.72    3.426  0.22( 0.06) 0.28      93.2     290.00
     4      292.03    6.76    3.416  0.22( 0.06) 0.28      93.6     214.00
     5      292.57    6.79    3.406  0.22( 0.06) 0.28      94.1     226.00
     6      304.74    7.58    3.199  0.22( 0.06) 0.28     104.5     300.00
     7      316.83    8.42    3.011  0.22( 0.06) 0.28     115.6     260.00
     8      316.91    8.43    3.010  0.22( 0.06) 0.28     115.7     230.00
     9      322.93    8.88    2.922  0.22( 0.06) 0.28     121.5     250.00
    10      323.11    8.89    2.919  0.22( 0.06) 0.28     121.7     234.00
    11      336.12    9.91    2.742  0.22( 0.06) 0.28     135.0     210.00
    12      339.29   10.17    2.702  0.22( 0.06) 0.28     138.3     400.00
    13      351.14   11.26    2.550  0.22( 0.06) 0.28     152.0     300.00
    14      367.04   23.87    1.658  0.22( 0.06) 0.29     252.5     200.00
    15      360.94   25.46    1.597  0.22( 0.06) 0.29     258.3     100.00
   TOTAL AREA(ACRES) =       258.3
```



```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     367.04  Tc(MIN.) =   23.871
 EFFECTIVE AREA(ACRES) =    252.53  AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      258.3
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    158.00 =    9008.61 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    158.00 TO NODE    160.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1002.32  DOWNSTREAM(FEET) =   992.80
 FLOW LENGTH(FEET) =   106.27   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  29.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  37.59
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     367.04
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   23.92
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    160.00 =    9114.88 FEET.
==========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      258.3  TC(MIN.) =     23.92
 EFFECTIVE AREA(ACRES) =    252.53  AREA-AVERAGED Fm(INCH/HR)=  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap = 0.291
 PEAK FLOW RATE(CFS)   =     367.04

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      279.87    6.13    3.612  0.22( 0.06) 0.28      84.3     310.00
     2      285.08    6.41    3.522  0.22( 0.06) 0.28      88.2     220.00
     3      291.45    6.77    3.411  0.22( 0.06) 0.28      93.2     290.00
     4      292.03    6.81    3.401  0.22( 0.06) 0.28      93.6     214.00
     5      292.57    6.84    3.392  0.22( 0.06) 0.28      94.1     226.00
     6      304.74    7.63    3.187  0.22( 0.06) 0.28     104.5     300.00
     7      316.83    8.47    3.001  0.22( 0.06) 0.28     115.6     260.00
     8      316.91    8.48    3.000  0.22( 0.06) 0.28     115.7     230.00
     9      322.93    8.92    2.913  0.22( 0.06) 0.28     121.5     250.00
    10      323.11    8.94    2.910  0.22( 0.06) 0.28     121.7     234.00
    11      336.12    9.96    2.735  0.22( 0.06) 0.28     135.0     210.00
    12      339.29   10.22    2.695  0.22( 0.06) 0.28     138.3     400.00
    13      351.14   11.31    2.543  0.22( 0.06) 0.28     152.0     300.00
    14      367.04   23.92    1.656  0.22( 0.06) 0.29     252.5     200.00
    15      360.94   25.51    1.596  0.22( 0.06) 0.29     258.3     100.00
==========================================================================
==========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1334

                         Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* DANA POINT HARBOR COMMERCIAL CORE AREA - Phase 2B Interim             *
* RATIONAL METHOD EXISTING CONDITION HYDROLOGY OUTLET 3                 *
* 100-YEAR STORM EVENT  EM                                              *
 ************************************************************************

  FILE NAME: 3E00R.DAT
  TIME/DATE OF STUDY: 16:09 02/13/2020
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   30.0     25.0    0.017/0.017/0.017   0.67    1.50 0.0312 0.125 0.0150
  3   50.0     45.0    0.017/0.017/0.017   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   326.73
  ELEVATION DATA: UPSTREAM(FEET) =   1332.32  DOWNSTREAM(FEET) =   1331.94

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.223
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.269
  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
  "5-7 DWELLINGS/ACRE"       B        0.21      0.30      0.500    76   15.22
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.55      0.20      0.500    91   15.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      5.01
  TOTAL AREA(ACRES) =      1.76   PEAK FLOW RATE(CFS) =      5.01
```



```
************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1331.94  DOWNSTREAM ELEVATION(FEET) = 1328.22
  STREET LENGTH(FEET) =   177.44   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.017
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.017

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL) =  0.017
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.42
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.93
  STREET FLOW TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =   16.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.154
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.93      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.56
  EFFECTIVE AREA(ACRES) =      2.69    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      2.7        PEAK FLOW RATE(CFS) =       7.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  11.10
  FLOW VELOCITY(FEET/SEC.) =  3.16   DEPTH*VELOCITY(FT*FT/SEC.) =   1.01
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     504.17 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1328.22  DOWNSTREAM(FEET) =  1260.18
  FLOW LENGTH(FEET) =   960.76   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.86
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.38
  PIPE TRAVEL TIME(MIN.) =   1.25    Tc(MIN.) =   17.45
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1464.93 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   17.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.023
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.09      0.20      0.500    91
  COMMERCIAL                 D        0.54      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.462
```

```
 SUBAREA AREA(ACRES) =    5.63      SUBAREA RUNOFF(CFS) =   14.85
 EFFECTIVE AREA(ACRES) =      8.32   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      21.92

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    105.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1260.18  DOWNSTREAM(FEET) =  1245.52
 FLOW LENGTH(FEET) =   775.08   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.40
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.92
 PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =   18.49
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    2240.01 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        3.73      0.20     0.500    91
 COMMERCIAL                 D        0.65      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.441
 SUBAREA AREA(ACRES) =    4.38      SUBAREA RUNOFF(CFS) =   11.18
 EFFECTIVE AREA(ACRES) =     12.70   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       12.7       PEAK FLOW RATE(CFS) =      32.36

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    107.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1245.52  DOWNSTREAM(FEET) =  1240.60
 FLOW LENGTH(FEET) =    98.55   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.38
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      32.36
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   18.59
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    2338.56 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.59
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.915
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        4.20      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.16      0.25     0.500    86
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D       12.06      0.20     0.500    91
 COMMERCIAL                 C        0.60      0.25     0.100    86
 COMMERCIAL                 D        0.97      0.20     0.100    91
```



```
 PUBLIC PARK                C        0.70      0.25     0.850    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.481
 SUBAREA AREA(ACRES) =   19.69      SUBAREA RUNOFF(CFS) =   49.71
 EFFECTIVE AREA(ACRES) =     32.39   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =       32.4       PEAK FLOW RATE(CFS) =      81.97

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.59
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.915
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                D        0.53      0.20     0.850    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    1.31
 EFFECTIVE AREA(ACRES) =     32.92   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       32.9       PEAK FLOW RATE(CFS) =      83.28

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    109.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1240.60  DOWNSTREAM(FEET) =  1239.01
 FLOW LENGTH(FEET) =    81.43   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.51
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      83.28
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   18.64
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    2419.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.64
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.911
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.52      0.25     0.100    86
 COMMERCIAL                 D        0.97      0.20     0.100    91
 CONDOMINIUMS               C        1.00      0.25     0.350    86
 CONDOMINIUMS               D       10.74      0.20     0.350    91
 PUBLIC PARK                D        0.07      0.20     0.850    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   13.30      SUBAREA RUNOFF(CFS) =   34.05
 EFFECTIVE AREA(ACRES) =     46.22   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.43
 TOTAL AREA(ACRES) =       46.2       PEAK FLOW RATE(CFS) =     117.19

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    111.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1239.07  DOWNSTREAM(FEET) =  1210.33
 FLOW LENGTH(FEET) =   407.01   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.32
```

GIVEN PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 117.19
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 18.91
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 111.00 = 2827.00 FEET.

****
FLOW PROCESS FROM NODE 111.00 TO NODE 111.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
MAINLINE Tc(MIN.) = 18.91
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.887
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.69	0.20	0.100	91
CONDOMINIUMS	D	0.09	0.20	0.350	91
PUBLIC PARK	D	0.85	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.505
SUBAREA AREA(ACRES) = 1.63 SUBAREA RUNOFF(CFS) = 4.09
EFFECTIVE AREA(ACRES) = 47.85 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 47.8 PEAK FLOW RATE(CFS) = 120.29

****
FLOW PROCESS FROM NODE 111.00 TO NODE 113.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 1210.33 DOWNSTREAM(FEET) = 1210.00
FLOW LENGTH(FEET) = 18.70 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.02
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 120.29
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 18.93
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 113.00 = 2845.70 FEET.

****
FLOW PROCESS FROM NODE 113.00 TO NODE 113.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
MAINLINE Tc(MIN.) = 18.93
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.885
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	13.30	0.20	0.350	91
PUBLIC PARK	D	3.90	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA AREA(ACRES) = 17.20 SUBAREA RUNOFF(CFS) = 43.23
EFFECTIVE AREA(ACRES) = 65.05 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 65.1 PEAK FLOW RATE(CFS) = 163.45

****
FLOW PROCESS FROM NODE 113.00 TO NODE 119.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 1210.00 DOWNSTREAM(FEET) = 1159.95
FLOW LENGTH(FEET) = 1078.02 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.12
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 163.45
PIPE TRAVEL TIME(MIN.) = 0.78 Tc(MIN.) = 19.71

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.

****
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
MAINLINE Tc(MIN.) = 19.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.820
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	1.51	0.25	0.200	86
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	5.27	0.20	0.200	91
COMMERCIAL	D	0.27	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 17.63
EFFECTIVE AREA(ACRES) = 72.10 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 72.1 PEAK FLOW RATE(CFS) = 177.23

****
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
MAINLINE Tc(MIN.) = 19.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.820
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	1.27	0.25	0.200	86
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	3.23	0.20	0.200	91
COMMERCIAL	D	0.27	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.194
SUBAREA AREA(ACRES) = 4.77 SUBAREA RUNOFF(CFS) = 11.93
EFFECTIVE AREA(ACRES) = 76.87 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 76.9 PEAK FLOW RATE(CFS) = 189.15

****
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 19.71
RAINFALL INTENSITY(INCH/HR) = 2.82
AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.41
EFFECTIVE STREAM AREA(ACRES) = 76.87
TOTAL STREAM AREA(ACRES) = 76.87
PEAK FLOW RATE(CFS) AT CONFLUENCE = 189.15

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

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==
INITIAL SUBAREA FLOW-LENGTH(FEET) = 331.01
ELEVATION DATA: UPSTREAM(FEET) = 1332.00 DOWNSTREAM(FEET) = 1330.74

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.172
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.903

```
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 CONDOMINIUMS                D       1.42      0.20       0.350    91   11.17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA RUNOFF(CFS) =      4.90
 TOTAL AREA(ACRES) =      1.42   PEAK FLOW RATE(CFS) =      4.90

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    203.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1330.74  DOWNSTREAM ELEVATION(FEET) = 1308.01
 STREET LENGTH(FEET) =   789.61   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 50.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  45.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.017
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.017

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.017
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.41
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.48
   HALFSTREET FLOOD WIDTH(FEET) =   18.40
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.01
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.39
 STREET FLOW TRAVEL TIME(MIN.) =   2.63   Tc(MIN.) =   13.80
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.459
 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        1.91      0.20       0.400    91
 CONDOMINIUMS                D        4.97      0.20       0.350    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.364
 SUBAREA AREA(ACRES) =    6.88      SUBAREA RUNOFF(CFS) =   20.96
 EFFECTIVE AREA(ACRES) =     8.30    AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
 TOTAL AREA(ACRES) =        8.3        PEAK FLOW RATE(CFS) =      25.30

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  22.45
 FLOW VELOCITY(FEET/SEC.) =  5.65   DEPTH*VELOCITY(FT*FT/SEC.) =   3.08
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =    1120.62 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    205.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1308.01  DOWNSTREAM ELEVATION(FEET) = 1245.00
 STREET LENGTH(FEET) =   901.07   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.00
```



```
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.57
   HALFSTREET FLOOD WIDTH(FEET) =   22.54
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    9.09
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.14
 STREET FLOW TRAVEL TIME(MIN.) =   1.65   Tc(MIN.) =   15.45
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.242
 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
 COMMERCIAL                  D        0.73      0.20       0.100    91
 CONDOMINIUMS                D       11.58      0.20       0.350    91
 PUBLIC PARK                 D        0.01      0.20       0.850    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.336
 SUBAREA AREA(ACRES) =   12.39      SUBAREA RUNOFF(CFS) =   35.40
 EFFECTIVE AREA(ACRES) =     20.69    AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =       20.7        PEAK FLOW RATE(CFS) =      59.07

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.62   HALFSTREET FLOOD WIDTH(FEET) =  25.51
 FLOW VELOCITY(FEET/SEC.) =  9.84   DEPTH*VELOCITY(FT*FT/SEC.) =   6.08
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    2021.69 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1245.00  DOWNSTREAM(FEET) =  1229.65
 FLOW LENGTH(FEET) =   135.30   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  33.43
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      59.07
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   15.52
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =    2156.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    210.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1229.65  DOWNSTREAM ELEVATION(FEET) = 1166.68
 STREET LENGTH(FEET) =  1205.30   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      76.21
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.57
   HALFSTREET FLOOD WIDTH(FEET) =   22.77
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.90
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.50
 STREET FLOW TRAVEL TIME(MIN.) =   2.54   Tc(MIN.) =   18.06
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.964
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
```

"11+ DWELLINGS/ACRE" C 3.38 0.25 0.200 86
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 9.23 0.20 0.200 91
COMMERCIAL D 0.42 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.197
SUBAREA AREA(ACRES) = 13.03 SUBAREA RUNOFF(CFS) = 34.27
EFFECTIVE AREA(ACRES) = 33.72 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 33.7 PEAK FLOW RATE(CFS) = 88.17

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 24.10
FLOW VELOCITY(FEET/SEC.) = 8.19 DEPTH*VELOCITY(FT*FT/SEC.) = 4.86
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 210.00 = 3362.29 FEET.

****
FLOW PROCESS FROM NODE 210.00 TO NODE 119.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1166.68 DOWNSTREAM(FEET) = 1159.95
FLOW LENGTH(FEET) = 307.60 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.07
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 88.17
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 18.24
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 119.00 = 3669.89 FEET.

****
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 18.24
RAINFALL INTENSITY(INCH/HR) = 2.95
AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.29
EFFECTIVE STREAM AREA(ACRES) = 33.72
TOTAL STREAM AREA(ACRES) = 33.72
PEAK FLOW RATE(CFS) AT CONFLUENCE = 88.17

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	189.15	19.71	2.820	0.21(0.09)	0.41	76.9	100.00
2	88.17	18.24	2.947	0.20(0.06)	0.29	33.7	200.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	271.44	18.24	2.947	0.21(0.08)	0.37	104.9	200.00
2	273.44	19.71	2.820	0.21(0.08)	0.37	110.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 273.44 Tc(MIN.) = 19.71
EFFECTIVE AREA(ACRES) = 110.59 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 110.6
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.

****
FLOW PROCESS FROM NODE 119.00 TO NODE 121.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1159.95 DOWNSTREAM(FEET) = 1150.00
FLOW LENGTH(FEET) = 321.11 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 37.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.10
GIVEN PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 273.44
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 19.94
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 121.00 = 4244.83 FEET.

****
FLOW PROCESS FROM NODE 121.00 TO NODE 121.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 19.94
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.801
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	6.04	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	8.06	0.20	0.200	91
COMMERCIAL	C	0.97	0.25	0.100	86
COMMERCIAL	D	1.54	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.185
SUBAREA AREA(ACRES) = 16.61 SUBAREA RUNOFF(CFS) = 41.26
EFFECTIVE AREA(ACRES) = 127.20 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 127.2 PEAK FLOW RATE(CFS) = 312.33

****
FLOW PROCESS FROM NODE 121.00 TO NODE 123.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1150.00 DOWNSTREAM(FEET) = 1140.00
FLOW LENGTH(FEET) = 798.79 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.91
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 312.33
PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 20.78
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 123.00 = 5043.62 FEET.

****
FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 20.78
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.736
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	6.79	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	17.92	0.20	0.200	91
APARTMENTS	C	4.46	0.25	0.200	86
APARTMENTS	D	0.69	0.20	0.200	91
COMMERCIAL	C	0.78	0.25	0.100	86
COMMERCIAL	D	1.88	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.192
SUBAREA AREA(ACRES) = 32.52 SUBAREA RUNOFF(CFS) = 78.84
EFFECTIVE AREA(ACRES) = 159.72 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31

```
 TOTAL AREA(ACRES) =      159.7       PEAK FLOW RATE(CFS) =     383.70

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1      386.28   19.31    2.852  0.21( 0.07) 0.31     154.0     200.00
     2      383.70   20.78    2.736  0.21( 0.07) 0.31     159.7     100.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     386.28  Tc(MIN.) =   19.31
 AREA-AVERAGED Fm(INCH/HR) =  0.07  AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.31  EFFECTIVE AREA(ACRES) =     154.01

****************************************************************************
 FLOW PROCESS FROM NODE    123.00 TO NODE    129.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1140.00  DOWNSTREAM(FEET) =  1122.00
 FLOW LENGTH(FEET) =   579.78   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.23
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     386.28
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   19.67
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    129.00 =    5623.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.823
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.85      0.25      0.200    86
 COMMERCIAL                 C        0.56      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.184
 SUBAREA AREA(ACRES) =    3.41      SUBAREA RUNOFF(CFS) =    8.52
 EFFECTIVE AREA(ACRES) =    157.42   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      163.1       PEAK FLOW RATE(CFS) =     390.70

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.823
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.54      0.25      0.200    86
 COMMERCIAL                 C        0.97      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.172
 SUBAREA AREA(ACRES) =    3.51      SUBAREA RUNOFF(CFS) =    8.78
 EFFECTIVE AREA(ACRES) =    160.93   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      166.6       PEAK FLOW RATE(CFS) =     399.48

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
```



```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   19.67
 RAINFALL INTENSITY(INCH/HR) =   2.82
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.31
 EFFECTIVE STREAM AREA(ACRES) =     160.93
 TOTAL STREAM AREA(ACRES) =     166.64
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     399.48

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.55
 ELEVATION DATA: UPSTREAM(FEET) =   1163.74  DOWNSTREAM(FEET) =   1148.43

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.616
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.789
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.29      0.25      0.200    86    5.99
 COMMERCIAL                 C        1.36      0.25      0.100    86    5.62
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.118
 SUBAREA RUNOFF(CFS) =      8.55
 TOTAL AREA(ACRES) =      1.65   PEAK FLOW RATE(CFS) =      8.55

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1148.43  DOWNSTREAM ELEVATION(FEET) = 1141.94
 STREET LENGTH(FEET) =   235.77   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 50.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  45.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.017
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.017

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.017
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.44
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   15.68
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.47
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.93
 STREET FLOW TRAVEL TIME(MIN.) =   0.88   Tc(MIN.) =    6.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.326
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.47      0.25      0.200    86
 COMMERCIAL                 C        4.51      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.109
 SUBAREA AREA(ACRES) =    4.98      SUBAREA RUNOFF(CFS) =   23.75
 EFFECTIVE AREA(ACRES) =      6.63    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.11
 TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      31.62

 END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
 DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.75
 FLOW VELOCITY(FEET/SEC.) =  4.96   DEPTH*VELOCITY(FT*FT/SEC.) =   2.40
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     556.32 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1141.94  DOWNSTREAM(FEET) =  1122.13
 FLOW LENGTH(FEET) =   643.31   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.54
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      31.62
 PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =    7.29
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =    1199.63 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.29
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.986
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        2.51      0.25     0.200    86
 COMMERCIAL                  C        3.05      0.25     0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.145
 SUBAREA AREA(ACRES) =    5.56      SUBAREA RUNOFF(CFS) =   24.77
 EFFECTIVE AREA(ACRES) =     12.19   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.13
 TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      54.36

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    129.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1122.13  DOWNSTREAM(FEET) =  1122.00
 FLOW LENGTH(FEET) =   81.38   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  39.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.94
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      54.36
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    7.56
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    129.00 =    1281.01 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 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.) =    7.56
 RAINFALL INTENSITY(INCH/HR) =   4.88
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.13
 EFFECTIVE STREAM AREA(ACRES) =      12.19
 TOTAL STREAM AREA(ACRES) =      12.19
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      54.36

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
```



```
     1      399.48   19.67    2.823  0.21( 0.06) 0.31      160.9      200.00
     1      396.47   21.13    2.709  0.21( 0.07) 0.31      166.6      100.00
     2       54.36    7.56    4.882  0.25( 0.03) 0.13       12.2      300.00

 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      322.58    7.56    4.882  0.21( 0.06) 0.28      74.1      300.00
     2      430.76   19.67    2.823  0.21( 0.06) 0.29     173.1      200.00
     3      426.48   21.13    2.709  0.21( 0.06) 0.30     178.8      100.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     430.76    Tc(MIN.) =    19.67
 EFFECTIVE AREA(ACRES) =     173.12   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      178.8
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    129.00 =    5623.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    131.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1105.04  DOWNSTREAM(FEET) =  1103.76
 FLOW LENGTH(FEET) =    35.44   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  41.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.67
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     430.76
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   19.69
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    131.00 =    5658.84 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    131.00 TO NODE    131.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        1.86      0.25     0.100    86
 COMMERCIAL                  D        0.14      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    5.03
 EFFECTIVE AREA(ACRES) =    175.12   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      180.8       PEAK FLOW RATE(CFS) =     434.86

****************************************************************************
 FLOW PROCESS FROM NODE    131.00 TO NODE    133.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1103.76  DOWNSTREAM(FEET) =  1101.65
 FLOW LENGTH(FEET) =   503.15   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.30
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     434.86
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   20.15
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    133.00 =    6161.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.15
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.784
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        1.00      0.25      0.100    86
 COMMERCIAL                  D        0.87      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.87      SUBAREA RUNOFF(CFS) =    4.65
 EFFECTIVE AREA(ACRES) =    176.99   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      182.7       PEAK FLOW RATE(CFS) =     434.86
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

**************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    135.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1101.65  DOWNSTREAM(FEET) =  1101.33
 FLOW LENGTH(FEET) =    60.37   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.30
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     434.86
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   20.20
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =    6222.36 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.20
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.780
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.36      0.25      0.100    86
 COMMERCIAL                  D        0.44      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    1.99
 EFFECTIVE AREA(ACRES) =    177.79   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      183.5       PEAK FLOW RATE(CFS) =     434.98

**************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    137.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1101.33  DOWNSTREAM(FEET) =  1098.66
 FLOW LENGTH(FEET) =   408.71   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.31
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     434.98
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   20.57
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    137.00 =    6631.07 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    137.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.57
```



```
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        4.06      0.25      0.100    86
 COMMERCIAL                  D        1.08      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    5.14      SUBAREA RUNOFF(CFS) =   12.61
 EFFECTIVE AREA(ACRES) =    182.93   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      188.6       PEAK FLOW RATE(CFS) =     442.97

**************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    141.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1098.66  DOWNSTREAM(FEET) =  1093.99
 FLOW LENGTH(FEET) =   318.57   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.64
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     442.97
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   20.86
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    141.00 =    6949.64 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.86
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.729
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        5.78      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    5.78      SUBAREA RUNOFF(CFS) =   14.07
 EFFECTIVE AREA(ACRES) =    188.71   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      194.4       PEAK FLOW RATE(CFS) =     453.48

**************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.86
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.729
 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"       C        0.87      0.25      0.400    86
 COMMERCIAL                  C        0.68      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.268
 SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    3.71
 EFFECTIVE AREA(ACRES) =    190.26   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      196.0       PEAK FLOW RATE(CFS) =     457.20

**************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    145.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1093.99  DOWNSTREAM(FEET) =  1076.30
```

FLOW LENGTH(FEET) = 504.72 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 48.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.86
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 457.20
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 21.17
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 145.00 = 7454.36 FEET.

****
FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.706
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.71	0.25	0.100	86
COMMERCIAL	D	0.32	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.03 SUBAREA RUNOFF(CFS) = 2.49
EFFECTIVE AREA(ACRES) = 191.29 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 197.0 PEAK FLOW RATE(CFS) = 457.20
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****
FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.706
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	C	1.02	0.25	0.350	86
CONDOMINIUMS	D	4.41	0.20	0.350	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.43 SUBAREA RUNOFF(CFS) = 12.87
EFFECTIVE AREA(ACRES) = 196.72 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 202.4 PEAK FLOW RATE(CFS) = 468.57

****
FLOW PROCESS FROM NODE 145.00 TO NODE 149.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1076.30 DOWNSTREAM(FEET) = 1053.58
FLOW LENGTH(FEET) = 289.89 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 36.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 37.85
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 468.57
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 21.30
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 149.00 = 7744.25 FEET.

****
FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.697
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	C	4.75	0.25	0.350	86
CONDOMINIUMS	D	1.68	0.20	0.350	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.43 SUBAREA RUNOFF(CFS) = 15.13
EFFECTIVE AREA(ACRES) = 203.15 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 208.9 PEAK FLOW RATE(CFS) = 482.05

****
FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.697
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.40	0.25	0.100	86
PUBLIC PARK	C	0.62	0.25	0.850	86
PUBLIC PARK	D	0.03	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.564
SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = 2.42
EFFECTIVE AREA(ACRES) = 204.20 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 209.9 PEAK FLOW RATE(CFS) = 484.47

****
FLOW PROCESS FROM NODE 149.00 TO NODE 151.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1053.58 DOWNSTREAM(FEET) = 1023.54
FLOW LENGTH(FEET) = 305.05 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 34.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 41.66
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 484.47
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 21.42
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 151.00 = 8049.30 FEET.

****
FLOW PROCESS FROM NODE 151.00 TO NODE 151.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.42
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.688
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.41	0.25	0.100	86
COMMERCIAL	D	1.11	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.52 SUBAREA RUNOFF(CFS) = 3.65
EFFECTIVE AREA(ACRES) = 205.72 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 211.4 PEAK FLOW RATE(CFS) = 486.50

****
FLOW PROCESS FROM NODE 151.00 TO NODE 153.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1023.54 DOWNSTREAM(FEET) = 1007.62
FLOW LENGTH(FEET) = 210.38 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 37.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 37.63
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 486.50
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 21.52

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 153.00 = 8259.68 FEET.

****

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

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

==========

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.85	0.20	0.100	91
PUBLIC PARK	D	2.01	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.627
SUBAREA AREA(ACRES) = 2.86 SUBAREA RUNOFF(CFS) = 6.58
EFFECTIVE AREA(ACRES) = 208.58 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 214.3 PEAK FLOW RATE(CFS) = 491.84

****

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

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

==========

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.27	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) = 0.27 SUBAREA RUNOFF(CFS) = 0.65
EFFECTIVE AREA(ACRES) = 208.85 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 214.6 PEAK FLOW RATE(CFS) = 492.49

****

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

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

==========

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	5.30	0.25	0.500	86
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	0.58	0.20	0.500	91
RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	9.75	0.25	0.400	86
RESIDENTIAL "8-10 DWELLINGS/ACRE"	D	1.01	0.20	0.400	91
APARTMENTS	C	2.16	0.25	0.200	86
COMMERCIAL	C	2.28	0.25	0.100	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.375
SUBAREA AREA(ACRES) = 21.08 SUBAREA RUNOFF(CFS) = 49.12
EFFECTIVE AREA(ACRES) = 229.93 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 235.6 PEAK FLOW RATE(CFS) = 541.61

****

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

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

==========

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	4.68	0.20	0.100	91
PUBLIC PARK	C	4.30	0.25	0.850	86
PUBLIC PARK	D	0.67	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.486
SUBAREA AREA(ACRES) = 9.65 SUBAREA RUNOFF(CFS) = 22.28
EFFECTIVE AREA(ACRES) = 239.58 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 245.3 PEAK FLOW RATE(CFS) = 563.89

****

FLOW PROCESS FROM NODE 153.00 TO NODE 155.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

==========

ELEVATION DATA: UPSTREAM(FEET) = 1007.62 DOWNSTREAM(FEET) = 1004.25
FLOW LENGTH(FEET) = 568.89 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.72
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 563.89
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 21.85
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

****

FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 1

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

==========

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 21.85
RAINFALL INTENSITY(INCH/HR) = 2.66
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.30
EFFECTIVE STREAM AREA(ACRES) = 239.58
TOTAL STREAM AREA(ACRES) = 245.29
PEAK FLOW RATE(CFS) AT CONFLUENCE = 563.89

****

FLOW PROCESS FROM NODE 400.00 TO NODE 401.00 IS CODE = 21

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

==========

INITIAL SUBAREA FLOW-LENGTH(FEET) = 295.31
ELEVATION DATA: UPSTREAM(FEET) = 1025.50 DOWNSTREAM(FEET) = 1017.82

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.137
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.502
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.15	0.25	0.100	86	6.14
COMMERCIAL	D	0.73	0.20	0.100	91	6.14

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.34
TOTAL AREA(ACRES) = 0.88 PEAK FLOW RATE(CFS) = 4.34

****

FLOW PROCESS FROM NODE 401.00 TO NODE 403.00 IS CODE = 31

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

==========

ELEVATION DATA: UPSTREAM(FEET) = 1017.82 DOWNSTREAM(FEET) = 1017.71
FLOW LENGTH(FEET) = 249.58 MANNING'S N = 0.013

```
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   1.63
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      4.34
 PIPE TRAVEL TIME(MIN.) =   2.54    Tc(MIN.) =    8.68
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    403.00 =     544.89 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    403.00 TO NODE    403.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.68
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.510
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.27      0.25      0.100    86
 COMMERCIAL                  D        0.80      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    4.32
 EFFECTIVE AREA(ACRES) =      1.95   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       7.88

****************************************************************************
 FLOW PROCESS FROM NODE    403.00 TO NODE    405.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1017.71  DOWNSTREAM(FEET) =  1016.04
 FLOW LENGTH(FEET) =   247.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.27
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.88
 PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =    9.46
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    405.00 =     792.39 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.46
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.293
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.50      0.25      0.100    86
 COMMERCIAL                  D        2.45      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    2.95      SUBAREA RUNOFF(CFS) =   11.34
 EFFECTIVE AREA(ACRES) =      4.90   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      18.84

****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    155.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1016.04  DOWNSTREAM(FEET) =  1014.57
 FLOW LENGTH(FEET) =    96.59   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.15
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     18.84
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    9.64
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    155.00 =     888.98 FEET.
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.64
 RAINFALL INTENSITY(INCH/HR) =   4.25
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       4.90
 TOTAL STREAM AREA(ACRES) =       4.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      18.84

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      525.97   10.08    4.140  0.23( 0.07) 0.30     140.5     300.00
     1      563.89   21.85    2.658  0.22( 0.07) 0.30     239.6     200.00
     1      555.12   23.33    2.560  0.22( 0.07) 0.30     245.3     100.00
     2       18.84    9.64    4.247  0.21( 0.02) 0.10       4.9     400.00

 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      535.10    9.64    4.247  0.23( 0.07) 0.29     139.3     400.00
     2      544.33   10.08    4.140  0.23( 0.07) 0.29     145.4     300.00
     3      575.64   21.85    2.658  0.22( 0.07) 0.30     244.5     200.00
     4      566.43   23.33    2.560  0.22( 0.07) 0.30     250.2     100.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     575.64    Tc(MIN.) =    21.85
 EFFECTIVE AREA(ACRES) =     244.48   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      250.2
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    155.00 =    8828.57 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    158.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1004.25  DOWNSTREAM(FEET) =  1002.32
 FLOW LENGTH(FEET) =   180.04   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.32
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     575.64
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   21.95
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    158.00 =    9008.61 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    158.00 TO NODE    158.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   21.95
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.651
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        1.19      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.19      SUBAREA RUNOFF(CFS) =    2.82
```

EFFECTIVE AREA(ACRES) = 245.67 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 251.4 PEAK FLOW RATE(CFS) = 575.64
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****
FLOW PROCESS FROM NODE 158.00 TO NODE 158.00 IS CODE = 15.1

>>>>>DEFINE MEMORY BANK # 1 <<<<<
==========
PEAK FLOWRATE TABLE FILE NAME: c2p00r.DNA
MEMORY BANK # 1 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	30.59	5.98	0.20(0.02)	0.10	5.8	310.00
2	31.02	6.22	0.20(0.02)	0.10	6.1	220.00
3	31.17	6.57	0.20(0.02)	0.10	6.3	290.00
4	31.18	6.60	0.20(0.02)	0.10	6.3	214.00
5	31.19	6.67	0.20(0.02)	0.10	6.4	226.00
6	30.39	7.46	0.20(0.02)	0.10	6.7	300.00
7	29.64	8.05	0.20(0.02)	0.10	6.8	230.00
8	29.43	8.22	0.20(0.02)	0.10	6.8	260.00
9	29.03	8.47	0.20(0.02)	0.10	6.9	234.00
10	28.73	8.66	0.20(0.02)	0.10	6.9	250.00
11	27.09	9.68	0.20(0.02)	0.10	6.9	210.00

TOTAL AREA(ACRES) = 6.9

****
FLOW PROCESS FROM NODE 158.00 TO NODE 158.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	535.10	9.75	4.220	0.23(0.07)	0.29	140.5	400.00
2	544.33	10.19	4.115	0.23(0.07)	0.29	146.6	300.00
3	575.64	21.95	2.651	0.22(0.07)	0.30	245.7	200.00
4	566.43	23.43	2.553	0.22(0.07)	0.30	251.4	100.00

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 158.00 = 9008.61 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	30.59	5.98	5.583	0.20(0.02)	0.10	5.8	310.00
2	31.02	6.22	5.460	0.20(0.02)	0.10	6.1	220.00
3	31.17	6.57	5.292	0.20(0.02)	0.10	6.3	290.00
4	31.18	6.60	5.279	0.20(0.02)	0.10	6.3	214.00
5	31.19	6.67	5.244	0.20(0.02)	0.10	6.4	226.00
6	30.39	7.46	4.919	0.20(0.02)	0.10	6.7	300.00
7	29.64	8.05	4.709	0.20(0.02)	0.10	6.8	230.00
8	29.43	8.22	4.655	0.20(0.02)	0.10	6.8	260.00
9	29.03	8.47	4.576	0.20(0.02)	0.10	6.9	234.00
10	28.73	8.66	4.516	0.20(0.02)	0.10	6.9	250.00
11	27.09	9.68	4.238	0.20(0.02)	0.10	6.9	210.00

LONGEST FLOWPATH FROM NODE 230.00 TO NODE 158.00 = 1222.97 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	466.62	5.98	5.583	0.22(0.06)	0.28	92.0	310.00
2	474.25	6.22	5.460	0.22(0.06)	0.28	95.7	220.00
3	484.63	6.57	5.292	0.22(0.06)	0.28	100.9	290.00
4	485.44	6.60	5.279	0.22(0.06)	0.28	101.4	214.00
5	487.69	6.67	5.244	0.22(0.06)	0.28	102.5	226.00
6	508.76	7.46	4.919	0.22(0.06)	0.28	114.1	300.00
7	523.59	8.05	4.709	0.22(0.06)	0.28	122.8	230.00
8	527.56	8.22	4.655	0.22(0.06)	0.28	125.2	260.00
9	533.41	8.47	4.576	0.22(0.06)	0.28	128.8	234.00
10	537.99	8.66	4.516	0.22(0.06)	0.28	131.7	250.00
11	560.54	9.68	4.238	0.22(0.06)	0.28	146.4	210.00
12	562.08	9.75	4.220	0.22(0.06)	0.28	147.4	400.00
13	570.63	10.19	4.115	0.22(0.06)	0.28	153.5	300.00

14	592.54	21.95	2.651	0.22(0.06)	0.29	252.6	200.00
15	582.70	23.43	2.553	0.22(0.06)	0.29	258.3	100.00

TOTAL AREA(ACRES) = 258.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 592.54 Tc(MIN.) = 21.948
EFFECTIVE AREA(ACRES) = 252.61 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 258.3
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 158.00 = 9008.61 FEET.

****
FLOW PROCESS FROM NODE 158.00 TO NODE 160.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1002.32 DOWNSTREAM(FEET) = 992.80
FLOW LENGTH(FEET) = 106.27 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 40.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 41.85
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 592.54
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 21.99
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 160.00 = 9114.88 FEET.
==========
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 258.3 TC(MIN.) = 21.99
EFFECTIVE AREA(ACRES) = 252.61 AREA-AVERAGED Fm(INCH/HR)= 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.291
PEAK FLOW RATE(CFS) = 592.54

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	466.62	6.03	5.559	0.22(0.06)	0.28	92.0	310.00
2	474.25	6.26	5.437	0.22(0.06)	0.28	95.7	220.00
3	484.63	6.61	5.272	0.22(0.06)	0.28	100.9	290.00
4	485.44	6.64	5.259	0.22(0.06)	0.28	101.4	214.00
5	487.69	6.72	5.225	0.22(0.06)	0.28	102.5	226.00
6	508.76	7.50	4.903	0.22(0.06)	0.28	114.1	300.00
7	523.59	8.10	4.694	0.22(0.06)	0.28	122.8	230.00
8	527.56	8.26	4.641	0.22(0.06)	0.28	125.2	260.00
9	533.41	8.51	4.563	0.22(0.06)	0.28	128.8	234.00
10	537.99	8.71	4.503	0.22(0.06)	0.28	131.7	250.00
11	560.54	9.72	4.227	0.22(0.06)	0.28	146.4	210.00
12	562.08	9.79	4.209	0.22(0.06)	0.28	147.4	400.00
13	570.63	10.23	4.105	0.22(0.06)	0.28	153.5	300.00
14	592.54	21.99	2.648	0.22(0.06)	0.29	252.6	200.00
15	582.70	23.48	2.551	0.22(0.06)	0.29	258.3	100.00

==========
==========
END OF RATIONAL METHOD ANALYSIS

OUTLET 3
ULTIMATE

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1334

                         Analysis prepared by:
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 ************************* DESCRIPTION OF STUDY *************************
* DANA POINT HARBOR COMMERCIAL CORE AREA PHASE 2B                       *
* RATIONAL METHOD ULTIMATE CONDITION OVERALL LINE C                     *
* 10-YEAR STORM EVENT EM                                                *
 ************************************************************************

  FILE NAME: 3P10ROV.DAT
  TIME/DATE OF STUDY: 16:28 02/13/2020
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   30.0     25.0    0.017/0.017/0.017   0.67    1.50 0.0312 0.125 0.0150
  3   50.0     45.0    0.017/0.017/0.017   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   326.73
  ELEVATION DATA: UPSTREAM(FEET) =   1332.32  DOWNSTREAM(FEET) =   1331.94

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.223
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.145
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.21      0.30      0.500    56   15.22
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.55      0.20      0.500    75   15.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.23
  TOTAL AREA(ACRES) =      1.76   PEAK FLOW RATE(CFS) =      3.23
```



```
************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1331.94  DOWNSTREAM ELEVATION(FEET) = 1328.22
  STREET LENGTH(FEET) =   177.44   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.017
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.017

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL) =  0.017
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.56
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   16.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.062
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.93      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      2.69    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       2.7        PEAK FLOW RATE(CFS) =       4.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.15
  FLOW VELOCITY(FEET/SEC.) =  2.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     504.17 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1328.22  DOWNSTREAM(FEET) =  1260.18
  FLOW LENGTH(FEET) =   960.76   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.35
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.74
  PIPE TRAVEL TIME(MIN.) =   1.41    Tc(MIN.) =   17.72
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1464.93 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   17.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.966
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.09      0.20      0.500    75
  COMMERCIAL                 D        0.54      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.462
```

```
 SUBAREA AREA(ACRES) =    5.63      SUBAREA RUNOFF(CFS) =    9.49
 EFFECTIVE AREA(ACRES) =      8.32   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      14.00

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    105.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1260.18  DOWNSTREAM(FEET) =  1245.52
 FLOW LENGTH(FEET) =   775.08   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.92
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.00
 PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =   19.35
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    2240.01 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.35
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.869
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        3.73      0.20     0.500    75
 COMMERCIAL                 D        0.65      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.441
 SUBAREA AREA(ACRES) =    4.38      SUBAREA RUNOFF(CFS) =    7.02
 EFFECTIVE AREA(ACRES) =     12.70   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       12.7       PEAK FLOW RATE(CFS) =      20.30

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    107.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1245.52  DOWNSTREAM(FEET) =  1240.60
 FLOW LENGTH(FEET) =    98.55   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.63
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.30
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   19.46
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    2338.56 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.46
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.863
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        4.20      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.16      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D       12.06      0.20     0.500    75
 COMMERCIAL                 C        0.60      0.25     0.100    69
 COMMERCIAL                 D        0.97      0.20     0.100    75
```



```
 PUBLIC PARK                C        0.70      0.25     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.481
 SUBAREA AREA(ACRES) =   19.69      SUBAREA RUNOFF(CFS) =   31.07
 EFFECTIVE AREA(ACRES) =     32.39   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =       32.4       PEAK FLOW RATE(CFS) =      51.30

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.46
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.863
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                D        0.53      0.20     0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    0.81
 EFFECTIVE AREA(ACRES) =     32.92   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       32.9       PEAK FLOW RATE(CFS) =      52.11

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    109.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1240.60  DOWNSTREAM(FEET) =  1239.01
 FLOW LENGTH(FEET) =    81.43   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.59
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      52.11
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   19.55
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    2419.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.55
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.859
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.52      0.25     0.100    69
 COMMERCIAL                 D        0.97      0.20     0.100    75
 CONDOMINIUMS               C        1.00      0.25     0.350    69
 CONDOMINIUMS               D       10.74      0.20     0.350    75
 PUBLIC PARK                D        0.07      0.20     0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   13.30      SUBAREA RUNOFF(CFS) =   21.45
 EFFECTIVE AREA(ACRES) =     46.22   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.43
 TOTAL AREA(ACRES) =       46.2       PEAK FLOW RATE(CFS) =      73.43

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    111.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1239.07  DOWNSTREAM(FEET) =  1210.33
 FLOW LENGTH(FEET) =   407.01   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  17.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.99
```

```
 GIVEN PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     73.43
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   19.84
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =    2827.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.84
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.843
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.69      0.20     0.100    75
 CONDOMINIUMS                D        0.09      0.20     0.350    75
 PUBLIC PARK                 D        0.85      0.20     0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.505
 SUBAREA AREA(ACRES) =     1.63      SUBAREA RUNOFF(CFS) =     2.56
 EFFECTIVE AREA(ACRES) =     47.85   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       47.8       PEAK FLOW RATE(CFS) =      75.32

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    113.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1210.33  DOWNSTREAM(FEET) =  1210.00
 FLOW LENGTH(FEET) =    18.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.45
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      75.32
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   19.86
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    113.00 =    2845.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.86
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.842
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                D       13.30      0.20     0.350    75
 PUBLIC PARK                 D        3.90      0.20     0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.463
 SUBAREA AREA(ACRES) =   17.20      SUBAREA RUNOFF(CFS) =   27.07
 EFFECTIVE AREA(ACRES) =     65.05   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       65.1       PEAK FLOW RATE(CFS) =     102.34

****************************************************************************
 FLOW PROCESS FROM NODE    113.00 TO NODE    119.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1210.00  DOWNSTREAM(FEET) =  1159.95
 FLOW LENGTH(FEET) =  1078.02   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  23.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.17
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     102.34
 PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =   20.71
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    119.00 =    3923.72 FEET.
```



