PRELIMINARY DRAINAGE STUDY
(HYDROLOGY AND HYDRAULICS)
FOR
NEWCASTLE-ELLIS
(PRELIMINARY ENGINEERING)

CITY CASE #: TBD

Job Number 2126

May 23, 2022

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Exp. 09/30/2023

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May 23, 2022

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1.0 INTRODUCTION

1.1 Project Description

This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Newcastle-Ellis project (herein referred to as "the project"). The project is located in the City of Perris, bounded by Ellis Avenue to the north, Case Road to the south, and existing parcels to the east and west, in the City of Perris, California. Refer to Figure 1.0 for a Vicinity Map of the project. Applicable Assessor Parcel Numbers (APNs) are 330-090-006 and 330-090-007.

1.2 Project Features

The site is approximately 35.4 acres (gross area) with a net area of approximately 33.5 acres. The project is proposing to develop an industrial tilt-up warehouse building and associated parking as part of this project. The proposed warehouse building footprint is approximately 671,001 square feet and there will be a total of ~182 auto parking stalls to be provided. The proposed impervious and pervious footprints within the drainage management area are approximately 1,166,554 square feet and 286,560 square feet (including the self-treating areas), respectively. The project also includes a minor sidewalk improvement for the frontage Ellis Avenue.

1.3 Drainage Characteristics

The existing site consists of open, undeveloped space, draining generally from north to south. There is minor offsite run-on flow to the site from the westerly undeveloped land. Runoff from the project generally drains in a southeasterly direction in a sheet flow manner towards San Jacinto River.

The post-project drainage characteristics will be maintained similar as compared to the pre-project condition. Regarding the minor run-on mentioned above, the project proposes a swale on the westerly edge of the project to direct and bypass the minor westerly run-on in a southerly direction, in an effort to maintain the existing drainage pattern. Therefore, there will be no run-on to the project from the westerly offsite area in the post-project condition. On-site runoff will be directed via on-site storm drain system to an underground storage facility (proprietary StormTrap system) for storing adequate runoff volume to address the storm water quality and potential HCOC

requirements. Select on-site catch basins will have pre-treatment BMP (i.e. - connector pipe screen) to help minimize trash/debris getting into the underground storage facility. Two (2) Modular Wetland System (MWS) units are proposed immediately downstream of the underground storage facility to provide treatment for the on-site runoff, based on the volume-based approach. Additionally, where feasible, the proposed landscape areas in the form of vegetated swales will provide pre-treatment prior to connecting into proposed atrium grates and storm drain pipes. Runoff from paved surfaces and roofs will be directed towards landscape areas where possible to help promote incidental infiltration and evaporation.

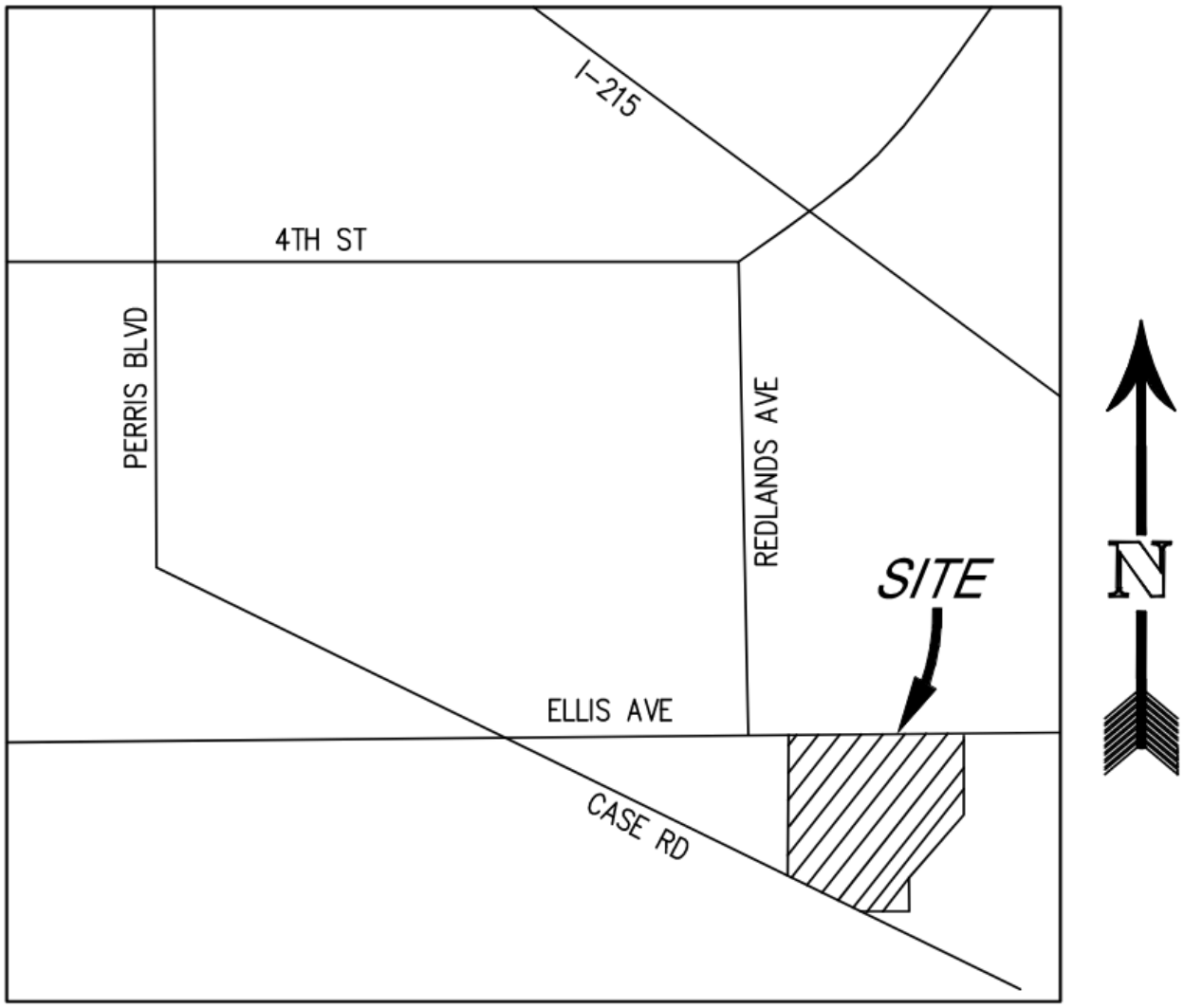
1.4 FEMA Flood Hazard Zone Information

The project is situated within the zone ae based on the FEMA flood insurance rate map (FIRM) number 06065c1440h, with an effective date of august 18, 2014. The majority of the site is within the floodplain flood fridge of the San Jacinto River. Based on the FIRM, the base flood elevation (BFE) is approximately 1420 feet (per NAVD 88 vertical datum). Therefore, the proposed building finished floor will be elevated above the elevation 1420 feet. Surrounding surface improvements including parking, driveways, and associated landscape areas are expected to be at existing grade. The project plans to stay off of the FEMA floodway area located near the southeasterly corner of the property and this area will remain as-is without improvement. For the proposed improvements within the flood fringe, the project plans to prepare and process a Conditional Letter of Map Revision, based on fill (CLOMR-F) through FEMA at a later stage of the project prior to obtaining a grading permit from the City of Perris.

1.6 Water Quality Management

In support of the preliminary site plan, a preliminary Water Quality Management Plan (WQMP) has been prepared for the project. The report is titled, “Preliminary Water Quality Management Plan for Newcastle-Ellis,” dated May 23, 2022, prepared by SDH & Associates, Inc. (Job Number 2126). The preliminary WQMP documents how the project addresses the requirements regarding permanent stormwater quality management, in accordance with the stormwater guidance document titled, “2010 Water Quality Management Plan for the Santa Ana Region of Riverside County.”

Figure 1: Vicinity Map



VICINITY MAP
NOT TO SCALE

2.0 HYDROLOGY

Preliminary hydrologic calculations were prepared in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual) for preliminary on-site storm drain sizing purpose. The Hydrowin Advanced Engineering Software (AES) 2016 Rational Method Analysis (Version 23.0) program was used to perform the hydrologic analysis in this study.

The AES hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results. The code numbers and their significances are as follows:

Subarea Hydrologic Processes (Codes)

Code 1: Confluence analysis at a node
Code 2: Initial subarea analysis
Code 3: Pipe flow travel time (computer-estimated pipe sizes)
Code 4: Pipe flow travel time (user-specified pipe size)
Code 5: Trapezoidal channel travel time
Code 6: Street flow analysis through a subarea
Code 7: User-specified information at a node
Code 8: Addition of the subarea runoff to mainline
Code 9: V-Gutter flow through a subarea
Code 10: Copy main-stream data onto a memory bank
Code 11: Confluence a memory bank with the main-stream memory
Code 12: Clear a memory bank
Code 13: Clear the main-stream memory
Code 14: Copy a memory bank onto the main-stream memory
Code 15: Hydrologic data bank storage functions

In order to perform the hydrologic analysis, base information for the study area is required. This information includes the drainage facility locations and sizes, land uses, flow patterns, drainage basin boundaries, and topographic elevations. Compiled hydrologic backup is included as Appendix A to this report.

Area

Drainage boundaries were delineated to distinguish areas with similar flow characteristics and hydrologic properties as well as to determine peak flows at confluence points, existing and proposed storm drain facilities, and to facilitate hydraulic analyses. Drainage basin boundaries, flow patterns, and topographic elevations are shown on the drainage study map for the site, included in Appendix B.

Time of Concentration/Intensity

The time of concentration was calculated using the AES to determine the intensity for the 100-year storm events. The rainfall intensity was calculated in AES using the 10 and 60-minute intensity values for the project area using NOAA Atlas 14 Point Precipitation Frequency Estimates. A supporting annotated chart has been included in Appendix A.

