PRELIMINARY DRAIANGE STUDY
(HYDROLOGY AND HYDARULICS)
FOR
LAKE CREEK-PLACENTIA
(PRELIMINARY ENGINEERING)

CITY CASE #: DPR 21-00015

(Job Number 2105)

Prepared for:
The Cubes at Placentia, LLC
13681 Newport Ave., Suite 8301
Tustin, CA 92780
Telephone: (949) 910-4616

Prepared by:

SDH & Associates, Inc.
27363 Via Industria
Temecula, California 92590
Telephone: (951) 683-3691

October 18, 2021
Revised: May 9, 2022
Revised: November 10, 2022
Revised: September 25, 2023

Lake Creek-Placentia
Preliminary Drainage Study

Preparer's Certification

This report has been prepared by or under the oversight of the following registered civil engineer who attests to the technical information contained herein and has judged the qualifications of referenced data upon which recommendations, conclusions, and decisions are based.

_____	_____	_____
Nobu Murakami, P.E.	**Date**	**Seal**
R.C.E. #78149		
Exp. 09/30/2025		

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FOR
LAKE CREEK-PLACENTIA
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REVISION PAGE

September 25, 2023

This report presents revisions to the previous version of the preliminary drainage study, dated November 10, 2022. The report was previously reviewed and accepted by the City of Perris; however, the project owner recently acquired a new parcel (APN 300-170-010) and incorporated the parcel into the project. As a result, the site plan has been revised to incorporate the additional parcel with slightly expanded proposed improvements. The general site concept remains similar to the previous version. The preliminary grading plan and the technical reports including this drainage study have been revised accordingly to support the revised site plan.

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REVISION PAGE

November 10, 2022

This report presents revisions to the previous version of the preliminary drainage study, dated May 29, 2022. There were no further comments from the City of Perris on the aforementioned drainage study; however, a segment of the proposed MDP Line H storm drain facility's alignment along Placentia Avenue has been adjusted based on our recent coordination with the City of Perris and adjacent property owners. Therefore, the drainage study map has been revised to be consistent with the latest preliminary grading plan and Line H storm drain facility's revised alignment. The preliminary draft calculation and storm drain profile for the Line H facility is provided for reference purpose but these items are expected to be updated at the time of final drainage study during construction documents to reflect the final storm drain improvement plan.

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REVISION PAGE

May 9, 2022

This report presents revisions to the previous version of the preliminary drainage study, dated October 18, 2021. Based on the review comments received from the City of Perris Development Services Department Planning Division (dated December 17, 2022), it was requested that the project to provide a box culvert (in lieu of the drainage concrete channel) as the frontage MDP Line H facility. Therefore, this drainage study has been revised to show and reflect a dual box culverts along Placentia Avenue frontage.

Separately, there were some comments on the project-specific Preliminary Water Quality Management Plan (PWQMP) that we received from the City of Perris via the contract reviewer, Ms. Cynthia Gabaldon, on December 17, 2021. The PWQMP was recently revised to address the outstanding comments and revised PWQMP hardcopies were sent back to Ms. Cynthia Gabaldon on May 9, 2022 for her 2nd review. Mr. Matthew Evans (assigned planner) for this project was copied in the correspondence (coordination effort) with Ms. Cynthia Gabaldon. This revised drainage study also reflects the revisions related to the PWQMP and BMP design.

1.0 INTRODUCTION

1.1 Project Description

This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Lake Creek-Placentia project (herein referred to as "the project"). The project is located in the City of Perris, bounded by Placentia Avenue to the south, Wilson Avenue to the west, existing developed parcel to the north, and Murrieta Avenue (to be vacated) and existing parcel to the east (not a part of this project). Refer to Figure 1.0 for a Vicinity Map of the project. Applicable Assessor Parcel Numbers (APNs) are 300-170-003, 004, 005, 006, 010, 011, 012, 013, 014, 015, 016, and 017.

1.2 Project Features

The overall project parcel consists of approximately 27.9 acres. The proposed improvements will consist of a tilt-up warehouse building and associated parking areas, sidewalks, and landscape areas. The proposed warehouse building footprint is approximately 580,900 square feet and there will be a total of ~201 auto parking stalls to be provided. The proposed impervious and pervious footprints within the drainage management area are approximately 1,018,262 square feet and 197,548 square feet, respectively. The project also includes a minor improvement for the frontage Wilson Avenue.