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****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.798
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        1.51      0.25     0.200    69
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        5.27      0.20     0.200    75
 COMMERCIAL                  D        0.27      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.196
 SUBAREA AREA(ACRES) =     7.05      SUBAREA RUNOFF(CFS) =    11.15
 EFFECTIVE AREA(ACRES) =     72.10   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.42
 TOTAL AREA(ACRES) =       72.1       PEAK FLOW RATE(CFS) =     110.93

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.798
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        1.27      0.25     0.200    69
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        3.23      0.20     0.200    75
 COMMERCIAL                  D        0.27      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.194
 SUBAREA AREA(ACRES) =     4.77      SUBAREA RUNOFF(CFS) =     7.54
 EFFECTIVE AREA(ACRES) =     76.87   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =       76.9       PEAK FLOW RATE(CFS) =     118.47

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.71
 RAINFALL INTENSITY(INCH/HR) =   1.80
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.41
 EFFECTIVE STREAM AREA(ACRES) =      76.87
 TOTAL STREAM AREA(ACRES) =      76.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     118.47

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   331.01
 ELEVATION DATA: UPSTREAM(FEET) =   1332.00  DOWNSTREAM(FEET) =   1330.74

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.172
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.561
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
CONDOMINIUMS               D       1.42      0.20       0.350    75   11.17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
SUBAREA RUNOFF(CFS) =      3.18
TOTAL AREA(ACRES) =      1.42   PEAK FLOW RATE(CFS) =      3.18

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    203.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1330.74  DOWNSTREAM ELEVATION(FEET) = 1308.01
 STREET LENGTH(FEET) =   789.61   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 50.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  45.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.017
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.017

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.017
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.92
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   15.33
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.52
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.92
 STREET FLOW TRAVEL TIME(MIN.) =   2.91   Tc(MIN.) =   14.08
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.243
 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        1.91      0.20       0.400    75
CONDOMINIUMS               D        4.97      0.20       0.350    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.364
SUBAREA AREA(ACRES) =    6.88      SUBAREA RUNOFF(CFS) =   13.44
EFFECTIVE AREA(ACRES) =      8.30    AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
TOTAL AREA(ACRES) =        8.3        PEAK FLOW RATE(CFS) =      16.22

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.84
 FLOW VELOCITY(FEET/SEC.) =  5.05   DEPTH*VELOCITY(FT*FT/SEC.) =   2.45
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =    1120.62 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    205.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1308.01  DOWNSTREAM ELEVATION(FEET) = 1245.00
 STREET LENGTH(FEET) =   901.07   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      27.50
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.50
```



```
   HALFSTREET FLOOD WIDTH(FEET) =   18.87
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.15
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.07
 STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   15.92
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.090
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      D        0.07      0.20       0.400    75
COMMERCIAL                 D        0.73      0.20       0.100    75
CONDOMINIUMS               D       11.58      0.20       0.350    75
PUBLIC PARK                D        0.01      0.20       0.850    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.336
SUBAREA AREA(ACRES) =   12.39      SUBAREA RUNOFF(CFS) =   22.56
EFFECTIVE AREA(ACRES) =     20.69    AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
TOTAL AREA(ACRES) =       20.7        PEAK FLOW RATE(CFS) =      37.64

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.54   HALFSTREET FLOOD WIDTH(FEET) =  21.37
 FLOW VELOCITY(FEET/SEC.) =  8.81   DEPTH*VELOCITY(FT*FT/SEC.) =   4.80
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    2021.69 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1245.00  DOWNSTREAM(FEET) =  1229.65
 FLOW LENGTH(FEET) =   135.30   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.30
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.64
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   16.03
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =    2156.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    210.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1229.65  DOWNSTREAM ELEVATION(FEET) = 1166.68
 STREET LENGTH(FEET) =  1205.30   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      48.52
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.50
   HALFSTREET FLOOD WIDTH(FEET) =   19.02
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.08
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.56
 STREET FLOW TRAVEL TIME(MIN.) =   2.84   Tc(MIN.) =   18.86
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.897
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       C        3.38      0.25       0.200    69
RESIDENTIAL
```

```
"11+ DWELLINGS/ACRE"       D        9.23      0.20     0.200    75
COMMERCIAL                 D        0.42      0.20     0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.197
SUBAREA AREA(ACRES) =   13.03     SUBAREA RUNOFF(CFS) =   21.75
EFFECTIVE AREA(ACRES) =    33.72    AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
TOTAL AREA(ACRES) =       33.7       PEAK FLOW RATE(CFS) =      55.78

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.12
FLOW VELOCITY(FEET/SEC.) =  7.33   DEPTH*VELOCITY(FT*FT/SEC.) =   3.82
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =    3362.29 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    210.00 TO NODE    119.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1166.68  DOWNSTREAM(FEET) =  1159.95
FLOW LENGTH(FEET) =   307.60   MANNING'S N =  0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  17.76
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      55.78
PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   19.15
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    119.00 =    3669.89 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =   19.15
RAINFALL INTENSITY(INCH/HR) =   1.88
AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.20
AREA-AVERAGED Ap =  0.29
EFFECTIVE STREAM AREA(ACRES) =      33.72
TOTAL STREAM AREA(ACRES) =      33.72
PEAK FLOW RATE(CFS) AT CONFLUENCE =      55.78

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1      118.47   20.71    1.798  0.21( 0.09) 0.41      76.9     100.00
    2       55.78   19.15    1.880  0.20( 0.06) 0.29      33.7     200.00

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      170.61   19.15    1.880  0.21( 0.08) 0.37     104.8     200.00
    2      171.73   20.71    1.798  0.21( 0.08) 0.37     110.6     100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     171.73    Tc(MIN.) =    20.71
EFFECTIVE AREA(ACRES) =     110.59   AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.37
TOTAL AREA(ACRES) =      110.6
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    119.00 =    3923.72 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    119.00 TO NODE    121.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```



```
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1159.95  DOWNSTREAM(FEET) =  1150.00
FLOW LENGTH(FEET) =   321.11   MANNING'S N =  0.013
DEPTH OF FLOW IN  54.0 INCH PIPE IS  27.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  20.88
GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     171.73
PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   20.97
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    121.00 =    4244.83 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    121.00 TO NODE    121.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   20.97
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.785
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       C        6.04      0.25     0.200    69
RESIDENTIAL
"11+ DWELLINGS/ACRE"       D        8.06      0.20     0.200    75
COMMERCIAL                 C        0.97      0.25     0.100    69
COMMERCIAL                 D        1.54      0.20     0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.185
SUBAREA AREA(ACRES) =   16.61     SUBAREA RUNOFF(CFS) =   26.08
EFFECTIVE AREA(ACRES) =   127.20   AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.35
TOTAL AREA(ACRES) =      127.2       PEAK FLOW RATE(CFS) =     196.08

****************************************************************************
FLOW PROCESS FROM NODE    121.00 TO NODE    123.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1150.00  DOWNSTREAM(FEET) =  1140.00
FLOW LENGTH(FEET) =   798.79   MANNING'S N =  0.013
DEPTH OF FLOW IN  60.0 INCH PIPE IS  37.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  15.28
GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     196.08
PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   21.84
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    123.00 =    5043.62 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   21.84
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.744
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       C        6.79      0.25     0.200    69
RESIDENTIAL
"11+ DWELLINGS/ACRE"       D       17.92      0.20     0.200    75
APARTMENTS                 C        4.46      0.25     0.200    69
APARTMENTS                 D        0.69      0.20     0.200    75
COMMERCIAL                 C        0.78      0.25     0.100    69
COMMERCIAL                 D        1.88      0.20     0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.192
SUBAREA AREA(ACRES) =   32.52     SUBAREA RUNOFF(CFS) =   49.82
EFFECTIVE AREA(ACRES) =   159.72   AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
TOTAL AREA(ACRES) =      159.7       PEAK FLOW RATE(CFS) =     241.18

** PEAK FLOW RATE TABLE **
```

```
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1      243.02   20.28    1.820  0.21( 0.07) 0.31     153.9      200.00
    2      241.18   21.84    1.744  0.21( 0.07) 0.31     159.7      100.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     243.02  Tc(MIN.) =   20.28
 AREA-AVERAGED Fm(INCH/HR) =  0.07  AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.31  EFFECTIVE AREA(ACRES) =     153.93

****************************************************************************
 FLOW PROCESS FROM NODE    123.00 TO NODE    129.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1140.00  DOWNSTREAM(FEET) =  1122.00
 FLOW LENGTH(FEET) =   579.78   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.38
 GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     243.02
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   20.71
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    129.00 =    5623.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.798
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.85      0.25      0.200    69
 COMMERCIAL                 C        0.56      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.184
 SUBAREA AREA(ACRES) =    3.41      SUBAREA RUNOFF(CFS) =    5.38
 EFFECTIVE AREA(ACRES) =    157.34   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      163.1       PEAK FLOW RATE(CFS) =     245.37

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.798
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.54      0.25      0.200    69
 COMMERCIAL                 C        0.97      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.172
 SUBAREA AREA(ACRES) =    3.51      SUBAREA RUNOFF(CFS) =    5.54
 EFFECTIVE AREA(ACRES) =    160.85   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      166.6       PEAK FLOW RATE(CFS) =     250.91

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.71
 RAINFALL INTENSITY(INCH/HR) =   1.80
 AREA-AVERAGED Fm(INCH/HR) =  0.06
```



```
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.31
 EFFECTIVE STREAM AREA(ACRES) =     160.85
 TOTAL STREAM AREA(ACRES) =     166.64
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     250.91

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.55
 ELEVATION DATA: UPSTREAM(FEET) =   1163.74  DOWNSTREAM(FEET) =   1148.43

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.616
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.798
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.29      0.25      0.200    69    5.99
 COMMERCIAL                 C        1.36      0.25      0.100    69    5.62
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.118
 SUBAREA RUNOFF(CFS) =      5.60
 TOTAL AREA(ACRES) =      1.65   PEAK FLOW RATE(CFS) =      5.60

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1148.43  DOWNSTREAM ELEVATION(FEET) = 1141.94
 STREET LENGTH(FEET) =   235.77   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 50.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  45.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.017
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.017

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.017
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.31
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.39
   HALFSTREET FLOOD WIDTH(FEET) =   13.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.05
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.56
 STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =    6.59
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.467
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.47      0.25      0.200    69
 COMMERCIAL                 C        4.51      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.109
 SUBAREA AREA(ACRES) =    4.98      SUBAREA RUNOFF(CFS) =   15.42
 EFFECTIVE AREA(ACRES) =      6.63    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.11
 TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      20.52

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.68
 FLOW VELOCITY(FEET/SEC.) =  4.49   DEPTH*VELOCITY(FT*FT/SEC.) =   1.93
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     556.32 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1141.94  DOWNSTREAM(FEET) =  1122.13
 FLOW LENGTH(FEET) =   643.31   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.99
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     20.52
 PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =    7.48
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =    1199.63 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =    7.48
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.223
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.51      0.25     0.200    69
 COMMERCIAL                 C        3.05      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.145
 SUBAREA AREA(ACRES) =    5.56      SUBAREA RUNOFF(CFS) =   15.95
 EFFECTIVE AREA(ACRES) =     12.19   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.13
 TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      35.01

**************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    129.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1122.13  DOWNSTREAM(FEET) =  1122.00
 FLOW LENGTH(FEET) =    81.38   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  28.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.60
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     35.01
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    7.77
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    129.00 =    1281.01 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 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.) =    7.77
 RAINFALL INTENSITY(INCH/HR) =   3.15
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.13
 EFFECTIVE STREAM AREA(ACRES) =      12.19
 TOTAL STREAM AREA(ACRES) =      12.19
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      35.01

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      250.91   20.71    1.798  0.21( 0.06) 0.31     160.9     200.00
     1      248.85   22.27    1.725  0.21( 0.07) 0.31     166.6     100.00
     2       35.01    7.77    3.152  0.25( 0.03) 0.13      12.2     300.00
```



```
 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      202.77    7.77    3.152  0.21( 0.06) 0.28      72.6     300.00
     2      270.73   20.71    1.798  0.21( 0.06) 0.29     173.0     200.00
     3      267.84   22.27    1.725  0.21( 0.06) 0.30     178.8     100.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     270.73    Tc(MIN.) =    20.71
 EFFECTIVE AREA(ACRES) =     173.04   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      178.8
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    129.00 =    5623.40 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    131.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1105.04  DOWNSTREAM(FEET) =  1103.76
 FLOW LENGTH(FEET) =    35.44   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  30.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.77
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     270.73
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   20.74
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    131.00 =    5658.84 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    131.00 TO NODE    131.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.74
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.797
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        1.86      0.25     0.100    69
 COMMERCIAL                 D        0.14      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    3.19
 EFFECTIVE AREA(ACRES) =   175.04   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      180.8       PEAK FLOW RATE(CFS) =     273.30

**************************************************************************
 FLOW PROCESS FROM NODE    131.00 TO NODE    133.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1103.76  DOWNSTREAM(FEET) =  1101.65
 FLOW LENGTH(FEET) =   503.15   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.50
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     273.30
 PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   21.47
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    133.00 =    6161.99 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   21.47
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.762
```

```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        1.00      0.25      0.100    69
 COMMERCIAL                  D        0.87      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     1.87      SUBAREA RUNOFF(CFS) =     2.93
 EFFECTIVE AREA(ACRES) =    176.91   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      182.7       PEAK FLOW RATE(CFS) =     273.30
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1101.65  DOWNSTREAM(FEET) =  1101.33
 FLOW LENGTH(FEET) =    60.37   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.50
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     273.30
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   21.55
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =    6222.36 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   21.55
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.757
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.36      0.25      0.100    69
 COMMERCIAL                  D        0.44      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.80      SUBAREA RUNOFF(CFS) =     1.25
 EFFECTIVE AREA(ACRES) =    177.71   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      183.5       PEAK FLOW RATE(CFS) =     273.30
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    137.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1101.33  DOWNSTREAM(FEET) =  1098.66
 FLOW LENGTH(FEET) =   408.71   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.50
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     273.30
 PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   22.15
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    137.00 =    6631.07 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    137.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.15
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.730
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
```



```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        4.06      0.25      0.100    69
 COMMERCIAL                  D        1.08      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     5.14      SUBAREA RUNOFF(CFS) =     7.89
 EFFECTIVE AREA(ACRES) =    182.85   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      188.6       PEAK FLOW RATE(CFS) =     274.83

****************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    141.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1098.66  DOWNSTREAM(FEET) =  1093.99
 FLOW LENGTH(FEET) =   318.57   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  41.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.63
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     274.83
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   22.45
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    141.00 =    6949.64 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.45
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.717
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        5.78      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     5.78      SUBAREA RUNOFF(CFS) =     8.80
 EFFECTIVE AREA(ACRES) =    188.63   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      194.4       PEAK FLOW RATE(CFS) =     281.44

****************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.45
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.717
 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"       C        0.87      0.25      0.400    69
 COMMERCIAL                  C        0.68      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.268
 SUBAREA AREA(ACRES) =     1.55      SUBAREA RUNOFF(CFS) =     2.30
 EFFECTIVE AREA(ACRES) =    190.18   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      196.0       PEAK FLOW RATE(CFS) =     283.74

****************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1093.99  DOWNSTREAM(FEET) =  1076.30
 FLOW LENGTH(FEET) =   504.72   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  34.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.75
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =     283.74
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   22.79
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =    7454.36 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.79
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.702
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.71      0.25     0.100    69
 COMMERCIAL                  D        0.32      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.03      SUBAREA RUNOFF(CFS) =    1.56
 EFFECTIVE AREA(ACRES) =    191.21   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      197.0       PEAK FLOW RATE(CFS) =     283.74
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.79
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.702
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                C        1.02      0.25     0.350    69
 CONDOMINIUMS                D        4.41      0.20     0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    5.43      SUBAREA RUNOFF(CFS) =    7.96
 EFFECTIVE AREA(ACRES) =    196.64   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      202.4       PEAK FLOW RATE(CFS) =     290.74

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    149.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1076.30  DOWNSTREAM(FEET) =  1053.58
 FLOW LENGTH(FEET) =   289.89   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  27.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  33.70
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     290.74
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   22.93
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    149.00 =    7744.25 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    149.00 TO NODE    149.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.93
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.696
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                C        4.75      0.25     0.350    69
 CONDOMINIUMS                D        1.68      0.20     0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    6.43      SUBAREA RUNOFF(CFS) =    9.34
 EFFECTIVE AREA(ACRES) =    203.07   AREA-AVERAGED Fm(INCH/HR) =  0.06
```



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 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      208.9       PEAK FLOW RATE(CFS) =     298.99

****************************************************************************
 FLOW PROCESS FROM NODE    149.00 TO NODE    149.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.93
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.696
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.40      0.25     0.100    69
 PUBLIC PARK                 C        0.62      0.25     0.850    69
 PUBLIC PARK                 D        0.03      0.20     0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.564
 SUBAREA AREA(ACRES) =    1.05      SUBAREA RUNOFF(CFS) =    1.47
 EFFECTIVE AREA(ACRES) =    204.12   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      209.9       PEAK FLOW RATE(CFS) =     300.46

****************************************************************************
 FLOW PROCESS FROM NODE    149.00 TO NODE    151.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1053.58  DOWNSTREAM(FEET) =  1023.54
 FLOW LENGTH(FEET) =   305.05   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  25.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  36.98
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     300.46
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   23.07
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    151.00 =    8049.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    151.00 TO NODE    151.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   23.07
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.690
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.41      0.25     0.100    69
 COMMERCIAL                  D        1.11      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.52      SUBAREA RUNOFF(CFS) =    2.28
 EFFECTIVE AREA(ACRES) =    205.64   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      211.4       PEAK FLOW RATE(CFS) =     301.68

****************************************************************************
 FLOW PROCESS FROM NODE    151.00 TO NODE    153.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1023.54  DOWNSTREAM(FEET) =  1007.62
 FLOW LENGTH(FEET) =   210.38   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  28.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  33.58
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     301.68
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   23.17
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    153.00 =    8259.68 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    153.00 TO NODE    153.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   23.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.85      0.20     0.100    75
  PUBLIC PARK                D        2.01      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.627
  SUBAREA AREA(ACRES) =    2.86      SUBAREA RUNOFF(CFS) =    4.02
  EFFECTIVE AREA(ACRES) =    208.50   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      214.3       PEAK FLOW RATE(CFS) =     304.89

************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    153.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   23.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.27      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) =    0.27      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =    208.77   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      214.6       PEAK FLOW RATE(CFS) =     305.29

************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    153.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   23.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        5.30      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.58      0.20     0.500    75
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        9.75      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.01      0.20     0.400    75
  APARTMENTS                 C        2.16      0.25     0.200    69
  COMMERCIAL                 C        2.28      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.375
  SUBAREA AREA(ACRES) =   21.08      SUBAREA RUNOFF(CFS) =   30.24
  EFFECTIVE AREA(ACRES) =    229.85   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      235.6       PEAK FLOW RATE(CFS) =     335.53

************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    153.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   23.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        5.28      0.20     0.100    75
  PUBLIC PARK                C        4.30      0.25     0.850    69
```



```
  PUBLIC PARK                D        0.67      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.464
  SUBAREA AREA(ACRES) =   10.25      SUBAREA RUNOFF(CFS) =   14.53
  EFFECTIVE AREA(ACRES) =    240.10   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      245.9       PEAK FLOW RATE(CFS) =     350.07

************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1007.62  DOWNSTREAM(FEET) =  1006.10
  FLOW LENGTH(FEET) =   446.62   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.83
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     350.07
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   23.59
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    154.00 =    8706.30 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    154.00 IS CODE = 15.1
------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
========================================================================
  PEAK FLOWRATE TABLE FILE NAME: 3p10rc1.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS) (MIN.)  (INCH/HR)          (ACRES)    NODE
      1        6.10    7.37  0.20( 0.02) 0.10       2.0      40.00
      2        6.17    7.75  0.20( 0.02) 0.10       2.1      30.00
      3        6.13    8.32  0.20( 0.02) 0.10       2.2       5.00
      4        6.13    8.33  0.20( 0.02) 0.10       2.2      15.00
    TOTAL AREA(ACRES) =          2.2

************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    154.00 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      324.89   10.96    2.590  0.23( 0.07) 0.30      139.6     300.00
      2      350.07   23.59    1.669  0.22( 0.07) 0.30      240.1     200.00
      3      344.58   25.17    1.608  0.22( 0.07) 0.30      245.9     100.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    154.00 =    8706.30 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1        6.10    7.37    3.251  0.20( 0.02) 0.10       2.0      40.00
      2        6.17    7.75    3.159  0.20( 0.02) 0.10       2.1      30.00
      3        6.13    8.32    3.031  0.20( 0.02) 0.10       2.2       5.00
      4        6.13    8.33    3.031  0.20( 0.02) 0.10       2.2      15.00
  LONGEST FLOWPATH FROM NODE     15.00 TO NODE    154.00 =     585.84 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      281.83    7.37    3.251  0.23( 0.07) 0.29       95.9      40.00
      2      287.68    7.75    3.159  0.23( 0.07) 0.29      100.8      30.00
      3      296.15    8.32    3.031  0.23( 0.07) 0.29      108.2       5.00
      4      296.21    8.33    3.031  0.23( 0.07) 0.29      108.3      15.00
      5      330.12   10.96    2.590  0.23( 0.07) 0.29      141.8     300.00
      6      353.42   23.59    1.669  0.22( 0.07) 0.30      242.3     200.00
      7      347.82   25.17    1.608  0.22( 0.07) 0.30      248.1     100.00
    TOTAL AREA(ACRES) =        248.1
```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 353.42 Tc(MIN.) = 23.590
EFFECTIVE AREA(ACRES) = 242.26 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 248.1
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 154.00 = 8706.30 FEET.

****
FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 12

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

****
FLOW PROCESS FROM NODE 154.00 TO NODE 155.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1006.00 DOWNSTREAM(FEET) = 1004.60
FLOW LENGTH(FEET) = 122.27 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.00
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 353.42
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 23.70
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

****
FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 15.1

>>>>>DEFINE MEMORY BANK # 1 <<<<<
==========
PEAK FLOWRATE TABLE FILE NAME: 3p10rc3.DNA
MEMORY BANK # 1 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.75	5.84	0.20(0.02)	0.10	2.0	95.00
2	6.56	7.10	0.20(0.02)	0.10	2.2	80.00
3	6.41	7.77	0.20(0.02)	0.10	2.2	70.00

TOTAL AREA(ACRES) = 2.2

****
FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	281.83	7.51	3.215	0.23(0.07)	0.29	95.9	40.00
2	287.68	7.89	3.127	0.23(0.07)	0.29	100.8	30.00
3	296.15	8.46	3.003	0.23(0.07)	0.29	108.2	5.00
4	296.21	8.46	3.003	0.23(0.07)	0.29	108.3	15.00
5	330.12	11.08	2.573	0.23(0.07)	0.29	141.8	300.00
6	353.42	23.70	1.664	0.22(0.07)	0.30	242.3	200.00
7	347.82	25.29	1.604	0.22(0.07)	0.30	248.1	100.00

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.75	5.84	3.712	0.20(0.02)	0.10	2.0	95.00
2	6.56	7.10	3.322	0.20(0.02)	0.10	2.2	80.00
3	6.41	7.77	3.153	0.20(0.02)	0.10	2.2	70.00

LONGEST FLOWPATH FROM NODE 70.00 TO NODE 155.00 = 774.26 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	260.66	5.84	3.712	0.23(0.06)	0.29	76.6	95.00
2	281.82	7.10	3.322	0.23(0.06)	0.29	92.8	80.00

3	288.30	7.51	3.215	0.23(0.06)	0.29	98.1	40.00
4	292.29	7.77	3.153	0.23(0.06)	0.29	101.5	70.00
5	294.03	7.89	3.127	0.23(0.06)	0.29	103.0	30.00
6	302.26	8.46	3.003	0.23(0.07)	0.29	110.5	5.00
7	302.31	8.46	3.003	0.23(0.07)	0.29	110.5	15.00
8	335.34	11.08	2.573	0.23(0.07)	0.29	144.0	300.00
9	356.79	23.70	1.664	0.22(0.07)	0.30	244.5	200.00
10	351.05	25.29	1.604	0.22(0.07)	0.30	250.3	100.00

TOTAL AREA(ACRES) = 250.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 356.79 Tc(MIN.) = 23.703
EFFECTIVE AREA(ACRES) = 244.51 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 250.3
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

****
FLOW PROCESS FROM NODE 155.00 TO NODE 158.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1004.60 DOWNSTREAM(FEET) = 1001.69
FLOW LENGTH(FEET) = 202.60 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.17
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 356.79
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 23.89
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 158.00 = 9031.17 FEET.

****
FLOW PROCESS FROM NODE 158.00 TO NODE 450.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1001.69 DOWNSTREAM(FEET) = 997.40
FLOW LENGTH(FEET) = 30.38 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 25.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 44.18
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 356.79
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 23.90
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

****
FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 12

>>>>>CLEAR MEMORY BANK # 2 <<<<<
==========
MEMORY BANK # 2 IS EMPTY - PROCESS IGNORED.

****
FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 15.1

>>>>>DEFINE MEMORY BANK # 2 <<<<<
==========
PEAK FLOWRATE TABLE FILE NAME: C2P10R.DNA
MEMORY BANK # 2 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	19.78	6.08	0.20(0.02)	0.10	5.8	310.00
2	20.11	6.36	0.20(0.02)	0.10	6.1	220.00
3	20.21	6.72	0.20(0.02)	0.10	6.3	290.00
4	20.22	6.76	0.20(0.02)	0.10	6.3	214.00
5	20.22	6.79	0.20(0.02)	0.10	6.4	226.00
6	19.71	7.58	0.20(0.02)	0.10	6.6	300.00
7	19.04	8.42	0.20(0.02)	0.10	6.8	260.00
8	19.04	8.43	0.20(0.02)	0.10	6.8	230.00
9	18.59	8.88	0.20(0.02)	0.10	6.9	250.00
10	18.58	8.89	0.20(0.02)	0.10	6.9	234.00

11	17.53	9.91	0.20(0.02)	0.10	6.9	210.00	

TOTAL AREA(ACRES) = 6.9

****

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 11

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

==========

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	260.66	6.05	3.638	0.23(0.06)	0.29	76.6	95.00
2	281.82	7.30	3.267	0.23(0.06)	0.29	92.8	80.00
3	288.30	7.72	3.165	0.23(0.06)	0.29	98.1	40.00
4	292.29	7.98	3.106	0.23(0.06)	0.29	101.5	70.00
5	294.03	8.09	3.080	0.23(0.06)	0.29	103.0	30.00
6	302.26	8.69	2.957	0.23(0.07)	0.29	110.5	5.00
7	302.31	8.69	2.957	0.23(0.07)	0.29	110.5	15.00
8	335.34	11.29	2.546	0.23(0.07)	0.29	144.0	300.00
9	356.79	23.90	1.656	0.22(0.07)	0.30	244.5	200.00
10	351.05	25.49	1.596	0.22(0.07)	0.30	250.3	100.00

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	19.78	6.08	3.629	0.20(0.02)	0.10	5.8	310.00
2	20.11	6.36	3.538	0.20(0.02)	0.10	6.1	220.00
3	20.21	6.72	3.426	0.20(0.02)	0.10	6.3	290.00
4	20.22	6.76	3.416	0.20(0.02)	0.10	6.3	214.00
5	20.22	6.79	3.406	0.20(0.02)	0.10	6.4	226.00
6	19.71	7.58	3.199	0.20(0.02)	0.10	6.6	300.00
7	19.04	8.42	3.011	0.20(0.02)	0.10	6.8	260.00
8	19.04	8.43	3.010	0.20(0.02)	0.10	6.8	230.00
9	18.59	8.88	2.922	0.20(0.02)	0.10	6.9	250.00
10	18.58	8.89	2.919	0.20(0.02)	0.10	6.9	234.00
11	17.53	9.91	2.742	0.20(0.02)	0.10	6.9	210.00

LONGEST FLOWPATH FROM NODE 230.00 TO NODE 450.00 = 1222.97 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	280.41	6.05	3.638	0.22(0.06)	0.27	82.4	95.00
2	280.86	6.08	3.629	0.22(0.06)	0.27	82.7	310.00
3	285.89	6.36	3.538	0.22(0.06)	0.27	86.6	220.00
4	292.21	6.72	3.426	0.22(0.06)	0.27	91.6	290.00
5	292.80	6.76	3.416	0.22(0.06)	0.27	92.1	214.00
6	293.36	6.79	3.406	0.22(0.06)	0.27	92.5	226.00
7	301.71	7.30	3.267	0.22(0.06)	0.28	99.3	80.00
8	305.79	7.58	3.199	0.22(0.06)	0.28	102.9	300.00
9	307.90	7.72	3.165	0.22(0.06)	0.28	104.8	40.00
10	311.68	7.98	3.106	0.22(0.06)	0.28	108.3	70.00
11	313.33	8.09	3.080	0.22(0.06)	0.28	109.8	30.00
12	317.59	8.42	3.011	0.22(0.06)	0.28	113.9	260.00
13	317.66	8.43	3.010	0.22(0.06)	0.28	114.0	230.00
14	321.03	8.69	2.957	0.22(0.06)	0.28	117.3	5.00
15	321.08	8.69	2.957	0.22(0.06)	0.28	117.4	15.00
16	323.20	8.88	2.922	0.22(0.06)	0.28	119.7	250.00
17	323.36	8.89	2.919	0.22(0.06)	0.28	119.9	234.00
18	335.37	9.91	2.742	0.22(0.06)	0.28	133.2	210.00
19	351.60	11.29	2.546	0.22(0.06)	0.28	151.0	300.00
20	367.32	23.90	1.656	0.22(0.06)	0.29	251.5	200.00
21	361.20	25.49	1.596	0.22(0.06)	0.29	257.2	100.00

TOTAL AREA(ACRES) = 257.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 367.32 Tc(MIN.) = 23.900
EFFECTIVE AREA(ACRES) = 251.45 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 257.2
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

****

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 12

>>>>>CLEAR MEMORY BANK # 3 <<<<<

==========

MEMORY BANK # 3 IS EMPTY - PROCESS IGNORED.

****

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 15.1

>>>>>DEFINE MEMORY BANK # 3 <<<<<

==========

PEAK FLOWRATE TABLE FILE NAME: 3p10rc4.DNA
MEMORY BANK # 3 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.84	7.95	0.20(0.02)	0.10	2.1	160.00
2	5.64	8.83	0.20(0.02)	0.10	2.1	150.00

TOTAL AREA(ACRES) = 2.1

****

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 11

>>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<

==========

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	280.41	6.05	3.638	0.22(0.06)	0.27	82.4	95.00
2	280.86	6.08	3.629	0.22(0.06)	0.27	82.7	310.00
3	285.89	6.36	3.538	0.22(0.06)	0.27	86.6	220.00
4	292.21	6.72	3.426	0.22(0.06)	0.27	91.6	290.00
5	292.80	6.76	3.416	0.22(0.06)	0.27	92.1	214.00
6	293.36	6.79	3.406	0.22(0.06)	0.27	92.5	226.00
7	301.71	7.30	3.267	0.22(0.06)	0.28	99.3	80.00
8	305.79	7.58	3.199	0.22(0.06)	0.28	102.9	300.00
9	307.90	7.72	3.165	0.22(0.06)	0.28	104.8	40.00
10	311.68	7.98	3.106	0.22(0.06)	0.28	108.3	70.00
11	313.33	8.09	3.080	0.22(0.06)	0.28	109.8	30.00
12	317.59	8.42	3.011	0.22(0.06)	0.28	113.9	260.00
13	317.66	8.43	3.010	0.22(0.06)	0.28	114.0	230.00
14	321.03	8.69	2.957	0.22(0.06)	0.28	117.3	5.00
15	321.08	8.69	2.957	0.22(0.06)	0.28	117.4	15.00
16	323.20	8.88	2.922	0.22(0.06)	0.28	119.7	250.00
17	323.36	8.89	2.919	0.22(0.06)	0.28	119.9	234.00
18	335.37	9.91	2.742	0.22(0.06)	0.28	133.2	210.00
19	351.60	11.29	2.546	0.22(0.06)	0.28	151.0	300.00
20	367.32	23.90	1.656	0.22(0.06)	0.29	251.5	200.00
21	361.20	25.49	1.596	0.22(0.06)	0.29	257.2	100.00

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.84	7.95	3.111	0.20(0.02)	0.10	2.1	160.00
2	5.64	8.83	2.930	0.20(0.02)	0.10	2.1	150.00

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 450.00 = 670.70 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	285.61	6.05	3.638	0.22(0.06)	0.27	84.0	95.00
2	286.07	6.08	3.629	0.22(0.06)	0.27	84.3	310.00
3	291.20	6.36	3.538	0.22(0.06)	0.27	88.3	220.00
4	297.65	6.72	3.426	0.22(0.06)	0.27	93.4	290.00
5	298.25	6.76	3.416	0.22(0.06)	0.27	93.8	214.00
6	298.82	6.79	3.406	0.22(0.06)	0.27	94.3	226.00
7	307.34	7.30	3.267	0.22(0.06)	0.27	101.2	80.00
8	311.51	7.58	3.199	0.22(0.06)	0.27	104.9	300.00
9	313.66	7.72	3.165	0.22(0.06)	0.27	106.8	40.00
10	317.16	7.95	3.111	0.22(0.06)	0.27	110.0	160.00
11	317.52	7.98	3.106	0.22(0.06)	0.27	110.3	70.00
12	319.14	8.09	3.080	0.22(0.06)	0.27	111.9	30.00
13	323.32	8.42	3.011	0.22(0.06)	0.27	116.1	260.00

14	323.39	8.43	3.010	0.22(0.06)	0.27	116.1	230.00
15	326.70	8.69	2.957	0.22(0.06)	0.27	119.5	5.00
16	326.75	8.69	2.957	0.22(0.06)	0.27	119.5	15.00
17	328.35	8.83	2.930	0.22(0.06)	0.27	121.3	150.00
18	328.83	8.88	2.922	0.22(0.06)	0.28	121.9	250.00
19	328.98	8.89	2.919	0.22(0.06)	0.28	122.1	234.00
20	340.65	9.91	2.742	0.22(0.06)	0.28	135.4	210.00
21	356.50	11.29	2.546	0.22(0.06)	0.28	153.1	300.00
22	370.49	23.90	1.656	0.22(0.06)	0.29	253.6	200.00
23	364.26	25.49	1.596	0.22(0.06)	0.29	259.4	100.00

TOTAL AREA(ACRES) = 259.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 370.49 Tc(MIN.) = 23.900
EFFECTIVE AREA(ACRES) = 253.59 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 259.4
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

****
FLOW PROCESS FROM NODE 450.00 TO NODE 460.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 997.40 DOWNSTREAM(FEET) = 992.80
FLOW LENGTH(FEET) = 47.05 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 29.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 38.93
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 370.49
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 23.92
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 460.00 = 9108.60 FEET.
==
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 259.4 TC(MIN.) = 23.92
EFFECTIVE AREA(ACRES) = 253.59 AREA-AVERAGED Fm(INCH/HR)= 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.290
PEAK FLOW RATE(CFS) = 370.49

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	285.61	6.08	3.630	0.22(0.06)	0.27	84.0	95.00
2	286.07	6.10	3.622	0.22(0.06)	0.27	84.3	310.00
3	291.20	6.38	3.531	0.22(0.06)	0.27	88.3	220.00
4	297.65	6.75	3.419	0.22(0.06)	0.27	93.4	290.00
5	298.25	6.78	3.409	0.22(0.06)	0.27	93.8	214.00
6	298.82	6.81	3.400	0.22(0.06)	0.27	94.3	226.00
7	307.34	7.33	3.262	0.22(0.06)	0.27	101.2	80.00
8	311.51	7.60	3.194	0.22(0.06)	0.27	104.9	300.00
9	313.66	7.74	3.160	0.22(0.06)	0.27	106.8	40.00
10	317.16	7.97	3.107	0.22(0.06)	0.27	110.0	160.00
11	317.52	8.00	3.101	0.22(0.06)	0.27	110.3	70.00
12	319.14	8.11	3.076	0.22(0.06)	0.27	111.9	30.00
13	323.32	8.44	3.007	0.22(0.06)	0.27	116.1	260.00
14	323.39	8.45	3.006	0.22(0.06)	0.27	116.1	230.00
15	326.70	8.71	2.953	0.22(0.06)	0.27	119.5	5.00
16	326.75	8.72	2.953	0.22(0.06)	0.27	119.5	15.00
17	328.35	8.85	2.926	0.22(0.06)	0.27	121.3	150.00
18	328.83	8.90	2.918	0.22(0.06)	0.28	121.9	250.00
19	328.98	8.91	2.916	0.22(0.06)	0.28	122.1	234.00
20	340.65	9.93	2.739	0.22(0.06)	0.28	135.4	210.00
21	356.50	11.31	2.543	0.22(0.06)	0.28	153.1	300.00
22	370.49	23.92	1.656	0.22(0.06)	0.29	253.6	200.00
23	364.26	25.51	1.596	0.22(0.06)	0.29	259.4	100.00

==
==
END OF RATIONAL METHOD ANALYSIS

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************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1334

                         Analysis prepared by:
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 ************************* DESCRIPTION OF STUDY *************************
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 2B                     *
* RATIONAL METHOD ULTIMATE CONDITION OVERALL LINE C                     *
* 100-YEAR STORM EVENT EM                                               *
 ************************************************************************

  FILE NAME: 3P00ROV.DAT
  TIME/DATE OF STUDY: 16:34 02/13/2020
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   30.0     25.0    0.017/0.017/0.017   0.67    1.50 0.0312 0.125 0.0150
  3   50.0     45.0    0.017/0.017/0.017   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   326.73
  ELEVATION DATA: UPSTREAM(FEET) =   1332.32  DOWNSTREAM(FEET) =   1331.94

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.223
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.269
  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
  "5-7 DWELLINGS/ACRE"       B        0.21      0.30      0.500    76   15.22
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.55      0.20      0.500    91   15.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      5.01
  TOTAL AREA(ACRES) =      1.76   PEAK FLOW RATE(CFS) =      5.01
```