Runoff Coefficient

The runoff coefficients used for each minor basin were calculated by the AES software based on the user-entered information of the hydrologic soil group and the land use for each basin. The percentage of impervious area (i.e. land use) in each subdrainage area was used to determine the land use entered within AES per Plate D-5.6 of the Hydrology Manual. Supporting information for parameters assigned to AES calculations is included with Appendix A of this report.

Hydrologic soil group data is available for the site through the Natural Resource Conservation Service (NRCS) Web Soil Survey, showing the site consisting primarily of Type "D" soil. For the purpose of hydrologic calculations for the proposed condition, soil type "D" has been applied.

Topography

The onsite project specific topography consists of 1-foot contours on the NAVD-88 vertical datum, provided by Arrowhead Mapping Corp.

2.1 Hydrologic Results

The hydrologic results at key points of interest for the project can be found in Table 2.1. The summary shows the hydrologic results at the proposed on-site catch basin locations (key catch basin locations) and overall on-site peak flow at the project discharge (outlet) locations. The detailed hydrologic calculation results are located in Appendix B of this report.

Table 2.1 – On-site Hydrologic Data Summary at Key Locations (10-year & 100-year)

Key Drainage Node ID [3]	Post-project[1]		
	Total Area (Acres)	Peak Flow Rate, Q_{10} (cfs) [2]	Peak Flow Rate, Q_{100} (cfs) [2]
105 (On-site Catch Basin - Surface)	3.3	6.4	11.5
108 (On-site Catch Basin - Surface)	1.8	3.2	5.7
118 (On-site Catch Basin - Surface)	0.5	0.9	1.5
125 (On-site Catch Basin - Surface)	3.2	6.2	11.1
133 (On-site Catch Basin - Surface)	1.7	3.4	6.0
137 (On-site Catch Basin - Surface)	0.4	0.8	1.4
143 (On-site Catch Basin - Surface)	0.4	0.8	1.4
148 (On-site Catch Basin - Surface)	3.2	5.7	10.2
153 (On-site Catch Basin - Surface)	0.5	1.0	1.8
160 (On-site Catch Basin - Surface)	13.3	24.0	42.9
170 (On-site Catch Basin - Surface)	28.3	39.6	71.2
180 (On-site – Outlet Location)	**28.9**	**39.6**	**71.3**

Note:

1: Refer to Appendix A for supporting information.

2: "cfs"= cubic feet per second.

3: Refer to Appendix B for Drainage Study Map

3.0 HYDRAULICS

3.1 Hydraulic Methodology and Criteria

The 10-year and 100-year, 1-hour post-project peak flow rates were calculated. For the on-site private storm drain systems, the 10-year peak flow rates based on the Modified Rational Method (AES Rational Method) outputs are used to determine preliminary sizes.

3.2 Inlet Sizing

Inlet design calculation specific to the proposed surface catch basin will be conducted during final engineering and calculation output will be incorporated in Appendix C. In the post-project condition, the on-site proposed storm drain catch basins (inlets) will be designed to intercept, at a minimum, the 10-year, 1-hour peak flow rates. There are a few sump inlet (grate inlet) locations onsite and the grate inlet will be designed to accommodate the local tributary peak flows. As the project is situated within the FEMA flood fringe of San Jacinto River, during a large storm event, the on-site proposed sump catch basin (inlet) locations and their vicinity could potentially experience some standing water temporarily from the tail water condition; however, runoff should drain with time as long as the proposed on-site storm drain systems are maintained on an as-needed basis by responsible parties.

3.3 Storm Drain Sizing

Preliminary storm drain sizing calculations were conducted in order to size the proposed on-site private storm drain pipes. The calculations were prepared using the 10-year, 1-hour peak flow rate output from the AES Rational Method and the Manning's equation along with a sizing bump-up factor (typically in the range of 15 to 30%) in an effort to account for potential hydraulic losses. Typically, this calculation approach is adequate for on-site private storm drain sizing. If necessary, a more detailed hydraulic calculation may be provided on a case-by-case basis during final engineering. A summary of preliminary on-site storm drain sizing calculations is provided in Appendix D.

As a note, the project will have onsite best management practices (BMPs) to treat runoff from the proposed improvements and comply with the permanent storm water requirements of the Riverside

County Santa Ana Region, prior to discharging into the proposed flood control facility. The project proposes a combination of a proprietary underground storage facility and modular wetland system (MWS) units as the permanent BMP to treat the on-site runoff prior to discharging near the southeast corner of the project.

4.0 FLOOD CONTROL DISCUSSION

The project is expected to increase the peak flow rate as a result of the proposed improvements. However, as indicated in Section 1.4 of this report, the entirety of the project as well as the southerly offsite channel are situated within the FEMA Zone AE floodplain (flood fringe) of the existing San Jacinto River. As part of the storm water quality management requirements (including water quality and hydrologic condition of concern), the project proposes an underground storage facility along with treatment units near the southeasterly corner of the project prior to discharging. While the proposed storm water management facilities are intended for relatively smaller storm events, the system would also provide incidental attenuation for larger storms. The project plans to provide energy dissipaters (linear gravel trench) near the southeasterly corner of the site (downstream of the proposed storm water management facilities) in an effort to help reduce the velocity and help minimize potential concern for erosion downstream. Therefore, with the site being entirely within the floodplain, flood control increased runoff mitigation (detention control) should not be necessary for this project. As a note, the project plans to have the proposed building finished floor above the base flood elevation and process a CLOMR-F through FEMA during final engineering (prior to obtaining a grading permit).

5.0 CONCLUSION

This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Newcastle-Ellis project. Hydrologic calculations were computed in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual). The peak discharge rates for the 10-year and 100-year, 1-hour storm event have been determined for the project. The relevant 10-year peak flow rates were used to determine the preliminary onsite storm drain sizes. Flood control mitigation (increased runoff mitigation) is not anticipated to be required for this project as the project is situated entirely within the FEMA floodplain (flood fringe). However, as the project needs to address the storm water quality management requirements, the project proposes a combination of an underground storage facility and treatment units. While the system is designed to address relatively smaller storm events, it would provide incidental attenuation (benefit) for larger storms. The project also proposes to provide energy dissipater (linear gravel trench) downstream of the storm water management facilities in an effort help reduce the velocity and minimize potential concern for erosion. Separately, the project plans to have the proposed building finished floor above the base flood elevation and process a CLOMR-F through FEMA for the proposed improvements that will be within the FEMA flood fringe (prior to obtaining Grading Permit approval from the City of Perris). In summary, the proposed drainage characteristics will be maintained as similar to the existing condition and no adverse impacts are anticipated to the existing drainage facilities as a result of the proposed improvements.

Appendix A

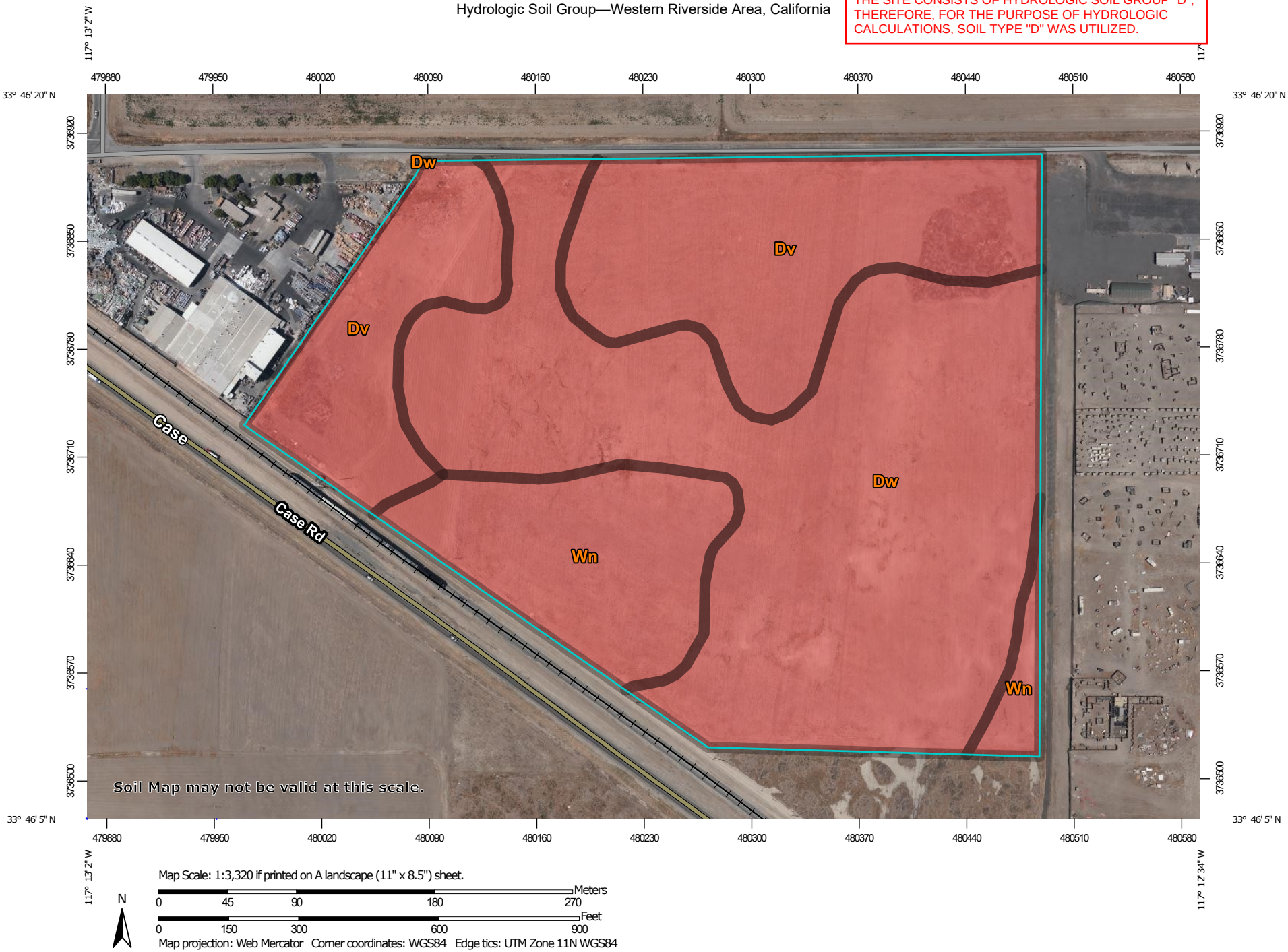
Hydrologic Backup Information

Includes:

1. Web Soil Survey Hydrologic Soil Group
2. NOAA Atlas 14 Annotated Rainfall Intensity Chart
3. FEMA FIRMette

Hydrologic Soil Group—Western Riverside Area, California

SUPPORTING MATERIALS - HYDROLOGIC SOILS GROUP
THE SITE CONSISTS OF HYDROLOGIC SOIL GROUP "D";
THEREFORE, FOR THE PURPOSE OF HYDROLOGIC
CALCULATIONS, SOIL TYPE "D" WAS UTILIZED.