It is our understanding that the City of Perris expects the project (as a condition of this project) to construct a frontage flood control storm drain facility along Placentia Avenue (referred to as the MDP "Line H"), from the existing Perris Valley Storm Drain (PVSD) Channel (downstream limit) to the intersection of Wilson Avenue and Placentia Avenue (upstream limit). Based on the report titled, "Master Drainage Plan for Perris Valley Commerce Center Specific Plan" (May 2010), a 12'(w) x 10'(h) box culvert was proposed for the downstream segment of MDP Line H. However, due to the existing vertical constraint and relatively flat grades, the allowable facility depth would be approximately 7 feet while having a positive drainage to the existing PVSD Channel. In order to provide an equivalent hydraulic capacity or more, the proposed facility would need to be widened while maintaining the depth to be 7 feet or less. Based on a hydraulic calculation, dual 9'(w) x 7'(h) box culverts would be a comparable facility size, providing a slightly more hydraulic capacity. However, at the authoring of this report (as of September 2023), the frontage flood control storm

drain facility design effort is being coordinated with the City of Perris and an upstream development, in order to determine the appropriate design criteria. The design of the frontage flood control storm drain facility is to be addressed in a separate offsite storm drain plan and associated hydraulic design report. At a minimum, the frontage storm drain facility is expected to be designed to convey the ultimate buildout runoff from the Lake Creek-Placentia project and tributary flow contributing to the westerly Wilson Avenue.

1.3 Drainage Characteristics

In the existing condition, the site consists of open, undeveloped space, draining generally from northwest to southeast. Runoff from the project generally drains in a southeasterly direction in a sheet flow manner towards Murrieta Avenue (to be vacated) and a vacant parcel (APN 300-170-001). Runoff continues to drain in an easterly direction and eventually discharge into the existing PVSD Channel (flood control channel). There is an offsite run-on location near the northwesterly corner of the site where off-site flow is entering to the project via an existing mid-block cross-gutter at the low point along Wilson Avenue. In general, the flow from the site is conveyed through the site in a southeasterly direction towards the Perris Valley Storm Drain Channel. From the discharge location into the Perris Valley Channel, runoff drains in a southerly direction and eventually discharges into San Jacinto River, Canyon Lake, and then to Lake Elsinore.

In the post-project condition, the drainage characteristics will remain similar as compared to the pre-project condition. Runoff from the site will be captured via proposed catch basins and conveyed via proposed storm drain pipes to proposed on-site best management practices (BMPs). Once treated, runoff from the project is anticipated to discharge into the proposed frontage flood control storm drain facility along Placentia Avenue. The flood control facility is anticipated to convey the runoff in an easterly direction and directly discharge into the existing Perris Valley Storm Drain Channel. The northwesterly offsite run-on flow from Wilson Avenue will be captured and conveyed by a proposed storm drain facility in Wilson Avenue in a southerly direction that will connect into the proposed frontage flood control facility along Placentia Avenue.