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************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1331.94  DOWNSTREAM ELEVATION(FEET) = 1328.22
  STREET LENGTH(FEET) =   177.44   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.017
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.017

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL) =  0.017
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.42
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.93
  STREET FLOW TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =   16.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.154
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.93      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.56
  EFFECTIVE AREA(ACRES) =      2.69    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      2.7       PEAK FLOW RATE(CFS) =       7.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  11.10
  FLOW VELOCITY(FEET/SEC.) =  3.16   DEPTH*VELOCITY(FT*FT/SEC.) =   1.01
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     504.17 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1328.22  DOWNSTREAM(FEET) =  1260.18
  FLOW LENGTH(FEET) =   960.76   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.86
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.38
  PIPE TRAVEL TIME(MIN.) =   1.25    Tc(MIN.) =   17.45
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1464.93 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   17.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.023
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.09      0.20      0.500    91
  COMMERCIAL                 D        0.54      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.462
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 SUBAREA AREA(ACRES) =    5.63      SUBAREA RUNOFF(CFS) =   14.85
 EFFECTIVE AREA(ACRES) =      8.32   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      21.92

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    105.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1260.18  DOWNSTREAM(FEET) =  1245.52
 FLOW LENGTH(FEET) =   775.08   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.40
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.92
 PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =   18.49
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    2240.01 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        3.73      0.20     0.500    91
 COMMERCIAL                 D        0.65      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.441
 SUBAREA AREA(ACRES) =    4.38      SUBAREA RUNOFF(CFS) =   11.18
 EFFECTIVE AREA(ACRES) =     12.70   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       12.7       PEAK FLOW RATE(CFS) =      32.36

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    107.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1245.52  DOWNSTREAM(FEET) =  1240.60
 FLOW LENGTH(FEET) =    98.55   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.38
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      32.36
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   18.59
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    2338.56 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.59
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.915
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        4.20      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.16      0.25     0.500    86
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D       12.06      0.20     0.500    91
 COMMERCIAL                 C        0.60      0.25     0.100    86
 COMMERCIAL                 D        0.97      0.20     0.100    91
```



```
 PUBLIC PARK                C        0.70      0.25     0.850    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.481
 SUBAREA AREA(ACRES) =   19.69      SUBAREA RUNOFF(CFS) =   49.71
 EFFECTIVE AREA(ACRES) =     32.39   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =       32.4       PEAK FLOW RATE(CFS) =      81.97

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.59
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.915
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                D        0.53      0.20     0.850    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    1.31
 EFFECTIVE AREA(ACRES) =     32.92   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       32.9       PEAK FLOW RATE(CFS) =      83.28

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    109.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1240.60  DOWNSTREAM(FEET) =  1239.01
 FLOW LENGTH(FEET) =    81.43   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.51
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      83.28
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   18.64
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    2419.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.64
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.911
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.52      0.25     0.100    86
 COMMERCIAL                 D        0.97      0.20     0.100    91
 CONDOMINIUMS               C        1.00      0.25     0.350    86
 CONDOMINIUMS               D       10.74      0.20     0.350    91
 PUBLIC PARK                D        0.07      0.20     0.850    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   13.30      SUBAREA RUNOFF(CFS) =   34.05
 EFFECTIVE AREA(ACRES) =     46.22   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.43
 TOTAL AREA(ACRES) =       46.2       PEAK FLOW RATE(CFS) =     117.19

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    111.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1239.07  DOWNSTREAM(FEET) =  1210.33
 FLOW LENGTH(FEET) =   407.01   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.32
```

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 GIVEN PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     117.19
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   18.91
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =    2827.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.91
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.887
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.69      0.20     0.100    91
 CONDOMINIUMS                D        0.09      0.20     0.350    91
 PUBLIC PARK                 D        0.85      0.20     0.850    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.505
 SUBAREA AREA(ACRES) =    1.63      SUBAREA RUNOFF(CFS) =    4.09
 EFFECTIVE AREA(ACRES) =     47.85   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       47.8       PEAK FLOW RATE(CFS) =     120.29

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    113.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1210.33  DOWNSTREAM(FEET) =  1210.00
 FLOW LENGTH(FEET) =    18.70   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.02
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     120.29
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   18.93
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    113.00 =    2845.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.93
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.885
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                D       13.30      0.20     0.350    91
 PUBLIC PARK                 D        3.90      0.20     0.850    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.463
 SUBAREA AREA(ACRES) =   17.20      SUBAREA RUNOFF(CFS) =   43.23
 EFFECTIVE AREA(ACRES) =     65.05   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       65.1       PEAK FLOW RATE(CFS) =     163.45

****************************************************************************
 FLOW PROCESS FROM NODE    113.00 TO NODE    119.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1210.00  DOWNSTREAM(FEET) =  1159.95
 FLOW LENGTH(FEET) =  1078.02   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.12
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     163.45
 PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   19.71
```



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 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    119.00 =    3923.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.71
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.820
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        1.51      0.25     0.200    86
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        5.27      0.20     0.200    91
 COMMERCIAL                  D        0.27      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.196
 SUBAREA AREA(ACRES) =    7.05      SUBAREA RUNOFF(CFS) =   17.63
 EFFECTIVE AREA(ACRES) =     72.10   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.42
 TOTAL AREA(ACRES) =       72.1       PEAK FLOW RATE(CFS) =     177.23

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.71
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.820
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        1.27      0.25     0.200    86
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        3.23      0.20     0.200    91
 COMMERCIAL                  D        0.27      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.194
 SUBAREA AREA(ACRES) =    4.77      SUBAREA RUNOFF(CFS) =   11.93
 EFFECTIVE AREA(ACRES) =     76.87   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =       76.9       PEAK FLOW RATE(CFS) =     189.15

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   19.71
 RAINFALL INTENSITY(INCH/HR) =   2.82
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.41
 EFFECTIVE STREAM AREA(ACRES) =      76.87
 TOTAL STREAM AREA(ACRES) =      76.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     189.15

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   331.01
 ELEVATION DATA: UPSTREAM(FEET) =   1332.00  DOWNSTREAM(FEET) =   1330.74

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.172
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.903
```

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 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 CONDOMINIUMS                D        1.42      0.20       0.350    91   11.17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA RUNOFF(CFS) =      4.90
 TOTAL AREA(ACRES) =      1.42   PEAK FLOW RATE(CFS) =      4.90

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    203.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1330.74  DOWNSTREAM ELEVATION(FEET) = 1308.01
 STREET LENGTH(FEET) =   789.61   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 50.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  45.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.017
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.017

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.017
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.41
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.48
   HALFSTREET FLOOD WIDTH(FEET) =   18.40
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.01
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.39
 STREET FLOW TRAVEL TIME(MIN.) =   2.63   Tc(MIN.) =   13.80
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.459
 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        1.91      0.20       0.400    91
 CONDOMINIUMS                D        4.97      0.20       0.350    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.364
 SUBAREA AREA(ACRES) =    6.88      SUBAREA RUNOFF(CFS) =   20.96
 EFFECTIVE AREA(ACRES) =     8.30    AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
 TOTAL AREA(ACRES) =        8.3        PEAK FLOW RATE(CFS) =      25.30

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  22.45
 FLOW VELOCITY(FEET/SEC.) =  5.65   DEPTH*VELOCITY(FT*FT/SEC.) =   3.08
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =    1120.62 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    205.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1308.01  DOWNSTREAM ELEVATION(FEET) = 1245.00
 STREET LENGTH(FEET) =   901.07   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.00
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   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.57
   HALFSTREET FLOOD WIDTH(FEET) =   22.54
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    9.09
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.14
 STREET FLOW TRAVEL TIME(MIN.) =   1.65   Tc(MIN.) =   15.45
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.242
 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
 COMMERCIAL                  D        0.73      0.20       0.100    91
 CONDOMINIUMS                D       11.58      0.20       0.350    91
 PUBLIC PARK                 D        0.01      0.20       0.850    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.336
 SUBAREA AREA(ACRES) =   12.39      SUBAREA RUNOFF(CFS) =   35.40
 EFFECTIVE AREA(ACRES) =     20.69    AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =       20.7        PEAK FLOW RATE(CFS) =      59.07

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.62   HALFSTREET FLOOD WIDTH(FEET) =  25.51
 FLOW VELOCITY(FEET/SEC.) =  9.84   DEPTH*VELOCITY(FT*FT/SEC.) =   6.08
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    2021.69 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1245.00  DOWNSTREAM(FEET) =  1229.65
 FLOW LENGTH(FEET) =   135.30   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  33.43
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      59.07
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   15.52
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =    2156.99 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    210.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1229.65  DOWNSTREAM ELEVATION(FEET) = 1166.68
 STREET LENGTH(FEET) =  1205.30   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      76.21
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.57
   HALFSTREET FLOOD WIDTH(FEET) =   22.77
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.90
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.50
 STREET FLOW TRAVEL TIME(MIN.) =   2.54   Tc(MIN.) =   18.06
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.964
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp          Ap      SCS
      LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
```

```
"11+ DWELLINGS/ACRE"       C        3.38      0.25     0.200    86
RESIDENTIAL
"11+ DWELLINGS/ACRE"       D        9.23      0.20     0.200    91
COMMERCIAL                 D        0.42      0.20     0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.197
SUBAREA AREA(ACRES) =   13.03     SUBAREA RUNOFF(CFS) =   34.27
EFFECTIVE AREA(ACRES) =    33.72    AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
TOTAL AREA(ACRES) =       33.7       PEAK FLOW RATE(CFS) =      88.17

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.59   HALFSTREET FLOOD WIDTH(FEET) =  24.10
FLOW VELOCITY(FEET/SEC.) =  8.19   DEPTH*VELOCITY(FT*FT/SEC.) =   4.86
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =    3362.29 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    210.00 TO NODE    119.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1166.68  DOWNSTREAM(FEET) =  1159.95
FLOW LENGTH(FEET) =   307.60   MANNING'S N =  0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  28.07
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      88.17
PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   18.24
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    119.00 =    3669.89 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =   18.24
RAINFALL INTENSITY(INCH/HR) =   2.95
AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.20
AREA-AVERAGED Ap =  0.29
EFFECTIVE STREAM AREA(ACRES) =      33.72
TOTAL STREAM AREA(ACRES) =      33.72
PEAK FLOW RATE(CFS) AT CONFLUENCE =      88.17

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      189.15   19.71    2.820  0.21( 0.09) 0.41      76.9     100.00
    2       88.17   18.24    2.947  0.20( 0.06) 0.29      33.7     200.00

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      271.44   18.24    2.947  0.21( 0.08) 0.37     104.9     200.00
    2      273.44   19.71    2.820  0.21( 0.08) 0.37     110.6     100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     273.44    Tc(MIN.) =    19.71
EFFECTIVE AREA(ACRES) =     110.59   AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.37
TOTAL AREA(ACRES) =      110.6
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    119.00 =    3923.72 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    119.00 TO NODE    121.00 IS CODE =  41
----------------------------------------------------------------------------
```



```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1159.95  DOWNSTREAM(FEET) =  1150.00
FLOW LENGTH(FEET) =   321.11   MANNING'S N =  0.013
DEPTH OF FLOW IN  54.0 INCH PIPE IS  37.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  23.10
GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     273.44
PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   19.94
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    121.00 =    4244.83 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    121.00 TO NODE    121.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   19.94
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.801
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       C        6.04      0.25     0.200    86
RESIDENTIAL
"11+ DWELLINGS/ACRE"       D        8.06      0.20     0.200    91
COMMERCIAL                 C        0.97      0.25     0.100    86
COMMERCIAL                 D        1.54      0.20     0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.185
SUBAREA AREA(ACRES) =   16.61     SUBAREA RUNOFF(CFS) =   41.26
EFFECTIVE AREA(ACRES) =    127.20   AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.35
TOTAL AREA(ACRES) =      127.2       PEAK FLOW RATE(CFS) =     312.33

****************************************************************************
FLOW PROCESS FROM NODE    121.00 TO NODE    123.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1150.00  DOWNSTREAM(FEET) =  1140.00
FLOW LENGTH(FEET) =   798.79   MANNING'S N =  0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  15.91
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     312.33
PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =   20.78
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    123.00 =    5043.62 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   20.78
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       C        6.79      0.25     0.200    86
RESIDENTIAL
"11+ DWELLINGS/ACRE"       D       17.92      0.20     0.200    91
APARTMENTS                 C        4.46      0.25     0.200    86
APARTMENTS                 D        0.69      0.20     0.200    91
COMMERCIAL                 C        0.78      0.25     0.100    86
COMMERCIAL                 D        1.88      0.20     0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.192
SUBAREA AREA(ACRES) =   32.52     SUBAREA RUNOFF(CFS) =   78.84
EFFECTIVE AREA(ACRES) =    159.72   AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
```

```
 TOTAL AREA(ACRES) =      159.7       PEAK FLOW RATE(CFS) =     383.70

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1      386.28   19.31    2.852  0.21( 0.07) 0.31     154.0      200.00
     2      383.70   20.78    2.736  0.21( 0.07) 0.31     159.7      100.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     386.28  Tc(MIN.) =   19.31
 AREA-AVERAGED Fm(INCH/HR) =  0.07  AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.31  EFFECTIVE AREA(ACRES) =     154.01

****************************************************************************
 FLOW PROCESS FROM NODE    123.00 TO NODE    129.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1140.00  DOWNSTREAM(FEET) =  1122.00
 FLOW LENGTH(FEET) =   579.78   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.23
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     386.28
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   19.67
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    129.00 =    5623.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.823
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.85      0.25      0.200    86
 COMMERCIAL                 C        0.56      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.184
 SUBAREA AREA(ACRES) =    3.41      SUBAREA RUNOFF(CFS) =    8.52
 EFFECTIVE AREA(ACRES) =    157.42   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      163.1       PEAK FLOW RATE(CFS) =     390.70

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.823
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.54      0.25      0.200    86
 COMMERCIAL                 C        0.97      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.172
 SUBAREA AREA(ACRES) =    3.51      SUBAREA RUNOFF(CFS) =    8.78
 EFFECTIVE AREA(ACRES) =    160.93   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      166.6       PEAK FLOW RATE(CFS) =     399.48

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
```



```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   19.67
 RAINFALL INTENSITY(INCH/HR) =   2.82
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.31
 EFFECTIVE STREAM AREA(ACRES) =     160.93
 TOTAL STREAM AREA(ACRES) =     166.64
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     399.48

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.55
 ELEVATION DATA: UPSTREAM(FEET) =   1163.74  DOWNSTREAM(FEET) =   1148.43

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.616
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.789
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.29      0.25      0.200    86    5.99
 COMMERCIAL                 C        1.36      0.25      0.100    86    5.62
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.118
 SUBAREA RUNOFF(CFS) =      8.55
 TOTAL AREA(ACRES) =      1.65   PEAK FLOW RATE(CFS) =      8.55

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1148.43  DOWNSTREAM ELEVATION(FEET) = 1141.94
 STREET LENGTH(FEET) =   235.77   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 50.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  45.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.017
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.017

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.017
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.44
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   15.68
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.47
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.93
 STREET FLOW TRAVEL TIME(MIN.) =   0.88   Tc(MIN.) =    6.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.326
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.47      0.25      0.200    86
 COMMERCIAL                 C        4.51      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.109
 SUBAREA AREA(ACRES) =    4.98      SUBAREA RUNOFF(CFS) =   23.75
 EFFECTIVE AREA(ACRES) =      6.63    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.11
 TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      31.62

 END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.75
  FLOW VELOCITY(FEET/SEC.) =  4.96   DEPTH*VELOCITY(FT*FT/SEC.) =   2.40
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     556.32 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1141.94  DOWNSTREAM(FEET) =  1122.13
  FLOW LENGTH(FEET) =   643.31   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.54
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.62
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =    7.29
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =    1199.63 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.986
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        2.51      0.25     0.200    86
  COMMERCIAL                  C        3.05      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.145
  SUBAREA AREA(ACRES) =    5.56      SUBAREA RUNOFF(CFS) =   24.77
  EFFECTIVE AREA(ACRES) =     12.19   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.13
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      54.36

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    129.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1122.13  DOWNSTREAM(FEET) =  1122.00
  FLOW LENGTH(FEET) =    81.38   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  39.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.94
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      54.36
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    7.56
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    129.00 =    1281.01 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 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.) =    7.56
  RAINFALL INTENSITY(INCH/HR) =   4.88
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.13
  EFFECTIVE STREAM AREA(ACRES) =      12.19
  TOTAL STREAM AREA(ACRES) =      12.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      54.36

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
```



```
      1      399.48   19.67    2.823  0.21( 0.06) 0.31     160.9     200.00
      1      396.47   21.13    2.709  0.21( 0.07) 0.31     166.6     100.00
      2       54.36    7.56    4.882  0.25( 0.03) 0.13      12.2     300.00

  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      322.58    7.56    4.882  0.21( 0.06) 0.28      74.1     300.00
      2      430.76   19.67    2.823  0.21( 0.06) 0.29     173.1     200.00
      3      426.48   21.13    2.709  0.21( 0.06) 0.30     178.8     100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     430.76    Tc(MIN.) =    19.67
  EFFECTIVE AREA(ACRES) =     173.12   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      178.8
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    129.00 =    5623.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    131.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1105.04  DOWNSTREAM(FEET) =  1103.76
  FLOW LENGTH(FEET) =    35.44   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  41.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.67
  GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     430.76
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   19.69
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    131.00 =    5658.84 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    131.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        1.86      0.25     0.100    86
  COMMERCIAL                  D        0.14      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    5.03
  EFFECTIVE AREA(ACRES) =    175.12   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      180.8       PEAK FLOW RATE(CFS) =     434.86

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    133.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1103.76  DOWNSTREAM(FEET) =  1101.65
  FLOW LENGTH(FEET) =   503.15   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.30
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     434.86
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   20.15
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    133.00 =    6161.99 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    133.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.15
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.784
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        1.00      0.25      0.100    86
 COMMERCIAL                  D        0.87      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.87      SUBAREA RUNOFF(CFS) =    4.65
 EFFECTIVE AREA(ACRES) =    176.99   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      182.7       PEAK FLOW RATE(CFS) =     434.86
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

**************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    135.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1101.65  DOWNSTREAM(FEET) =  1101.33
 FLOW LENGTH(FEET) =    60.37   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.30
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     434.86
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   20.20
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =    6222.36 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.20
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.780
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.36      0.25      0.100    86
 COMMERCIAL                  D        0.44      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    1.99
 EFFECTIVE AREA(ACRES) =    177.79   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      183.5       PEAK FLOW RATE(CFS) =     434.98

**************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    137.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1101.33  DOWNSTREAM(FEET) =  1098.66
 FLOW LENGTH(FEET) =   408.71   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.31
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     434.98
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   20.57
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    137.00 =    6631.07 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    137.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.57
```



```
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        4.06      0.25      0.100    86
 COMMERCIAL                  D        1.08      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    5.14      SUBAREA RUNOFF(CFS) =   12.61
 EFFECTIVE AREA(ACRES) =    182.93   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      188.6       PEAK FLOW RATE(CFS) =     442.97

**************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    141.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1098.66  DOWNSTREAM(FEET) =  1093.99
 FLOW LENGTH(FEET) =   318.57   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.64
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     442.97
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   20.86
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    141.00 =    6949.64 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.86
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.729
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        5.78      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    5.78      SUBAREA RUNOFF(CFS) =   14.07
 EFFECTIVE AREA(ACRES) =    188.71   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      194.4       PEAK FLOW RATE(CFS) =     453.48

**************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   20.86
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.729
 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"       C        0.87      0.25      0.400    86
 COMMERCIAL                  C        0.68      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.268
 SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    3.71
 EFFECTIVE AREA(ACRES) =    190.26   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      196.0       PEAK FLOW RATE(CFS) =     457.20

**************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    145.00 IS CODE =  41
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1093.99  DOWNSTREAM(FEET) =  1076.30
```

FLOW LENGTH(FEET) = 504.72 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 48.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.86
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 457.20
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 21.17
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 145.00 = 7454.36 FEET.

****
FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.706
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.71	0.25	0.100	86
COMMERCIAL	D	0.32	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.03 SUBAREA RUNOFF(CFS) = 2.49
EFFECTIVE AREA(ACRES) = 191.29 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 197.0 PEAK FLOW RATE(CFS) = 457.20
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****
FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.706
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	C	1.02	0.25	0.350	86
CONDOMINIUMS	D	4.41	0.20	0.350	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.43 SUBAREA RUNOFF(CFS) = 12.87
EFFECTIVE AREA(ACRES) = 196.72 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 202.4 PEAK FLOW RATE(CFS) = 468.57

****
FLOW PROCESS FROM NODE 145.00 TO NODE 149.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1076.30 DOWNSTREAM(FEET) = 1053.58
FLOW LENGTH(FEET) = 289.89 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 36.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 37.85
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 468.57
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 21.30
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 149.00 = 7744.25 FEET.

****
FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.697
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	C	4.75	0.25	0.350	86
CONDOMINIUMS	D	1.68	0.20	0.350	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.43 SUBAREA RUNOFF(CFS) = 15.13
EFFECTIVE AREA(ACRES) = 203.15 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 208.9 PEAK FLOW RATE(CFS) = 482.05

****
FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.697
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.40	0.25	0.100	86
PUBLIC PARK	C	0.62	0.25	0.850	86
PUBLIC PARK	D	0.03	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.564
SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = 2.42
EFFECTIVE AREA(ACRES) = 204.20 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 209.9 PEAK FLOW RATE(CFS) = 484.47

****
FLOW PROCESS FROM NODE 149.00 TO NODE 151.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1053.58 DOWNSTREAM(FEET) = 1023.54
FLOW LENGTH(FEET) = 305.05 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 34.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 41.66
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 484.47
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 21.42
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 151.00 = 8049.30 FEET.

****
FLOW PROCESS FROM NODE 151.00 TO NODE 151.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.42
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.688
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.41	0.25	0.100	86
COMMERCIAL	D	1.11	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.52 SUBAREA RUNOFF(CFS) = 3.65
EFFECTIVE AREA(ACRES) = 205.72 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 211.4 PEAK FLOW RATE(CFS) = 486.50

****
FLOW PROCESS FROM NODE 151.00 TO NODE 153.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 1023.54 DOWNSTREAM(FEET) = 1007.62
FLOW LENGTH(FEET) = 210.38 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 37.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 37.63
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 486.50
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 21.52

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 153.00 = 8259.68 FEET.

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****************************************************************************
```

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

```
----------------------------------------------------------------------------
```

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

```
============================================================================
```

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.85	0.20	0.100	91
PUBLIC PARK	D	2.01	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.627
SUBAREA AREA(ACRES) = 2.86 SUBAREA RUNOFF(CFS) = 6.58
EFFECTIVE AREA(ACRES) = 208.58 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 214.3 PEAK FLOW RATE(CFS) = 491.84

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****************************************************************************
```

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

```
----------------------------------------------------------------------------
```

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

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============================================================================
```

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.27	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) = 0.27 SUBAREA RUNOFF(CFS) = 0.65
EFFECTIVE AREA(ACRES) = 208.85 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 214.6 PEAK FLOW RATE(CFS) = 492.49

```
****************************************************************************
```

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

```
----------------------------------------------------------------------------
```

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

```
============================================================================
```

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	5.30	0.25	0.500	86
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	0.58	0.20	0.500	91
RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	9.75	0.25	0.400	86
RESIDENTIAL "8-10 DWELLINGS/ACRE"	D	1.01	0.20	0.400	91
APARTMENTS	C	2.16	0.25	0.200	86
COMMERCIAL	C	2.28	0.25	0.100	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.375
SUBAREA AREA(ACRES) = 21.08 SUBAREA RUNOFF(CFS) = 49.12
EFFECTIVE AREA(ACRES) = 229.93 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 235.6 PEAK FLOW RATE(CFS) = 541.61

```
****************************************************************************
```

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

```
----------------------------------------------------------------------------
```

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

```
============================================================================
```

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	5.28	0.20	0.100	91
PUBLIC PARK	C	4.30	0.25	0.850	86
PUBLIC PARK	D	0.67	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.464
SUBAREA AREA(ACRES) = 10.25 SUBAREA RUNOFF(CFS) = 23.71
EFFECTIVE AREA(ACRES) = 240.18 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 245.9 PEAK FLOW RATE(CFS) = 565.32

```
****************************************************************************
```

FLOW PROCESS FROM NODE 153.00 TO NODE 154.00 IS CODE = 41

```
----------------------------------------------------------------------------
```

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

```
============================================================================
```

ELEVATION DATA: UPSTREAM(FEET) = 1007.62 DOWNSTREAM(FEET) = 1006.10
FLOW LENGTH(FEET) = 446.62 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.79
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 565.32
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 21.77
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 154.00 = 8706.30 FEET.

```
****************************************************************************
```

FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 15.1

```
----------------------------------------------------------------------------
```

>>>>>DEFINE MEMORY BANK # 1 <<<<<

```
============================================================================
```

PEAK FLOWRATE TABLE FILE NAME: 3P00RC1.DNA
MEMORY BANK # 1 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.34	7.33	0.20(0.02)	0.10	2.0	40.00
2	9.44	7.70	0.20(0.02)	0.10	2.1	30.00
3	9.38	8.22	0.20(0.02)	0.10	2.2	5.00
4	9.38	8.23	0.20(0.02)	0.10	2.2	15.00

TOTAL AREA(ACRES) = 2.2

```
****************************************************************************
```

FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 11

```
----------------------------------------------------------------------------
```

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

```
============================================================================
```

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	528.24	10.00	4.159	0.23(0.07)	0.30	141.1	300.00
2	565.32	21.77	2.663	0.22(0.07)	0.30	240.2	200.00
3	556.50	23.26	2.564	0.22(0.07)	0.30	245.9	100.00

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 154.00 = 8706.30 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.34	7.33	4.970	0.20(0.02)	0.10	2.0	40.00
2	9.44	7.70	4.832	0.20(0.02)	0.10	2.1	30.00
3	9.38	8.22	4.653	0.20(0.02)	0.10	2.2	5.00
4	9.38	8.23	4.650	0.20(0.02)	0.10	2.2	15.00

LONGEST FLOWPATH FROM NODE 15.00 TO NODE 154.00 = 585.84 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	473.12	7.33	4.970	0.23(0.07)	0.29	105.4	40.00
2	482.84	7.70	4.832	0.23(0.07)	0.29	110.7	30.00
3	496.05	8.22	4.653	0.23(0.07)	0.29	118.2	5.00
4	496.28	8.23	4.650	0.23(0.07)	0.29	118.3	15.00
5	536.62	10.00	4.159	0.23(0.07)	0.29	143.3	300.00

```
     6      570.68   21.77    2.663  0.22( 0.07) 0.30     242.3     200.00
     7      561.65   23.26    2.564  0.22( 0.07) 0.30     248.1     100.00
   TOTAL AREA(ACRES) =       248.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      570.68  Tc(MIN.) =   21.774
  EFFECTIVE AREA(ACRES) =    242.34  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      248.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    154.00 =    8706.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    154.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1006.00  DOWNSTREAM(FEET) =  1004.60
  FLOW LENGTH(FEET) =   122.27   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.06
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     570.68
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   21.84
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    155.00 =    8828.57 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
============================================================================
  PEAK FLOWRATE TABLE FILE NAME: 3P00RC3.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)  (MIN.)  (INCH/HR)           (ACRES)     NODE
      1        10.41    5.80  0.20( 0.02) 0.10       2.0       95.00
      2        10.13    6.98  0.20( 0.02) 0.10       2.2       80.00
      3         9.91    7.59  0.20( 0.02) 0.10       2.2       70.00
    TOTAL AREA(ACRES) =         2.2

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 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       473.12    7.41    4.937  0.23( 0.07) 0.29     105.4       40.00
      2       482.84    7.78    4.803  0.23( 0.07) 0.29     110.7       30.00
      3       496.05    8.30    4.627  0.23( 0.07) 0.29     118.2        5.00
      4       496.28    8.31    4.624  0.23( 0.07) 0.29     118.3       15.00
      5       536.62   10.08    4.141  0.23( 0.07) 0.29     143.3      300.00
      6       570.68   21.84    2.658  0.22( 0.07) 0.30     242.3      200.00
      7       561.65   23.33    2.560  0.22( 0.07) 0.30     248.1      100.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    155.00 =    8828.57 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        10.41    5.80    5.681  0.20( 0.02) 0.10       2.0       95.00
      2        10.13    6.98    5.111  0.20( 0.02) 0.10       2.2       80.00
      3         9.91    7.59    4.871  0.20( 0.02) 0.10       2.2       70.00
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE    155.00 =     774.26 FEET.