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

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

Date(s) aerial images were photographed: May 25, 2019—Jun 25, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Dv	Domino silt loam, saline-alkali	D	12.6	32.4%
Dw	Domino silt loam, strongly saline-alkali	D	20.5	52.5%
Wn	Willows silty clay, deep, strongly saline-alkali	D	5.9	15.0%
Totals for Area of Interest			**39.0**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

SUPPORTING MATERIALS - NOAA ATALAS 14 - INTENSITY 10-YEAR AND 100-YEAR (10-MIN. & 60-MIN.)

NOAA Atlas 14, Volume 6, Version 2
Location name: Perris, California, USA*
Latitude: 33.7708°, Longitude: -117.2133°
Elevation: 1417.54 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.03** (0.864-1.25)	**1.46** (1.22-1.76)	**2.05** (1.72-2.50)	**2.58** (2.12-3.16)	**3.34** (2.66-4.22)	**3.96** (3.10-5.12)	**4.64** (3.53-6.17)	**5.39** (3.97-7.37)	**6.47** (4.57-9.25)	**7.38** (5.04-10.9)
10-min	**0.744** (0.624-0.900)	**1.05** (0.876-1.27)	**1.48** (1.23-1.79)	**1.85** (1.52-2.26)	**2.39** (1.91-3.02)	**2.84** (2.21-3.68)	**3.32** (2.53-4.42)	**3.86** (2.85-5.28)	**4.64** (3.28-6.62)	**5.29** (3.61-7.84)
15-min	**0.600** (0.500-0.724)	**0.844** (0.704-1.02)	**1.19** (0.992-1.44)	**1.49** (1.23-1.82)	**1.93** (1.54-2.44)	**2.29** (1.79-2.96)	**2.68** (2.04-3.56)	**3.11** (2.30-4.26)	**3.74** (2.64-5.34)	**4.26** (2.91-6.32)
30-min	**0.482** (0.404-0.582)	**0.680** (0.568-0.820)	**0.956** (0.796-1.16)	**1.20** (0.990-1.46)	**1.55** (1.24-1.96)	**1.84** (1.44-2.38)	**2.16** (1.64-2.86)	**2.50** (1.85-3.42)	**3.01** (2.13-4.30)	**3.43** (2.34-5.08)
60-min	**0.325** (0.272-0.393)	**0.458** (0.383-0.554)	**0.645** (0.538-0.782)	**0.808** (0.667-0.988)	**1.05** (0.834-1.32)	**1.24** (0.969-1.61)	**1.46** (1.11-1.93)	**1.69** (1.25-2.31)	**2.03** (1.44-2.90)	**2.31** (1.58-3.43)
2-hr	**0.245** (0.205-0.296)	**0.330** (0.276-0.400)	**0.447** (0.372-0.542)	**0.546** (0.451-0.668)	**0.686** (0.547-0.868)	**0.798** (0.622-1.03)	**0.916** (0.696-1.22)	**1.04** (0.769-1.42)	**1.22** (0.862-1.74)	**1.36** (0.929-2.02)
3-hr	**0.200** (0.168-0.242)	**0.266** (0.222-0.322)	**0.355** (0.296-0.430)	**0.429** (0.354-0.524)	**0.532** (0.425-0.674)	**0.615** (0.480-0.796)	**0.700** (0.532-0.929)	**0.790** (0.583-1.08)	**0.915** (0.647-1.31)	**1.01** (0.693-1.50)
6-hr	**0.143** (0.120-0.173)	**0.188** (0.157-0.227)	**0.247** (0.206-0.299)	**0.295** (0.244-0.361)	**0.362** (0.289-0.459)	**0.414** (0.323-0.537)	**0.468** (0.356-0.622)	**0.524** (0.387-0.716)	**0.600** (0.424-0.857)	**0.660** (0.450-0.977)
12-hr	**0.097** (0.081-0.117)	**0.127** (0.106-0.153)	**0.167** (0.139-0.202)	**0.199** (0.165-0.243)	**0.244** (0.194-0.308)	**0.278** (0.217-0.360)	**0.313** (0.238-0.415)	**0.349** (0.258-0.477)	**0.398** (0.282-0.569)	**0.437** (0.298-0.647)
24-hr	**0.065** (0.057-0.075)	**0.086** (0.076-0.099)	**0.114** (0.100-0.132)	**0.137** (0.120-0.160)	**0.168** (0.143-0.203)	**0.193** (0.160-0.237)	**0.218** (0.176-0.274)	**0.243** (0.192-0.315)	**0.279** (0.211-0.375)	**0.306** (0.224-0.426)
2-day	**0.037** (0.033-0.043)	**0.050** (0.045-0.058)	**0.068** (0.060-0.079)	**0.083** (0.072-0.097)	**0.103** (0.088-0.125)	**0.120** (0.099-0.147)	**0.136** (0.110-0.172)	**0.154** (0.121-0.199)	**0.178** (0.135-0.240)	**0.198** (0.145-0.275)
3-day	**0.026** (0.023-0.030)	**0.036** (0.032-0.042)	**0.049** (0.044-0.057)	**0.061** (0.053-0.071)	**0.077** (0.065-0.092)	**0.089** (0.074-0.110)	**0.102** (0.083-0.129)	**0.117** (0.092-0.151)	**0.136** (0.103-0.184)	**0.152** (0.112-0.212)
4-day	**0.021** (0.019-0.024)	**0.029** (0.026-0.034)	**0.040** (0.035-0.046)	**0.049** (0.043-0.058)	**0.063** (0.053-0.076)	**0.073** (0.061-0.090)	**0.085** (0.069-0.107)	**0.097** (0.076-0.125)	**0.114** (0.086-0.153)	**0.127** (0.093-0.177)
7-day	**0.013** (0.012-0.015)	**0.018** (0.016-0.021)	**0.026** (0.023-0.030)	**0.032** (0.028-0.037)	**0.041** (0.034-0.049)	**0.048** (0.040-0.059)	**0.055** (0.045-0.069)	**0.063** (0.050-0.082)	**0.075** (0.056-0.100)	**0.084** (0.061-0.117)
10-day	**0.010** (0.009-0.011)	**0.014** (0.012-0.016)	**0.019** (0.017-0.022)	**0.024** (0.021-0.028)	**0.030** (0.026-0.037)	**0.036** (0.030-0.044)	**0.041** (0.034-0.052)	**0.047** (0.037-0.061)	**0.056** (0.043-0.076)	**0.063** (0.046-0.088)
20-day	**0.006** (0.005-0.007)	**0.008** (0.007-0.009)	**0.011** (0.010-0.013)	**0.014** (0.013-0.017)	**0.019** (0.016-0.023)	**0.022** (0.018-0.027)	**0.026** (0.021-0.033)	**0.030** (0.024-0.039)	**0.036** (0.027-0.049)	**0.041** (0.030-0.057)
30-day	**0.004** (0.004-0.005)	**0.006** (0.005-0.007)	**0.009** (0.008-0.010)	**0.011** (0.010-0.013)	**0.015** (0.012-0.018)	**0.018** (0.015-0.022)	**0.021** (0.017-0.026)	**0.024** (0.019-0.031)	**0.029** (0.022-0.040)	**0.034** (0.025-0.047)
45-day	**0.003** (0.003-0.004)	**0.005** (0.004-0.005)	**0.007** (0.006-0.008)	**0.009** (0.008-0.010)	**0.011** (0.010-0.014)	**0.014** (0.011-0.017)	**0.016** (0.013-0.021)	**0.019** (0.015-0.025)	**0.024** (0.018-0.032)	**0.028** (0.020-0.039)
60-day	**0.003** (0.003-0.003)	**0.004** (0.004-0.005)	**0.006** (0.005-0.007)	**0.007** (0.006-0.009)	**0.010** (0.008-0.012)	**0.012** (0.010-0.014)	**0.014** (0.011-0.018)	**0.017** (0.013-0.022)	**0.021** (0.016-0.028)	**0.024** (0.018-0.034)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

NOTES TO USERS

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

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

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

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

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

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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

Base map information shown on this FIRM was derived from multiple sources including the Riverside County, CA effective database, and the National Geodetic Survey. Base map imagery for Riverside County, CA is a mosaic of the NAIP 2009 images, 1 meter resolution.