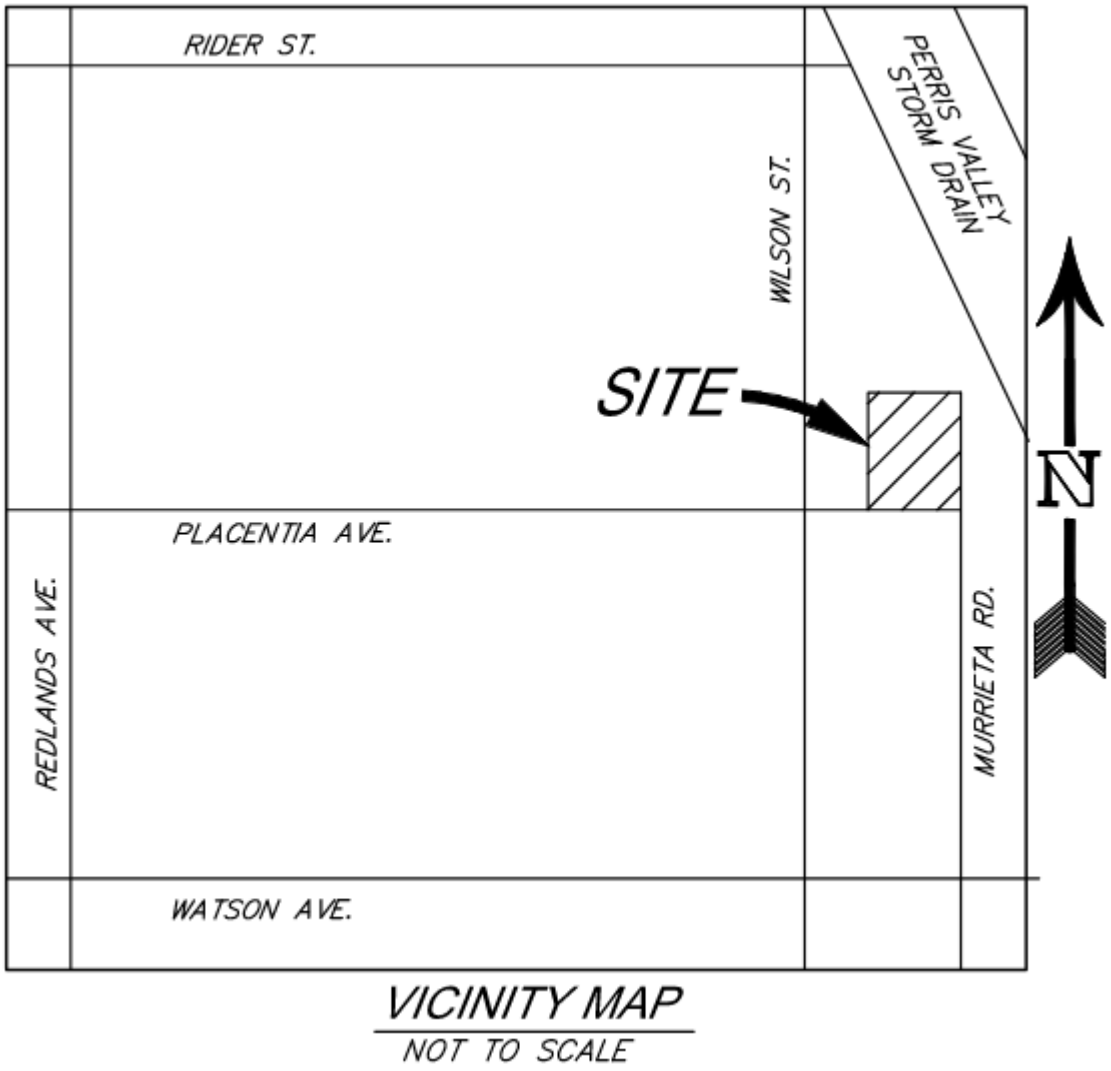
1.4 FEMA Flood Hazard Zone Information

The water courses around the project have been identified by the Federal Emergency Management Agency (FEMA) as Zone X and Zone AE. The project is shown on the FEMA Flood Insurance Rate Map (FIRM) number 06065C1430H, effective August 18, 2014. The majority of the proposed project will be situated within Zone X; however, a small portion of the project will be within the FEMA Zone AE flood fringe (but outside of the floodway). The improvements that will be within the flood fringe will be surface parking and associated landscaping areas. The proposed building finished floor and pad elevation are expected to be above the FEMA's base flood elevation (BFE), which is estimated to be approximately 1437.4 (+/-) based on interpolation using the FEMA cross-section "J". More specifically, based on the requirements/direction from the City of Perris, the proposed building pad elevation is designed to be at least one foot above the BFE. For the portion of the project that will be within the flood fringe, the project plans to process a Conditional Letter of Map Revision (CLOMR) through FEMA. For reference purpose, a copy of the FIRMette (reduced size) is included at the end of Appendix A.

1.6 Water Quality Management

In support of the preliminary site plan and grading plan, a Water Quality Management Plan (WQMP) has been prepared for the project. The report is titled, "Water Quality Management Plan for Lake Creek-Placentia," with a revised date of September 25, 2023, prepared by SDH & Associates, Inc. (Job Number 2105). The 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



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 (subdivided) to runoff collection (or runoff concentration) locations, in order to determine peak flows for the purpose of sizing proposed storm drain facilities. 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 AES to determine the intensity for the 10-year and 100-year storm events. The 10-minute and 60-minute intensity values for the project were obtained from the Riverside County Hydrology Manual as input data into AES. An 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 specified land use information in accordance with Plate D-5.6 of the Hydrology Manual was used by AES to estimate the runoff coefficient. Supporting information for parameters assigned to AES calculations is included with Appendix A of this report.