  ** PEAK FLOW RATE TABLE **
```



```
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1       437.30    5.80    5.681  0.23( 0.06) 0.29      84.5       95.00
    2       471.43    6.98    5.111  0.23( 0.07) 0.29     101.4       80.00
    3       483.10    7.41    4.937  0.23( 0.07) 0.29     107.6       40.00
    4       487.73    7.59    4.871  0.23( 0.07) 0.29     110.2       70.00
    5       492.61    7.78    4.803  0.23( 0.07) 0.29     112.9       30.00
    6       505.47    8.30    4.627  0.23( 0.07) 0.29     120.4        5.00
    7       505.69    8.31    4.624  0.23( 0.07) 0.29     120.5       15.00
    8       545.04   10.08    4.141  0.23( 0.07) 0.29     145.5      300.00
    9       576.07   21.84    2.658  0.22( 0.07) 0.30     244.6      200.00
   10       566.84   23.33    2.560  0.22( 0.07) 0.30     250.3      100.00
  TOTAL AREA(ACRES) =       250.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      576.07  Tc(MIN.) =   21.844
  EFFECTIVE AREA(ACRES) =    244.59  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      250.3
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    155.00 =    8828.57 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    158.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1004.60  DOWNSTREAM(FEET) =  1001.69
  FLOW LENGTH(FEET) =   202.60   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.34
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     576.07
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   21.96
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    158.00 =    9031.17 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    158.00 TO NODE    450.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1001.69  DOWNSTREAM(FEET) =   997.40
  FLOW LENGTH(FEET) =    30.38   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  34.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  49.81
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     576.07
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   21.97
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    450.00 =    9061.55 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    450.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================
  ***MEMORY BANK #  2 IS EMPTY - PROCESS IGNORED.***