The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

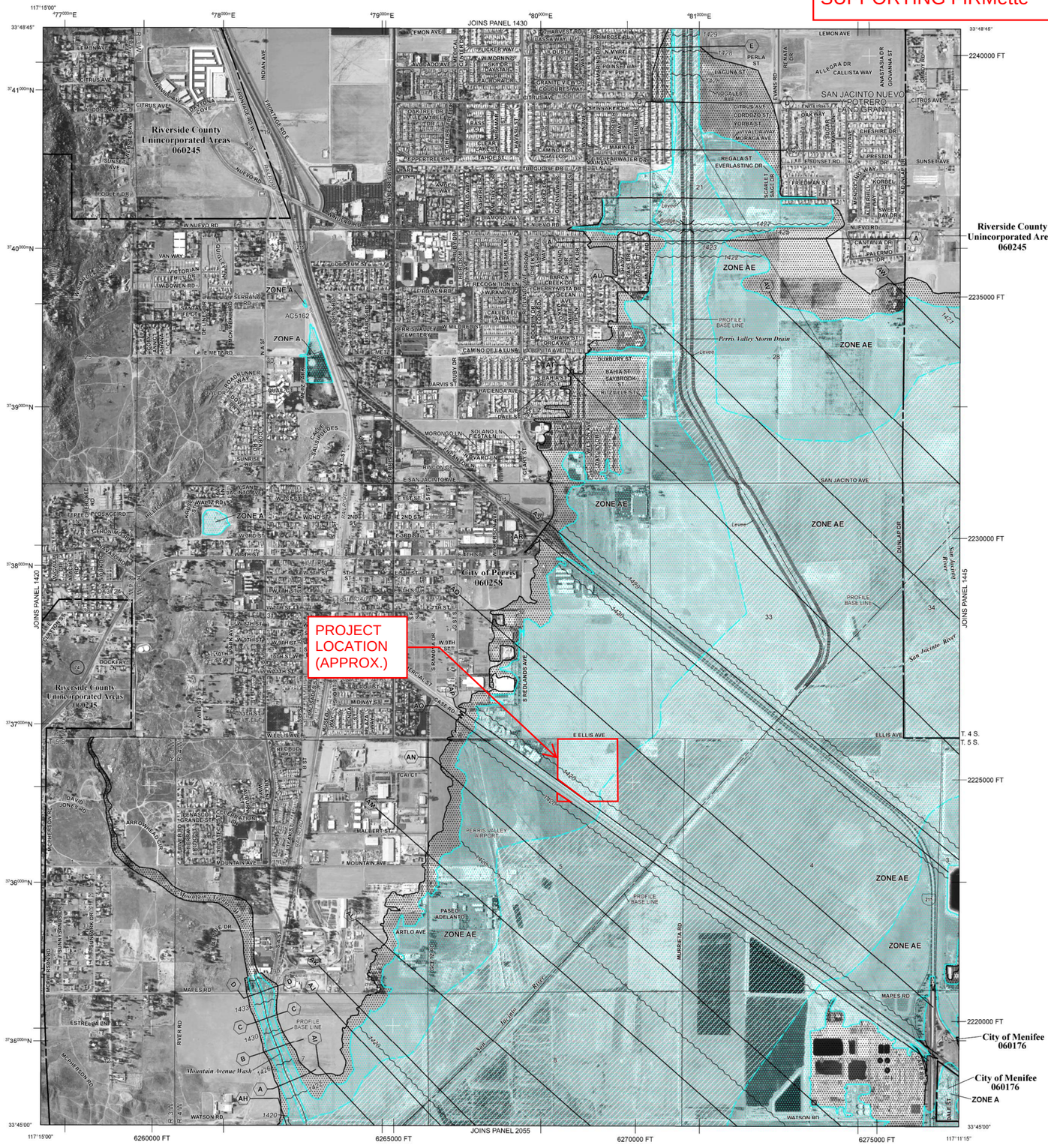
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

NOTE:
THE ENTIRETY OF THE SITE IS STUATED IN FEMA ZONE AE, WITH A MAJORITY OF THE SITE (PROPOSED IMPROVEMENTS) BING IN THE 100-YEAR FLOODPLAIN FRINGE WHILE A SMALL SOUTHESATERLY CORNER OF THE SITE BEING IN THE FLOODWAY (NOT TO BE DEVEVELOPED IN THIS AREA). THE PROPOSED SURFACE PARKING AND LANDSCAPE IMPROVEMENTS WILL BE NEARLYL AT GRADE AND THE FINISHED FLOOR OF THE PROPOSED BUILDING IS ANTICIPATED TO BE ABOVE THE BASE FLOOD ELEVATION (BY AT LEAST A FOOT). THE PROJECT PLANS TO PROCESS A CLOMR-F THROUGH FEMA FOR THE PORTION THE PROJECT WITHIN THE FLOOD FRINGE.

SUPPORTING FIRMette



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

- **ZONE X** — Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4675000mE — 1000-meter Universal Transverse Mercator grid ticks, zone 11
- 6000000 FT — 5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 18, 2014: for a description of revisions, see Notice to Users page in the Flood Insurance Study report.

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

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1440H

FIRM

FLOOD INSURANCE RATE MAP
RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1440 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MENIFEE, CITY OF	060176	1440	H
PERRIS, CITY OF	060258	1440	H
RIVERSIDE COUNTY UNINCORPORATED AREAS	060245	1440	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06065C1440H

MAP REVISED
AUGUST 18, 2014

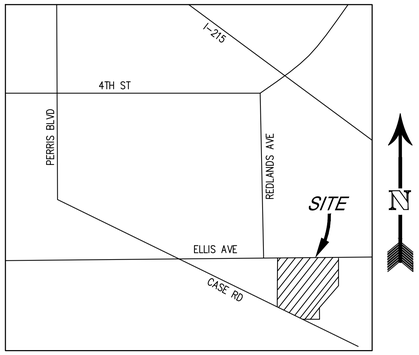
Federal Emergency Management Agency

Appendix B

Modified Rational Method Results

Includes:

1. Post-project Drainage Study Map
2. Post-project AES Rational Method Output (10-year & 100-year)



VICINITY MAP
NOT TO SCALE

NOTES:

1. *THIS DRAINAGE STUDY MAP IS PREPARED IN SUPPORT OF THE ON-SITE PRELIMINARY HYDROLOGIC CALCULATIONS AND STORM DRAIN SIZING.*
2. *THE EXISTING SITE CONSISTS OF OPEN, UNDEVELOPED SPACE, DRAINING GENERALLY FROM NORTH TO SOUTH. THERE IS MINOR OFFSITE RUN-ON FLOW TO THE SITE FROM THE WESTERLY UNDEVELOPED LAND. RUNOFF FROM THE PROJECT GENERALLY DRAINS IN A SOUTHEASTERLY DIRECTION IN A SHEET FLOW MANNER TOWARDS SAN JACINTO RIVER.*
3. *THE POST-PROJECT DRAINAGE CHARACTERISTICS WILL BE MAINTAINED SIMILAR AS COMPARED TO THE PRE-PROJECT CONDITION. REGARDING THE MINOR RUN-ON MENTIONED ABOVE, THE PROJECT PROPOSES A SWALE ON THE WESTERLY EDGE OF THE PROJECT TO DIRECT AND BYPASS THE MINOR WESTERLY RUN-ON IN A SOUTHERLY DIRECTION, IN AN EFFORT TO MAINTAIN THE EXISTING DRAINAGE PATTERN. THEREFORE, THERE WILL BE NO RUN-ON TO THE PROJECT FROM THE WESTERLY OFFSITE AREA IN THE POST-PROJECT CONDITION. ON-SITE RUNOFF WILL BE DIRECTED VIA ON-SITE STORM DRAIN SYSTEM TO AN UNDERGROUND STORAGE FACILITY (PROPRIETARY STORMTRAP SYSTEM) FOR STORING ADEQUATE RUNOFF VOLUME TO ADDRESS THE STORM WATER QUALITY AND POTENTIAL HCOC REQUIREMENTS. SELECT ON-SITE CATCH BASINS WILL HAVE PRE-TREATMENT BMP (I.E. – CONNECTOR PIPE SCREEN) TO HELP MINIMIZE TRASH/DEBRIS GETTING INTO THE UNDERGROUND STORAGE FACILITY. TWO (2) MODULAR WETLAND SYSTEM (MWS) UNITS ARE PROPOSED IMMEDIATELY DOWNSTREAM OF THE UNDERGROUND STORAGE FACILITY TO PROVIDE TREATMENT FOR THE ON-SITE RUNOFF, BASED ON THE VOLUME-BASED APPROACH. ADDITIONALLY, WHERE FEASIBLE, THE PROPOSED LANDSCAPE AREAS IN THE FORM OF VEGETATED SWALES WILL PROVIDE PRE-TREATMENT PRIOR TO CONNECTING INTO PROPOSED ATRIUM GRATES AND STORM DRAIN PIPES. RUNOFF FROM PAVED SURFACES AND ROOFS WILL BE DIRECTED TOWARDS LANDSCAPE AREAS WHERE POSSIBLE TO HELP PROMOTE INCIDENTAL INFILTRATION AND EVAPORATION.*
4. *THE PROJECT IS SITUATED WITHIN THE ZONE AE BASED ON THE FEMA FLOOD INSURANCE RATE MAP (FIRM) NUMBER 06065C1440H, WITH AN EFFECTIVE DATE OF AUGUST 18, 2014. THE MAJORITY OF THE SITE IS WITHIN THE FLOODPLAIN FLOOD FRIDGE OF THE SAN JACINTO RIVER. BASED ON THE FIRM, THE BASE FLOOD ELEVATION (BFE) IS APPROXIMATELY 1420 FEET (PER NAVD 88 VERTICAL DATUM). THEREFORE, THE PROPOSED BUILDING FINISHED FLOOR WILL BE ELEVATED ABOVE THE ELEVATION 1420 FEET. SURROUNDING SURFACE IMPROVEMENTS INCLUDING PARKING, DRIVEWAYS, AND ASSOCIATED LANDSCAPE AREAS ARE EXPECTED TO BE AT EXISTING GRADE. THE PROJECT PLANS TO STAY OFF OF THE FEMA FLOODWAY AREA LOCATED NEAR THE SOUTHEASTERLY CORNER OF THE PROPERTY AND THIS AREA WILL REMAIN AS-IS WITHOUT IMPROVEMENT. FOR THE PROPOSED IMPROVEMENTS WITHIN THE FLOOD FRINGE, THE PROJECT PLANS TO PREPARE AND PROCESS A CONDITIONAL LETTER OF MAP REVISION, BASED ON FILL (CLOMR-F) THROUGH FEMA AT A LATER STAGE OF THE PROJECT PRIOR TO OBTAINING A GRADING PERMIT FROM THE CITY OF PERRIS.*
5. *THE PROJECT IS EXPECTED TO INCREASE THE PEAK FLOW RATE AS A RESULT OF THE PROPOSED IMPROVEMENTS. HOWEVER, AS INDICATED IN SECTION 1.4 OF THIS REPORT, THE ENTIRETY OF THE PROJECT AS WELL AS THE SOUTHERLY OFFSITE CHANNEL ARE SITUATED WITHIN THE FEMA ZONE AE FLOODPLAIN (FLOOD FRINGE) OF THE EXISTING SAN JACINTO RIVER. AS PART OF THE STORM WATER QUALITY MANAGEMENT REQUIREMENTS (INCLUDING WATER QUALITY AND HYDROLOGIC CONDITION OF CONCERN), THE PROJECT PROPOSES AN UNDERGROUND STORAGE FACILITY ALONG WITH TREATMENT UNITS NEAR THE SOUTHEASTERLY CORNER OF THE PROJECT PRIOR TO DISCHARGING. WHILE THE PROPOSED STORM WATER MANAGEMENT FACILITIES ARE INTENDED FOR RELATIVELY SMALLER STORM EVENTS, THE SYSTEM WOULD ALSO PROVIDE INCIDENTAL ATTENUATION FOR LARGER STORMS. THE PROJECT PLANS TO PROVIDE ENERGY DISSIPATERS NEAR THE SOUTHEASTERLY CORNER OF THE SITE (DOWNSTREAM OF THE PROPOSED STORM WATER MANAGEMENT FACILITIES) IN AN EFFORT TO HELP REDUCE THE VELOCITY AND HELP MINIMIZE POTENTIAL CONCERN FOR EROSION DOWNSTREAM. THEREFORE, WITH THE SITE BEING ENTIRELY WITHIN THE FLOODPLAIN, FLOOD CONTROL INCREASED RUNOFF MITIGATION (DETENTION CONTROL) SHOULD NOT BE NECESSARY FOR THIS PROJECT. AS A NOTE, THE PROJECT PLANS TO HAVE THE PROPOSED BUILDING FINISHED FLOOR ABOVE THE BASE FLOOD ELEVATION AND PROCESS A CLOMR-F THROUGH FEMA DURING FINAL ENGINEERING (PRIOR TO OBTAINING A GRADING PERMIT).*
6. *THE SITE IS SITUATED ON HYDROLOGIC SOIL GROUP D. FOR THE PURPOSE OF HYDROLOGIC CALCULATION SOIL GROUP D WAS APPLIED IN THE CALCULATION.*

NOTE: THERE IS AN OFFSITE RUN-ON FROM THE EXISTING OFFSITE AREA TO THE WEST. THE PROJECT IS PROPOSING A LANDSCAPE / SWALE (SELF-TREATING AREA) ALONG WTHE WESTERLY AND SOUTHERLY EDGES OF THE SITE TO PICK UP THE WESTERLY OFFSITE FLOWS AND CONVEY AROUND THE SITE, AS SIMILAR TO THE EXISTING CONDITION. THE OFFSITE AREA/FLOW ARE TO BE DETERMINED.

LEGEND

- *TRACT BOUNDARY*
- *MAJOR DRAINAGE BOUNDARY*
- *SUB BASIN BOUNDARY*
- *DRAINAGE FLOW PATH*
- *DRAINAGE ACREAGE* — X.X AC.
- *BASIN NODE ID* — XXX
- *DISCHARGE LOCATION*
- *PROPOSED STORM DRAIN*
- *FEMA FLOODWAY*

N

0 40 80 160 240 320

SCALE 1"=80'

APN 330-090-016 VACANT

VACANT APN 330-090-027

NOT A PART OF THE PROJECT

BASIN 100

0.9 AC. 108 | 1.7 AC. 105 | 1.7 AC. 125 | 0.8 AC. 133 | 135 | 136 | 131 | 141 | 0.4 AC. | 0.4 AC. | 140 | 137 | 132 | 143 | 0.9 AC. | 123 | 1.5 AC. | 151 | 0.5 AC. | 145 | 1001 | 107 | 0.9 AC. | 103 | 1.6 AC. | 101 | 121 | 106 | 116 | 150 | 148 | 153 | 155 | 2.5 AC. | 147 | 0.5 AC. | 120 | 118 | 7.8 AC. | 157 | 0.7 AC. | 146 | 150 | 156 | 5.5 AC. | 170 | 165 | 160 | 0.6 AC. | 180

NOT A PART OF THE PROJECT

EX. RAILROAD ESMT APN 330-080-024

VACANT APN 330-090-009

VACANT APN 330-090-027

NOT A PART OF THE PROJECT

OUTLET-NODE 180
A=28.9 AC.
Q10=39.6 CFS
Q100=71.3 CFS

DRAINAGE STUDY MAP FOR NEWCASTLE-ELLIS (POST-PROJECT)

JN 2126 DATE: 5/23/2022

S:\SDH DRAWINGS\NEWCASTLE-ELLIS\WP\DRN Exhibit Post.dwg 2022-05-23 - 8:42PM - SDH

NOT FOR CONSTRUCTION – EXHIBIT FOR PRELIMINARY DRAINAGE STUDY ONLY

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                  (Rational Tabling Version 23.0)
              Release Date: 07/01/2016  License ID 1717

                        Analysis prepared by:

                        SDH & ASSOCIATES, INC.
                         27363 VIA INDUSTRIA
                          TEMECULA, CA 92590
                            (951) 683-3691

 ************************* DESCRIPTION OF STUDY *************************
* NEWCASTLE-ELLIS (JN 2126)                                             *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 100                                                             *
 *************************************************************************