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    450.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 2 <<<<<
============================================================================
  PEAK FLOWRATE TABLE FILE NAME: C2P00R.DNA
  MEMORY BANK #  2 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)  (MIN.)  (INCH/HR)           (ACRES)     NODE
      1        30.59    5.98  0.20( 0.02) 0.10       5.8      310.00
      2        31.02    6.22  0.20( 0.02) 0.10       6.1      220.00
      3        31.17    6.57  0.20( 0.02) 0.10       6.3      290.00
      4        31.18    6.60  0.20( 0.02) 0.10       6.3      214.00
      5        31.19    6.67  0.20( 0.02) 0.10       6.4      226.00
      6        30.39    7.46  0.20( 0.02) 0.10       6.7      300.00
```

7	29.64	8.05	0.20(0.02)	0.10	6.8	230.00
8	29.43	8.22	0.20(0.02)	0.10	6.8	260.00
9	29.03	8.47	0.20(0.02)	0.10	6.9	234.00
10	28.73	8.66	0.20(0.02)	0.10	6.9	250.00
11	27.09	9.68	0.20(0.02)	0.10	6.9	210.00

TOTAL AREA(ACRES) = 6.9

****
FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	437.30	5.97	5.592	0.23(0.06)	0.29	84.5	95.00
2	471.43	7.13	5.049	0.23(0.07)	0.29	101.4	80.00
3	483.10	7.56	4.882	0.23(0.07)	0.29	107.6	40.00
4	487.73	7.74	4.818	0.23(0.07)	0.29	110.2	70.00
5	492.61	7.92	4.752	0.23(0.07)	0.29	112.9	30.00
6	505.47	8.44	4.582	0.23(0.07)	0.29	120.4	5.00
7	505.69	8.45	4.580	0.23(0.07)	0.29	120.5	15.00
8	545.04	10.21	4.110	0.23(0.07)	0.29	145.5	300.00
9	576.07	21.97	2.649	0.22(0.07)	0.30	244.6	200.00
10	566.84	23.45	2.552	0.22(0.07)	0.30	250.3	100.00

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	30.59	5.98	5.583	0.20(0.02)	0.10	5.8	310.00
2	31.02	6.22	5.460	0.20(0.02)	0.10	6.1	220.00
3	31.17	6.57	5.292	0.20(0.02)	0.10	6.3	290.00
4	31.18	6.60	5.279	0.20(0.02)	0.10	6.3	214.00
5	31.19	6.67	5.244	0.20(0.02)	0.10	6.4	226.00
6	30.39	7.46	4.919	0.20(0.02)	0.10	6.7	300.00
7	29.64	8.05	4.709	0.20(0.02)	0.10	6.8	230.00
8	29.43	8.22	4.655	0.20(0.02)	0.10	6.8	260.00
9	29.03	8.47	4.576	0.20(0.02)	0.10	6.9	234.00
10	28.73	8.66	4.516	0.20(0.02)	0.10	6.9	250.00
11	27.09	9.68	4.238	0.20(0.02)	0.10	6.9	210.00

LONGEST FLOWPATH FROM NODE 230.00 TO NODE 450.00 = 1222.97 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	467.85	5.97	5.592	0.22(0.06)	0.28	90.4	95.00
2	468.40	5.98	5.583	0.22(0.06)	0.28	90.6	310.00
3	475.79	6.22	5.460	0.22(0.06)	0.28	94.3	220.00
4	486.11	6.57	5.292	0.22(0.06)	0.28	99.6	290.00
5	486.93	6.60	5.279	0.22(0.06)	0.28	100.0	214.00
6	489.22	6.67	5.244	0.22(0.06)	0.28	101.2	226.00
7	502.16	7.13	5.049	0.22(0.06)	0.28	108.0	80.00
8	510.76	7.46	4.919	0.22(0.06)	0.28	112.8	300.00
9	513.36	7.56	4.882	0.22(0.06)	0.28	114.3	40.00
10	517.78	7.74	4.818	0.22(0.06)	0.28	116.9	70.00
11	522.42	7.92	4.752	0.22(0.06)	0.28	119.7	30.00
12	525.43	8.05	4.709	0.22(0.06)	0.28	121.6	230.00
13	529.27	8.22	4.655	0.22(0.06)	0.28	124.0	260.00
14	534.53	8.44	4.582	0.22(0.06)	0.28	127.3	5.00
15	534.74	8.45	4.580	0.22(0.06)	0.28	127.4	15.00
16	534.98	8.47	4.576	0.22(0.06)	0.28	127.6	234.00
17	539.10	8.66	4.516	0.22(0.06)	0.28	130.4	250.00
18	560.24	9.68	4.238	0.22(0.06)	0.28	144.9	210.00
19	571.31	10.21	4.110	0.22(0.06)	0.28	152.5	300.00
20	592.95	21.97	2.649	0.22(0.06)	0.29	251.5	200.00
21	583.10	23.45	2.552	0.22(0.06)	0.29	257.2	100.00

TOTAL AREA(ACRES) = 257.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 592.95 Tc(MIN.) = 21.969
EFFECTIVE AREA(ACRES) = 251.53 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28

TOTAL AREA(ACRES) = 257.2
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

****
FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 12

>>>>>CLEAR MEMORY BANK # 3 <<<<<
==========
MEMORY BANK # 3 IS EMPTY - PROCESS IGNORED.

****
FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 15.1

>>>>>DEFINE MEMORY BANK # 3 <<<<<
==========
PEAK FLOWRATE TABLE FILE NAME: 3P00RC4.DNA
MEMORY BANK # 3 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.03	7.77	0.20(0.02)	0.10	2.1	160.00
2	8.71	8.65	0.20(0.02)	0.10	2.1	150.00

TOTAL AREA(ACRES) = 2.1

****
FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 11

>>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
==========

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	467.85	5.97	5.592	0.22(0.06)	0.28	90.4	95.00
2	468.40	5.98	5.583	0.22(0.06)	0.28	90.6	310.00
3	475.79	6.22	5.460	0.22(0.06)	0.28	94.3	220.00
4	486.11	6.57	5.292	0.22(0.06)	0.28	99.6	290.00
5	486.93	6.60	5.279	0.22(0.06)	0.28	100.0	214.00
6	489.22	6.67	5.244	0.22(0.06)	0.28	101.2	226.00
7	502.16	7.13	5.049	0.22(0.06)	0.28	108.0	80.00
8	510.76	7.46	4.919	0.22(0.06)	0.28	112.8	300.00
9	513.36	7.56	4.882	0.22(0.06)	0.28	114.3	40.00
10	517.78	7.74	4.818	0.22(0.06)	0.28	116.9	70.00
11	522.42	7.92	4.752	0.22(0.06)	0.28	119.7	30.00
12	525.43	8.05	4.709	0.22(0.06)	0.28	121.6	230.00
13	529.27	8.22	4.655	0.22(0.06)	0.28	124.0	260.00
14	534.53	8.44	4.582	0.22(0.06)	0.28	127.3	5.00
15	534.74	8.45	4.580	0.22(0.06)	0.28	127.4	15.00
16	534.98	8.47	4.576	0.22(0.06)	0.28	127.6	234.00
17	539.10	8.66	4.516	0.22(0.06)	0.28	130.4	250.00
18	560.24	9.68	4.238	0.22(0.06)	0.28	144.9	210.00
19	571.31	10.21	4.110	0.22(0.06)	0.28	152.5	300.00
20	592.95	21.97	2.649	0.22(0.06)	0.29	251.5	200.00
21	583.10	23.45	2.552	0.22(0.06)	0.29	257.2	100.00

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.03	7.77	4.807	0.20(0.02)	0.10	2.1	160.00
2	8.71	8.65	4.519	0.20(0.02)	0.10	2.1	150.00

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 450.00 = 670.70 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	475.93	5.97	5.592	0.22(0.06)	0.27	92.0	95.00
2	476.48	5.98	5.583	0.22(0.06)	0.27	92.2	310.00
3	484.01	6.22	5.460	0.22(0.06)	0.27	96.0	220.00
4	494.52	6.57	5.292	0.22(0.06)	0.27	101.3	290.00
5	495.36	6.60	5.279	0.22(0.06)	0.27	101.8	214.00
6	497.68	6.67	5.244	0.22(0.06)	0.27	103.0	226.00
7	510.87	7.13	5.049	0.22(0.06)	0.27	109.9	80.00
8	519.64	7.46	4.919	0.22(0.06)	0.27	114.8	300.00
9	522.29	7.56	4.882	0.22(0.06)	0.27	116.3	40.00

10	526.79	7.74	4.818	0.22(0.06)	0.28	119.0	70.00
11	527.58	7.77	4.807	0.22(0.06)	0.28	119.5	160.00
12	531.39	7.92	4.752	0.22(0.06)	0.28	121.8	30.00
13	534.36	8.05	4.709	0.22(0.06)	0.28	123.7	230.00
14	538.14	8.22	4.655	0.22(0.06)	0.28	126.1	260.00
15	543.32	8.44	4.582	0.22(0.06)	0.28	129.4	5.00
16	543.52	8.45	4.580	0.22(0.06)	0.28	129.5	15.00
17	543.76	8.47	4.576	0.22(0.06)	0.28	129.7	234.00
18	547.57	8.65	4.519	0.22(0.06)	0.28	132.4	150.00
19	547.80	8.66	4.516	0.22(0.06)	0.28	132.5	250.00
20	568.40	9.68	4.238	0.22(0.06)	0.28	147.1	210.00
21	579.23	10.21	4.110	0.22(0.06)	0.28	154.6	300.00
22	598.04	21.97	2.649	0.22(0.06)	0.29	253.7	200.00
23	588.00	23.45	2.552	0.22(0.06)	0.29	259.4	100.00

TOTAL AREA(ACRES) = 259.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 598.04 Tc(MIN.) = 21.969
EFFECTIVE AREA(ACRES) = 253.67 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 259.4
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

****
FLOW PROCESS FROM NODE 450.00 TO NODE 460.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 997.40 DOWNSTREAM(FEET) = 992.80
FLOW LENGTH(FEET) = 47.05 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 39.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 43.45
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 598.04
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 21.99
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 460.00 = 9108.60 FEET.
==========
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 259.4 TC(MIN.) = 21.99
EFFECTIVE AREA(ACRES) = 253.67 AREA-AVERAGED Fm(INCH/HR)= 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.290
PEAK FLOW RATE(CFS) = 598.04

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	475.93	5.98	5.582	0.22(0.06)	0.27	92.0	95.00
2	476.48	6.00	5.573	0.22(0.06)	0.27	92.2	310.00
3	484.01	6.24	5.450	0.22(0.06)	0.27	96.0	220.00
4	494.52	6.59	5.284	0.22(0.06)	0.27	101.3	290.00
5	495.36	6.61	5.271	0.22(0.06)	0.27	101.8	214.00
6	497.68	6.69	5.236	0.22(0.06)	0.27	103.0	226.00
7	510.87	7.15	5.041	0.22(0.06)	0.27	109.9	80.00
8	519.64	7.48	4.912	0.22(0.06)	0.27	114.8	300.00
9	522.29	7.58	4.875	0.22(0.06)	0.27	116.3	40.00
10	526.79	7.76	4.811	0.22(0.06)	0.28	119.0	70.00
11	527.58	7.79	4.800	0.22(0.06)	0.28	119.5	160.00
12	531.39	7.94	4.746	0.22(0.06)	0.28	121.8	30.00
13	534.36	8.07	4.702	0.22(0.06)	0.28	123.7	230.00
14	538.14	8.24	4.649	0.22(0.06)	0.28	126.1	260.00
15	543.32	8.46	4.577	0.22(0.06)	0.28	129.4	5.00
16	543.52	8.47	4.574	0.22(0.06)	0.28	129.5	15.00
17	543.76	8.48	4.570	0.22(0.06)	0.28	129.7	234.00
18	547.57	8.67	4.514	0.22(0.06)	0.28	132.4	150.00
19	547.80	8.68	4.510	0.22(0.06)	0.28	132.5	250.00
20	568.40	9.70	4.233	0.22(0.06)	0.28	147.1	210.00
21	579.23	10.23	4.106	0.22(0.06)	0.28	154.6	300.00
22	598.04	21.99	2.648	0.22(0.06)	0.29	253.7	200.00
23	588.00	23.47	2.551	0.22(0.06)	0.29	259.4	100.00

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END OF RATIONAL METHOD ANALYSIS

APPENDIX C – HYDRAULIC (WSPGW) RESULTS

FILE: C2P10H.WSW W S P G W - EDIT LISTING - Version 14.07 Date: 2-12-2020 Time: 5:54:40

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		4.000														
CD	2	4	1		3.000														
CD	3	4	1		2.000														
CD	4	4	1		1.000														
CD	5	4	1		.830														
CD	6	4	1		1.250														
CD	7	4	1		1.500														
CD	8	4	1		.500														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B

HEADING LINE NO 2 IS -

PROPOSED STORM DRAIN LATERAL C2

HEADING LINE NO 3 IS -

10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	-.714	2	6.290

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1015.130	1.360	2	.013	.000	.000	.000	0

ELEMENT NO 3 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1021.130	1.460	2	0	0	.013	.000	.000	.000	.000	.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1021.430	1.460	2	.013	.000	.000	39.727	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1161.130	2.160	2	.013	.000	.000	.000	0

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1189.320	2.300	2	.013	22.500	-71.786	.000	0

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1191.980	2.310	2	.013	.000	.000	.000	0

ELEMENT NO 8 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1196.610	2.410	2	0	0	.013	.000	.000	.000	.000	.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1219.260	2.520	2	.013	.000	.000	.000	0

ELEMENT NO 10 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1224.530	2.550	2	.013	22.505	-13.417	.000	0

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 11 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1269.610	2.770	2	.013	.000	.000	.000	0

ELEMENT NO 12 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1304.880	2.950	2	.013	22.500	89.814	.000	0

ELEMENT NO 13 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1306.880	2.960	2	.013	.000	.000	.000	0

ELEMENT NO 14 IS A TRANSITION

	STATION	INVERT	SECT	N	RADIUS	ANGLE
U/S DATA	1320.220	2.960	2	.013	.000	.000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 15 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1324.060	2.980	2	.013	.000	.000	.000	0

ELEMENT NO 16 IS A JUNCTION

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	1328.720	3.080	2	4	5	.013	3.022	1.318	4.980	5.150	45.000	-90.000
									RADIUS	ANGLE		
									.000	.000		

ELEMENT NO 17 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1331.380	3.090	2	.013	.000	.000	.000	0

ELEMENT NO 18 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1374.560	3.310	2	.013	22.498	-109.965	.000	0

ELEMENT NO 19 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1407.340	3.470	2	.013	.000	.000	.000	0

ELEMENT NO 20 IS A JUNCTION

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	1411.340	4.970	7	6	0	.013	8.700	.000	5.220	.000	-45.500	.000
									RADIUS	ANGLE		
									.000	.000		

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 21 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1414.000	4.980	7	.013	.000	.000	.000	0

ELEMENT NO 22 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1449.350	5.160	7	.013	22.504	90.000	.000	0

ELEMENT NO 23 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1466.610	5.250	7	.013	.000	.000	.000	0

ELEMENT NO 24 IS A JUNCTION

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	1466.910	5.250	7	8	0	.013	.277	.000	6.000	.000	-45.000	.000
									RADIUS	ANGLE		
									.000	.000		

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 25 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1525.410	5.540	7	.013	.000	.000	.000	0

ELEMENT NO 26 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1529.430	6.210	5	8	6	.013	.830	4.393	6.340	6.090	45.000	-44.700

RADIUS	ANGLE
25.592	9.000

ELEMENT NO 27 IS A SYSTEM HEADWORKS

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1529.430	6.210	5	6.210

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	-.714	7.004	6.290	20.09	2.84	.13	6.42	.00	1.44	.00	3.000	.000	.00	1 .0
15.130	.1371					.0009	.01	7.00	.00	.58	.013	.00	.00	PIPE
1015.130	1.360	4.944	6.304	20.09	2.84	.13	6.43	.00	1.44	.00	3.000	.000	.00	1 .0
JUNCT STR	.0167					.0009	.01	4.94	.00		.013	.00	.00	PIPE
1021.130	1.460	4.849	6.309	20.09	2.84	.13	6.43	.00	1.44	.00	3.000	.000	.00	1 .0
.300	.0000					.0009	.00	4.85	.00	.00	.013	.00	.00	PIPE
1021.430	1.460	4.866	6.326	20.09	2.84	.13	6.45	.00	1.44	.00	3.000	.000	.00	1 .0
139.700	.0050					.0009	.13	4.87	.00	1.37	.013	.00	.00	PIPE
1161.130	2.160	4.293	6.453	20.09	2.84	.13	6.58	.00	1.44	.00	3.000	.000	.00	1 .0
28.190	.0050					.0009	.03	.00	.00	1.37	.013	.00	.00	PIPE
1189.320	2.300	4.201	6.501	20.09	2.84	.13	6.63	.00	1.44	.00	3.000	.000	.00	1 .0
2.660	.0038					.0009	.00	4.20	.00	1.48	.013	.00	.00	PIPE
1191.980	2.310	4.193	6.503	20.09	2.84	.13	6.63	.00	1.44	.00	3.000	.000	.00	1 .0
JUNCT STR	.0216					.0009	.00	4.19	.00		.013	.00	.00	PIPE
1196.610	2.410	4.097	6.507	20.09	2.84	.13	6.63	.00	1.44	.00	3.000	.000	.00	1 .0
22.650	.0049					.0009	.02	4.10	.00	1.38	.013	.00	.00	PIPE
1219.260	2.520	4.008	6.528	20.09	2.84	.13	6.65	.00	1.44	.00	3.000	.000	.00	1 .0
5.270	.0057					.0009	.00	.00	.00	1.32	.013	.00	.00	PIPE

	Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt		No Wth

Station / L/Elem	Elev / Ch Slope	(FT)	Elev	(CFS)	(FPS)	Head / SF Ave	Grd.El. / HF	Elev / SE Dpth	Depth / Froude N	Width / Norm Dp	Dia.-FT or I.D. / "N"	/ X-Fall	ZL / ZR	Prs/Pip / Type Ch
1224.530	2.550	3.992	6.542	20.09	2.84	.13	6.67	.00	1.44	.00	3.000	.000	.00	1 .0
45.080	.0049					.0009	.04	3.99	.00	1.38	.013	.00	.00	PIPE
1269.610	2.770	3.813	6.583	20.09	2.84	.13	6.71	.00	1.44	.00	3.000	.000	.00	1 .0
35.270	.0051					.0009	.03	.00	.00	1.36	.013	.00	.00	PIPE
1304.880	2.950	3.690	6.640	20.09	2.84	.13	6.77	.00	1.44	.00	3.000	.000	.00	1 .0
2.000	.0050					.0009	.00	3.69	.00	1.37	.013	.00	.00	PIPE
1306.880	2.960	3.682	6.642	20.09	2.84	.13	6.77	.00	1.44	.00	3.000	.000	.00	1 .0
TRANS STR	.0000					.0009	.01	3.68	.00		.013	.00	.00	PIPE
1320.220	2.960	3.694	6.654	20.09	2.84	.13	6.78	.00	1.44	.00	3.000	.000	.00	1 .0
3.840	.0052					.0009	.00	3.69	.00	1.35	.013	.00	.00	PIPE
1324.060	2.980	3.678	6.658	20.09	2.84	.13	6.78	.00	1.44	.00	3.000	.000	.00	1 .0
JUNCT STR	.0215					.0007	.00	3.68	.00		.013	.00	.00	PIPE
1328.720	3.080	3.642	6.722	15.75	2.23	.08	6.80	.00	1.27	.00	3.000	.000	.00	1 .0
2.660	.0038					.0006	.00	3.64	.00	1.29	.013	.00	.00	PIPE
1331.380	3.090	3.633	6.723	15.75	2.23	.08	6.80	.00	1.27	.00	3.000	.000	.00	1 .0
43.180	.0051					.0006	.02	.00	.00	1.19	.013	.00	.00	PIPE
1374.560	3.310	3.454	6.764	15.75	2.23	.08	6.84	.00	1.27	.00	3.000	.000	.00	1 .0
32.780	.0049					.0006	.02	3.45	.00	1.20	.013	.00	.00	PIPE

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING Date: 2-12-2020 Time: 5:54:44

DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B

PROPOSED STORM DRAIN LATERAL C2

10-YEAR STORM - MHW CONDITION WSE=4.41

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1407.340	3.470	3.312	6.782	15.75	2.23	.08	6.86	.00	1.27	.00	3.000	.000	.00	1 .0
JUNCT STR	.3750					.0025	.01	3.31	.00		.013	.00	.00	PIPE

C2P10H

1411.340	4.970	1.653	6.623	7.05	3.99	.25	6.87	.00	1.03	.00	1.500	.000	.00	1	.0
2.660	.0038					.0045	.01	1.65	.00	1.50	.013	.00	.00	PIPE	
1414.000	4.980	1.655	6.635	7.05	3.99	.25	6.88	.00	1.03	.00	1.500	.000	.00	1	.0
35.350	.0051					.0045	.16	.00	.00	1.16	.013	.00	.00	PIPE	
1449.350	5.160	1.683	6.843	7.05	3.99	.25	7.09	.00	1.03	.00	1.500	.000	.00	1	.0
17.260	.0052					.0045	.08	1.68	.00	1.14	.013	.00	.00	PIPE	
1466.610	5.250	1.671	6.921	7.05	3.99	.25	7.17	.00	1.03	.00	1.500	.000	.00	1	.0
JUNCT STR	.0000					.0043	.00	1.67	.00		.013	.00	.00	PIPE	
1466.910	5.250	1.705	6.955	6.77	3.83	.23	7.18	.00	1.01	.00	1.500	.000	.00	1	.0
58.500	.0050					.0042	.24	1.71	.00	1.13	.013	.00	.00	PIPE	
1525.410	5.540	1.659	7.199	6.77	3.83	.23	7.43	.00	1.01	.00	1.500	.000	.00	1	.0
JUNCT STR	.1667					.0046	.02	.00	.00		.013	.00	.00	PIPE	

---------- WARNING - Junction Analysis - Large Lateral Flow(s)----------

1529.430	6.210	1.219	7.429	1.55	2.86	.13	7.56	.00	.56	.00	.830	.000	.00	1	.0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		1.250														
CD	2	4	1		.830														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B
HEADING LINE NO 2 IS -
PROPOSED STORM DRAIN LATERAL C2-A
HEADING LINE NO 3 IS -
10-YEAR STORM - MHW CONDITION WSE=4.41

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1002.830	5.220	1	6.800

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1040.540	5.810	1	.012	.000	.000	-45.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1065.150	6.200	1	.012	.000	.000	.000	0

ELEMENT NO 4 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1069.150	6.300	1	2	1	.012	.908	3.722	7.930	7.510	67.700	-42.300
									RADIUS	ANGLE		
									.000	.000		

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1069.350	6.300	1	.012	.000	.000	-.280	0

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1111.500	6.960	1	.012	.000	.000	45.000	0

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1116.480	7.040	1	.012	.000	.000	45.000	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1134.150	7.310	1	.012	.000	.000	.000	0

ELEMENT NO 9 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1134.200	7.310	1	2	0	.012	.990	.000	7.520	.000	45.000	.000
									RADIUS	ANGLE		
									.000	.000		

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1152.820	7.600	1	.012	.000	.000	.000	0

ELEMENT NO 11 IS A SYSTEM HEADWORKS * *

C2AP10H

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1152.820	7.600	1	7.600

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1002.830	5.220	1.580	6.800	8.70	7.09	.78	7.58	.00	1.14	.00	1.250	.000	.00	1 .0
37.710	.0156					.0155	.58	1.58	.00	1.02	.012	.00	.00	PIPE
1040.540	5.810	1.689	7.499	8.70	7.09	.78	8.28	.00	1.14	.00	1.250	.000	.00	1 .0
24.610	.0158					.0155	.38	1.69	.00	1.01	.012	.00	.00	PIPE
1065.150	6.200	1.679	7.879	8.70	7.09	.78	8.66	.00	1.14	.00	1.250	.000	.00	1 .0
JUNCT STR	.0250					.0094	.04	1.68	.00		.012	.00	.00	PIPE
1069.150	6.300	2.836	9.136	4.07	3.32	.17	9.31	.00	.82	.00	1.250	.000	.00	1 .0
.200	.0000					.0034	.00	2.84	.00	.00	.012	.00	.00	PIPE
1069.350	6.300	2.837	9.137	4.07	3.32	.17	9.31	.00	.82	.00	1.250	.000	.00	1 .0
42.150	.0157					.0034	.14	2.84	.00	.60	.012	.00	.00	PIPE
1111.500	6.960	2.345	9.305	4.07	3.32	.17	9.48	.00	.82	.00	1.250	.000	.00	1 .0
4.980	.0161					.0034	.02	2.34	.00	.59	.012	.00	.00	PIPE
1116.480	7.040	2.307	9.347	4.07	3.32	.17	9.52	.00	.82	.00	1.250	.000	.00	1 .0
17.670	.0153					.0034	.06	2.31	.00	.60	.012	.00	.00	PIPE
1134.150	7.310	2.097	9.407	4.07	3.32	.17	9.58	.00	.82	.00	1.250	.000	.00	1 .0
JUNCT STR	.0000					.0027	.00	2.10	.00		.012	.00	.00	PIPE
1134.200	7.310	2.210	9.520	3.08	2.51	.10	9.62	.00	.71	.00	1.250	.000	.00	1 .0
18.620	.0156					.0019	.04	2.21	.00	.51	.012	.00	.00	PIPE

	Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt		No Wth

C2AP10H

Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1152.820	7.600	1.956	9.556	3.08	2.51	.10	9.65	.00	.71	.00	1.250	.000	.00	1 .0

FILE: C2BP10H.WSW W S P G W - EDIT LISTING - Version 14.07 Date: 2-13-2020 Time: 9: 7:16

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		1.250														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B

HEADING LINE NO 2 IS -
PROPOSED STORM DRAIN LATERAL C2-B

HEADING LINE NO 3 IS -
10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1002.160	6.300	1	9.130

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1006.310	6.570	1	.012	.000	.000	22.506	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1027.790	8.000	1	.012	.000	.000	.000	0

ELEMENT NO 4 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1027.790	8.000	1	8.000

Program Package Serial Number: 7132
WATER SURFACE PROFILE LISTING Date: 2-13-2020 Time: 9: 7:19
DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B
PROPOSED STORM DRAIN LATERAL C2-B
10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1002.160	6.300	2.830	9.130	3.72	3.03	.14	9.27	.00	.78	.00	1.250	.000	.00	1 .0
4.150	.0651					.0028	.01	2.83	.00	.39	.012	.00	.00	PIPE
1006.310	6.570	2.582	9.152	3.72	3.03	.14	9.30	.00	.78	.00	1.250	.000	.00	1 .0
20.901	.0666					.0028	.06	2.58	.00	.39	.012	.00	.00	PIPE
1027.211	7.961	1.250	9.211	3.72	3.03	.14	9.35	.00	.78	.00	1.250	.000	.00	1 .0
.579	.0666					.0026	.00	1.25	.00	.39	.012	.00	.00	PIPE
1027.790	8.000	1.210	9.210	3.72	3.06	.15	9.36	.00	.78	.44	1.250	.000	.00	1 .0

♠

FILE: C2CP10H.WSW W S P G W - EDIT LISTING - Version 14.07 Date: 2-13-2020 Time: 9:35:21

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		1.250														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B

HEADING LINE NO 2 IS -
PROPOSED STORM DRAIN LATERAL C2-C

HEADING LINE NO 3 IS -
10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1002.840	5.790	1	7.430

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1006.450	6.090	1	.012	.000	.000	-45.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1029.390	8.000	1	.012	.000	.000	.000	0

ELEMENT NO 4 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1029.390	8.000	1	8.000

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1002.840	5.790	1.640	7.430	4.39	3.58	.20	7.63	.00	.85	.00	1.250	.000	.00	1 .0
1.325	.0831					.0039	.01	1.64	.00	.40	.012	.00	.00	PIPE
1004.165	5.900	1.545	7.446	4.39	3.58	.20	7.64	.00	.85	.00	1.250	.000	.00	1 .0
HYDRAULIC JUMP														
1004.165	5.900	.438	6.338	4.39	11.46	2.04	8.38	.00	.85	1.19	1.250	.000	.00	1 .0
2.285	.0831					.0546	.12	.44	3.56	.40	.012	.00	.00	PIPE
1006.450	6.090	.447	6.537	4.39	11.14	1.93	8.46	.00	.85	1.20	1.250	.000	.00	1 .0
.040	.0833					.0525	.00	.45	3.42	.40	.012	.00	.00	PIPE
1006.490	6.093	.447	6.540	4.39	11.14	1.93	8.47	.00	.85	1.20	1.250	.000	.00	1 .0
4.682	.0833					.0493	.23	.45	3.42	.40	.012	.00	.00	PIPE
1011.172	6.483	.463	6.946	4.39	10.62	1.75	8.70	.00	.85	1.21	1.250	.000	.00	1 .0
3.559	.0833					.0432	.15	.46	3.20	.40	.012	.00	.00	PIPE
1014.731	6.779	.480	7.259	4.39	10.13	1.59	8.85	.00	.85	1.22	1.250	.000	.00	1 .0
2.810	.0833					.0379	.11	.48	2.99	.40	.012	.00	.00	PIPE
1017.541	7.013	.497	7.511	4.39	9.66	1.45	8.96	.00	.85	1.22	1.250	.000	.00	1 .0
2.270	.0833					.0333	.08	.50	2.79	.40	.012	.00	.00	PIPE
1019.812	7.203	.515	7.718	4.39	9.21	1.32	9.03	.00	.85	1.23	1.250	.000	.00	1 .0
1.864	.0833					.0292	.05	.52	2.61	.40	.012	.00	.00	PIPE

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt		No Wth

Station / L/Elem	Elev / Ch Slope	(FT)	Elev	(CFS)	(FPS)	Head / SF Ave	Grd.El. / HF	Elev / SE Dpth	Depth / Froude N	Width / Norm Dp	Dia.-FT or I.D. / "N"	or I.D. / X-Fall	ZL / ZR	Prs/Pip / Type Ch
1021.676	7.358	.534	7.892	4.39	8.78	1.20	9.09	.00	.85	1.24	1.250	.000	.00	1 .0
1.546	.0833					.0256	.04	.53	2.43	.40	.012	.00	.00	PIPE
1023.222	7.486	.554	8.040	4.39	8.37	1.09	9.13	.00	.85	1.24	1.250	.000	.00	1 .0
1.289	.0833					.0225	.03	.55	2.27	.40	.012	.00	.00	PIPE
1024.511	7.594	.574	8.168	4.39	7.98	.99	9.16	.00	.85	1.25	1.250	.000	.00	1 .0
1.078	.0833					.0198	.02	.57	2.12	.40	.012	.00	.00	PIPE
1025.589	7.684	.596	8.279	4.39	7.61	.90	9.18	.00	.85	1.25	1.250	.000	.00	1 .0
.898	.0833					.0174	.02	.60	1.97	.40	.012	.00	.00	PIPE
1026.488	7.758	.619	8.377	4.39	7.25	.82	9.19	.00	.85	1.25	1.250	.000	.00	1 .0
.747	.0833					.0154	.01	.62	1.84	.40	.012	.00	.00	PIPE
1027.234	7.821	.642	8.463	4.39	6.92	.74	9.21	.00	.85	1.25	1.250	.000	.00	1 .0
.612	.0833					.0135	.01	.64	1.71	.40	.012	.00	.00	PIPE
1027.846	7.871	.667	8.538	4.39	6.60	.68	9.21	.00	.85	1.25	1.250	.000	.00	1 .0
.495	.0833					.0119	.01	.67	1.59	.40	.012	.00	.00	PIPE
1028.341	7.913	.693	8.606	4.39	6.29	.61	9.22	.00	.85	1.24	1.250	.000	.00	1 .0
.389	.0833					.0105	.00	.69	1.48	.40	.012	.00	.00	PIPE
1028.730	7.945	.721	8.666	4.39	6.00	.56	9.22	.00	.85	1.24	1.250	.000	.00	1 .0
.293	.0833					.0093	.00	.72	1.37	.40	.012	.00	.00	PIPE

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING Date: 2-13-2020 Time: 9:35:24

DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B

PROPOSED STORM DRAIN LATERAL C2-C

10-YEAR STORM - MHW CONDITION WSE=4.41

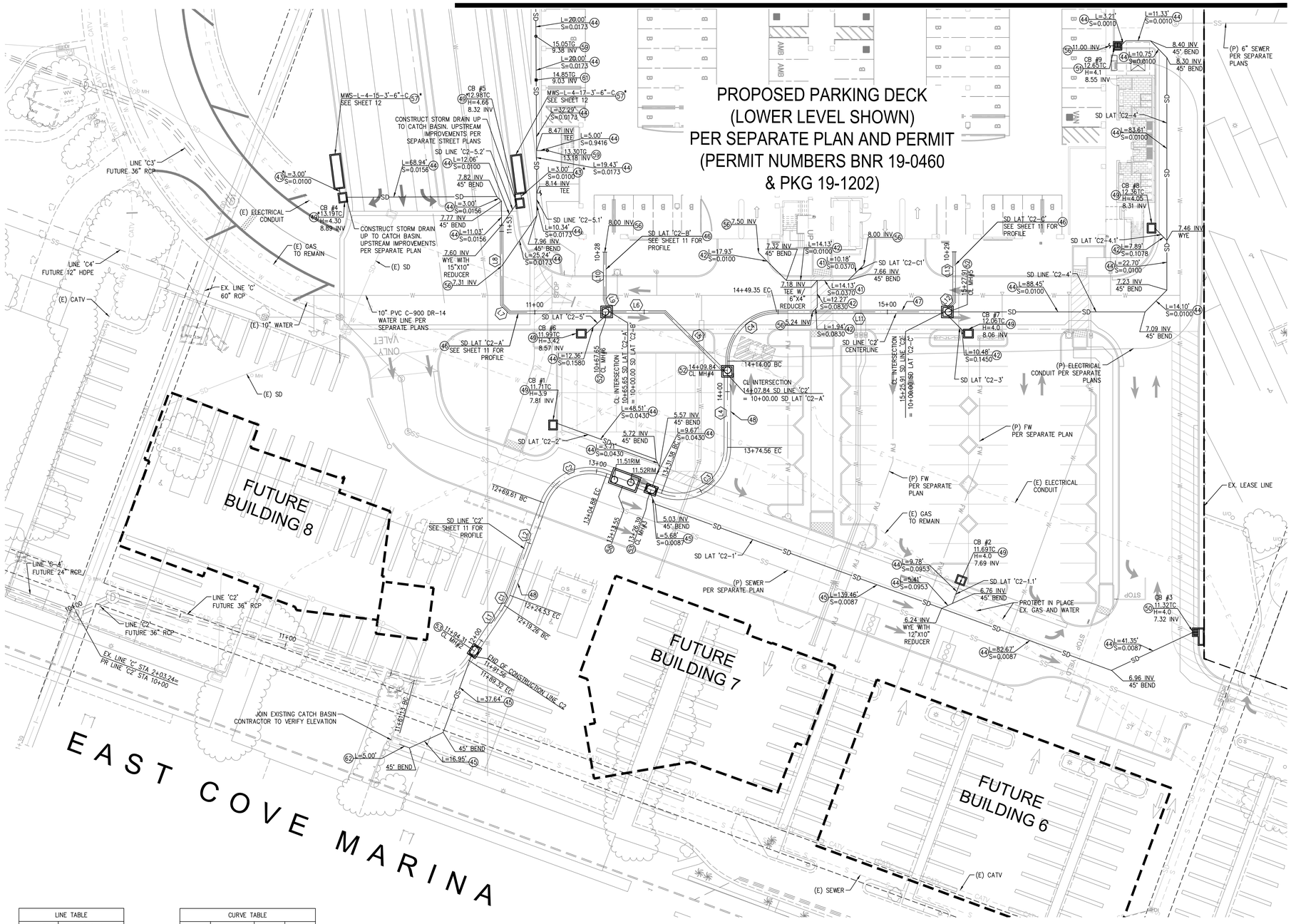
Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1029.023	7.969	.750	8.719	4.39	5.72	.51	9.23	.00	.85	1.22	1.250	.000	.00	1 .0
.204	.0833					.0082	.00	.75	1.27	.40	.012	.00	.00	PIPE

C2CP10H

1029.227	7.986	.781	8.767	4.39	5.45	.46	9.23	.00	.85	1.21	1.250	.000	.00	1 .0
.122	.0833					.0073	.00	.78	1.18	.40	.012	.00	.00	PIPE
1029.349	7.997	.813	8.810	4.39	5.20	.42	9.23	.00	.85	1.19	1.250	.000	.00	1 .0
.041	.0833					.0065	.00	.81	1.09	.40	.012	.00	.00	PIPE
1029.390	8.000	.849	8.849	4.39	4.95	.38	9.23	.00	.85	1.17	1.250	.000	.00	1 .0

APPENDIX D – STORM DRAIN PLAN AND PROFILES

SEE SHEET 10



STORM DRAIN CONSTRUCTION NOTES

(40) INSTALL 3" PVC SCH 40, INCLUDING ALL BENDS AND FITTINGS.

(41) INSTALL 4" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(42) INSTALL 6" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(43) INSTALL 8" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(44) INSTALL 10" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(45) INSTALL 12" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(46) INSTALL 15" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(47) INSTALL 18" RCP STORM DRAIN WITH BEDDING PER OCPW. STD. PLAN 1319

(48) INSTALL 36" RCP STORM DRAIN WITH BEDDING PER OCPW. STD. PLAN 1319

(49) CONSTRUCT CURB OPENING INLET TYPE I PER OCPW STD. PLAN 1301 AND PER STORM DRAIN INLET MARKING DETAIL ON SHEET 12.

(50) CONSTRUCT COMBINATION INLET TYPE III PER OCPW STD. PLAN 1303 AND PER STORM DRAIN INLET MARKING DETAIL ON SHEET 12.

(51) CONSTRUCT COMBINATION INLET TYPE IV PER OCPW STD. PLAN 1309 AND PER STORM DRAIN INLET MARKING DETAIL ON SHEET 12.

(52) CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE I PER OCPW. STD. PLAN 321-2

(53) CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE II, PER OCPW 320-2-0C

(54) CONSTRUCT JUNCTION STRUCTURE TYPE IV PER OCPW STD. PLAN 331-3-0C

(55) CONSTRUCT JUNCTION STRUCTURE TYPE VI PER OCPTW. STD. PLAN 332-2-0C

(56) CONNECT TO PARKING STRUCTURE STORM DRAIN POINT OF CONNECTION. SEE BUILDING MEP PLANS FOR CONTINUATION.

(57) INSTALL MODULAR WETLAND UNIT PER DETAIL ON SHEET 12. (SIZE PER PLAN)

(58) INSTALL JENSEN STORMSAFE FILTRATION VAULT PER DETAIL ON SHEET 12.

(59) INSTALL 6" NDS ATRIUM DRAIN.

(60) INSTALL CLEANOUT STRUCTURE PER DETAIL ON SHEET 12.

(61) INSTALL 12" NDS 1280 ATRIUM DRAIN.

(62) CONNECT TO EXISTING CATCH BASIN TEMPORARY CONNECTION.

(XX)* CONSTRUCTION NOTE TO BE CONSTRUCTED PER SEPARATE IMPROVEMENT PLAN. FOR REFERENCE ONLY.

STORM DRAIN GENERAL NOTES:

1. ALL REINFORCED CONCRETE PIPE TO BE CONSTRUCTED WITH WATER TIGHT JOINTS.

2. ALL MANHOLES TO BE BOLTED DOWN.

3. STENCILING PER DETAIL ON SHEET 12 SHALL BE MOUNTED ON TOP OF EVERY INLET.

LINE TABLE	
NUMBER	BEARING
L1	N29° 56' 58"E
L2	N16° 31' 54"E
L4	N3° 37' 08"W
L5	N48° 41' 21"W
L6	S86° 18' 39"W
L7	N48° 58' 09"W
L8	N3° 58' 09"W
L9	N25° 59' 31"W
L10	N3° 31' 29"W
L11	N86° 18' 37"E
L12	N41° 30' 58"E
L13	N3° 29' 02"W

CURVE TABLE			
CURVE	DELTA	LENGTH	RADIUS
C1	13° 25' 03"	5.27	22.50
C2	89° 48' 52"	35.27	22.50
C3	109° 57' 54"	43.18	22.50
C4	90° 00' 01"	35.34	22.50

LEGEND

- PROPERTY LINE
- LEASE LINE
- SD — EXISTING STORM DRAIN
- SD — PROPOSED STORM DRAIN <12"
- SD — PROPOSED STORM DRAIN ≥12"
- FUTURE STORM DRAIN
- FUTURE MANHOLE
- PROPOSED MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED MODULAR WETLAND SYSTEM
- PROPOSED AREA DRAIN
- PROPOSED CURB OPENING CATCH BASIN WITH GRATINGS
- PROPOSED GRATED INLET
- W — PROPOSED WATER LINE
- SS — PROPOSED SEWER LINE
- W — W — EXISTING WATER LINE
- S — S — EXISTING SEWER LINE

WM	WATER METER	(E)	EXISTING
℄	CENTER LINE	(P)	PROPOSED
P.L.	PROPERTY LINE	INV	INVERT
R/W	RIGHT-OF-WAY	L	LENGTH
FS	FINISHED SURFACE	S	SLOPE
TC	TOP OF CURB	LAT	LATERAL
TG	TOP OF GRATE	CB	CATCH BASIN
SS	SANITARY SEWER	MH	MANHOLE
SD	STORM DRAIN	EC	END OF CURVE
DW	DOMESTIC WATER	BC	BEGINNING OF CURVE
RW	RECLAIMED WATER	RCP	REINFORCED CONCRETE PIPE
FH	FIRE HYRANT	HDPE	HIGH DENSITY POLYETHYLENE
ST	STREET LIGHT		

N

0 20 30 42

(IN FEET)
1 INCH = 20 FEET

NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
7					
6					
5					
4					
3					
2					
1					

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JACOB VANDERVIS R.C.E. No. C46301 DATE

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CHECKED BY:	DATE
RECOMMENDED BY:	DATE

DANA POINT HARBOR REVITALIZATION

DANA POINT HARBOR PARTNERS, LLC

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PARKING STRUCTURE PRECISE GRADING PLANS

STORM DRAIN PLAN - SOUTH

SHT 9 OF 17

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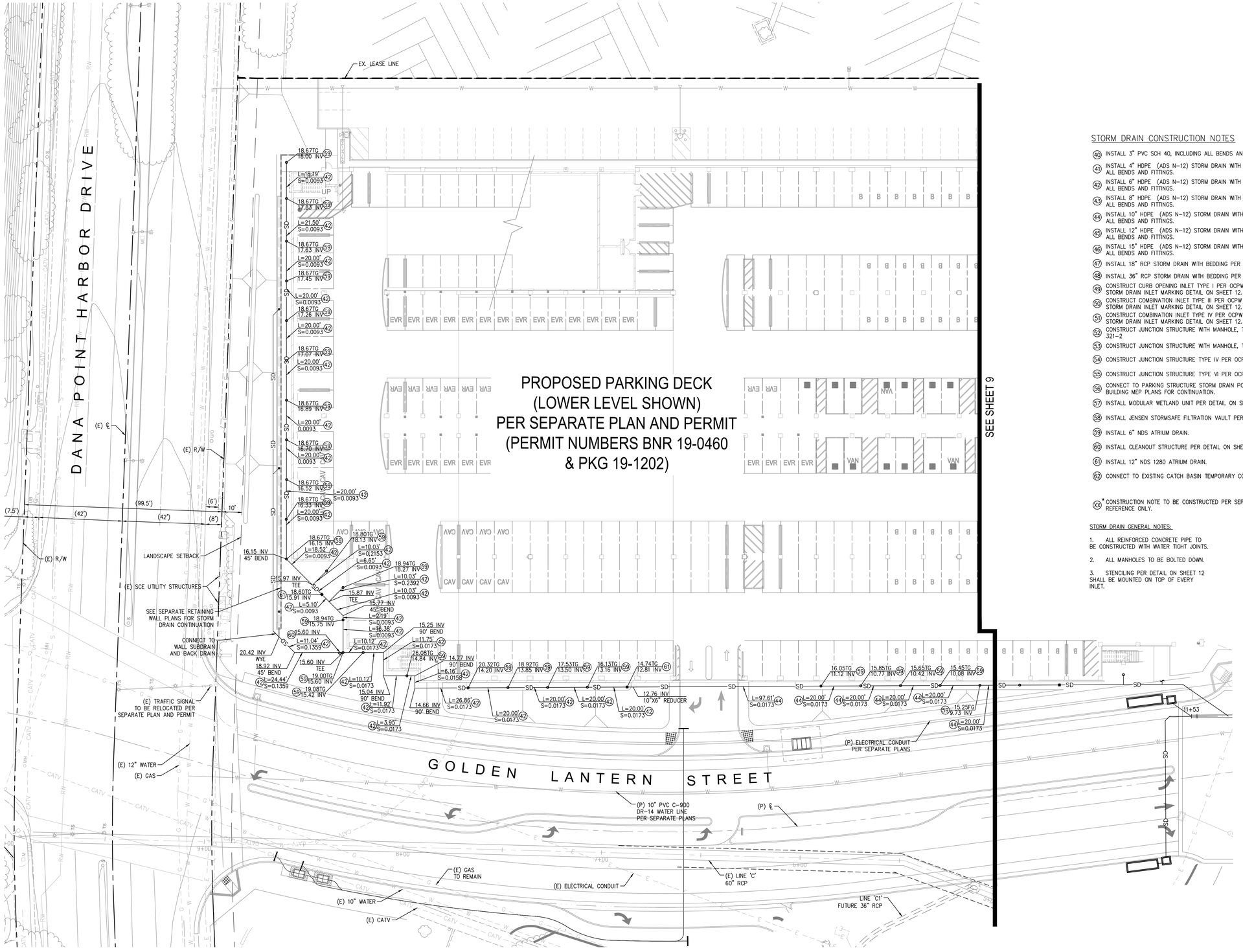

STORM DRAIN CONSTRUCTION NOTES

(40) INSTALL 3" PVC SCH 40, INCLUDING ALL BENDS AND FITTINGS.

(41) INSTALL 4" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(42) INSTALL 6" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(43) INSTALL 8" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(44) INSTALL 10" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(45) INSTALL 12" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(46) INSTALL 15" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS.

(47) INSTALL 18" RCP STORM DRAIN WITH BEDDING PER OCPW. STD. PLAN 1319

(48) INSTALL 36" RCP STORM DRAIN WITH BEDDING PER OCPW. STD. PLAN 1319

(49) CONSTRUCT CURB OPENING INLET TYPE I PER OCPW STD. PLAN 1301 AND PER STORM DRAIN INLET MARKING DETAIL ON SHEET 12.

(50) CONSTRUCT COMBINATION INLET TYPE III PER OCPW STD. PLAN 1303 AND PER STORM DRAIN INLET MARKING DETAIL ON SHEET 12.

(51) CONSTRUCT COMBINATION INLET TYPE IV PER OCPW STD. PLAN 1309 AND PER STORM DRAIN INLET MARKING DETAIL ON SHEET 12.

(52) CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE I PER OCPW. STD. PLAN 321-2

(53) CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE II, PER OCPW 320-2-OC

(54) CONSTRUCT JUNCTION STRUCTURE TYPE IV PER OCPW STD. PLAN 331-3-OC

(55) CONSTRUCT JUNCTION STRUCTURE TYPE VI PER OCPTW. STD. PLAN 332-2-OC

(56) CONNECT TO PARKING STRUCTURE STORM DRAIN POINT OF CONNECTION. SEE BUILDING MEP PLANS FOR CONTINUATION.

(57) INSTALL MODULAR WETLAND UNIT PER DETAIL ON SHEET 12. (SIZE PER PLAN)

(58) INSTALL JENSEN STORMSAFE FILTRATION VAULT PER DETAIL ON SHEET 12.

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(XX)* CONSTRUCTION NOTE TO BE CONSTRUCTED PER SEPARATE IMPROVEMENT PLAN. FOR REFERENCE ONLY.

STORM DRAIN GENERAL NOTES:

1. ALL REINFORCED CONCRETE PIPE TO BE CONSTRUCTED WITH WATER TIGHT JOINTS.
2. ALL MANHOLES TO BE BOLTED DOWN.
3. STENCILING PER DETAIL ON SHEET 12 SHALL BE MOUNTED ON TOP OF EVERY INLET.

0 20 30 42
(IN FEET)
1 INCH = 20 FEET

LEGEND

- PROPERTY LINE
- LEASE LINE
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN <12"
- PROPOSED STORM DRAIN ≥12"
- FUTURE STORM DRAIN
- FUTURE MANHOLE
- PROPOSED MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED MODULAR WETLAND SYSTEM
- PROPOSED AREA DRAIN
- PROPOSED CURB OPENING CATCH BASIN WITH GRATINGS
- PROPOSED GRATED INLET
- PROPOSED WATER LINE
- PROPOSED SEWER LINE
- EXISTING WATER LINE
- EXISTING SEWER LINE

WM	WATER METER	(E)	EXISTING
℄	CENTER LINE	(P)	PROPOSED
P	PROPERTY LINE	INV	INVERT
R/W	RIGHT-OF-WAY	L	LENGTH
FS	FINISHED SURFACE	S	SLOPE
TC	TOP OF CURB	LAT	LATERAL
TG	TOP OF GRATE	CB	CATCH BASIN
SS	SANITARY SEWER	MH	MANHOLE
SD	STORM DRAIN	EC	END OF CURVE
DW	DOMESTIC WATER	BC	BEGINNING OF CURVE
RW	RECLAIMED WATER	RCP	REINFORCED CONCRETE PIPE
FH	FIRE HYRANT	HDPE	HIGH DENSITY POLYETHYLENE
ST	STREET LIGHT		

NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
7					
6					
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RECOMMENDED BY:	DATE

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PARKING STRUCTURE PRECISE GRADING PLANS

STORM DRAIN PLAN - NORTH

SHT 10 OF 17

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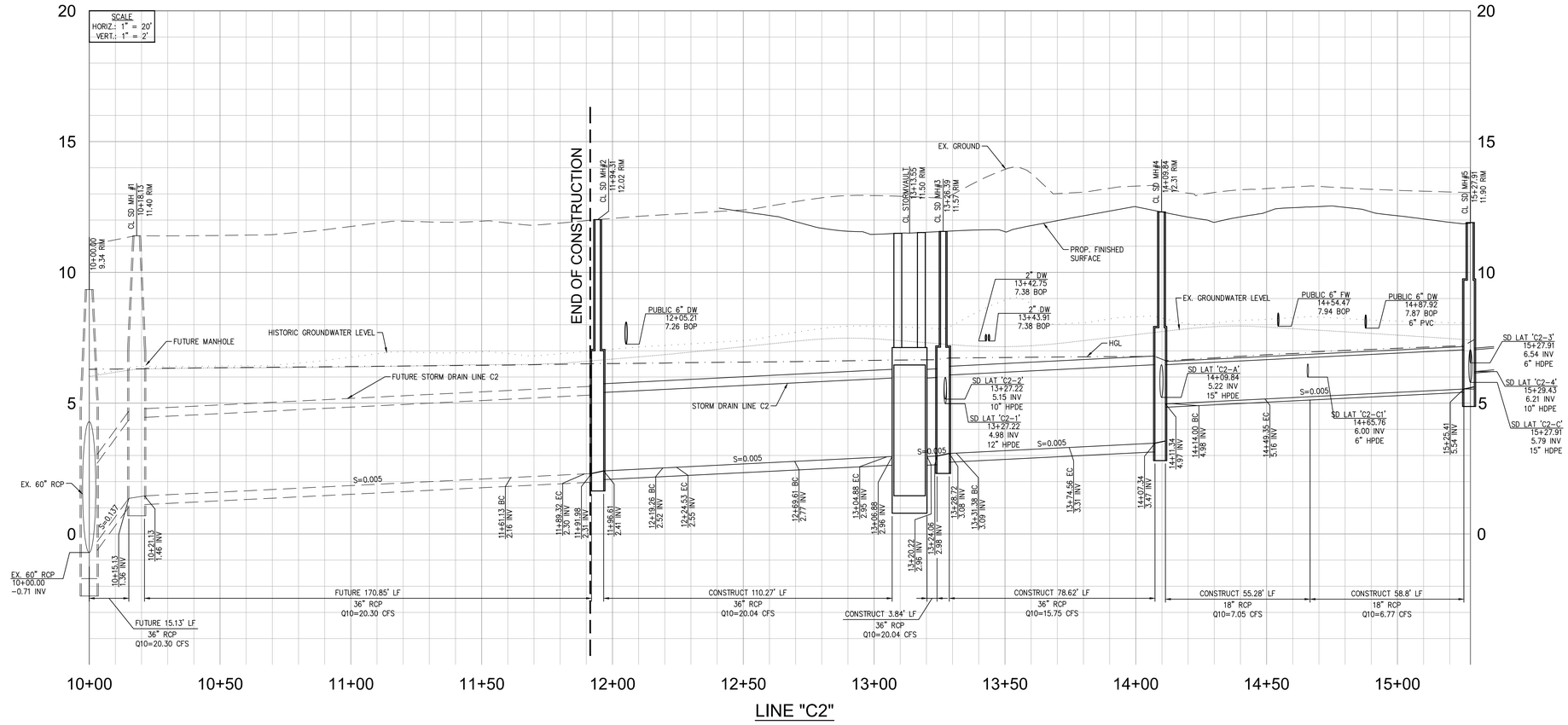
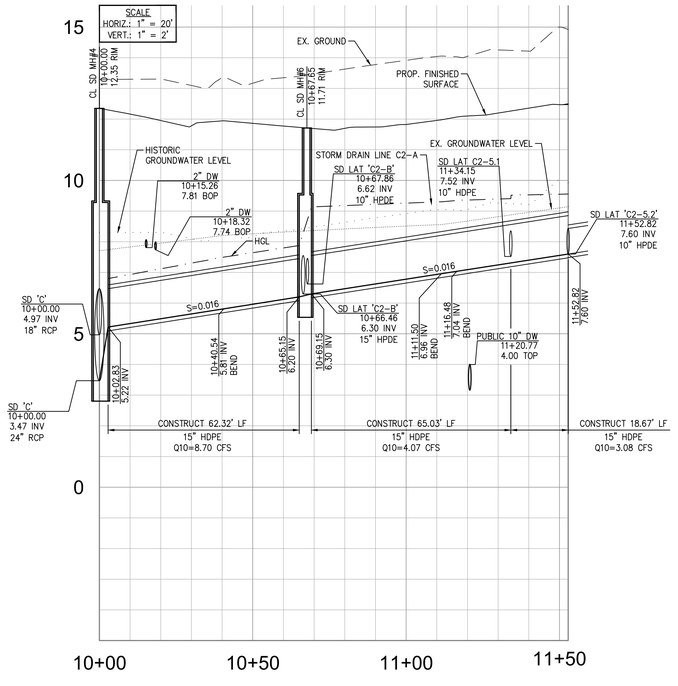
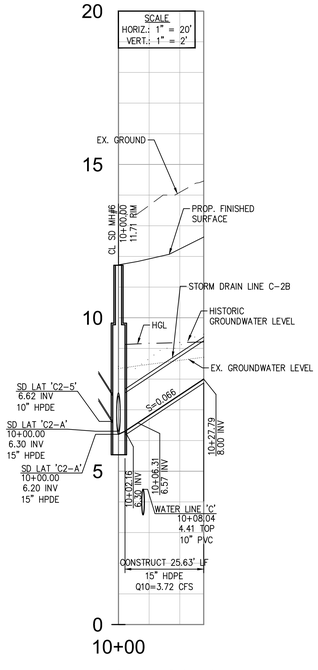


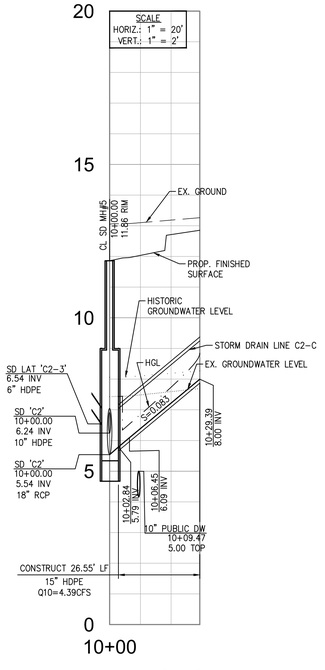
LINE "C2"



LINE "C2-A"



LINE "C2-B"



LINE "C2-C"

LF	LINEAR FEET
FW	FIRE WATER
BOP	BOTTOM OF PIPE
TOP	TOP OF PIPE

NOTE:

10-YEAR HYDRAULIC GRADE LINE (HGL) AS PLOTTED WITH OUTFALL WITH HIGH TIDE ELEVATION OF 4.41.

NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
7					
6					
5					
4					
3					
2					
1					

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JACOB VANDERVIS R.C.E. No. C46301 DATE

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PARKING STRUCTURE PRECISE GRADING PLANS

STORM DRAIN PROFILES

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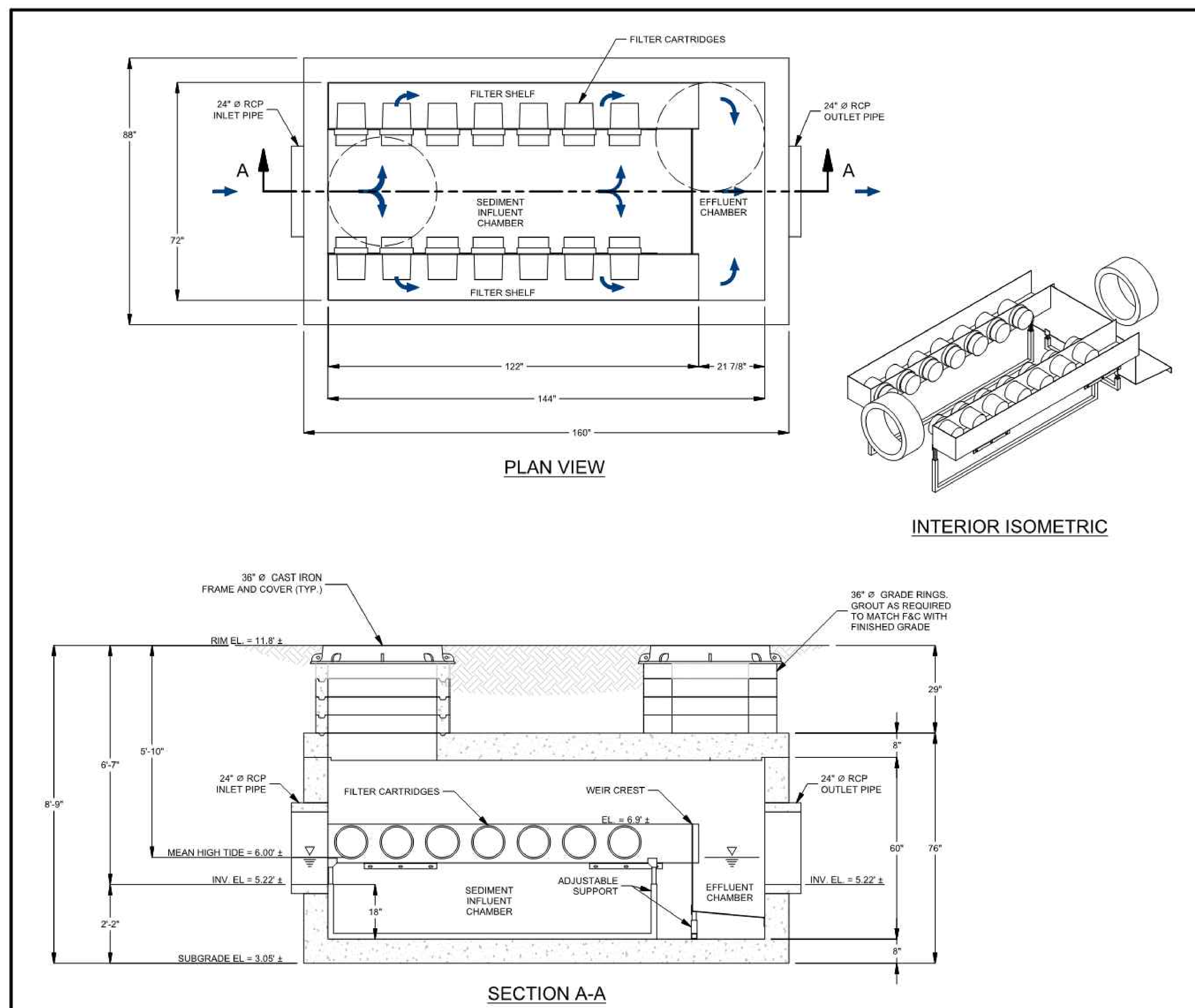


STORMVAULT WITH 10-PACK STORMSAFE CARTRIDGES
STORMWATER TREATMENT LOCATION C2.1

SYSTEM AND TREATMENT FLOW DESIGN:

STORMWATER QUALITY DESIGN FLOW (SQDF)	2.24-CFS (1,150-GPM)
STORM DRAIN DESIGN PEAK CONVEYANCE FLOW	21-CFS
RETURN FREQUENCY / PERIOD OF PEAK DESIGN CONVEYANCE FLOW	10 - YEARS

STORMSAFE FILTER TREATMENT DESIGN:

MEDIA FILTER SUBSTRATA	PATHOGEN CARTRIDGE
NUMBER OF CARTRIDGES	14
INDIVIDUAL CARTRIDGE ULTIMATE MAXIMUM LOADING RATE	115-GPM / CART
HYDRAULIC DRIVING HEAD	6-INCHES

STORMWATER FILTRATION TREATMENT UNIT (SWFTU) NOTES:
THE STORMSAFE FILTER EMPLOYS THE PATENTED ANTIMICROBIAL MEDIA TO TREAT STORMWATER BY FABCO. THE TREATMENT PROCESS IS DESIGNED TO ACHIEVE BACTERIA REDUCTION THROUGH PHYSICAL CELLULAR DISRUPTION ON TOP OF BASIC SEDIMENTATION, PHYSICAL FILTRATION OF TOTAL SUSPENDED SOLIDS (TSS), AND GROSS SOLIDS AND DEBRIS REMOVAL. THE STORMSAFE PATHOGEN CARTRIDGE ACHIEVES THE FOLLOWING EFFLUENT DISCHARGE WATER QUALITY GOALS:

- SPECIFICALLY TARGETS AND KILLS 50 TO 70% OF THE BACTERIA IN STORMWATER
- PROVEN CAPABLE OF REDUCING THE FOLLOWING TYPES OF INDICATOR BACTERIA:
  - 77% E.Coli
  - 77% FECAL COLIFORM
  - 49% ENTEROCOCCUS
- NO ATTENUATION OR DISSIPATION OF BACTERIA REMOVAL EFFICIENCY OVER TIME REGARDLESS OF TOTAL MASS LOADING
- NO TOXICITY RESIDUAL IMPACTS TO DOWNSTREAM BIOTA
- REMOVAL OF OIL AND GREASE

MEDIA FILTRATION PROCESS SPECIFICATIONS:
1. FILTER CARTRIDGES SHALL BE OPEN CELL FOAM SUBSTRATA MEDIA WITH THE PATENTED CHEMICAL CHARGED COATING ON POLYMER OPEN CELL FOAM SUBSTRATA MEDIA.
2. THE DEPTH OF THE POLYMER MEDIA SHALL BE NOT LESS THAN 11-INCHES IN DEPTH / THICKNESS.
3. THE SPECIFIC HYDRAULIC LOADING RATE OF THE FILTRATION MEDIA SHALL BE NO MORE THAN THE VALUE SHOWN IN THE STORMSAFE FILTER TREATMENT DESIGN TABLE ABOVE.

CONSTRUCTION NOTES:
1. CONTRACTOR TO VERIFY VERTICAL DIMENSIONS OF ALL PRECAST PIECES IN FIELD
2. VERIFY SUBBASE ELEVATION BEFORE PLACING PRECAST COMPONENTS OR BACKFILLING.
3. APPLY BUTYL MASTIC AND/OR GROUT TO SEAL JOINTS OF STRUCTURE.
4. APPLY LOAD TO MASTIC SEAL IN JOINTS OF VAULT/MANHOLE SECTIONS TO COMPRESS SEALANT IF NECESSARY. UNIT MUST BE WATER TIGHT, HOLDING WATER UP TO FLOWLINE INVERT (MINIMUM).
5. CONTRACTOR TO GROUT SEAL INLET AND DISCHARGE PIPES TO VAULT/MANHOLE WALL
6. ALL INTERNAL COMPONENTS INSTALLED BY MANUFACTURER
7. BLOCK AND/OR GROUT PACK BENEATH FRAMES AND COVERS TO MATCH FINISHED GRADE.

MATERIALS:
1. FINAL DIMENSIONS OF PROJECT SPECIFIC MANUFACTURING VARIES WITH LOCAL PRE-CASTING CAPACITIES AS WELL AS PER SITE SPECIFIC STRUCTURAL DESIGN TO MEET INSTALLATION, APPLICATION DEMANDS.
2. ALL DIMENSIONS ARE IN DECIMAL INCHES
3. PRECAST MATERIALS AND MANUFACTURING METHODS SHALL CONFORM TO ASTM C-857 AND AASHTO LOADING METHOD
4. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH F' c = 5,000 - psi AT 28-DAYS
5. THE PORTLAND CEMENT USED IN THE PRECAST SECTION SHALL MEET THE REQUIREMENTS OF TYPE II/V HIGH SULFATE RESISTANT
6. BASIN (PLASTIC) SHALL BE POLYPROPYLENE COPOLYMER
7. ALL METAL WORK SHALL BE ASTM 316L STAINLESS STEEL

LIFTING WEIGHTS:
1. HEAVIEST PICK WEIGHT IS 31,000-LBS
2. JENSEN CRANE TRUCK CAN SET A MAXIMUM OF 25,000-LBS AT 15-FT OFFSET DISTANCE FROM CENTER OF CRANE TRUNNION

MATERIAL LIST - PROVIDED WITH UNIT:

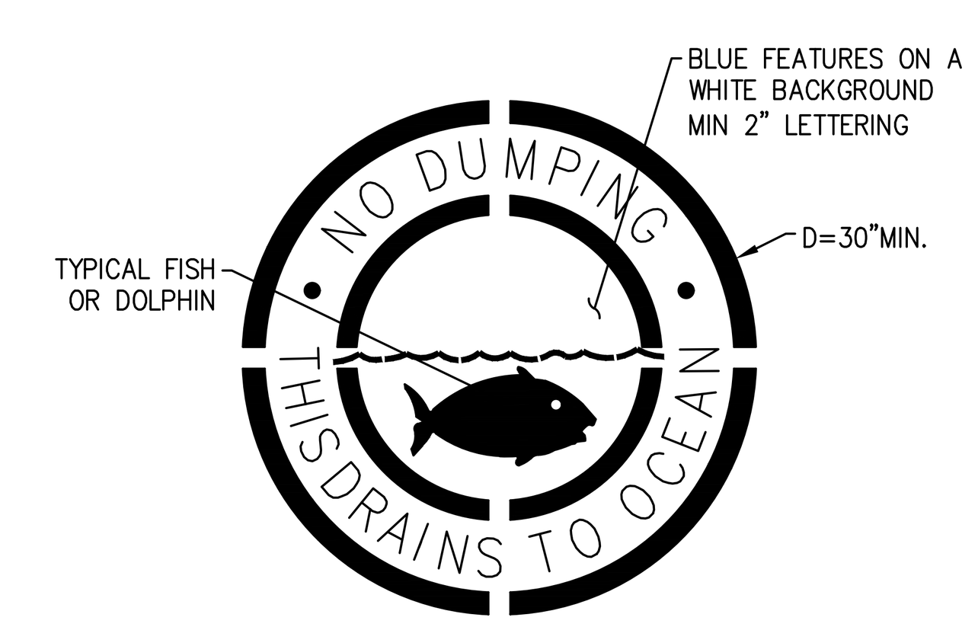
QTY	COMPONENT DESCRIPTION	PROVIDER	INSTALLER
14	STORM SAFE PATHOGEN FILTER CARTRIDGES	JENSEN	JENSEN
6	36" GRADE RING	JENSEN	CONTRACTOR
2	36" COVER	JENSEN	CONTRACTOR

DISCLAIMERS, INCLUDING BUT NOT LIMITED TO:
1.) All elevations have been provided by others, and have not been verified by Jensen Precast. Contractor to verify all dimensions and elevations in field prior to installation.
2.) These layout drawings are intended to show overall system design only. All concrete component thicknesses, dimensions, and joint orientations may vary across Jensen Precast's manufacturing facilities. Contractor to confirm all thicknesses, dimensions, and joint orientations prior to installation.
3.) System design criteria has been provided to Jensen Precast. Others are responsible for verification that system meets intended application.
4.) Foundation, subgrade, and backfill to be designed by others.

JENSEN STORMWATER SYSTEMS
521 DUNN CIRCLE, SPARKS, NV 89431
www.jensenwaterresources.com
(855) 468-5600

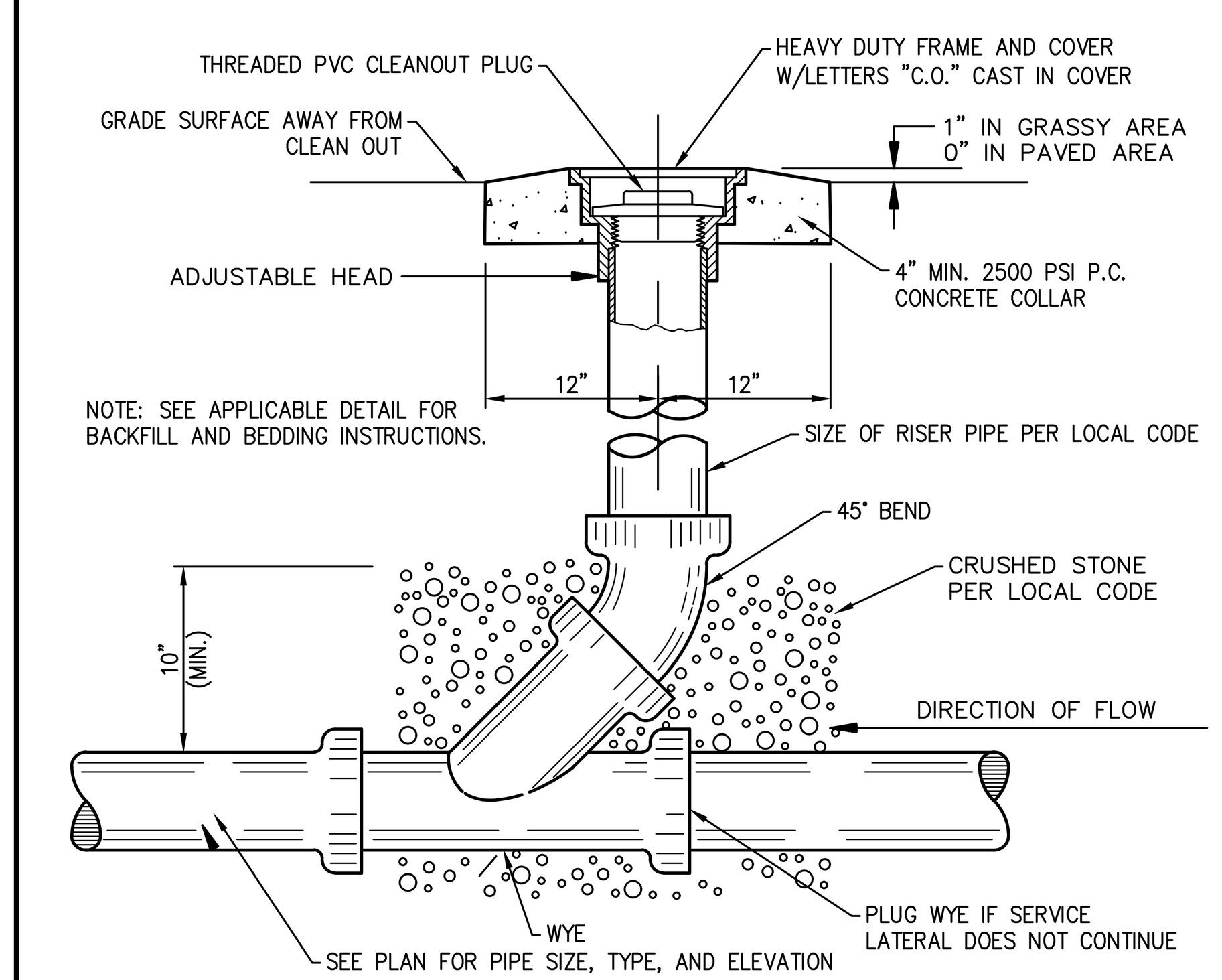
PROJECT: DANA POINT STORMSAFE, DANA POINT, CA
PART NUMBER: STORMBASIN HORIZONTAL CONFIG VER 2 | DRAWN BY: R. Luo | CREATED: | MODIFIED: 2/4/2020 | REV: | SHEET: 1 OF 2

STORMBASIN HORIZONTAL CONFIG DRAWING.dwg



NOTE: STORM DRAIN IS A PRIVATE SYSTEM. ALL STORM DRAIN INLETS (CATCH BASINS) THAT DISCHARGE INTO AN EXISTING OR PROPOSED STORM DRAIN SHALL BE MARKED (LABELED) WITH THE ABOVE NOTATION TO DISCOURAGE ILLEGAL DUMPING OF POLLUTANTS.

49 50 51 STORM DRAIN INLET MARKING
N.T.S.

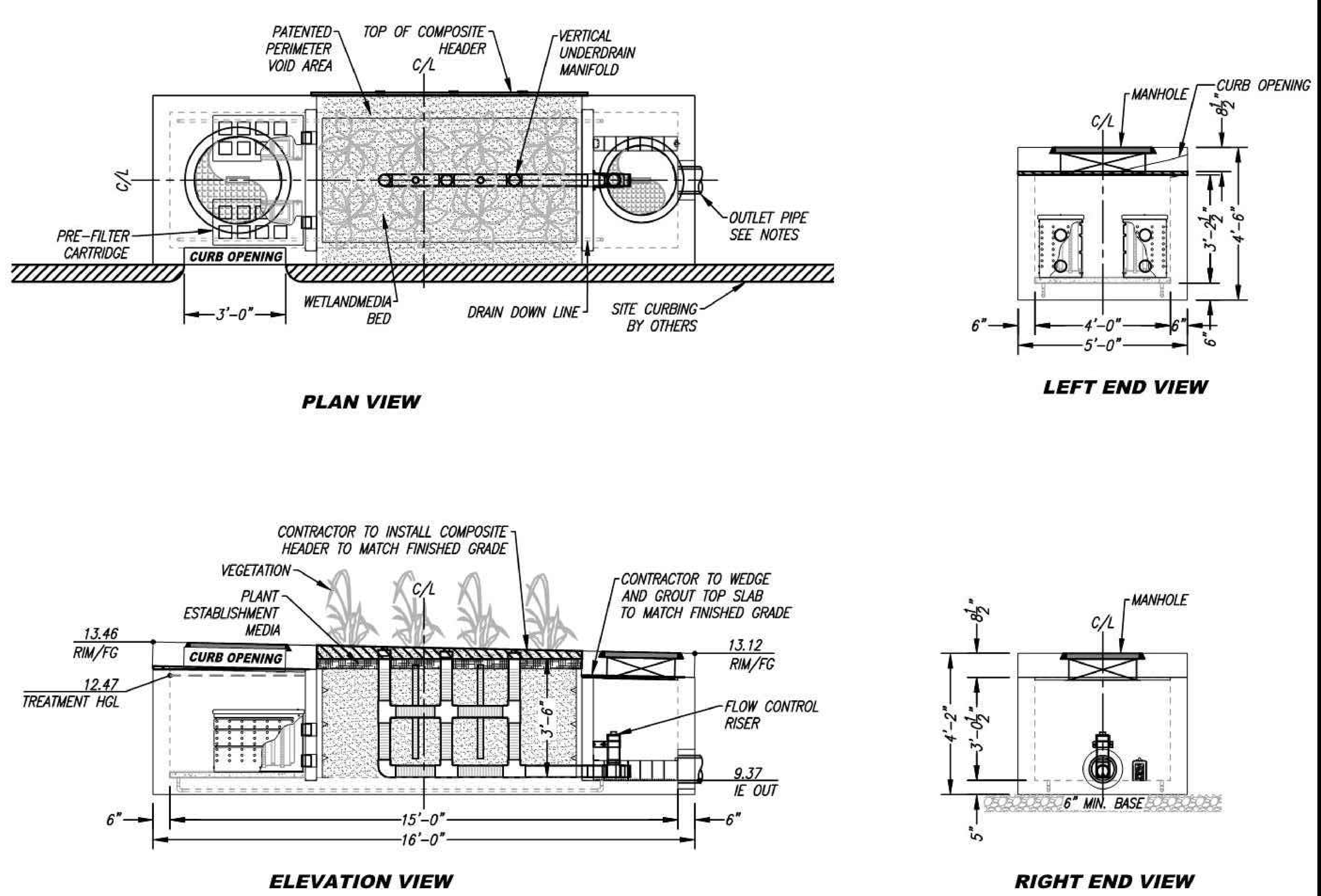


60 CLEANOUT DETAIL
N.T.S.

SITE SPECIFIC DATA

SITE SPECIFIC DATA			
PROJECT NUMBER		9931	
PROJECT NAME		DANA POINT HARBOR REHABILITATION	
PROJECT LOCATION		DANA POINT, CA	
STRUCTURE ID		SYSTEM #2.5	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.160	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			FLOW BY
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	N/A	N/A	N/A
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	9.37	PVC	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	13.12	13.12	13.12
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	ø30"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			TBD
ORIFICE SIZE (DIA. INCHES)			TBD

NOTES: PRELIMINARY. NOT FOR CONSTRUCTION.



TREATMENT FLOW (CFS)	0.160
OPERATING HEAD (FT)	3.1
PRETREATMENT LOADING RATE (GPM/SF)	1.4
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-4-15-3'-6"-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING MODULAR WETLANDS FOR ACTIVATION OF UNIT. MANUFACTURES WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A MODULAR WETLANDS REPRESENTATIVE.

GENERAL NOTES

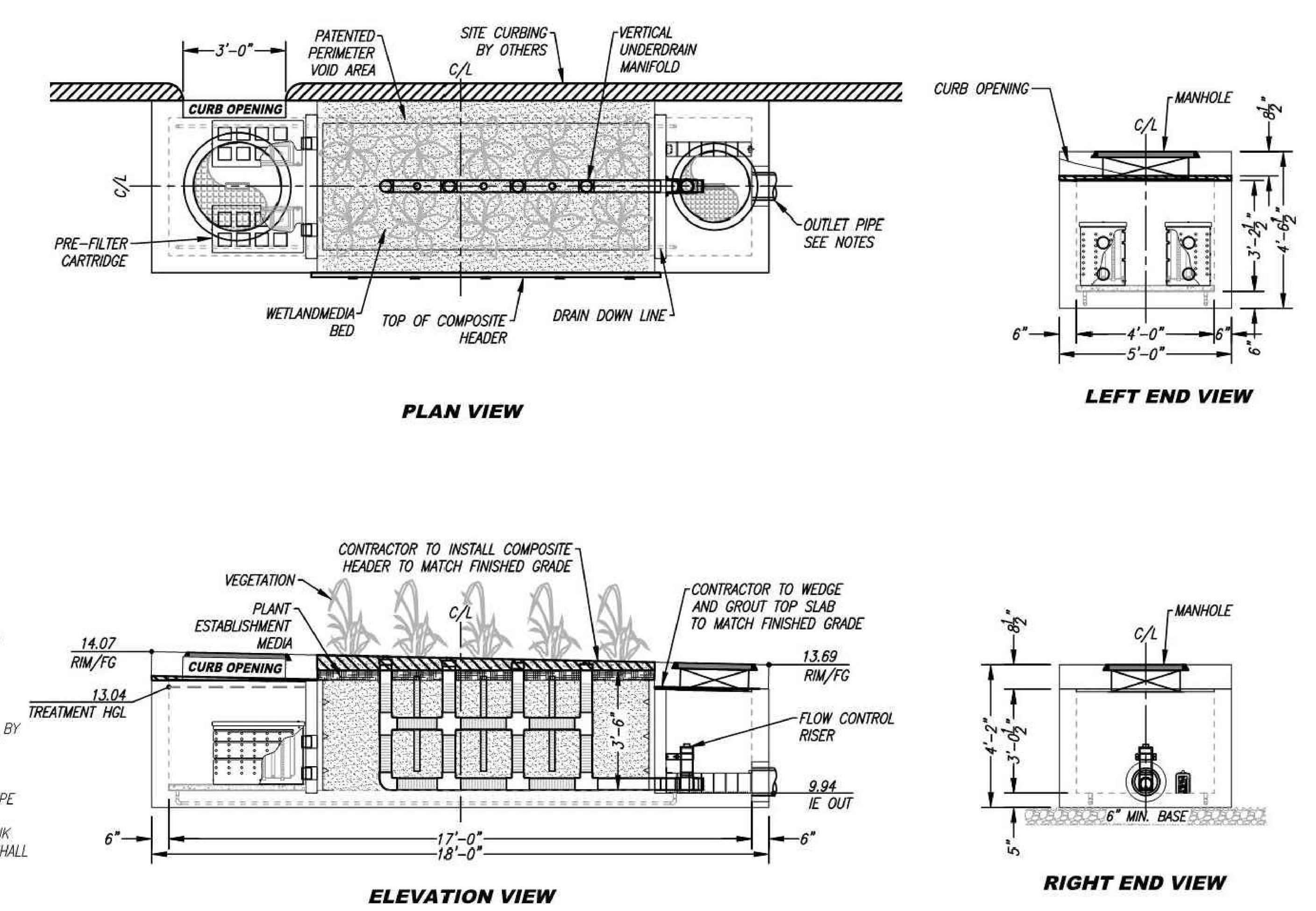
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

Bio Clean A Forterra Company

SITE SPECIFIC DATA

SITE SPECIFIC DATA			
PROJECT NUMBER		9931	
PROJECT NAME		DANA POINT HARBOR REHABILITATION	
PROJECT LOCATION		DANA POINT, CA	
STRUCTURE ID		SYSTEM 2.8	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.190	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			FLOW BY
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	N/A	N/A	N/A
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	9.94	PVC	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	13.69	13.69	13.69
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	ø30"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			TBD
ORIFICE SIZE (DIA. INCHES)			TBD

NOTES: PRELIMINARY. NOT FOR CONSTRUCTION.



TREATMENT FLOW (CFS)	0.190
OPERATING HEAD (FT)	3.1
PRETREATMENT LOADING RATE (GPM/SF)	1.7
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-4-17-3'-6"-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING MODULAR WETLANDS FOR ACTIVATION OF UNIT. MANUFACTURES WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A MODULAR WETLANDS REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

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6					
5					
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JACOB VANDERVIS R.C.E. No. C46301 DATE

DRAWN BY: DATE
DESIGNED BY: DATE
CHECKED BY: DATE
RECOMMENDED BY: DATE

DANA POINT HARBOR REVITALIZATION
DANA POINT HARBOR PARTNERS, LLC

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PARKING STRUCTURE PRECISE GRADING PLANS

STORM DRAIN DETAILS

APPENDIX E – CATCH BASIN SIZING

```
************************************************************************
                HYDRAULIC ELEMENTS - I  PROGRAM PACKAGE
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                          Analysis prepared by:




------------------------------------------------------------------------
  TIME/DATE OF STUDY: 11:12 02/05/2020
========================================================================
 Problem Descriptions:
  CB No. 9
  Area C2.1

************************************************************************
>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<
------------------------------------------------------------------------


    Curb Inlet Capacities are approximated based on the Bureau of
    Public Roads nomograph plots for flowby basins and sump basins.


    BASIN INFLOW(CFS) =    1.49
    BASIN OPENING(FEET) =  0.50
    DEPTH OF WATER(FEET) =  0.50

    >>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) =       1.37

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

 Problem Descriptions:
  CB No. 8
  Area C2.2

************************************************************************
>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<
------------------------------------------------------------------------


    Curb Inlet Capacities are approximated based on the Bureau of
    Public Roads nomograph plots for flowby basins and sump basins.


    BASIN INFLOW(CFS) =    0.48
    BASIN OPENING(FEET) =  0.50
    DEPTH OF WATER(FEET) =  0.50

    >>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) =       0.44

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

 Problem Descriptions:
  CB No. 7
  Area C2.4

************************************************************************
>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<
------------------------------------------------------------------------


    Curb Inlet Capacities are approximated based on the Bureau of
    Public Roads nomograph plots for flowby basins and sump basins.