  FILE NAME: NE1HP10.RAT
  TIME/DATE OF STUDY: 17:07 05/23/2022
-------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------
  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
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.850
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.808
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.320
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.460
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4623269
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4585035
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.816
  SLOPE OF INTENSITY DURATION CURVE = 0.4623
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

```
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   240.00
  UPSTREAM ELEVATION(FEET) =     16.58
  DOWNSTREAM ELEVATION(FEET) =     14.52
  ELEVATION DIFFERENCE(FEET) =      2.06
  TC = 0.303*[(  240.00**3)/(     2.06)]**.2 =    7.030
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.199
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8849
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      3.31
  TOTAL AREA(ACRES) =      1.70   TOTAL RUNOFF(CFS) =      3.31

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.199
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8849
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    1.60   SUBAREA RUNOFF(CFS) =    3.11
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =       6.42
  TC(MIN.) =    7.03

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    12.02  DOWNSTREAM(FEET) =    11.35
  FLOW LENGTH(FEET) =   298.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.30
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       6.42
  PIPE TRAVEL TIME(MIN.) =   1.51    Tc(MIN.) =    8.54
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.54
  RAINFALL INTENSITY(INCH/HR) =   2.01
  TOTAL STREAM AREA(ACRES) =     3.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.42

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    108.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   403.00
  UPSTREAM ELEVATION(FEET) =     17.13
  DOWNSTREAM ELEVATION(FEET) =     13.90
  ELEVATION DIFFERENCE(FEET) =      3.23
  TC = 0.303*[(  403.00**3)/(     3.23)]**.2 =    8.769
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.986
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.58
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      1.58

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.986
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    1.58
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       3.16
  TC(MIN.) =    8.77

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.40  DOWNSTREAM(FEET) =    11.35
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.27
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.16
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    8.80
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    110.00 =     412.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.80
  RAINFALL INTENSITY(INCH/HR) =   1.98
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.16

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        6.42     8.54        2.010          3.30
      2        3.16     8.80        1.982          1.80

 **********************************WARNING***********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        9.48     8.54       2.010
      2        9.49     8.80       1.982

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.48   Tc(MIN.) =    8.54
  TOTAL AREA(ACRES) =        5.1
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     538.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.35  DOWNSTREAM(FEET) =     9.93
  FLOW LENGTH(FEET) =   712.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.74
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.48
  PIPE TRAVEL TIME(MIN.) =   3.17    Tc(MIN.) =   11.71
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.71
  RAINFALL INTENSITY(INCH/HR) =   1.74
  TOTAL STREAM AREA(ACRES) =     5.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.48

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    118.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   348.00
  UPSTREAM ELEVATION(FEET) =     17.13
  DOWNSTREAM ELEVATION(FEET) =     15.68
  ELEVATION DIFFERENCE(FEET) =      1.45
  TC = 0.303*[(  348.00**3)/(     1.45)]**.2 =    9.425
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.920
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8831
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.18  DOWNSTREAM(FEET) =     9.93
  FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.18
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.85
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    9.44
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    120.00 =     360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 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.) =    9.44
  RAINFALL INTENSITY(INCH/HR) =   1.92
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.85

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.48    11.71        1.737          5.10
      2        0.85     9.44        1.919          0.50

 **********************************WARNING***********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        8.50     9.44       1.919
      2       10.25    11.71       1.737

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.25   Tc(MIN.) =   11.71
  TOTAL AREA(ACRES) =        5.6
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =    1250.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.93  DOWNSTREAM(FEET) =     7.70
  FLOW LENGTH(FEET) =   751.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.55
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.25
  PIPE TRAVEL TIME(MIN.) =   2.75    Tc(MIN.) =   14.46
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    170.00 =    2001.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    125.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   241.00
  UPSTREAM ELEVATION(FEET) =     16.58
  DOWNSTREAM ELEVATION(FEET) =     14.52
  ELEVATION DIFFERENCE(FEET) =      2.06
  TC = 0.303*[(  241.00**3)/(     2.06)]**.2 =    7.047
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.197
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8849
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      3.30
  TOTAL AREA(ACRES) =      1.70   TOTAL RUNOFF(CFS) =      3.30

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.197
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8849
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    1.50   SUBAREA RUNOFF(CFS) =    2.92
```

```
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =       6.22
  TC(MIN.) =    7.05

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    12.02  DOWNSTREAM(FEET) =    11.16
  FLOW LENGTH(FEET) =   430.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.11
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.22
  PIPE TRAVEL TIME(MIN.) =   2.30    Tc(MIN.) =    9.35
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    135.00 =     671.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.35
  RAINFALL INTENSITY(INCH/HR) =   1.93
  TOTAL STREAM AREA(ACRES) =     3.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.22

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    133.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   228.00
  UPSTREAM ELEVATION(FEET) =     16.35
  DOWNSTREAM ELEVATION(FEET) =     14.34
  ELEVATION DIFFERENCE(FEET) =      2.01
  TC = 0.303*[(  228.00**3)/(     2.01)]**.2 =    6.850
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.226
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8850
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.58
  TOTAL AREA(ACRES) =      0.80   TOTAL RUNOFF(CFS) =      1.58
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.226
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8850
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    1.77
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       3.35
  TC(MIN.) =    6.85

****************************************************************************
  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) =    11.84  DOWNSTREAM(FEET) =    11.16
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.59
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.35
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    6.86
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    135.00 =     236.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 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.) =    6.86
  RAINFALL INTENSITY(INCH/HR) =   2.22
  TOTAL STREAM AREA(ACRES) =     1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.35

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        6.22     9.35        1.927          3.20
      2        3.35     6.86        2.224          1.70

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
```

```
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.91     6.86       2.224
      2        9.12     9.35       1.927

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.12   Tc(MIN.) =    9.35
  TOTAL AREA(ACRES) =        4.9
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    135.00 =     671.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.16  DOWNSTREAM(FEET) =     9.85
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.12
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   10.11
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    140.00 =     921.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.11
  RAINFALL INTENSITY(INCH/HR) =   1.86
  TOTAL STREAM AREA(ACRES) =     4.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.12

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    137.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
```

```
        DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   226.00
  UPSTREAM ELEVATION(FEET) =     14.49
  DOWNSTREAM ELEVATION(FEET) =     12.40
  ELEVATION DIFFERENCE(FEET) =      2.09
  TC = 0.303*[(  226.00**3)/(     2.09)]**.2 =    6.761
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.239
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8851
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.79
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.79

****************************************************************************
  FLOW PROCESS FROM NODE    137.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.90  DOWNSTREAM(FEET) =     9.85
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.17
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.79
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    6.93
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    140.00 =     248.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 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.) =    6.93
  RAINFALL INTENSITY(INCH/HR) =   2.21
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.79

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.12    10.11        1.859          4.90
      2        0.79     6.93        2.214          0.40

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
```

```
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.04     6.93       2.214
      2        9.79    10.11       1.859

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.79   Tc(MIN.) =   10.11
  TOTAL AREA(ACRES) =        5.3
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    140.00 =     921.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.85  DOWNSTREAM(FEET) =     9.82
  FLOW LENGTH(FEET) =    11.50   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.22
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.79
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   10.16
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    145.00 =     932.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.16
  RAINFALL INTENSITY(INCH/HR) =   1.85
  TOTAL STREAM AREA(ACRES) =     5.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.79

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    143.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
```

```
        DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   219.00
  UPSTREAM ELEVATION(FEET) =     15.50
  DOWNSTREAM ELEVATION(FEET) =     13.40
  ELEVATION DIFFERENCE(FEET) =      2.10
  TC = 0.303*[(  219.00**3)/(     2.10)]**.2 =    6.628
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.260
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8852
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    10.90  DOWNSTREAM(FEET) =     9.82
  FLOW LENGTH(FEET) =    29.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.94
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.80
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.71
  LONGEST FLOWPATH FROM NODE    141.00 TO NODE    145.00 =     248.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 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.) =    6.71
  RAINFALL INTENSITY(INCH/HR) =   2.25
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.80

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.79    10.16        1.855          5.30
      2        0.80     6.71        2.247          0.40

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
```

```
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.26     6.71       2.247
      2       10.45    10.16       1.855

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.45   Tc(MIN.) =   10.16
  TOTAL AREA(ACRES) =        5.7
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    145.00 =     932.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.82  DOWNSTREAM(FEET) =     9.45
  FLOW LENGTH(FEET) =   185.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.77
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.45
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =   10.98
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    150.00 =    1117.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.98
  RAINFALL INTENSITY(INCH/HR) =   1.79
  TOTAL STREAM AREA(ACRES) =     5.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.45

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    148.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   421.00
  UPSTREAM ELEVATION(FEET) =     15.90
  DOWNSTREAM ELEVATION(FEET) =     11.60
  ELEVATION DIFFERENCE(FEET) =      4.30
  TC = 0.303*[(  421.00**3)/(     4.30)]**.2 =    8.501
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.014
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8837
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.25
  TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      1.25

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    148.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.014
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8837
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    2.50   SUBAREA RUNOFF(CFS) =    4.45
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =       5.70
  TC(MIN.) =    8.50

****************************************************************************
  FLOW PROCESS FROM NODE    148.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.60  DOWNSTREAM(FEET) =     9.45
  FLOW LENGTH(FEET) =    21.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.45
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.70
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.57
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    150.00 =     442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 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.) =    8.57
 RAINFALL INTENSITY(INCH/HR) =   2.01
 TOTAL STREAM AREA(ACRES) =     3.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.70

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       10.45    10.98        1.790          5.70
     2        5.70     8.57        2.007          3.20

 ********************************WARNING*********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       13.85     8.57       2.007
     2       15.53    10.98       1.790

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.53   Tc(MIN.) =   10.98
 TOTAL AREA(ACRES) =        8.9
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    150.00 =    1117.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     9.45  DOWNSTREAM(FEET) =     9.41
 FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  17.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.25
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.53
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   11.01
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    155.00 =    1129.50 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.) =   11.01
  RAINFALL INTENSITY(INCH/HR) =   1.79
  TOTAL STREAM AREA(ACRES) =     8.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.53

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    153.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   212.00
  UPSTREAM ELEVATION(FEET) =     14.60
  DOWNSTREAM ELEVATION(FEET) =     12.40
  ELEVATION DIFFERENCE(FEET) =      2.20
  TC = 0.303*[(  212.00**3)/(     2.20)]**.2 =    6.440
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.290
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8854
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.01
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.01

****************************************************************************
  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) =     9.90  DOWNSTREAM(FEET) =     9.41
  FLOW LENGTH(FEET) =    29.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.01
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.54
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    155.00 =     241.00 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.) =    6.54
 RAINFALL INTENSITY(INCH/HR) =   2.27
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.01

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       15.53    11.01        1.787          8.90
     2        1.01     6.54        2.274          0.50

*********************************WARNING*********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
*************************************************************************

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       10.23     6.54       2.274
     2       16.32    11.01       1.787

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      16.32   Tc(MIN.) =   11.01
 TOTAL AREA(ACRES) =        9.4
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    155.00 =    1129.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    165.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     9.41  DOWNSTREAM(FEET) =     7.77
 FLOW LENGTH(FEET) =   821.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.32
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.32
 PIPE TRAVEL TIME(MIN.) =   3.17    Tc(MIN.) =   14.18
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    165.00 =    1950.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 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.) =   14.18
  RAINFALL INTENSITY(INCH/HR) =   1.59
  TOTAL STREAM AREA(ACRES) =     9.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.32

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    160.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   376.00
  UPSTREAM ELEVATION(FEET) =     16.50
  DOWNSTREAM ELEVATION(FEET) =     12.94
  ELEVATION DIFFERENCE(FEET) =      3.56
  TC = 0.303*[(  376.00**3)/(     3.56)]**.2 =    8.249
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.042
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8839
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      9.93
  TOTAL AREA(ACRES) =      5.50   TOTAL RUNOFF(CFS) =      9.93

****************************************************************************
  FLOW PROCESS FROM NODE    157.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.042
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8839
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    7.80   SUBAREA RUNOFF(CFS) =   14.08
  TOTAL AREA(ACRES) =       13.3   TOTAL RUNOFF(CFS) =      24.01
  TC(MIN.) =    8.25

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     8.94  DOWNSTREAM(FEET) =     7.77
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  12.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.13
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      24.01
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    8.34
  LONGEST FLOWPATH FROM NODE    156.00 TO NODE    165.00 =     438.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 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.) =    8.34
  RAINFALL INTENSITY(INCH/HR) =   2.03
  TOTAL STREAM AREA(ACRES) =    13.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.01

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       16.32    14.18        1.590          9.40
      2       24.01     8.34        2.032         13.30

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       33.61     8.34       2.032
      2       35.11    14.18       1.590

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      33.61   Tc(MIN.) =    8.34
  TOTAL AREA(ACRES) =       22.7
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    165.00 =    1950.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     7.77  DOWNSTREAM(FEET) =     7.70
```

```
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.01
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.61
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    8.46
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    170.00 =    1984.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       33.61     8.46        2.019       22.70
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    170.00 =    1984.50 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       10.25    14.46        1.576        5.60
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    170.00 =    2001.00 FEET.

 ****************************WARNING*************************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      39.61       8.46        2.019
      2      36.48      14.46        1.576

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      39.61   Tc(MIN.) =    8.46
  TOTAL AREA(ACRES) =       28.3

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    180.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.41  DOWNSTREAM(FEET) =    11.40
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.06
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   3
  PIPE-FLOW(CFS) =      39.61
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    8.85
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    180.00 =    2026.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 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.) =    8.85
  RAINFALL INTENSITY(INCH/HR) =   1.98
  TOTAL STREAM AREA(ACRES) =    28.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.61

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE    180.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1500.00
  UPSTREAM ELEVATION(FEET) =     14.50
  DOWNSTREAM ELEVATION(FEET) =     12.40
  ELEVATION DIFFERENCE(FEET) =      2.10
  TC = 0.937*[( 1500.00**3)/(     2.10)]**.2 =   65.033
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.786
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5750
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.27
  TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      0.27

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 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.) =   65.03
  RAINFALL INTENSITY(INCH/HR) =   0.79
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.27

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       39.61     8.85        1.977         28.30
      2        0.27    65.03        0.786          0.60

 **********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ***************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       39.64     8.85       1.977
      2       16.02    65.03       0.786

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      39.64   Tc(MIN.) =    8.85
  TOTAL AREA(ACRES) =       28.9
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    180.00 =    2026.00 FEET.
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       28.9  TC(MIN.) =      8.85
  PEAK FLOW RATE(CFS)   =      39.64
========================================================================
========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1717

                          Analysis prepared by:

                          SDH & ASSOCIATES, INC.
                           27363 VIA INDUSTRIA
                            TEMECULA, CA 92590
                              (951) 683-3691

 ************************* DESCRIPTION OF STUDY *************************
* NEWCASTLE-ELLIS (JN 2126)                                             *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                 *
* BASIN 100                                                             *
 *************************************************************************

  FILE NAME: NE1HP00.RAT
  TIME/DATE OF STUDY: 17:05 05/23/2022
-------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------
  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
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.850
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.808
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.320
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.460
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4623269
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4585035
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.460
  SLOPE OF INTENSITY DURATION CURVE = 0.4585
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