    BASIN INFLOW(CFS) =    1.04
    BASIN OPENING(FEET) =  0.50
    DEPTH OF WATER(FEET) =  0.50
```

>>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) = 0.95

==========

Problem Descriptions:
CB No. 4
Area C2.8

****
>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<

Curb Inlet Capacities are approximated based on the Bureau of
Public Roads nomograph plots for flowby basins and sump basins.

BASIN INFLOW(CFS) = 1.65
BASIN OPENING(FEET) = 0.50
DEPTH OF WATER(FEET) = 0.50

>>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) = 1.51

==========

Problem Descriptions:
CB No. 5
Area C2.9

****
>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<

Curb Inlet Capacities are approximated based on the Bureau of
Public Roads nomograph plots for flowby basins and sump basins.

BASIN INFLOW(CFS) = 2.07
BASIN OPENING(FEET) = 0.50
DEPTH OF WATER(FEET) = 0.50

>>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) = 1.90

==========

Problem Descriptions:
CB No. 6
Area C2.6

****
>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<

Curb Inlet Capacities are approximated based on the Bureau of
Public Roads nomograph plots for flowby basins and sump basins.

BASIN INFLOW(CFS) = 1.26
BASIN OPENING(FEET) = 0.50
DEPTH OF WATER(FEET) = 0.50

>>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) = 1.15

==========

Problem Descriptions:
CB No. 3
Area C2.10A

****
>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<

Curb Inlet Capacities are approximated based on the Bureau of
Public Roads nomograph plots for flowby basins and sump basins.

BASIN INFLOW(CFS) = 1.12
BASIN OPENING(FEET) = 0.50
DEPTH OF WATER(FEET) = 0.50

>>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) = 1.03

==========

Problem Descriptions:
CB No. 2
Area C2.10B

****

>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<

Curb Inlet Capacities are approximated based on the Bureau of
Public Roads nomograph plots for flowby basins and sump basins.

BASIN INFLOW(CFS) = 2.56
BASIN OPENING(FEET) = 0.50
DEPTH OF WATER(FEET) = 0.50

>>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) = 2.35

==========

Problem Descriptions:
CB No. 1
Area C2.11

****

>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<

Curb Inlet Capacities are approximated based on the Bureau of
Public Roads nomograph plots for flowby basins and sump basins.

BASIN INFLOW(CFS) = 1.75
BASIN OPENING(FEET) = 0.50
DEPTH OF WATER(FEET) = 0.50

>>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) = 1.60

==========

Inlet Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Feb 10 2020

CB No. 9

Grate Inlet

Location	= Sag
Curb Length (ft)	= -0-
Throat Height (in)	= -0-
Grate Area (sqft)	= 2.57
Grate Width (ft)	= 2.10
Grate Length (ft)	= 2.45

Gutter

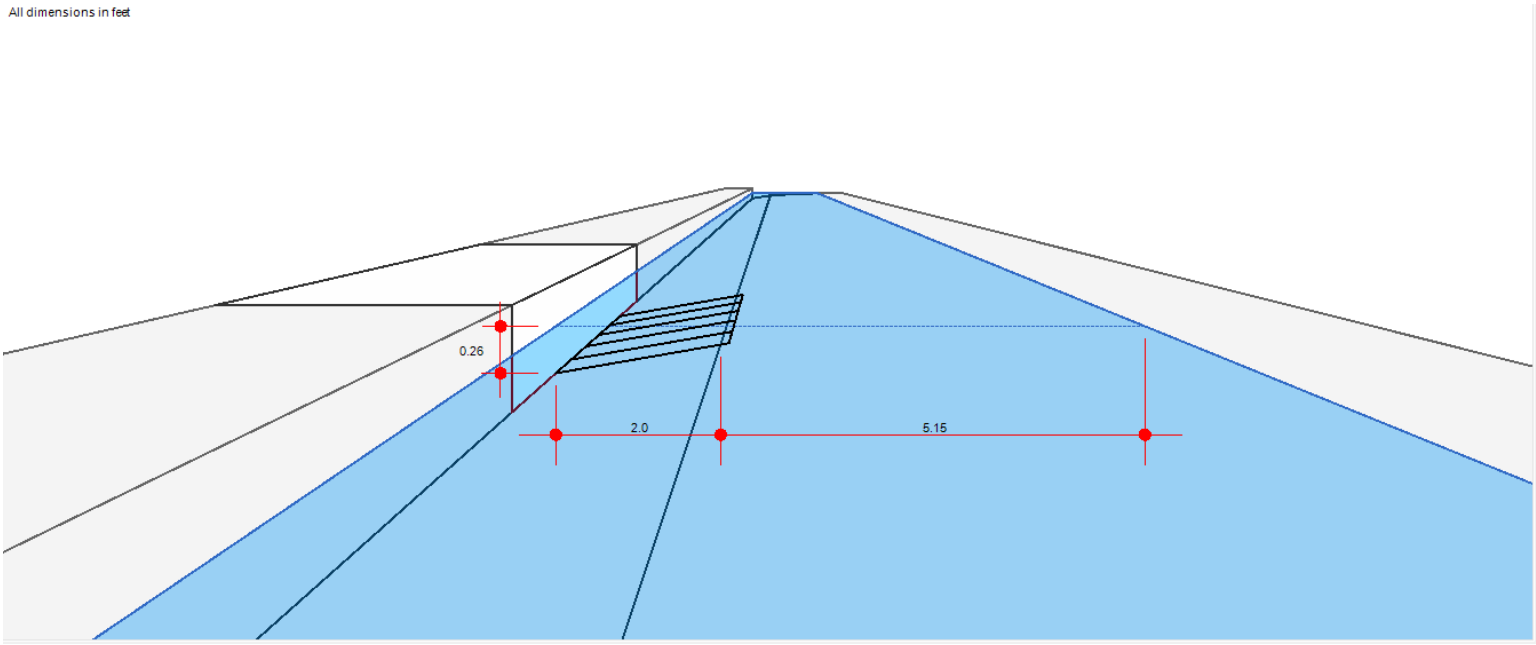
Slope, Sw (ft/ft)	= 0.080
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= -0-
Gutter Width (ft)	= 2.00
Gutter Slope (%)	= -0-
Gutter n-value	= 0.013

Calculations

Compute by:	Known Q
Q (cfs)	= 1.51

Highlighted

Q Total (cfs)	= 1.51
Q Capt (cfs)	= 1.51
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 3.16
Efficiency (%)	= 100
Gutter Spread (ft)	= 7.15
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-



APPENDIX F – MASTER PLAN OF DRAINAGE

Master Plan of Drainage

for

Dana Point Harbor

Commercial Core Retail & Dry Stack Lease Areas

Permit No. GRD19-0177

Dana Point, California

January, 2020

This Hydrology Study has been prepared by, and under the direction of, the undersigned, a duly Registered Civil Engineer in the State of California. Except as noted, the undersigned attests to the technical information contained herein, and has judged to be acceptable the qualifications of any technical specialists providing engineering data for this report, upon which findings, conclusions, and recommendations are based.

Jacob Vandervis, PE
Registered Civil Engineer No. C46301
Exp.: 12/31/20

REGISTERED PROFESSIONAL ENGINEER
JACOB VANDERVIS
No. 046301
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Prepared for:

BWP BURNHAM|WARD PROPERTIES
R.D. OLSON CONSTRUCTION
BELLWETHER FINANCIAL GROUP

Dana Point Harbor Partners, LLC &
Dana Point Harbor Partner Dry Stack, LLC
1100 Newport Center Drive, Suite 200
Newport Beach, CA 92660

Prepared by:

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RISING TO THE CHALLENGE

Tait & Associates, Inc.
701 N. Parkcenter Drive
Santa Ana, CA 92705
(714) 560-8200

TAIT JOB # **ME0381**

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TECHNICAL APPENDIX

ABBREVIATIONS

AES: Advanced Engineer Software
BMP: Best Management Practices
CCA: Commercial Core Area
CCRA: Commercial Core Retail Area
CDP: Coastal Development Plan
DPH: Dana Point Harbor
DSA: Dry Stack Lease Area
DMA: Drainage Management Area
HGL: Hydraulic Grade Line
LDM: Local Drainage Manual
NRCS: National Resources Conservation Service
OCHM: Orange County Hydrology Manual
WQMP: Water Quality Management Plan
WQ: Water Quality

SECTION 1 INTRODUCTION AND BACKGROUND

The Master Plan of Drainage (MPD) study provides a storm water runoff management program analysis and drainage design for the proposed Dana Point Harbor (DPH or Harbor) Revitalization Project for the Commercial Core Area (CCA) approved under Coastal Development Plan (CDP) 13-0018(1), which includes the Commercial Core Retail Area (CCRA) and the Dry Stack Lease Area (DSA). The analysis on this study incorporates hydrology and hydraulic design of the storm drain system for flood control and water quality treatment purposes. This MPD analyses the existing drainage patterns and provides preliminary proposed condition calculations for the CCA. It determines the existing storm drainage capacity, preliminary location of proposed inlets and storm drain systems. In addition, this Report outlines a program for future Water Quality Best Management Practices (BMPs) designed to meet the South Orange County regulations. The MPD will serve as a guideline for future studies to be prepared for final construction documents for the CCRA and DSA. The recommendations of this MPD will reduce potential hydrologic impacts to the appropriate levels as described in this document. This study was prepared following the requirements set forth by the Orange County Hydrology Manual (OCHM), dated 1986, and its 1996 Addendum and the Orange County Local Drainage Manual (LDM), dated January 1996.

DPH encompasses approximately 276.8 acres, owned by the County of Orange (County), and located in the southern portion of the City of Dana Point (City). The proposed CCA improvements within DPH constitute approximately 30 acres. DPH is bordered by the Pacific Ocean to the south, Dana Point Headlands and Old Cove Marine Preserve to the west, Doheny State Beach to the east and a variety of commercial, hotel, residential and public park uses to the north. The Interstate-5 freeway is located approximately two miles to the east and provides regional access to the Harbor. The City lies in the southwest portion of Orange County, in the State of California and it is part of the larger Southern California Region. It was incorporated on January 1st, 1989 and comprises of approximately 6.5 square miles. See Figure 1 Vicinity Map for project location.

The Dana Point Harbor Revitalization Plan has been in process since the late 1990's. The project goal is to improve the Harbor's boat slips, retail center, boater facilities and parking, and storm water quality treatment. The Dana Point Harbor is owned by the County of Orange and it is currently under a 66-year operating and maintenance lease agreement with the DPH Partners, LLC. and DPH Partners Drystack, LLC. which includes: Burnham Ward Properties, R.D. Olson Development and Bellwether Financial Group. Burnham Ward Properties will develop the Commercial Core Retail Area, R.D. Olson will develop the Hotel Area, and Bellwether Financial Group will develop the Marina portion and the Dry Stack Lease Area.

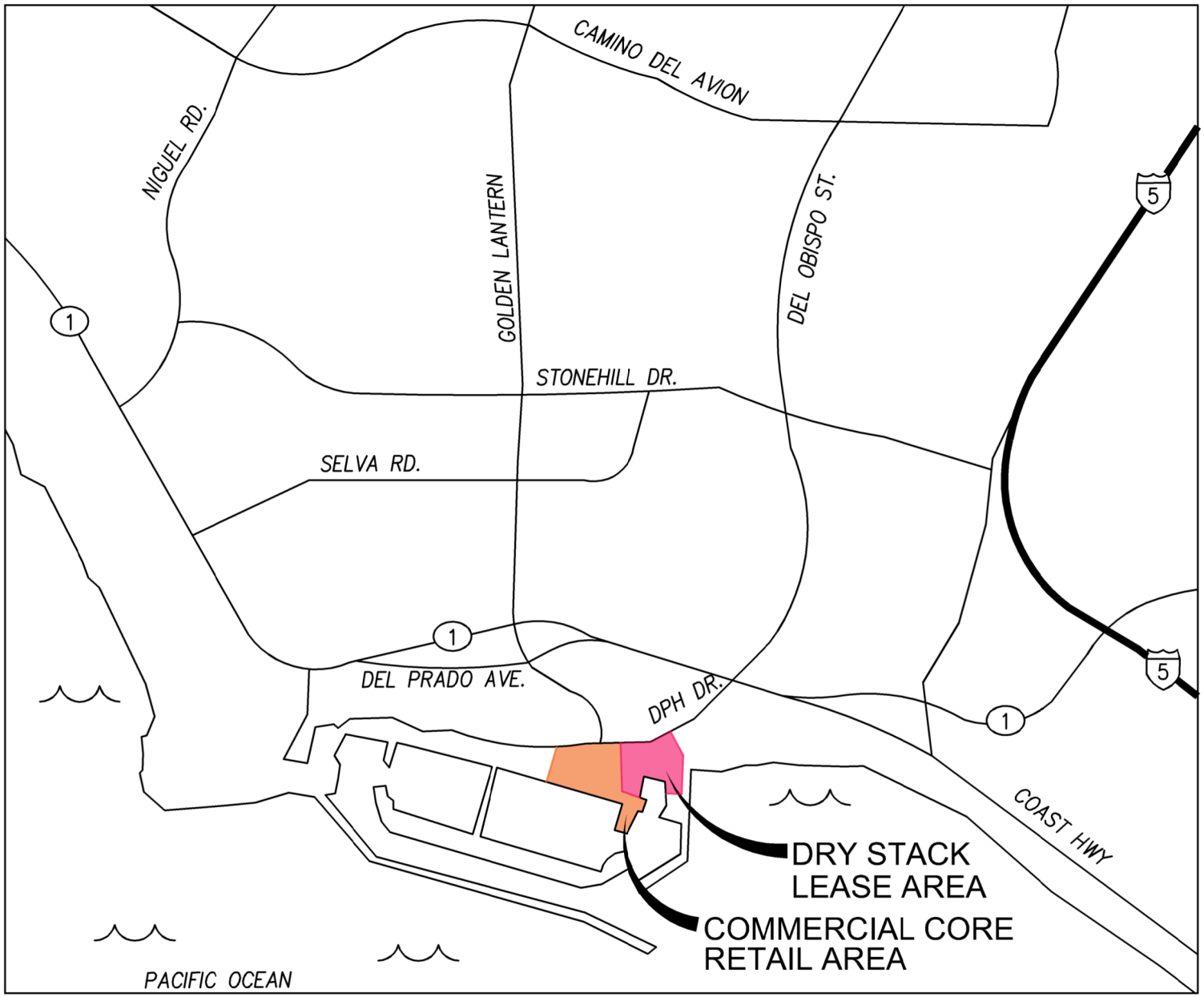

FIGURE 1 - VICINITY MAP

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K:\Drawings\ME\ME03810 – Dana Point Harbor\ENG\Hydrology\Master\Figures\ME03810– Vicinity Map.dwg
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Figure 2 DPH Study Area provides an overview of DPH and the CCA. The CCRAA portion of the Harbor will include twelve commercial buildings, surface parking lots, and a 3-level parking structure. The Dry Stack Lease Area incorporates pavement improvements to the existing parking lot, removal of Embarcadero Place and improvements to the existing Boater Services Building. The CCA encompasses the northeast portion of DPH with Casitas Place to the west and Puerto Place to the east, the East Cove Marina and to the south and Dana Point Harbor Drive to the north.

The Environmental Impact Report (EIR), dated 2006, outlined multiple Planning Areas for the DPH Revitalization. The improvements discussed in this MPD are Planning Areas PA-1 and PA-2 of the EIR. PA -1 is the CCRA and PA-2 is the DSA. The proposed development will comply with all of the Project Design Features (PDF), Standard Conditions of Approval (SCA), and Mitigation Measures (MM) outlined in the EIR. Exhibit B of the EIR describes all the PDFs, MMs and SCAs and it is provided in *Appendix E*. This Report will comply with PDF 4.4-1, SCA 4.4-8, SCA 4.4-9, SCA 4.4-10, SCA 4.4-11, MM 4.1-1a, MM 4.3-13, MM 4.4-1, MM 4.4-2, MM 4.4-3, MM4.7-6, and MM 4.8-11.

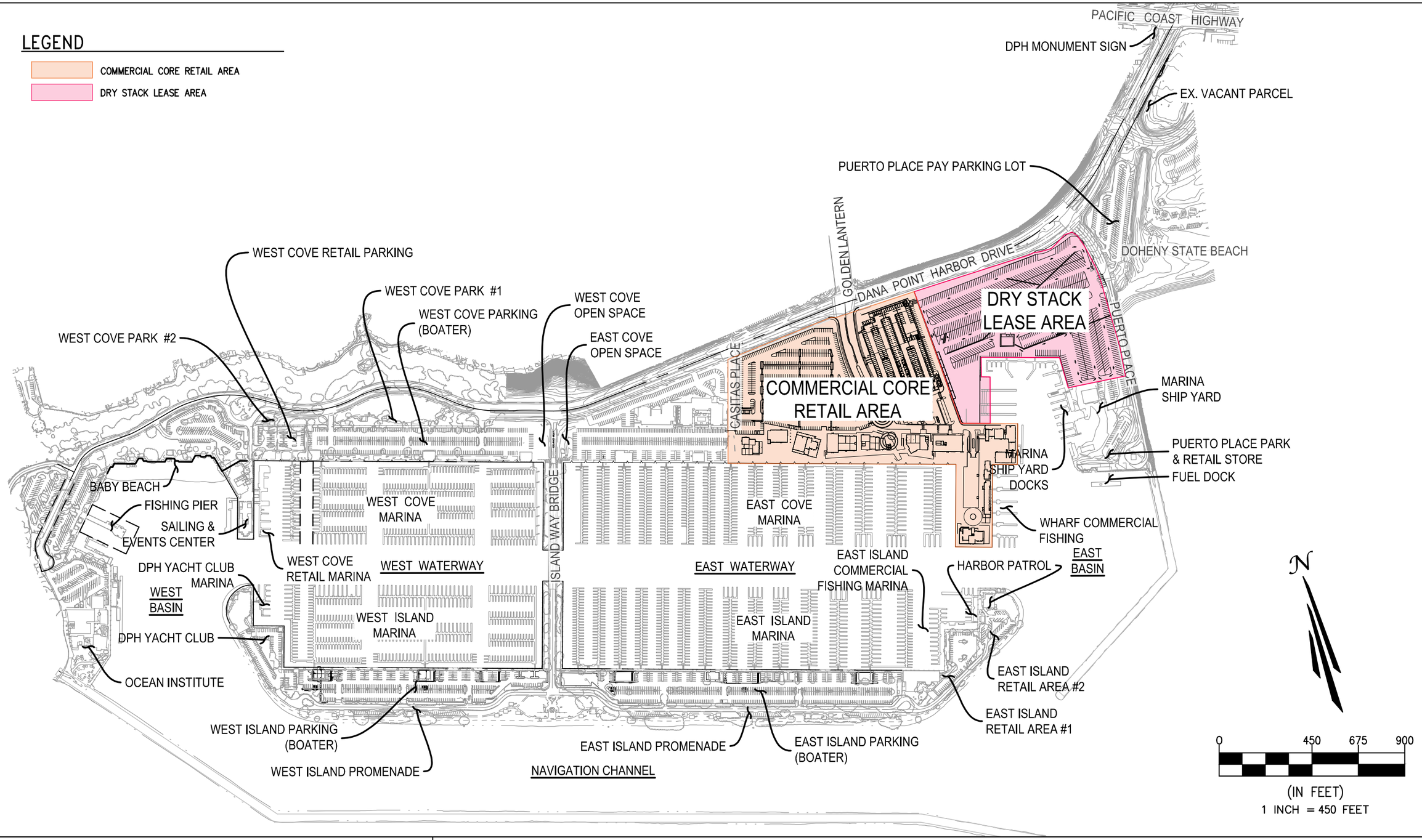

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FIGURE 2 - DPH STUDY AREA

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SECTION 2 PROJECT DESCRIPTION

Dana Point Harbor (DPH) was constructed between the late 1960's and early 1970's by the County of Orange and the United States Army Corps of Engineers. In the late 1990's the County began planning for the Revitalization of DPH, in 2006 the Environmental Impact Report (EIR) was approved, in November 18, 2014 the CDP was approved by the Coastal Commission and the City of Dana Point, in May 29, 2019 the Substantial Conformance to the2014 CDP was approved and detailed planning has occurred since then. At this time, the CCRA of the DPH Revitalization Plan is under construction documents and design for Phase 2B which is the construction of a 3-level Parking Structure. See Section 2.3 below for the current Construction Phasing Plan for the CCRA. The initial construction phase for the DSA is entitled under the same EIR and CDP for the CCRA and is currently in the preliminary design phase. The ultimate redevelopment of the DSA will be subject to additional Coastal Commission and City of Dana Point Local Coastal Plan approval. As part of the DPH Revitalization project Bellwether Financial Group is managing the redevelopment of the DSA and Burnham Ward is redeveloping the CCRA. *Appendix M* provides the proposed improvement plans for the CCRA and DSA, Sections 2.1 and 2.2 below provide a detailed description of each site, and Figure 3 is the Proposed Commercial Core Area Site Plan.

2.1 Dry Stack Lease Area

The DSA is located on the eastern portion of DPH, between Puerto Place and the CCRA 3-level parking structure. It encompasses approximately 12 acres, consisting of asphalt paved surfaces for vehicle parking, boat storage, an access roadway (Embarcadero Place), a boat launch ramp, a boater services building, and several underground existing wet and dry utilities including a sewer lift station. The initial construction project (interim condition) proposed improvements include the removal of Embarcadero Place and reconfiguration of the existing parking areas. The ultimate proposed improvements will consists of one 6,000-square foot (sf) two-story Boater Service and Dry Storage Office Building, boat wash stations connected to the sewer public system, potential relocation of existing sewer lift station, a reconfigured day-use auto and trailer parking lot, and dry storage facility for long term land storage of boats. No boat maintenance operations other than exterior cleaning will occur within the DSA.

2.2 Commercial Core Retail Area

The CCRA is located on the eastern portion of DPH, between Casitas Place and the DSA, immediately north of the East Cove Marina boater boat slips. It encompasses approximately 20 acres. The existing site consist of surface parking lots, retail buildings, restaurants, a portion of dry boat storage, the Dana Wharf Area and the Catalina Express. The retail and restaurant buildings are surrounded by concrete walkways and some small landscape areas. The proposed

improvements include new retail and restaurant buildings along the waterfront with an ocean front boardwalk, multiple paved surface parking lots, a 3-level parking structure, newly landscaped areas, renovation to the existing Dana Wharf and its existing buildings, and the realignment of Golden Lantern Street. The proposed 3-level parking structure is located in an area where several existing surface parking lots are located.

2.3 Construction Phasing

The CCRA Construction Phasing is currently at Phase 2B. The DSA will be built independently and will not include phasing. Detailed description of each phase including storm drain installation and the DSA construction plan is detailed below. Figure 4 is the storm drain system construction phasing.

CCRA Construction Phases

Phase 1 and Phase 2A have been completed and consisted of:

- Phase 1: Public street improvements to Puerto Place and Casitas Place at Dana Point Harbor Drive, and improvements to Dana Point Harbor Drive.
- Phase 2A: Parking lot restriping within the Dry Stack Lease Area.

Phase 2B to 6 consist of:

- Phase 2B: Rough grading, precise grading and construction of the Parking Structure within the CCRA. Precise grading operations will include the partial realignment of Golden Lantern. For the rough grading portion of the work all stormwater will be kept on-site in proposed temporary desilting basins, then cleaned and pumped via a proposed temporary pump system that will discharge to the nearest storm drain inlet. Construction activities will follow the requirements under the rough grading Stormwater Pollution Prevention Plan (SWPPP).
  During the precise grading activities and the construction of the parking structure portions of the ultimate storm drain system for the CCRA will be installed. However, the storm drain line that connects to the existing main Line C (as described in Sections 4, 5 and 6) will not be built due to conflicts with an existing Boater Services Building that must remain until the parking structure is completed. Temporary pumps will be placed to pump stormwater and discharge to the nearest storm drain inlet or manhole. This temporary condition is expected to last until the removal of the existing Boater Services Building, which is part of the initial construction activities for Phase 4A. A duration of 6 to 12 months is anticipated at this time.

- Phase 3: Redevelopment and remodeling of the existing buildings at Dana Wharf, and completion of improvements to Golden Lantern. This phase includes ultimate build out of the storm drain system that will serve Dana Wharf within the CCRA.

- Phase 4A: Buildings 6 to 9, adjacent surface parking and waterfront boardwalk area immediately adjacent to buildings. This phase includes ultimate build out of the storm drain system that will serve the Phase 2B storm drain improvements, and the removal of the temporary storm drain pumps installed as part of Phase 2B. The storm drain system will connect to main Line C.

- Phase 4B: Buildings 10, 11 and 12 adjacent surface parking and waterfront boardwalk area immediately adjacent to buildings. This phase includes ultimate build out of the main components of the CCRA storm drain system.

- Phase 5: Demolition of remaining on-site buildings and construction of surface parking lot areas remaining. At this stage the complete storm drain system for the CCRA is completed.

- Phase 6: completion of the CCRA landscaping and signing improvements.

DSA Construction

The DSA is currently entitled under the CDP to reconfigure the existing Dry Storage, the Day Use Auto and Trailer parking lots, remove Embarcadero Place, and construct a new sewer lift station. The ultimate built out will include a proposed Dry Storage Building and a Boater Services Office Building, which are not part of the current entitlements and will be subject to a separate Coastal Development Permit. For this MPD the interim condition of the DSA is being utilized. In this interim condition, Embarcadero Place is removed, the existing parking lot is reconfigured and regraded, and the existing Boater Services Building remains. The proposed storm drain system as laid out and designed in this MPD is planned to accommodate the ultimate “built-out” condition.

LEGEND

- COMMERCIAL CORE RETAIL AREA
- DRY STACK LEASE AREA

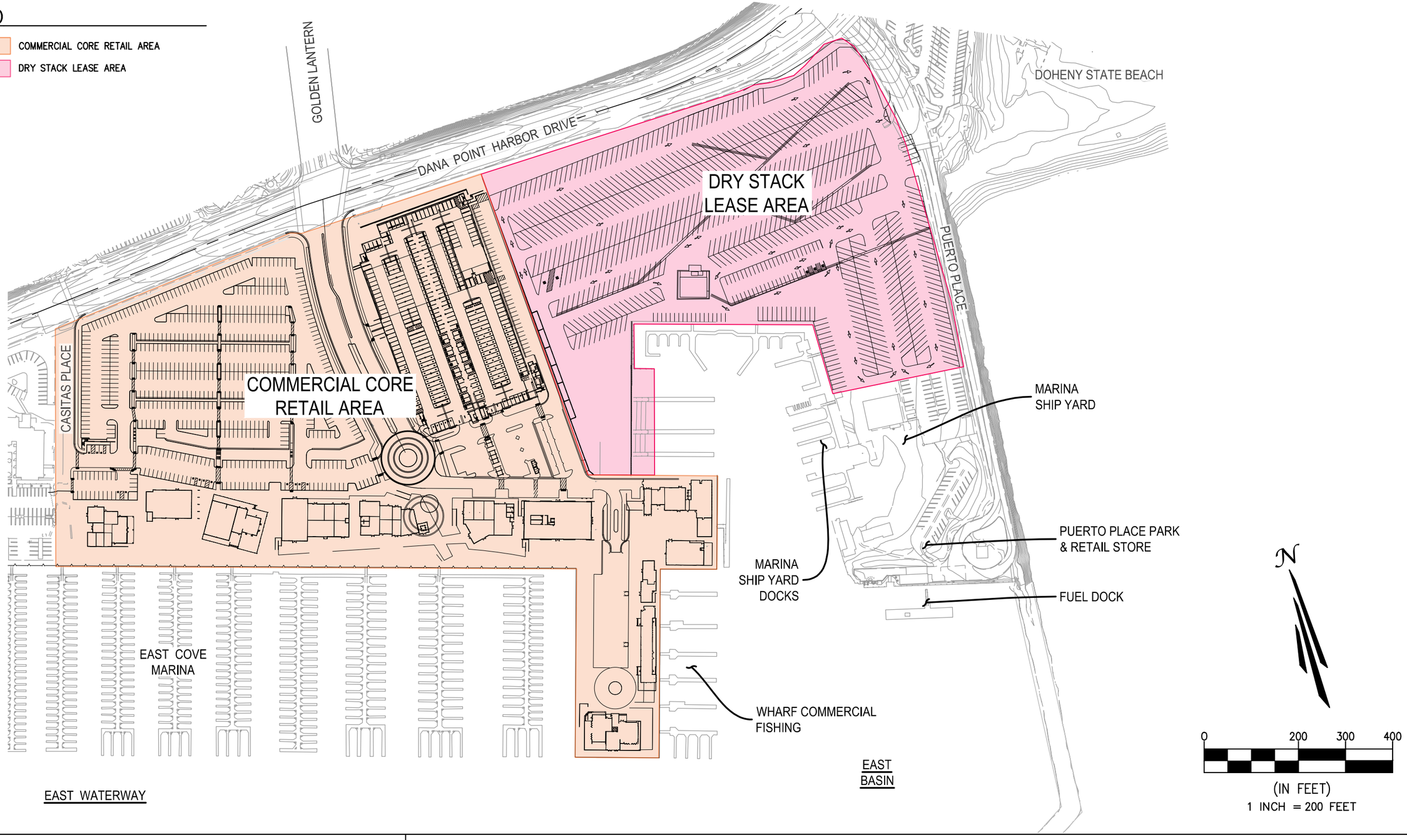

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FIGURE 3 - PROPOSED COMMERCIAL CORE AREA SITE PLAN

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DANA POINT HARBOR PARTNERS, LLC

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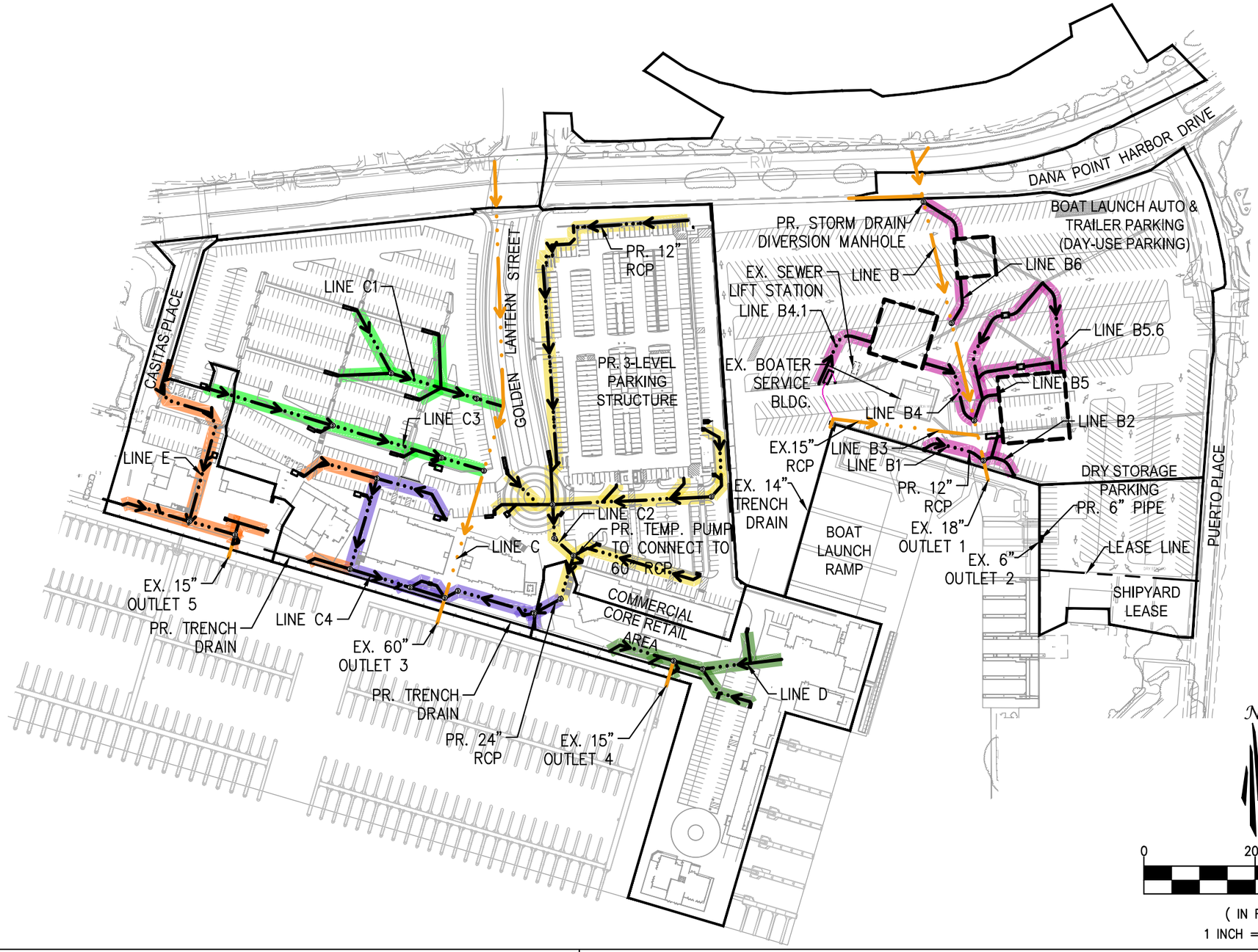

LEGEND

- DRAINAGE AREA BOUNDARY
- EXISTING STORM DRAIN LINE
- PROPOSED STORM DRAIN LINE
- PHASE 2B
- PHASE 3
- PHASE 4A
- PHASE 4B
- PHASE 5
- PHASE DSA
- PROPOSED DETENTION BASIN
- PROPOSED CATCH BASIN/INLET
- Ⓓ PROPOSED MANHOLE JUNCTION STRUCTURE

N

0 200 300 400

(IN FEET)

1 INCH = 200 FEET

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FIGURE 4 - STORM DRAIN CONSTRUCTION PHASING

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SECTION 3 HYDROLOGY DESIGN AND CRITERIA

3.1 Hydrology Criteria

The existing and proposed condition hydrology calculations were prepared in conformance with the Orange County Hydrology Manual (OCHM), dated 1986 and its Addendum No. 1, dated 1996.The hydrology analysis and small area hydrograph were prepared using the Advanced Engineer Software (AES), a computer software approved by the Orange County Flood Control District that follows the hydrology methodology and criteria from the OCHM. For this analysis drainage area delineations were prepared following existing topography and proposed contours for each analysis, flow paths, areas, and elevation were determined, as well as hydrology characteristics such as soil group and land use. The rational method for the existing and proposed conditions for the 10-year and 100-year storm were prepared for the CCRA and DSA. The Small Area Hydrograph analysis was prepared for the 10-year and 100-year storm events for the DSA for basin design and analysis purposes. Per the OCHM, the Antecedent Moisture Content (AMC) is II for the 10-year storm event, and III for the 100-year storm event. Sections 4 and 5 provide detailed descriptions for the Existing Condition and Proposed Condition Hydrology analyses.

3.1.1 Rational Method

The OCHM uses the rational method to calculate peak runoff discharge from a drainage area. It utilizes the equation Q=CIA, where Q is discharge, I is intensity, and A is area. The RATSCX module of AES was used to analyze and route runoff through each subarea using elevations, slopes, flow lengths, soil group, land use and area inputs. The rational method analysis was prepared using the high confidence rainfall values as determined by the OCHM. The AES results provide peak discharge and time of concentration. The area being analyzed includes elevation below mean sea level which result in negative numbers. Due to limitations of AES for modeling purposes all elevations were raise by 1,000 to input into the models. Time of concentration and peak flow rates for the 10- and 100-year storm events were obtained.

3.1.2 Small Area Hydrograph

The Small Area Hydrograph (SAH) was prepared to analyze the proposed underground detention basins for the DSA. The SAH analyzes the basins' ability to reduce peak flow runoff for flood control purposes. Per the OCHM the SAH applies to watersheds smaller than 640 acres. This analysis was prepared using the FLOODSCX module of AES, which utilizes the time of concentration obtained from the rational method, the rainfall depth, the total tributary area and the loss rates (F_m and $\bar{Y}$) to calculate the watershed hydrograph. The hydrograph is then routed through the proposed basin using the stage-storage-discharge table and the outflow discharge hydrograph is obtained. The small area hydrograph was run for the 10-year and 100-

year storm events to analyze the capacity of the proposed basins and the flow through the storm drain system. The basin calculations and design are describe further in Section 5.1.1 of this report.

3.2 Soil Group and Land Use

3.2.2 Land Use

The DPH Commercial Core land use types consist mainly of commercial areas. The off-site drainage area to Storm Drain Line C includes the following classifications: commercial, 5-7 dwelling Units/acre, 8-10 dwelling Units/acre, 11+ dwelling Units/acre, apartments, condominiums, and public park land use. The delineation and determination for the off-site area land use types follows the Dana Point Harbor general land use plan and aerial imagery. Figure 6 is the Land Use Map.

Shapefiles were obtained for the Soil Types from NRCS and created for the Land Use in ArcGIS. Hydrology Boundaries were imported into ArcGIS, and the areas were overlaid and intersected to develop the off-site hydrology.

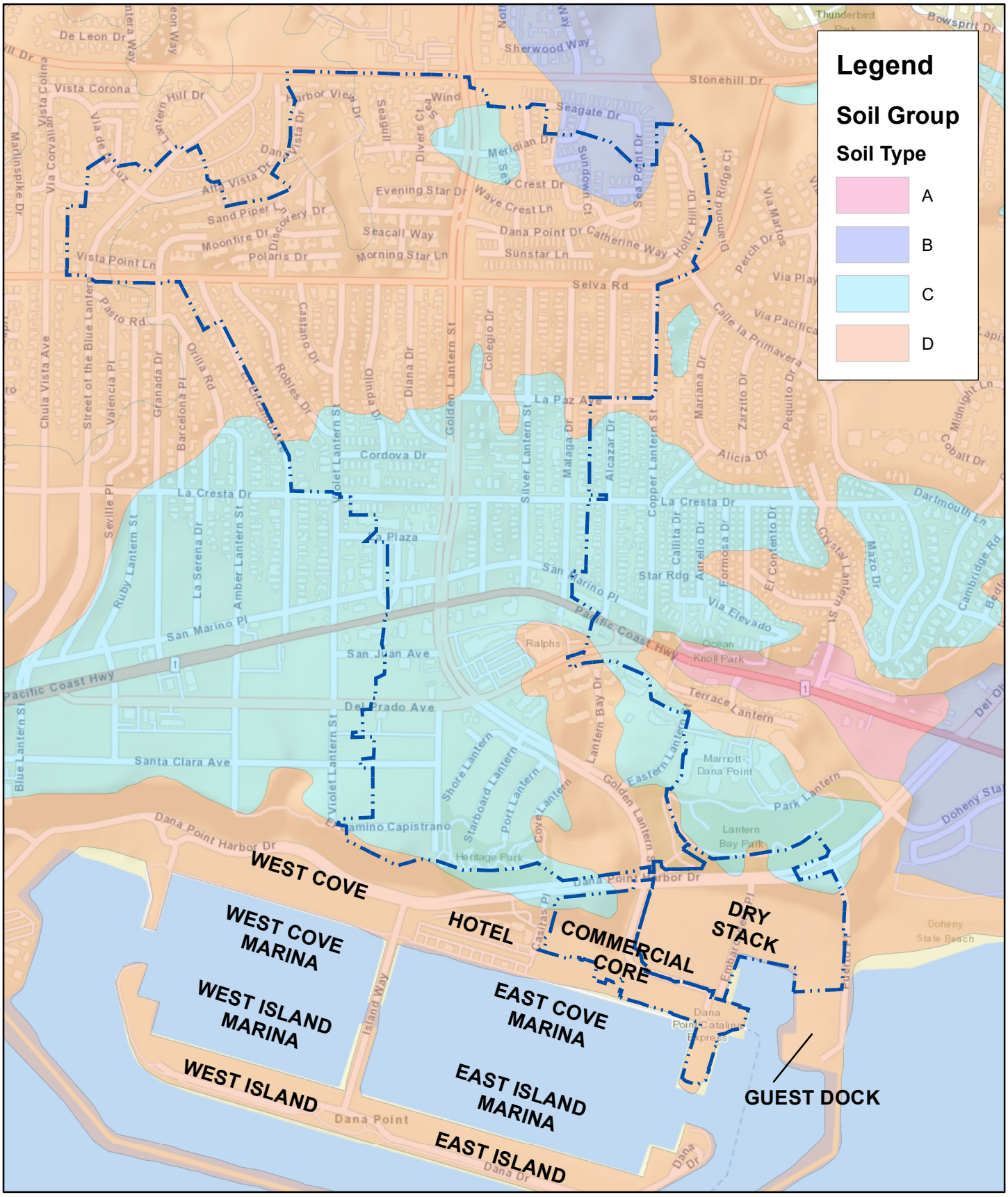
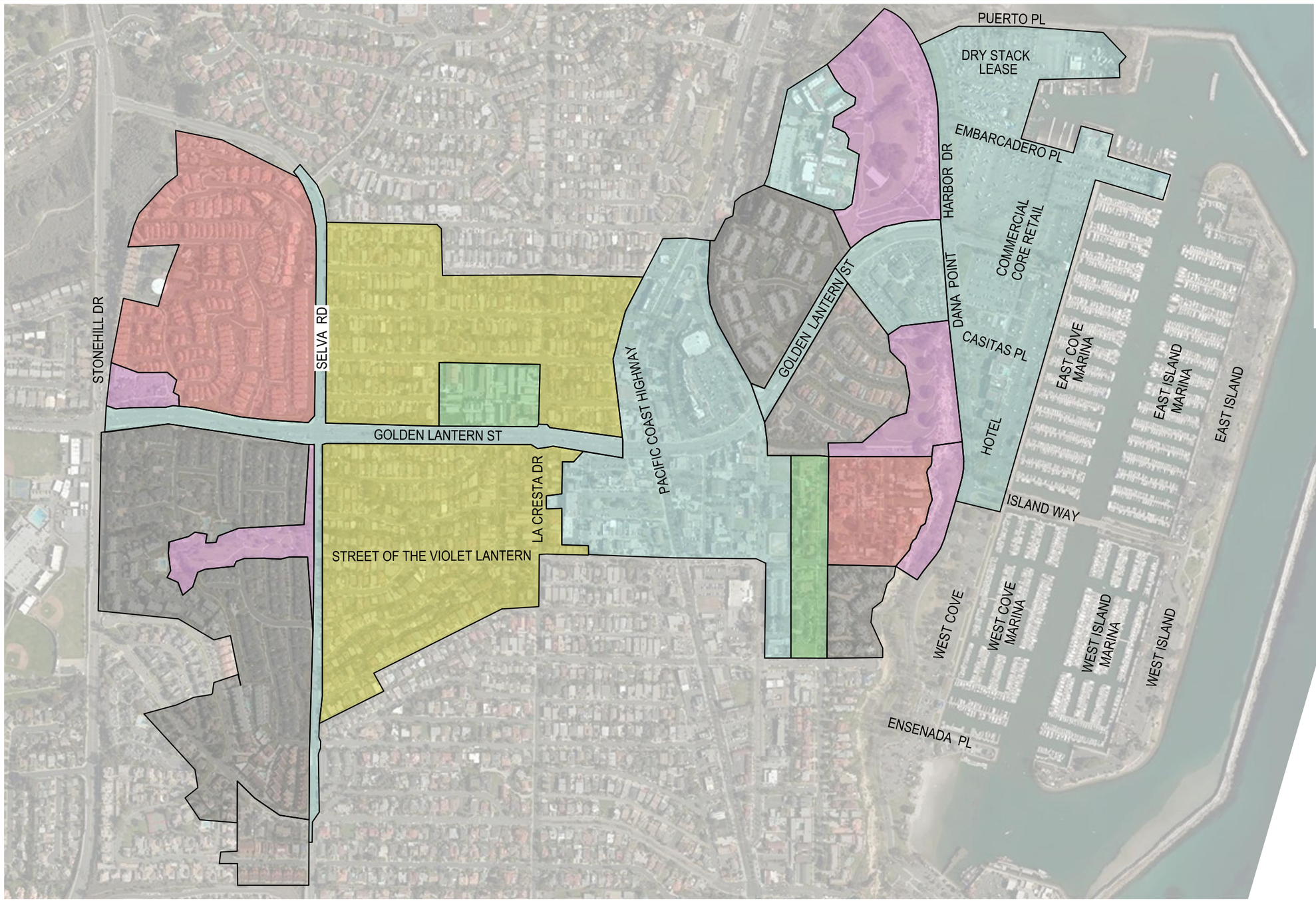


Figure 5 - Soil Group Map



LEGEND

- PUBLIC PARK
- 5–7 DWELLINGS/ACRE
- 8–10 DWELLINGS/ACRE
- 11+ DWELLINGS/ACRE
- APARTMENTS
- COMMERCIAL/DOWNTOWN BUSINESS
- CONDOMINIUMS

N

0 600 900 1200

(IN FEET)
1 INCH = 600 FEET

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FIGURE 6 - LAND USE MAP

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K:\Drawings\ME\ME03810 - Dana Point Harbor\ENG\Hydrology\Master\Figures\ME03810-Land Use Map.dwg PLOTTED: 12/4/2019 8:50:07 AM BY Edwin Medina

3.2.1 Soil Group

DPH is underlaid by artificial fills and marine deposits which overlay bedrock of the Capistrano Formation. The artificial fill materials consist of alternating layers of clayey sands, silty sands, sands, sandy clays, and sandy silts. The granular sands were found to be medium dense to dense and the fine-grained clay and silt materials were found to be predominantly firm to very firm. Marine deposit materials consist of wet, loose to medium dense, silty sands to sands. The Capistrano Formation bedrock consist of hard to very hard, fine to coarse-grained, massive sandstones with occasional beds of moderately hard to hard, gray to very dark gray claystones and siltstones.

The OCHM utilizes Hydrologic Soil Groups to develop the rational method calculations. Soils are classified as Hydrologic Soil Groups A, B, C and D. Soil group A is defined as a low runoff potential, group B has moderate infiltration rates, group C has slow infiltration rates, and group D has high runoff potential. The DPH Soil Groups were obtained from the National Resources Conservation Service (NRCS) online web soils tool. The majority of the on-site consists of groups C and D while the off-site consists of groups A, B, C, and D. Figure 5 is the Soils Group Map which includes the Soils Groups utilized for the project on-site and off-site drainage areas.

3.3 Regional Hydrology

DPH is located within the Dana Point Hydrologic Subarea of the San Juan Creek Hydrologic Unit, which is a part of the San Diego Basin. The Dana Point Harbor lies within the bounds of the Dana Point Coastal Streams Watershed, which drains to the Pacific Ocean. The almost fully developed watershed is 6 square miles and includes the cities of Dana Point, Laguna Beach Laguna Niguel and San Juan Capistrano. Included in the watershed are a number of coastal drains that discharge to the Pacific Ocean through DPH. Stormwater runoff from the site, sheet flows to different inlets that connect to underground storm drain lines that ultimately discharge to the Harbor through storm drain outlets located within the concrete stone revetment below the seawall.

The CCA includes the existing storm drain main Lines B and C which are 18- and 60-inch Reinforced Concrete Pipes (RCP), respectively. Line B bisects the DSA, while Line C bisects the CCRA. Both Line B and Line C receive off-site runoffs from the City of Dana Point. These lines discharge through Outlets 1 and 3 respectively. Line B receives a small portion of runoff from the bluffs north of the DSA and Line C receives stormwater runoff from a large off-site area consisting of residential and commercial developments within the City of Dana Point and north of Dana Point Harbor Drive. Section 4 provides more detail for these off-site drainage areas. Stormwater runoff from the proposed project areas discharges directly to the Ocean via several

County maintained and engineered storm drain systems or as stormwater runoff that sheet flows directly into the Ocean over the seawall.

SECTION 4 EXISTING CONDITION HYDROLOGY

The area being analyzed on this report consists of approximately 30 acres within the Dana Point Harbor. In the existing condition, some stormwater runoff sheet flows over the seawall, while the majority of the site's runoff is conveyed via curb opening catch basins and grated inlets into the existing County storm drain systems. There are five existing storm drain systems that service the study area: one 18-inch outlet under the seawall and one 6-inch outlet through the seawall at the southern edge of the DSA and three outlets (two 15-inch, and one 60-inch) under the seawall at the southern edge in the CCRA. These Outlets were built through the concrete stone revetment located under the existing seawall. The 6-inch outlet is a perforation found during a field visit that does not have documented as-builts, and its located 2.2-feet below the top of the sewall. Drainage areas to each outlet were delineated to obtain peak discharges for the 10-year and 100-year storm events. Hydrology maps of the existing condition that were utilized for this study are included on *Appendix A*, and the AES Rational Method Results are included in Appendix C. Figure 7 Existing Condition Drainage Areas highlights the drainage area tributary to each outlet and exhibits the existing storm drain. The sections below provide drainage area descriptions to each outlet and Table 1 is the Peak Flow Summary.

4.1 Dry Stack Lease Area Outlets

- **Outlet 1- Storm Drain Line B**

  Outlet 1 is located southeast of Embarcadero Place and outlets to the ocean under the seawall through the concrete stone revetment. In the existing condition, approximately 20.1 acres are tributary to this outlet: 15.7acres on-site and 4.4acres off-site. Existing Storm Drain Line B an 18-inch RCP as shown in the Dana Point Harbor as-builts (*Appendix K*) connects and discharges through this outlet. The off-site drainage area to Outlet 1 consist of a portion of Dana Point Harbor Drive, Puerto Place, Heritage Park and the bluffs north of Dana Point Harbor Drive. The off-site subareas encompass approximately 4.37acres. The on-site drainage area consists of dry boater storage parking and a Boater Services Building that sheet flow to existing catch basins and a 14-inch wide trench drain. The 14-inch trench drain is located at the top of the boater launch ramp and receives runoff from the boater parking lot. The existing trench drain has capacity to capture the 10-year storm event flows, higher year storm event flows will by-pass the trench drain and sheet flow directly into the Ocean (*Appendix N* provides the analysis for the trench drain capacity). The 10- year and 100-year storm event peak discharge to this outlet are 48.46 cubic feet second (cfs) and 76.15cfs respectively.

- **Outlet 2**
  Outlet 2 is located through the eastern seawall face in the DSA. In the existing condition, approximately 1.7 acres are tributary to this Outlet which connects to a 26-inch by 26-inch grated inlet. Stormwater discharges through a 6-inch PVC pipe perforation at the seawall approximately 2-feet below top of seawall. The off-site drainage area tributary to Outlet 2 consists of a portion of the adjacent Shipyard Lease Area. Stormwater from the off-site area sheet flows under an existing chain link fence into a V-Gutter, and ultimately is conveyed to the grated inlet. The on-site drainage area includes a portion of the existing dry boater storage parking. The 10-year and 100-year storm event peak discharge to this outlet are 4.75cfs and 7.29cfs respectively.

4.2 Commercial Core Retail Area Outlets

- **Outlet 3 –Storm Drain Line C**
  Outlet 3 is located in the eastern portion of the East Cove Marina and outlets to the ocean under the seawall through the concrete stone revetment. Storm Drain Line C is an existing 60-inch RCP that connects to Outlet 3 as shown in the Dana Point Harbor as-builts (*Appendix K*). In the existing condition, approximately 245 acres are tributary to this outlet. The majority of the tributary area (approximately 237 acres) is off-site with existing RCP storm drain lines that range from 33-inch to 60-inch. *Appendix A* provides the off-site existing condition hydrology map for Outlet 3. The total on-site drainage (Subarea H) has a tributary area of 7.75 acres, and consists of: paved parking lots, commercial buildings, walkways, restaurants, retail spaces and Golden Lantern Street. Stormwater runoff from these areas sheet flow through the parking lot, are collected via storm drain inlets, and connect to the existing 60-inch RCP via storm drain laterals. Stormwater runoff that is not collected through the existing inlets will sheet flow over the existing boardwalk into the Ocean. The 10-year and 100-year storm event peak discharges to this outlet are 356.23cfs and 575.46cfs respectively.

- **Outlet 4**
  Outlet 4 is located below the south facing seawall for the East Cove Marina, immediately adjacent to the west seawall of Dana Wharf. In the existing condition, approximately 3.40 acres are tributary to this outlet via an existing 15-inch RCP storm drain line (see as-builts in *Appendix K*). The drainage area consists of Dana Wharf parking lot, building areas, and the parking lot north of the Dana Wharf. Stormwater is collected via grated and curb opening catch basins. The 10-year and 100-year storm event peak discharge to this outlet are 9.06cfs and 13.84cfs respectively.

- **Outlet 5**
  Outlet 5 is located in the center of the East Cove Marina, west of Outlet 3. In the existing condition, approximately 1.55 acres are tributary to this outlet via an existing 15-inch RCP storm drain system (see as-builts in *Appendix K*). The drainage area consists of the eastern portion of the East Marina parking lot and a boater services building. The 10-year and 100-year storm event peak discharge to this outlet are 4.98 cfs and 7.61 cfs respectively.

- **Outlet 6 - Direct Discharge to the Ocean**
  Portions of DPH sheet flow directly to the Ocean over the seawall. These areas along the seawall include the boardwalk, patio eating area, and roof runoff from adjacent buildings along Dana Wharf. This drainage area includes approximately 0.44 acres and has 10-year and 100- year storm event peak discharge of 1.6 cfs and 2.44 cfs respectively.

Table 1: Existing Condition and Peak Flows Summary

Outlet	Area (AC)	10-year peak (cfs)	100 year peak (cfs)
1	20.1	48.46	76.15
2	1.7	4.75	7.29
3	252.75	356.23	575.46
4	3.4	9.06	13.84
5	1.55	4.98	7.61
6	0.44	1.6	2.44

OUTLETS EXISTING CONDITIONS			
OUTLET	AREA(AC)	10-YEAR PEAK(CFS)	100 YEAR PEAK (CFS)
1	20.1	48.46	76.15
2	1.7	4.75	7.29
3	252.75	356.23	575.46
4	3.4	9.06	13.84
5	1.55	4.98	7.61
6	0.44	1.6	2.44

LEGEND

- TRIBUTARY TO OUTLET 1
- TRIBUTARY TO OUTLET 2
- ONSITE TRIBUTARY TO OUTLET 3**
- TRIBUTARY TO OUTLET 4
- TRIBUTARY TO OUTLET 5
- TRIBUTARY TO OUTLET 6 *
- WATERSHED AREA BOUNDARY
- EXISTING STORM DRAIN LINE

NOTES

* SHEET FLOW DIRECTLY TO HARBOR
** ONLY ON-SITE TRIBUTARY AREA TO OUTLET 3 SHOWN

N

0 200 300 400

(IN FEET)
1 INCH = 200 FEET

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FIGURE 7 - EXISTING CONDITION DRAINAGE AREAS

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SECTION 5 PROPOSED CONDITION HYDROLOGY

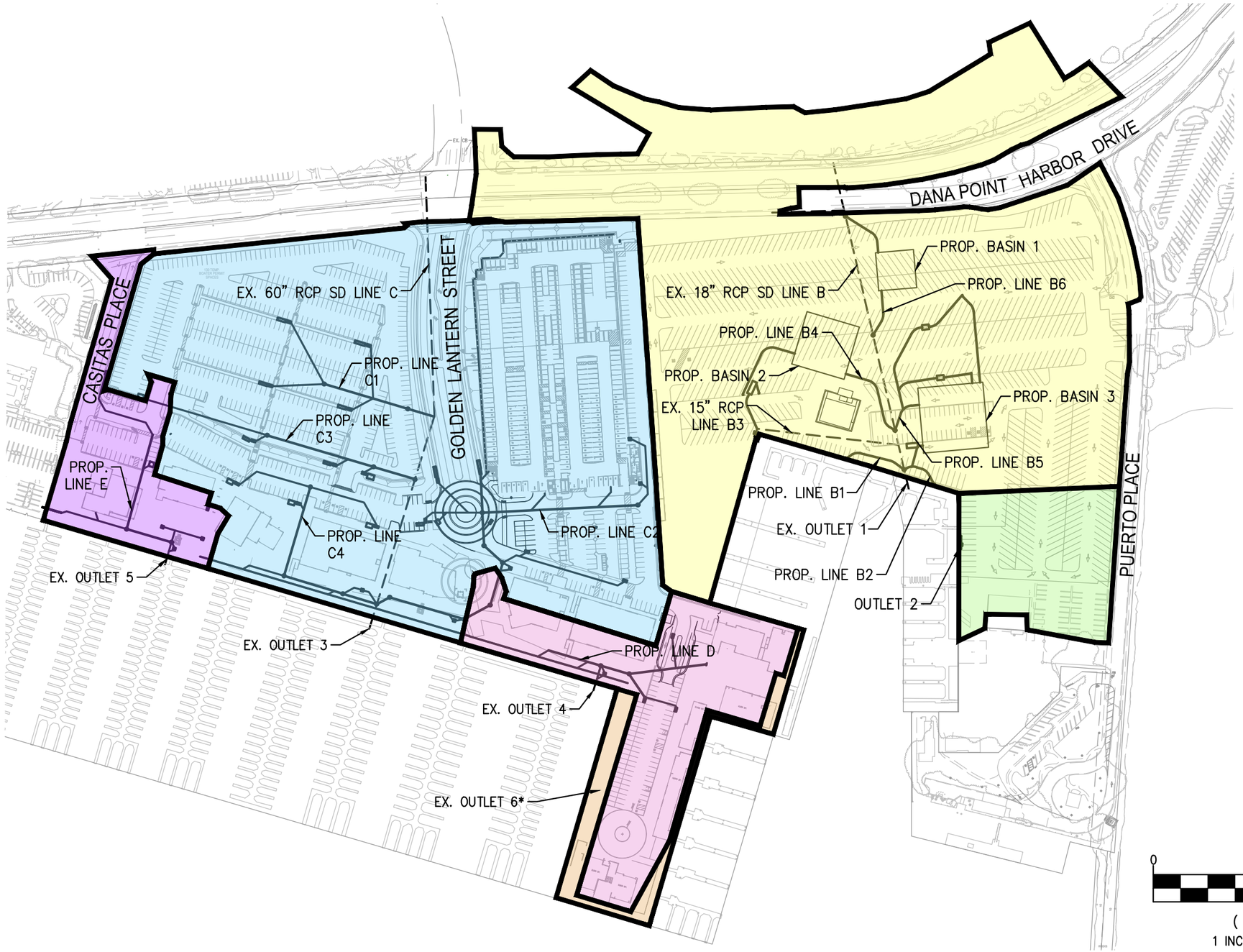
The proposed condition hydrology analysis was prepared for Outlets 1, 2, 3, 4, 5 and 6 for the 10-year and 100-year storm events. The proposed condition drainage design follows existing condition drainage patterns except within Drainage Areas to Outlets 1 and 3 were proposed changes include increasing the area tributary to Outlet 3 (CCRA) and decreasing the area tributary to Outlet 1 (DSA). This change occurs for two reasons:

1. The existing 18-inch RCP storm drain Line B that is tributary to Outlet 1 (see Section 6 for detailed description) is under capacity.
2. The leasing boundary changes associated with the DSA and CCRA sites result in modifications to the existing parking lot area where the proposed 3-level parking structure will be constructed as part of the CCRA.

This change results in adding approximately 5 acres of drainage area to storm drain Line C. In the DSA, proposed detention basins are planned to reduce potential flooding and relieve storm drain flow through Line B (Section 5.1.1 provides Basin Design details). *Appendix B* provides the proposed condition hydrology maps, and *Appendix D* includes the AES RM and SAH Results for the 10- and 100-year storm events. Figure 8 includes a map with the overall drainage areas contributing to each of the existing Outlets in the proposed condition. The sections below provide drainage area descriptions for each Outlet and Table 8 lists a peak flow summary for the proposed condition.

5.1 Dry Stack Lease Area

- **Outlet 1 - Storm Drain Line B (18-inch RCP)**
  Existing Outlet 1 will remain. Existing off-site drainage will continue to drain to Line B. In the proposed condition, three on-site detention basins will provide relief to Line B which was determined to be under capacity per the existing condition analysis (See Section 6.6). To better accommodate on-site stormwater runoff, a proposed diversion manhole will be constructed to divert off-site flows to Detention Basin 1, and Detentions Basin 2 and 3 are designed to receive on-site stormwater runoff. These three basins will detain runoff and slowly release it via a controlled outlets to Line B (Section 5.1.1 discusses the proposed detention basin analysis design). In the proposed condition, stormwater runoff from the proposed day-use, trailer and vehicle parking will sheet flows and be collected through several proposed 4-foot wide concrete gutters that will direct water to proposed inlets. These inlets will connect to proposed storm drain lines that ultimately will connect to Line B.



PROPOSED CONDITION DISCHARGE SUMMARY			
OUTLET	AREA(AC)	10-YEAR PEAK(CFS)	100 YEAR PEAK (CFS)
1	15.01	9.76	29.42
2	1.66	4.25	6.63
3	259.40	374.28	602.02
4	3.00	8.86	13.53
5	1.80	6.05	9.20
6	0.58	2.04	3.11

LEGEND

- TRIBUTARY TO OUTLET 1
- TRIBUTARY TO OUTLET 2
- ONSITE TRIBUTARY TO OUTLET 3**
- TRIBUTARY TO OUTLET 4
- TRIBUTARY TO OUTLET 5
- TRIBUTARY TO OUTLET 6 *
- WATERSHED AREA BOUNDARY
- EXISTING STORM DRAIN LINE
- PROPOSED STORM DRAIN LINE
- PROPOSED BASIN
- PROP. PROPOSED
- EX. EXISTING

NOTES

* SHEET FLOW DIRECTLY YO HARBOR
** ONLY ON-SITE TRIBUTARY AREA TO OUTLET 3 SHOWN

N

0 200 300 400

(IN FEET)
1 INCH = 200 FEET

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FIGURE 8 - PROPOSED CONDITION DRAINAGE AREAS

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5.2 Commercial Core Retail Area

The proposed drainage for the CCRA consist of three main watershed boundaries that drain to Outlets 3, 4 and 5 under the seawall and an small area that sheet flows over the seawall around the Dana Wharf.