```
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   240.00
  UPSTREAM ELEVATION(FEET) =     16.58
  DOWNSTREAM ELEVATION(FEET) =     14.52
  ELEVATION DIFFERENCE(FEET) =      2.06
  TC = 0.303*[(  240.00**3)/(     2.06)]**.2 =    7.030
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.902
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8908
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      5.91
  TOTAL AREA(ACRES) =      1.70   TOTAL RUNOFF(CFS) =      5.91

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.902
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8908
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    1.60   SUBAREA RUNOFF(CFS) =    5.56
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =      11.47
  TC(MIN.) =    7.03

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    12.02  DOWNSTREAM(FEET) =    11.35
  FLOW LENGTH(FEET) =   298.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.30
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      11.47
  PIPE TRAVEL TIME(MIN.) =   1.51    Tc(MIN.) =    8.54
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.54
  RAINFALL INTENSITY(INCH/HR) =   3.57
  TOTAL STREAM AREA(ACRES) =     3.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.47

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    108.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   403.00
  UPSTREAM ELEVATION(FEET) =     17.13
  DOWNSTREAM ELEVATION(FEET) =     13.90
  ELEVATION DIFFERENCE(FEET) =      3.23
  TC = 0.303*[(  403.00**3)/(     3.23)]**.2 =    8.769
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.526
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8899
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      2.82
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      2.82

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.526
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8899
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.82
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       5.65
  TC(MIN.) =    8.77

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.40  DOWNSTREAM(FEET) =    11.35
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.93
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.65
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    8.80
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    110.00 =     412.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.80
  RAINFALL INTENSITY(INCH/HR) =   3.52
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.65

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.47     8.54        3.570          3.30
      2        5.65     8.80        3.521          1.80

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       16.95     8.54       3.570
      2       16.96     8.80       3.521

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.95   Tc(MIN.) =    8.54
  TOTAL AREA(ACRES) =        5.1
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     538.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.35  DOWNSTREAM(FEET) =     9.93
  FLOW LENGTH(FEET) =   712.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.76
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.95
  PIPE TRAVEL TIME(MIN.) =   3.15    Tc(MIN.) =   11.69
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.69
  RAINFALL INTENSITY(INCH/HR) =   3.09
  TOTAL STREAM AREA(ACRES) =     5.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.95

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    118.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   348.00
  UPSTREAM ELEVATION(FEET) =     17.13
  DOWNSTREAM ELEVATION(FEET) =     15.68
  ELEVATION DIFFERENCE(FEET) =      1.45
  TC = 0.303*[(  348.00**3)/(     1.45)]**.2 =    9.425
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.411
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8896
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.52
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.52

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    118.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    13.18  DOWNSTREAM(FEET) =     9.93
 FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.50
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.52
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    9.44
 LONGEST FLOWPATH FROM NODE    116.00 TO NODE    120.00 =     360.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 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.) =    9.44
 RAINFALL INTENSITY(INCH/HR) =   3.41
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.52

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       16.95    11.69        3.091          5.10
     2        1.52     9.44        3.409          0.50

 ********************************WARNING*************************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       15.21     9.44       3.409
     2       18.33    11.69       3.091

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      18.33   Tc(MIN.) =   11.69
```

```
  TOTAL AREA(ACRES) =        5.6
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.93  DOWNSTREAM(FEET) =     7.70
  FLOW LENGTH(FEET) =   751.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.19
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.33
  PIPE TRAVEL TIME(MIN.) =   2.41    Tc(MIN.) =   14.10
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    170.00 =    2001.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    125.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   241.00
  UPSTREAM ELEVATION(FEET) =     16.58
  DOWNSTREAM ELEVATION(FEET) =     14.52
  ELEVATION DIFFERENCE(FEET) =      2.06
  TC = 0.303*[(  241.00**3)/(     2.06)]**.2 =    7.047
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.898
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8908
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      5.90
  TOTAL AREA(ACRES) =      1.70   TOTAL RUNOFF(CFS) =      5.90

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.898
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8908
```

```
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    1.50   SUBAREA RUNOFF(CFS) =    5.21
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =      11.11
  TC(MIN.) =    7.05

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    12.02  DOWNSTREAM(FEET) =    11.16
  FLOW LENGTH(FEET) =   430.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.11
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.11
  PIPE TRAVEL TIME(MIN.) =   2.30    Tc(MIN.) =    9.35
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    135.00 =     671.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.35
  RAINFALL INTENSITY(INCH/HR) =   3.42
  TOTAL STREAM AREA(ACRES) =     3.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.11

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    133.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   228.00
  UPSTREAM ELEVATION(FEET) =     16.35
  DOWNSTREAM ELEVATION(FEET) =     14.34
  ELEVATION DIFFERENCE(FEET) =      2.01
  TC = 0.303*[(  228.00**3)/(     2.01)]**.2 =    6.850
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.949
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8909
  SOIL CLASSIFICATION IS "D"
```

```
  SUBAREA RUNOFF(CFS) =      2.81
  TOTAL AREA(ACRES) =      0.80   TOTAL RUNOFF(CFS) =      2.81

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.949
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8909
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    3.17
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       5.98
  TC(MIN.) =    6.85

****************************************************************************
  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) =    11.84  DOWNSTREAM(FEET) =    11.16
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.70
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.98
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    6.86
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    135.00 =     236.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 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.) =    6.86
  RAINFALL INTENSITY(INCH/HR) =   3.95
  TOTAL STREAM AREA(ACRES) =     1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.98

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc       INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.11     9.35        3.424          3.20
      2        5.98     6.86        3.946          1.70

 ********************************WARNING**********************************
```

```
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       14.13     6.86       3.946
      2       16.30     9.35       3.424

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.30   Tc(MIN.) =    9.35
  TOTAL AREA(ACRES) =        4.9
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    135.00 =     671.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.16  DOWNSTREAM(FEET) =     9.85
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.10
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.30
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   10.03
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    140.00 =     921.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.03
  RAINFALL INTENSITY(INCH/HR) =   3.31
  TOTAL STREAM AREA(ACRES) =     4.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.30

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    137.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==========================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   226.00
  UPSTREAM ELEVATION(FEET) =     14.49
  DOWNSTREAM ELEVATION(FEET) =     12.40
  ELEVATION DIFFERENCE(FEET) =      2.09
  TC = 0.303*[(  226.00**3)/(     2.09)]**.2 =    6.761
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.973
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8909
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.42
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.42

**************************************************************************
  FLOW PROCESS FROM NODE    137.00 TO NODE    140.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.90  DOWNSTREAM(FEET) =     9.85
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.48
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.42
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    6.91
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    140.00 =     248.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 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.) =    6.91
  RAINFALL INTENSITY(INCH/HR) =   3.93
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.42

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       16.30    10.03        3.315          4.90
      2        1.42     6.91        3.933          0.40

 ********************************WARNING**********************************
```

```
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       12.64     6.91       3.933
      2       17.49    10.03       3.315

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      17.49   Tc(MIN.) =   10.03
  TOTAL AREA(ACRES) =        5.3
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    140.00 =     921.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.85  DOWNSTREAM(FEET) =     9.82
  FLOW LENGTH(FEET) =    11.50   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.31
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.49
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   10.08
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    145.00 =     932.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.08
  RAINFALL INTENSITY(INCH/HR) =   3.31
  TOTAL STREAM AREA(ACRES) =     5.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.49

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    143.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   219.00
  UPSTREAM ELEVATION(FEET) =     15.50
  DOWNSTREAM ELEVATION(FEET) =     13.40
  ELEVATION DIFFERENCE(FEET) =      2.10
  TC = 0.303*[(  219.00**3)/(     2.10)]**.2 =    6.628
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.009
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8910
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.43
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.43

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    10.90  DOWNSTREAM(FEET) =     9.82
  FLOW LENGTH(FEET) =    29.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.05
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.43
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.70
  LONGEST FLOWPATH FROM NODE    141.00 TO NODE    145.00 =     248.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 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.) =    6.70
  RAINFALL INTENSITY(INCH/HR) =   3.99
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.43

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       17.49    10.08        3.308          5.30
      2        1.43     6.70        3.990          0.40
```

```
 ********************************WARNING*************************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       13.05     6.70       3.990
      2       18.68    10.08       3.308

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      18.68   Tc(MIN.) =   10.08
  TOTAL AREA(ACRES) =        5.7
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    145.00 =     932.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.82  DOWNSTREAM(FEET) =     9.45
  FLOW LENGTH(FEET) =   185.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.77
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.68
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =   10.90
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    150.00 =    1117.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.90
  RAINFALL INTENSITY(INCH/HR) =   3.19
  TOTAL STREAM AREA(ACRES) =     5.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.68
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    148.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   421.00
  UPSTREAM ELEVATION(FEET) =     15.90
  DOWNSTREAM ELEVATION(FEET) =     11.60
  ELEVATION DIFFERENCE(FEET) =      4.30
  TC = 0.303*[(  421.00**3)/(     4.30)]**.2 =    8.501
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.577
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8901
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      2.23
  TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      2.23

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    148.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.577
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8901
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    2.50   SUBAREA RUNOFF(CFS) =    7.96
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =      10.19
  TC(MIN.) =    8.50