- **Outlet 3 (60-inch RCP) – Storm Drain Lateral C1 to C4**
  Existing Outlet 3 will remain located in the eastern portion of the East Cove Marina. In the proposed condition, four main laterals are being proposed that convey runoff to Line C and separate connections to Line C are proposed. Laterals C1 and C3 consist of surface pavement runoff from the northern parking areas between Casitas Place and Golden Lantern Street. Runoff from the parking lot will be collected at low points where stormwater will be treated via biofiltration and collected into the storm drain system. Lateral C2 receives runoff from Golden Lantern Street, the proposed 3-level parking structure, the surface paved parking area south of the parking structure, buildings 6 and 7 roofs, and building 8 with portions of the boardwalk south of building 8. Lateral C4 collects runoff for paved surfaced parking in front of building 11, building 9 and 10 roofs, and portions of the boardwalk south of building 9 and 10. The total on-site has a tributary area of 14.1 acres to the existing 60-inch storm drain system. A summary of the areas contributing and peak flows for each of the proposed laterals connecting to Line C is listed below on Table 7.

Table 7: Storm Drain Line C Proposed Condition Peak Flow Summary

Lateral Name	Area (AC)	10-Year Peak Discharge (cfs)	100-Year Peak Discharge (cfs)
Lateral C1	2.2	6.17	9.44
Lateral C2	7.6	18.63	28.85
Lateral C3	2.2	6.75	10.41
Lateral C4	2.1	5.84	9.03

As described in Section 4, a large off-site areas from the City of Dana Point contributes to Line C. In the proposed condition, the total area tributary to Line C is 259.4 acres (which includes an additional 6.65 acres) , and the 10-year and 100-year storm events peak discharge are 374.28cfs and 602.02cfs, respectively. There is an increase of 18.05cfs and 26.56cfs for the 10-year and 100-year storm events peak discharge, respectively. Approximately 5% increase in peak discharge for the 10-year, and 4.6% for the 100-year storm event. A discussion regarding the capacity and hydraulic design of Line C is provided in Section 6.

- **Outlet 4 – Storm Drain Line D (15-inch RCP)**
  Existing Outlet 4 will remain located northeast of the East Cove Marina, immediately adjacent to the Dana Wharf and directly south of proposed Building 6. In the proposed condition, Outlet 4 receives runoff from the boardwalk south of Building 6 and 7 and the redeveloped Dana Wharf. Approximately 3.0 acres are tributary to a proposed storm drain system that discharges into the existing 15-inch outlet. The 10-year and 100-year peak discharge to this Outlet are 8.86cfs and 13.53cfs, respectively. This is a reduction from the existing peak flows at this outlet of 0.2cfs for the 10-year and 0.31cfs for the 100-year storm event.

- **Outlet 5 – Storm Drain Line E (15-inch RCP)**
  Existing Outlet 5 will remain located center of the East Cove Marina and southwest of the CCRA. In the proposed condition, Outlet 5 receives runoff from Casitas Place, Building 12, southern portion of Building 11 roof, and the boardwalk south of Buildings 11 and 12. Approximately 1.8 acres are tributary to a proposed storm drain system that discharges into the existing 15-inch RCP outlet. The 10-year and 100-year peak discharge to this outlet are 6.05cfs and 9.26cfs, respectively. This is a small increase from the existing condition peak flows at this outlet of 0.25cfs for the 10-year and 1.65cfs for the 100-year storm events.

- **Outlet 6 – Direct Discharge to the Ocean**
  It is anticipated that several small areas surrounding the buildings along Dana Wharf will directly discharge stormwater runoff into the harbor via flow over the existing seawall. This area (Drainage Area Outlet 6) consists of 0.58acres with 10year peak flows of 2.04cfs and 3.11cfs for the 100 year storm event.

Table 8: Proposed Condition Peak Flows Summary

Outlet	Area (AC)	10 Year peak (cfs)	100 Year Peak (cfs)
1	15.0	38.14	58.93
2	1.69		
3	259.4	374.28	602.02
4	3.0	8.86	13.53
5	1.8	6.05	9.2
6*	0.58	2.04	3.11
*Sheet flow directly into the Ocean.			

SECTION 6 HYDRAULIC DESIGN

6.1 Hydraulic Criteria and Methodology

This MPD analyzed the hydraulic capacity of the existing storm drain systems for both the existing and proposed conditions, the new proposed storm drain system, surface flooding capacity, and the water quality (low-flow) storm drain system. The DPH proposed storm drain facilities include on-site storm drains systems, curb-side and grated inlets, Bioclean Modular Wetland Units (MWS), Jensen StormSafe Filters, underground detention basins, and diversion structures. The MPD provides preliminary hydraulic calculations for the proposed storm drain system main lines, analyses site drainage design, and sets a basis for future storm drain design for each construction phase of the Dana Point Harbor Revitalization Project. The construction phasing is detailed in Section 6 of this report. The MPD hydraulic calculations follow the criteria and requirements set forth by the Orange County Local Drainage Manual (LDM), dated January 1996. Per Chapter 1 of the LDM protection levels for proposed development follow the criteria below:

- Structures: provide 100-year storm event protection for all habitable structures.
- General Criteria: storm drains with tributary areas of less than 640 acres are to be designed for a minimum of a 10-year storm event below top of curb, using a combination of street and storm drain flow. In sump conditions, catch basins and the connecting storm drain should be design for a 25-year storm event.
- Hydraulic Grade Line (HGL) – Freeboard: a design HGL of at least 0.5-feet below the street gutter flow line shall be provided within catch basins where the entire system is being design. For preliminary studies the HGL of the storm drain mainline shall be at least 2-feet below the street gutter flow line. This MPD does not include inlet design. Future studies to be provided at each phase of construction, shall include catch basin sizing following this criteria.

All proposed storm drain main lines for the DPH CCA should be design for the 10-year storm event. The CCA is in a flow by condition, since flows will pond up to the top of curb and sheet flow through walkways and into the Ocean. The proposed inlets should be sized using the 25-year storm event discharge. The CCA is not in a sump condition, due to being immediately adjacent to the Ocean with sufficient clearance from the top of the wall to the sea water level.

The Water Surface Pressure Gradient (WSPGW), a software developed by the Los Angeles County Flood Control District and approved by the County of Orange was utilized to calculate the HGL for the existing and proposed storm drain lines. WSPG uses the Bernoulli equation to calculate the HGL for each storm drain line utilizing the flow and the boundary conditions.

DPH is located immediately adjacent to the Ocean, all existing storm drain outlets were built under the seawall through the concrete stone revetment (excluding Outlet 2). The Outlet inverts are below mean sea level, with the exception of Outlet 2 which is approximately 2.2-feet below the top of the seawall. Thus, all storm drain systems are controlled downstream by the seawater elevation, which varies due to tidal influence. Section 6.2 describes the sea level conditions at DPH. Seawater is expected to backflow into the storm drain system, as it does in the existing condition, and it is considered in the hydraulic calculations by setting the downstream surface water elevation at the appropriate elevation for each analysis prepared:

- Mean High Water (MHW) 10-year storm event: this analysis is used as the basis for storm drain line design.
- Mean High-High Water (MHHW) plus 2-feet 10-year storm event: this analysis is the considered the worst condition analysis. It includes the Sea Level Rise Condition
- Mean High Water (MHW) 100-year storm event.

These analyses were prepared for the CCRA storm drain Lines C, C1, C2, C3, C4, D and E and for the DSA storm drain Lines B, B1, B2, B3, B4, B4.1, B5, B5.1,and B6. Section 6.6 describes the results of this analysis.

6.1.1 Future Hydraulic Analysis

Future Hydrology and Hydraulic Basis of Design Reports for each construction phase of the DPH CCA Revitalization project, shall follow the MPD hydraulic design criteria and overall drainage plan, and will include the following additional analyses:

- Design of storm drain inlet based on the 25-year storm event.
- Surface flooding analysis for the 100-year storm event MHHW downstream condition. TAIT suggests the use of a modeling tool such as XP-SWMMM be used to understand and analyze the flow of water above the top of curb through the surface and into the ocean.
- Protection of all structures from the anticipated 100-year storm event flows by setting finished floor pads above the flooding elevation and providing adequate flow pathways between proposed buildings.
- Design by-pass structures to divert low-flows for water quality treatment and stormwater conveyance through the storm drain main lines.

6.2 Sea Level Rise

DPH storm water runoff discharges are influenced by the sea water levels. Tidal changes occur throughout the day, with the moon cycles and due to tectonic forces. The majority of the project areas' storm drain outlets are located below the mean sea water level (estimated to be +2.5-feet for DPH) causing the storm drain system to incur in sea water intrusion which limits the hydraulic capacity of the storm drain lines. In order to determine sea water levels the NOAA Tides/Water Levels for La Jolla Monitoring Station were obtained (see *Appendix G*). The datum change between La Jolla Monitoring Station and NAVD88 is -0.19-feet. Per NOAA the following are the calculated tidal water levels averages to be used for design:

- Mean Sea Level (MSL) is at 2.73'-0.19' = 2.54-feet.
- Mean High Water (MHW) is at 4.6'-0.19' = 4.41-feet.
- Mean High-High Water (MHHW) is at 5.32'-0.19' = 5.13'.

The United States Army Corps of Engineers and California State Agencies have issued general guidance provisions to incorporate sea level rise into the design of federal or state agency coastal projects. Per the Dana Point Harbor Revitalization Preliminary Shoreline Management Plan, prepared by Project Dimensions and dated March 2014 (*Appendix O*) Ocean water levels in South Orange County are influenced by the global climatic oscillations. The sea level rise for southern California areas locate south of Cape Mendocino, are projected to rise 2- to 12-inches by 2030, 5- to 24-inches by 2050 and 17- to 66-inches by 2100. Per the State of California Sea-Level Rise Guidance probabilistic projections for the height of sea level rise depend on the greenhouse gas emission projections. Up to 2050 using different emission scenarios there are minor result differences, and after 2050 different emission scenarios result in significant sea level rise. For projects with a life span to 2050 under a high-emission scenario the State recommends the use of low projection sea level rise at 1.1-feet, medium risk projection at 1.9-feet, and extreme risk projection at 2.7-feet.

For this MPD and for future Hydrology and Hydraulic Basis of Design Analysis for the DPH CCA the downstream condition using the MHHW plus 2-feet to account for sea level rise will be analyzed. This would set the sea level for MHHW at 7.13-feet. This is a conservative approach analysis considering that there is a level of uncertainty in sea level rise projections. It is important to note that the existing DPH was built approximately 50-years ago, and planning for Revitalization has been under way for the last 20-years. Thus, it is expected and anticipated that throughout the life-span of the project (anticipated to be the entire 66-year D&M Lease Term) some future improvements will occur to DPH as additional analysis of sea rise impacts are undertaken.

6.3 100-Year Flood Analysis

Currently the proposed building finish floor elevations for new buildings within the CCRA (Buildings 6-12) are set at 12.5-feet elevation. This elevation is 3-feet above the top of the existing seawall which is at 9.5-feet on average (based on TAIT Field Surveys). Future analysis should determine ponding above finish surface and properly design flowpaths for stormwater to sheet flow in between the proposed buildings, through the boardwalk and into the ocean. For this MPD an exhibit is provided in *Appendix P* that delineates the areas in which 100-year ponding may occur, anticipates flowpaths and corridors through the buildings, and sheet flows over the existing seawall are outlined. This analysis is based on an assumed level for the 100-year storm event flows with a MHHW level (5.13-feet), plus 2-feet (sea level rise projection) of 7.13-feet.

It should be noted that County Maintenance Staff have not recorded any flooding issues at DPH throughout its current life span. The Laguna Beach Audubon rain gage data was obtained from the Orange County website. This rain gage is the closest to DPH with records since 1928. The highest rain event recorded was in December 6, 1997 with a total rain depth of 5.5-inches, which per the OCHM is considered a 100-year storm event. The NOAA tidal records for the La Jolla station for the same date, measured the highest sea level at 5.07-feet and the day after at 5.62-feet. No damages to structures or flooding issues were recorded during that storm event or that year. The rain season of 1997- 1998 was an El Nino season with some of the highest ever recorded rainfall.

6.4 Groundwater Influences

Per the Seismic Hazard Zone Report for the Dana Point Quadrangle, dated 2001, the historical high groundwater elevation at DPH is located 5-feet below ground surface (bgs). Per the Geotechnical Findings and Preliminary Geotechnical Design Considerations and Recommendations Dana Point Harbor Revitalization, prepared by GMU Geotechnical Inc., dated December 2018, the existing groundwater at the CCA was found between approximately 3- to 15-feet bgs. In addition, at the Harbor groundwater elevations fluctuate with tidal variations. *Appendix I* provides a figure that depicts anticipated groundwater level across the CCA based on recent geotechnical borings for DPH. During final design of the proposed storm drain system design considerations shall be considered for any infrastructure that will be located within groundwater (which shall include the use of water tight joints and concrete pipe.

6.6 Hydraulic Results

6.6.1 Dry Stack Lease Area

- **Storm Drain Line B**

  Storm Drain Line B is an existing 18-inch RCP that begins north of Dana Point Harbor Drive and extends into DPH. It crosses the street east of Embarcadero place and runs under the paved surface parking areas. Two laterals (15-inch and 18-inch) connect to Line B at the southern end. This connection was observed during a recent TAIT field visit and record documents on these lines are not available. Line B discharges to the Ocean through Outlet 1 (at approximately elevation -4.3). In the existing condition, this storm drain line is under capacity based on the calculated existing 10-year stormwater runoff flow.

  In the proposed condition, the existing connections at the southern end will remain. Two new laterals will connect to this line under the surface parking areas. Immediately south of Dana Point Harbor Drive a new diversion storm drain manhole is proposed to divert flow to a proposed underground detention basin. Flows from this Detention Basin will be slowly released back to Line B. The WSPG analysis was prepared for the existing and proposed conditions and the results are provided in *Appendix F*, the storm drain profiles including the HGL show that with the proposed diversion and the three proposed detention basins, Line B will not be under pressure and the HGL will be within the existing 18-inch storm drain pipe. Additional proposed laterals B1, B2, B3, B4, B4,1, B5, B5,1 and B6 were analyzed to determine the HGL at these proposed lateral connections. All proposed storm drain lines were found to have sufficient capacity. For the 100-year MHW analysis it is noted that the HGL is above the storm drain pipe at some locations and the resulting ponding of stormwater will result in stormwater runoff overflowing the existing seawall directly into the Ocean.

- **Storm Drain Line A**

  Storm drain Line A is a new proposed short storm drain lateral line that will connect at a proposed grated inlet to the existing storm drain for Outlet 1. Flows will be collected via a grated inlet and will discharge to the Ocean via an existing 6-inch perforation through the seawall. Future studies, will analyze the feasibility to use a pump system to serve a low flow treatment configuration. All overflows exceeding the required treatment volume and the capacity of the 6-inch outlet pipe will pond and flow over the proposed grated inlet and into the Ocean following the existing condition drainage patterns.

6.6.2 Commercial Core Area

- **Storm Drain Line C**

Storm drain Line C consists of the existing 60-inch RCP line that crosses the Harbor at the Commercial Retail Area (CCRA) and discharges at Outlet 3. The 10-year and 100-year storm event discharge for the existing and proposed condition were analyzed and presented herein. The sizes and slopes of the existing Line C used on this study were determined based on as-built plans and field verifications where possible (using the opening at the existing storm drain manholes and catch basins within the Harbor were dip to obtained existing invert information). There are four main laterals that are proposed to connect to the existing Line C. These laterals vary in size from 12-inch to 44-inch RCP (pipe material was assumed for these laterals and all proposed storm drain laterals). The existing invert elevation of the main Line C is at 7.2 below sea level (-7.2). Since the MHW was used as a downstream control for the 10-year storm event, pressure flow is prevalent in the existing line. The proposed storm drain laterals were design to connect to Line C at different elevations to allow 3-feet to 4-feet between the 10-year Hydraulic Gradient Line (HGL) and the proposed ground surface elevation. There are a few locations at the upstream end of Lateral C-2 and along the boardwalk for Laterals C-2 and C-4 where only a 2-foot minimum separation could be obtained between the proposed surface elevation and the 10-year HGL. *Appendix H* includes the storm drain profiles plotted with the HGL profile obtained from WSPGW.
The 100-year storm event discharge with analyzed with the MHHW as the downstream control. The results of this study indicates that flooding will occur during a 100-year storm event. As a result, the grading design for the CCRA will incorporate where necessary provisions for swales and stormwater conveyance around the proposed buildings to protect buildings from a 100-year storm event. The runoff conveyance systems around the building will allow surface discharge to the Harbor over the seawall.

- **Storm Drain Line D**

Storm drain Line D is a proposed 15-inch RCP line extension to the existing 15-inch RCP line that discharges runoff from the Dana Wharf Area to the Harbor at Outlet 4. The existing outlet is located south of proposed Building 6. The anticipated invert elevation based on as-built plans for this outlet is at 3-feet. Elevations of the Dana Wharf area range from 7- to 10-feet and the downstream water surface elevation for the hydraulic calculations was set at MHW. The 10-year HGL in the proposed condition remains 2.5-feet to 4-feet below the proposed ground surface. The 100-year HGL exceeds the ground surface elevation by a maximum of 12-inches.

SECTION 7 WATER QUALITY DESIGN

The DPH Revitalization project will incorporate Water Quality Management Practices following the guidelines set forth in the South Orange County Technical Guidance Document (TGD), dated September 2017, which complies with the San Diego Regional Water Quality Board requirements. All Water Quality (WQ) design and analysis provided in this MPD is preliminary and will serve as a guideline for final storm drain design and preparation of the Water Quality Management Plan.

Per Section 2.3.5.1 TGD priority projects are categorically exempted from hydromodification requirements where the project discharges to: "Existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean"'. All DPH stormwater runoff discharges directly to the Pacific Ocean. Thus this project is exempt from Hydromodifcation. Figure 9 is a copy of the Dana Point Exemption Map taken from the TGD.

7.1 Receiving Waters and Pollutants of Concern

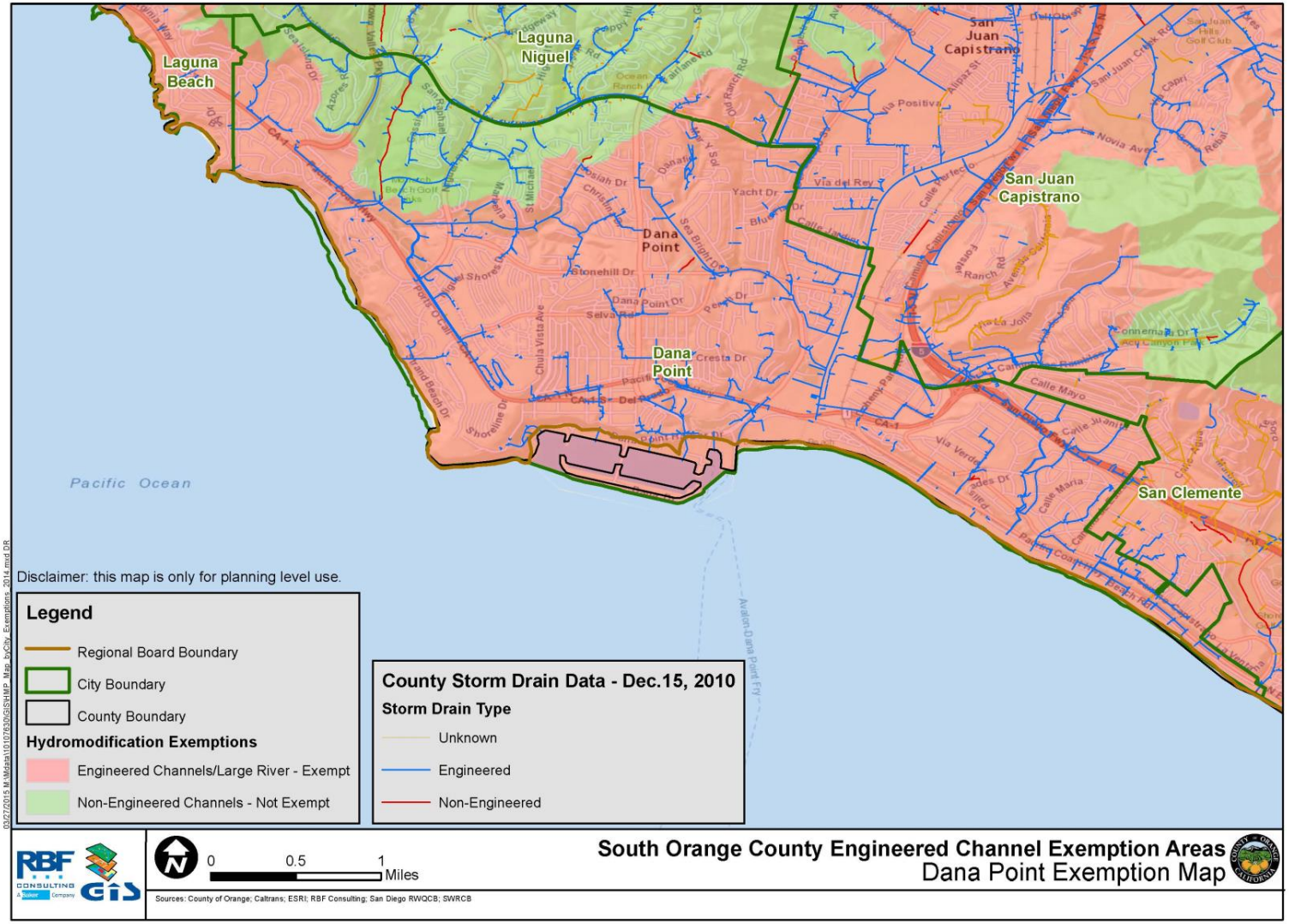
The receiving water body for the project is the Pacific Ocean Shoreline, Dana Point Harbor. Per The California State Water Board website the 2014/2016 303d listed impairments are: Indicator Bacteria, Dissolved Oxygen, Toxicity and Zinc.

Per Table 2-4 Anticipated and Potential Pollutants Generated by Land Use Type of the TGD the following are the Pollutants of Concern for DPH:

- Suspended Solid/ Sediments.
- Nutrients.
- Heavy Metals.
- Pathogens (Bacteria/ Virus).
- Pesticides, Oil & Grease.
- Toxic Organic Compounds.
- Trash & Debris.

Within the CCRA the portion adjacent to the seawall along the boardwalk and in landscape/seating areas, the only anticipated pollutants are Trash & Debris, sediments, Bacteria & Viruses and Pesticides. Heavy Metals and Oil & Grease will not be anticipated in these areas since these areas will be separated from the automobile and boat related parking areas of the project. Only the parking structure, surface parking lots and the DSA are expected to generate all of the pollutants as listed above.

Figure F-2: Dana Point Exemption Map



TAKEN FROM SOUTH ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT

FIGURE 9 - DANA POINT
HYDROMODIFICATION EXEMPTION MAP

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7.2 Low Impact BMP Selection and Design

In accordance with Section 2.5 of the TGD Low Impact Development (LID) Best Management Practices (BMP's) must be selected and size to maximized volume retention and pollutant retention according to a specific hierarchy. Below is a description for selection criteria and analyses of BMP's for the DPH project proposed for this MPD. Final analysis, design and a WQMP shall be completed for the CCRA and the DSA separately.

1. Capture and retain the DCV (Design Captured Volume from a 24-hr 85th percentile storm event) and drawdown within 48hr or less following the end of the precipitation.
   In order to capture and retain runoff, infiltration rates of the existing soil and the depth of groundwater will need to be considered. Infiltration for the project has been determined unfeasible by GMU Geotechnical Engineering due to the following reasons:
   - Percolation testing results indicated existing soil infiltration rates vary from 0.10 to 0.32in/hr. Based on this the percolation field testing does not meet the minimum requirements of 0.6in/hr (unfactored) to fully infiltrate the DCV volume.
   - Groundwater depths as described on Section 6.4 of this MPD ranges from 3-feet 10-feet bgs for the vast majority of the project area.
   - The site Hydrologic Soil Group is classified as D, which tends to yield very low percolation rates.

   Based on the above presented information, it is not feasible to comply with the retention requirements since infiltration is not adequate for DPH.

2. Harvest and Use feasibility shall be analyzed (Section 4.2.3 of TGD), and implement Harvest and Use BMP (Section 4.3 of the TGD).
   Based on the current Site Plans for the redevelopment of DPH and the CCA, there will not be enough landscaped areas to utilize a Harvest and Use BMP. In addition, South Coast Water District has installed existing a recycled water line on Dana Point Harbor Drive and is requiring the use of recycled water possible for proposed landscape areas within the CCA. Therefore, Harvest and Use for the CCA was determined to be a non-feasible BMP.

3. Select and Size Biotreatment Systems.
   The use of biofiltration basins may not be feasible due to of the proximity to the ocean. Biofiltration basins are designed to utilize a discharge point located approximately 3.75-feet or more below the top of the basin with a basin ponding depth of anywhere from 6-inches to 18-inches. The finished surface in the vicinity of the seawall are approximately

10-feet (the area between the buildings and the seawall is the lowest finished surface for stormwater capture). The basin outlet would need to be located at an approximate elevation of 5 to to 5.5-feet and the MHW for the project is at 4.41-feet. In a preliminary analysis, it was noted that the HGL in storm drain Lines B and C would be too high to provide sufficient clearance between the receiving pipe HGL and the biofiltration systems. Therefore, based on the anticipated water surface and HGL within the proposed CCA storm drain systems, the use of biofiltration basins was found to be infeasible and it is not recommended for this project.

4. Maximize volume and pollutant retention through the incorporation of all of the applicable Hydrologic Sources of Control (HSC) and use biofiltration BMPs.
   The project has identified the proposed use of Bioclean Modular Wetlands System, Jensen StormSafe or Bioclean Kraken Filter, which are proprietary devices with high pollutant removal efficiency for the CCA proposed Water Quality Treatment BMPs. Technical information and performance information for these proposed BMP's is provided in *Appendix J* of this MPD. Per Appendix J of the TGD, flow through systems such as MWS have been deemed acceptable if sized to treat 150% of the flow-based calculated treatment flows. These systems will be all designed following the procedure outlined on Appendix E.3.5.4: Worksheet for Using the Flow-Based Compact Biofiltration with Supplemental Retention Method for Sizing Compact Biofiltration BMPs - Worksheet 9: Flow-Based Compact Biofiltration with Supplemental Retention Method. Preliminary calculations are provided in *Appendix J* and the Proposed Storm Drain Plan on *Appendix H* includes a plan layout of the proposed BMPs.

   Biofiltration in the form of MWS has been selected as the main BMP to meet the WQ requirements and target the pollutants of concern for the project where feasible. StormSafe or Kraken Filters will be utilized for areas where MWS are not feasible due to sites constraints as described below:
   - When the HGL elevation of the proposed storm drain system is above the bottom of the MWS units. Under this condition, flows could by-pass the unit and untreated water would discharge to the Harbor.
   - At locations adjacent to the Harbor biofitration BMP's could have seawater backing into the storm drain systems which could affect the plants health and limit the type of plans that can be utilized in the MWS units.
   - There are some locations where it is physically not possible to connect the MWS to the existing storm drain system due to existing invert elevations.

Drainage Management Areas (DMAs) at locations near the seawall specifically the boardwalk, the buildings along the southern border of the CCRA, the Dana Wharf, the parking structure, areas along the DSA seawall, and the proposed parking lot shall use filter systems such as Jensen StormSafe or Bioclean Kraken Filter due to high groundwater conditions and the stormdrain systems' HGL. These devices will be designed to treat the required water quality flows to the maximum extent possible. Where determined to be feasible in final design proposed filter systems may be replaced with MWS.

Table 9 includes a summary of each DMA and the proposed BMP for each area for both the CCRA and the DSA.

7.3 Commercial Core Retail Area

The Drainage Management Areas within the Commercial Core Retail Area encompasses 18.97 acres. It was divided into 38 DMA's for this study (Figure shows the Proposed DMA Areas for the CCRA). Within the CCRA, 8.5 acres will be treated with MWS biofiltration while the remaining 10.47acres are proposed to be treated with StormSafe or Kraken filters. Where possible the roof drains for the proposed buildings will be treated with MWS that will be placed partially above ground to increase biofiltration WQ treatment, see detailed description below.

DMA F consist of 0.56 acres in the Dana Wharf area. Due to the existing conditions of this area and proximity to the Harbor it is unfeasible to collect runoff and provide treatment prior to discharge over the seawall. This small DMA will not be treated and will remain as it is in the existing condition.

7.4 Dry Stack Lease Area

The Dry Stack Lease Area encompasses 12 acres. It was divided into 8 DMA's for this study. 7.41 acres will be treated with MWS biofiltration while the remaining 4.35 acres are proposed to be treated with StormSafe or Kraken filters. DMA D1 and D2 of the DSA consist of 2.66 acres that currently drain to a grated inlet that discharges through a perforation on the seawall only about 2.3-feet below the top of wall. Due to the existing conditions of this area and proximity to the Harbor it is unfeasible to collect runoff and provide treatment prior to discharge. A new grated inlet is proposed at this location to connect to the existing perforation. This new inlet shall include filtration inserts to provide WQ treatment to the maximum extent possible. During final design the feasibility of a pump to provide a more advanced WQ treatment will be analyzed.

7.5 Proprietary Devices - Structural BMPs

7.5.1 Modular Wetlands Systems

Modular Wetland Systems is a proprietary biofiltration BMP's that uses horizontal flow allowing for a smaller footprint. This BMP includes a pretreatment chamber that includes separation and pre-filter cartridges. In this chamber sediments and hydrocarbons are removed from runoff before entering the bio-filtration chamber, reducing maintenance and improving performance. The MWS system meets the TAPE testing criteria as required for proprietary systems as outlined in the TGD Appendix J.

7.5.2 Stormsafe

The StormSafe Filter is proprietary media filtration BMP that has been tested and utilized in Harbor storm water programs. It has demonstrated significant effectiveness in reducing bacteria in storm water. This system also removes other pollutants of concern typical of media filtration type BMPs's. This specific media filtration BMP was selected due to its ability to remove nutrients and bacteria.

7.5.3 Kraken Filters

The Kraken Filter is a WQ treatment BMP system that utilizes an advanced membrane filtration that provides a high level of removals for total suspended solids (TSS), phosphorus, nutrients, metals, trash, and hydrocarbons. The Kraken (membrane) Filter cartridge provides high flow rates, while the system can operate at a low loading rate to ensure maximum performance, minimum maintenance, and minimal clogging.

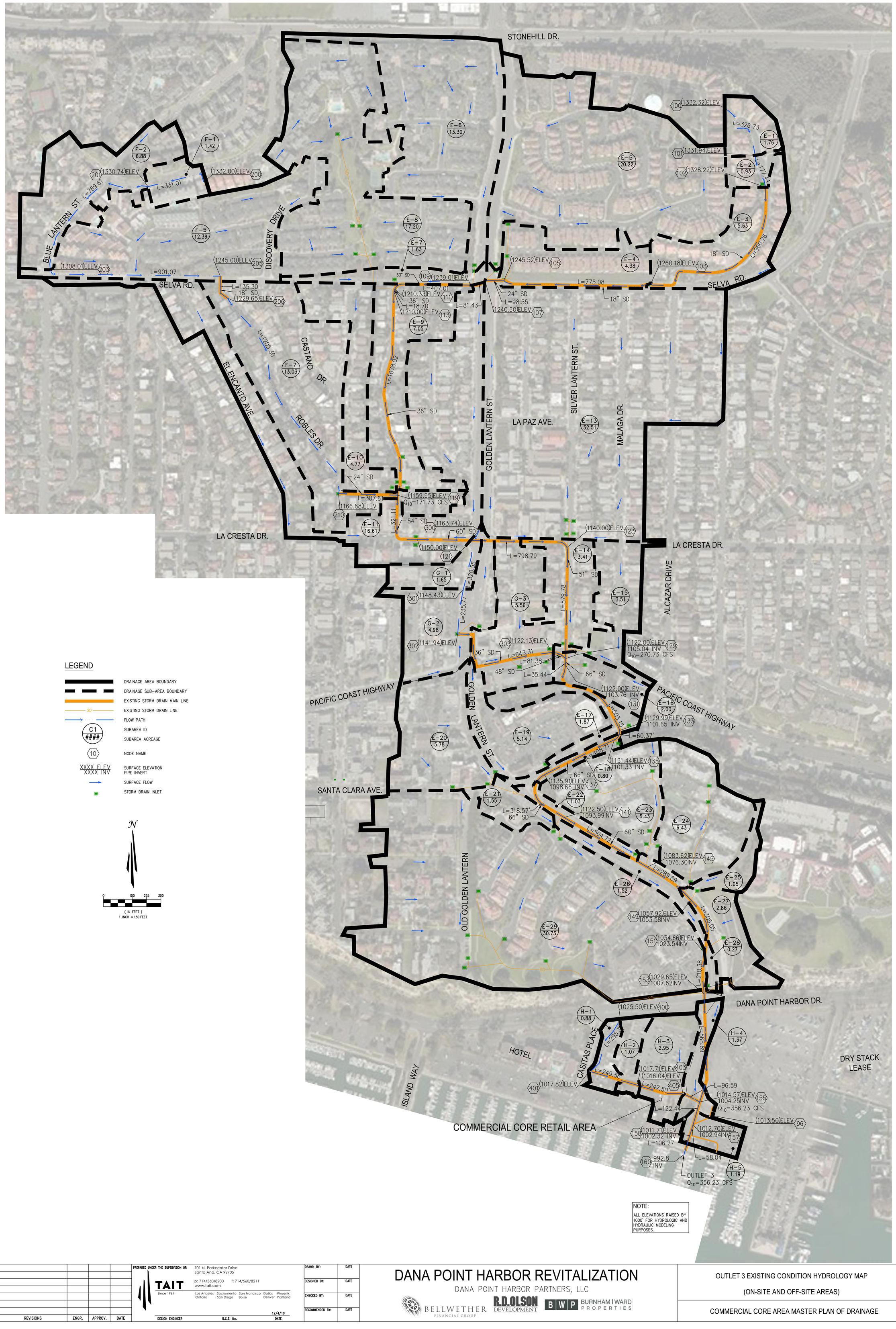
SECTION 8 Conclusion, Final Remarks and Future Studies

The Dana Point Harbor Revitalization Plan proposes the redevelopment of certain areas within the existing Harbor. This study investigates the Commercial Core Area (CCA) which includes the Commercial Core Retail Area (CCRA) and the Dry Stack Lease Area (DSA) and provides analyses for this Master Plan of Drainage for the CCA. The analysis in this study includes hydrology and hydraulic design of the storm drain systems for flood control and water quality treatment purposes. This MPD analyzes the existing drainage patterns and provides calculations for a proposed condition for the CCA. The existing and proposed condition 10-year and 100-year storm events was analyzed for the ultimate condition, and a preliminary plan for storm drain construction was developed and presented herein to incorporate different construction phases. A 100-year flood analysis was also completed and drainage patterns were delineated to ensure all proposed building structure to be protected for the 100-year storm event in a Mean High-High Water condition following County of Orange requirements and guidelines. A preliminary Water Quality Treatment Program was developed, and a path for future studies was discussed in this report.

8.1 Future Studies

This Section summarizes studies that may be included with final design for each phase of construction as applicable.

1. Prepare the proposed condition 25-year storm event hydrology analysis to size proposed drainage inlet openings.
2. Analyze 100-year MHHW at the proposed storm drain main line, and surface flooding analysis for this condition. Tait suggests the use of a modeling tool such as XP-SWMMM to understand and analyze the flow of water above the top of curb through the surface and into the ocean.
3. Develop details to provide structure protection from the 100-year flood by setting finished floor pads above the flooding elevation and provide methods to convey flow around buildings of proposed stormwater.
4. Finalize design of proposed stormwater by-pass structures to divert low-flows for water quality treatment and stormwater conveyance through the proposed storm drain main lines.
5. Determine final sizes and location of proprietary BMPs.
6. Prepare Final Project WQMP for the Commercial Core Retail Area and Dry Stack Lease Area (considering Phasing as necessary).



LEGEND

- DRAINAGE AREA BOUNDARY
- DRAINAGE SUB-AREA BOUNDARY
- EXISTING STORM DRAIN MAIN LINE
- SD — EXISTING STORM DRAIN LINE
- FLOW PATH
- C1 / #### — SUBAREA ID / SUBAREA ACREAGE
- 10 — NODE NAME
- XXXX ELEV / XXXX INV — SURFACE ELEVATION / PIPE INVERT
- SURFACE FLOW
- STORM DRAIN INLET

N

0 150 225 300

(IN FEET)
1 INCH = 150 FEET

NOTE:
ALL ELEVATIONS RAISED BY 1000' FOR HYDROLOGIC AND HYDRAULIC MODELING PURPOSES.

NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
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6					
5					
4					
3					
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OUTLET 3 EXISTING CONDITION HYDROLOGY MAP

(ON-SITE AND OFF-SITE AREAS)

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

SHT 1 OF 1

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DANA POINT HARBOR DRIVE

CASITAS PLACE

GOLDEN LANTERN STREET

DRY STACK LEASE AREA
(N.A.P.)

HOTEL
(N.A.P.)

EAST COVER MARINA

DANA WHARF

C1.1 0.53 | C1.2 0.52 | C1.3 0.66 | C1.4 0.45 | C2.1 0.44 | C2.2 0.11 | C2.3 1.39 | C2.4 1.56 | C2.5A 0.35 | C2.5B 0.17 | C2.6 0.29 | C2.7 0.35 | C2.8A 0.35 | C2.8B 0.27 | C2.9 0.23 | C2.10A 1.11 | C2.10B 0.57 | C2.11 0.41 | C3.1 0.67 | C3.2 0.36 | C3.3 0.37 | C3.4 0.85 | C4.1 0.48 | C4.2 0.49 | C4.3 0.50 | C4.4 0.31 | C4.5 0.36 | D-1 0.61 | D-2 0.27 | D-3 0.86 | D-4 0.43 | D-5 0.41 | D-6 0.44 | E-1 0.26 | E-2 0.57 | E-3 0.34 | E-4 0.22 | E-5 0.41 | F 0.56

OUTLET 5– LINE E
15"RCP
997.9INV
(PER AS BUILT)

OUTLET 3 –LINE C
60"RCP
992.8INV
(PER AS BUILT)

OUTLET 4 –LINE D
15"RCP
997.8INV
(PER AS BUILT)

DRAINAGE AREA F
SHEETFLOWS OVER EXISTING SEAWALL
TO HARBOR

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED STORM DRAIN LINE
- EXISTING STORM DRAIN LINE
- FLOWPATH
- X-3 / 0.27 — SUBAREA ID / SUBAREA ACREAGE
- 475 1009.0FS / 1005INV — NODE ELEVATION
- AREA DRAINING TO LATERAL C1
- AREA DRAINING TO LATERAL C2
- AREA DRAINING TO LATERAL C3
- AREA DRAINING TO LATERAL C4
- AREA DRAINING TO LINE D
- AREA DRAINING TO LINE E
- AREA DRAINING TO OUTLET 6 (SHEET FLOW)

N

0 40 60 80
(IN FEET)
1 INCH = 40 FEET

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COMMERCIAL CORE RETAIL AREA
PROPOSED CONDITION HYDROLOGY MAP
(ON-SITE AREAS ONLY)

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

SHT 1 OF 1

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