****************************************************************************
  FLOW PROCESS FROM NODE    148.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.60  DOWNSTREAM(FEET) =     9.45
  FLOW LENGTH(FEET) =    21.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.88
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.19
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.56
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    150.00 =     442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 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.) =    8.56
  RAINFALL INTENSITY(INCH/HR) =   3.57
  TOTAL STREAM AREA(ACRES) =     3.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.19

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       18.68    10.90        3.192          5.70
      2       10.19     8.56        3.565          3.20

 **********************************WARNING***********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       24.86     8.56       3.565
      2       27.80    10.90       3.192

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      27.80   Tc(MIN.) =   10.90
  TOTAL AREA(ACRES) =        8.9
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    150.00 =    1117.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.45  DOWNSTREAM(FEET) =     9.41
  FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.65
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      27.80
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   10.93
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    155.00 =    1129.50 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.) =   10.93
  RAINFALL INTENSITY(INCH/HR) =   3.19
  TOTAL STREAM AREA(ACRES) =     8.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.80

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    153.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   212.00
  UPSTREAM ELEVATION(FEET) =     14.60
  DOWNSTREAM ELEVATION(FEET) =     12.40
  ELEVATION DIFFERENCE(FEET) =      2.20
  TC = 0.303*[(  212.00**3)/(     2.20)]**.2 =    6.440
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.062
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8911
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.81
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.81

****************************************************************************
  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) =     9.90  DOWNSTREAM(FEET) =     9.41
  FLOW LENGTH(FEET) =    29.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.64
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.81
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.53
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    155.00 =     241.00 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.) =    6.53
  RAINFALL INTENSITY(INCH/HR) =   4.04
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.81

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       27.80    10.93        3.187          8.90
      2        1.81     6.53        4.038          0.50

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       18.40     6.53       4.038
      2       29.23    10.93       3.187

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      29.23   Tc(MIN.) =   10.93
  TOTAL AREA(ACRES) =        9.4
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    155.00 =    1129.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    165.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.41  DOWNSTREAM(FEET) =     7.77
  FLOW LENGTH(FEET) =   821.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.37
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
```

```
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.23
  PIPE TRAVEL TIME(MIN.) =   3.13    Tc(MIN.) =   14.06
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    165.00 =    1950.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 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.) =   14.06
  RAINFALL INTENSITY(INCH/HR) =   2.84
  TOTAL STREAM AREA(ACRES) =     9.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.23

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    160.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   376.00
  UPSTREAM ELEVATION(FEET) =     16.50
  DOWNSTREAM ELEVATION(FEET) =     12.94
  ELEVATION DIFFERENCE(FEET) =      3.56
  TC = 0.303*[(  376.00**3)/(     3.56)]**.2 =    8.249
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.626
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8902
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =     17.75
  TOTAL AREA(ACRES) =      5.50   TOTAL RUNOFF(CFS) =     17.75

****************************************************************************
  FLOW PROCESS FROM NODE    157.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.626
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8902
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    7.80   SUBAREA RUNOFF(CFS) =   25.18
  TOTAL AREA(ACRES) =       13.3   TOTAL RUNOFF(CFS) =      42.93
  TC(MIN.) =    8.25

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     8.94  DOWNSTREAM(FEET) =     7.77
 FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.01
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      42.93
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    8.33
 LONGEST FLOWPATH FROM NODE    156.00 TO NODE    165.00 =     438.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 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.) =    8.33
 RAINFALL INTENSITY(INCH/HR) =   3.61
 TOTAL STREAM AREA(ACRES) =    13.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     42.93

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       29.23    14.06        2.840          9.40
     2       42.93     8.33        3.610         13.30

 ********************************WARNING*************************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       60.24     8.33       3.610
     2       62.99    14.06       2.840

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      60.24   Tc(MIN.) =    8.33
```

```
 TOTAL AREA(ACRES) =       22.7
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    165.00 =    1950.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    165.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     7.77  DOWNSTREAM(FEET) =     7.70
 FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.012
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.01
 (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
  AT DEPTH = 0.82 * DIAMETER)
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      60.24
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    8.44
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    170.00 =    1984.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       60.24     8.44       3.588       22.70
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    170.00 =    1984.50 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       18.33    14.10       2.836        5.60
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    170.00 =    2001.00 FEET.

 ****************************WARNING*********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ********************************************************************

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      71.22       8.44        3.588
     2      65.95      14.10        2.836
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      71.22   Tc(MIN.) =    8.44
  TOTAL AREA(ACRES) =       28.3

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    180.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.41  DOWNSTREAM(FEET) =    11.40
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.06
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   3
  PIPE-FLOW(CFS) =      71.22
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    8.83
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    180.00 =    2026.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 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.) =    8.83
  RAINFALL INTENSITY(INCH/HR) =   3.51
  TOTAL STREAM AREA(ACRES) =    28.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     71.22

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE    180.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1500.00
  UPSTREAM ELEVATION(FEET) =     14.50
  DOWNSTREAM ELEVATION(FEET) =     12.40
```

```
  ELEVATION DIFFERENCE(FEET) =      2.10
  TC = 0.937*[( 1500.00**3)/(     2.10)]**.2 =   65.033
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.407
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6840
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.58
  TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      0.58

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 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.) =   65.03
  RAINFALL INTENSITY(INCH/HR) =   1.41
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.58

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       71.22     8.83        3.514         28.30
      2        0.58    65.03        1.407          0.60

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       71.30     8.83       3.514
      2       29.09    65.03       1.407

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      71.30   Tc(MIN.) =    8.83
  TOTAL AREA(ACRES) =       28.9
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    180.00 =    2026.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       28.9  TC(MIN.) =      8.83
  PEAK FLOW RATE(CFS)   =      71.30
```

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

Appendix C

Inlet Sizing

Note: Detailed onsite inlet calculations will be conducted at the time of the final drainage study and will be incorporated in this Appendix.

Appendix D

Preliminary Storm Drain Sizing

Includes:

1. Preliminary on-site storm drain sizing summary

Newcastle-Ellis
Job # 2126
5/23/2022

Preliminary Storm Drain Size

The purpose of this table is to provide estimated preliminary pipe sizes to convey the anticipated 10-year peak flow rates with a preliminary sizing bump-up factor to account for potential head losses through the pipe.

Manning's n: 0.012 HDPE or equivalent

Preliminary Sizing Bump-up (%): 30

			Preliminary Sizes per Varying Slopes						
		Slope at:	0.2%		0.5%		1.0%		
Node ID's:	Q_{10} (cfs[1])	Q_{100} with Sizing Factor (cfs[1])	Minimum Pipe Size[2] (feet)	Suggested Pipe Size (inches)	Minimum Pipe Size[2] (feet)	Suggested Pipe Size (inches)	Minimum Pipe Size [2] (feet)	Suggested Pipe Size (inches)	PRELIMINARY RECOMMENDATIONS[3]
105 - 110	6.4	8.3	1.80	24"	1.52	24"	1.33	18"	**Use 18" HDPE @ 0.2% MIN.**
108 - 110	3.2	4.2	1.39	18"	1.17	18"	1.03	18"	**Use 18" HDPE @ 0.2% MIN.**
110 - 120	9.5	12.4	2.09	30"	1.76	24"	1.55	24"	**Use 24" HDPE @ 0.2% MIN.**
118 - 120	0.9	1.2	0.86	12"	0.73	10"	0.64	8"	**Use 12" HDPE @ 0.2% MIN.**
120 - 170	10.3	13.4	2.15	30"	1.81	24"	1.59	24"	**Use 30" HDPE @ 0.2% MIN.**
125 - 135	6.2	8.1	1.78	24"	1.50	18"	1.32	18"	**Use 18" HDPE @ 0.2% MIN.**
133 - 135	3.4	4.4	1.42	18"	1.20	18"	1.05	18"	**Use 18" HDPE @ 0.2% MIN.**
135 - 140	9.1	11.8	2.06	30"	1.73	24"	1.52	24"	**Use 24" HDPE @ 0.2% MIN.**
137 - 140	0.8	1.0	0.83	10"	0.70	10"	0.61	8"	**Use 12" HDPE @ 0.2% MIN.**
140 - 145	9.8	12.7	2.11	30"	1.78	24"	1.56	24"	**Use 30" HDPE @ 0.2% MIN.**
143 - 145	0.8	1.0	0.83	10"	0.70	10"	0.61	8"	**Use 12" HDPE @ 0.2% MIN.**
145 - 150	10.5	13.7	2.17	30"	1.83	24"	1.60	24"	**Use 30" HDPE @ 0.2% MIN.**
148 - 150	5.7	7.4	1.73	24"	1.45	18"	1.28	18"	**Use 18" HDPE @ 0.2% MIN.**
150 - 155	15.5	20.2	2.51	36"	2.11	30"	1.86	24"	**Use 36" HDPE @ 0.2% MIN.**
153 - 155	1.0	1.3	0.90	12"	0.76	10"	0.66	8"	**Use 12" HDPE @ 0.2% MIN.**
155 - 165	16.3	21.2	2.56	36"	2.15	30"	1.89	24"	**Use 36" HDPE @ 0.2% MIN.**
160 - 165	24.0	31.2	2.96	36"	2.49	30"	2.19	30"	**Use 36" HDPE @ 0.2% MIN.**
165 - 170	33.6	43.7	3.36	42"	2.83	36"	2.48	30"	**Use 36" HDPE @ 0.2% MIN.**
170 - 180	39.6	51.5	3.57	48"	3.01	42"	2.64	36"	**Use 3-12" HDPE @ 0.2% MIN.**

Note:

1. "cfs" = cubic feet per second.
2. Minimum pipe sizes are calculated using the Manning's equation and are based on the flow rates with "bump up factor" to account for potential head losses through the storm drain pipes.
3. The on-site storm drain systems are private and the normal depth calculations should suffice for pipe sizing purpose.
   The preliminary recommendations may differ slightly from the pipe sizing summary table above. Detailed calculations may be performed on an as-needed basis during final engineering to validate the required sizes.