Hydrologic soil group data based on the Riverside County Hydrology Manual indicates the project primarily consists of Hydrologic Soil Group "C". For the purpose of hydrologic calculations for the proposed condition, Soil Group C 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)	1.3	2.6	3.7
109 (On-site Catch Basin)	1.1	2.2	3.1
115 (On-site Inflow into Basin)	2.4	4.6	6.6
119 (On-site Curb Cut into Basin)	1.3	2.7	3.9
120 (On-site Inflow into Basin)	1.3	2.7	3.9
127 (On-site Landscape Drain)	0.3	0.2	0.3
130 (Outlet to "Line H")	**4.5**	**7.3**	**10.4**
220 (On-site Catch Basin)	0.5	0.9	1.3
303 (On-site Landscape Drain)	0.4	0.3	0.5
305 (On-site Catch Basin - Surface)	1.4	2.8	4.0
309 (On-site Catch Basin)	2.1	5.0	7.0
314 (On-site Catch Basin)	2.1	5.0	7.0
319 (On-site Catch Basin)	2.2	5.2	7.4
324 (On-site Catch Basin)	2.8	6.6	9.4
327 (On-site Catch Basin)	0.5	0.9	1.3
340 (On-site Overall Flow into BMP)	11.5	22.2	31.7
405 (On-site Catch Basin - Surface)	4.0	7.4	10.5
409 (On-site Catch Basin - Surface)	4.3	7.9	11.3

412 (On-site Catch Basin - Surface)	1.0	2.4	3.4
430 (On-site Overall Flow into BMP)	9.3	16.3	23.3
437 (On-site Landscape Drain)	0.7	0.4	0.6
450 **(Flow Contribution from Basin 200)**	**0.5**	**0.9**	**1.3**
450 **(Flow Contribution from Basin 300)**	**11.5**	**22.2**	**31.7**
460 **(Flow Contribution from Basin 400)**	**10.0**	**16.4**	**23.4**
480 **Shared Outlet for Basins 200, 300 & 400** **(Outlet to "Line H")**	**22.0**	**38.9**	**55.6**

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 and BMP overflow 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 several catch basin (grate inlet) locations in sump and the grate inlet will be designed to accommodate the local tributary peak flows. Due to the project's proximity to the existing Perris Valley Storm Drain (PVSD) Channel floodplain, the on-site proposed catch basins (low point areas) could potentially experience some standing water temporarily, pending the downstream tail water conditions in the Perris Valley Storm Drain Channel and the proposed Line H facility. It's prudent the downstream storm drain systems are maintained on an as-needed basis by responsible parties in order to maintain its original design functionality and minimize potential standing water.

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 100-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 indicated in the introduction of this report, it is our understanding the City of Perris expects the project to construct a flood control facility along frontage Placentia Avenue to the exiting PVSD Channel. Runoff from the project is anticipated to discharge into the proposed flood control facility. Pending the hydraulic grade lines (HGLs) in the proposed flood control facility, flap valves may be recommended for the proposed on-site storm drain pipes at the discharge (outlet) locations.

It is our understanding the City of Perris and/or RCFC has a plan for improvements to the existing Perris Valley Storm Drain (PVSD) Channel; however, it is unknown as to when the downstream Perris Valley Storm Drain Channel improvements will take place. At this time (anticipating the project will be constructed prior to the potential improvements of the existing PVSD Chanel in the future), the proposed frontage storm drain facility's outfall is expected to discharge at the bottom (invert) of the existing PVSD channel on south side of Placentia Avenue.

As mentioned in Section 1.2 of this report, the frontage flood control storm drain facility design effort is being coordinated with the City of Perris and an upstream development project, in order to determine the appropriate design criteria. A preliminary hydraulic design calculation has been performed to determine a required facility size that would be comparable and in conformance to the MDP for Perris Valley Commerce Center Specific Plan (2010); however, the design will be updated accordingly based on the ongoing coordination with the City. The design of the frontage flood control storm drain facility is to be addressed in a separate offsite storm drain plan and associated hydraulic design report. At a minimum, the frontage storm drain facility is expected to be designed to convey the ultimate buildout runoff from the Lake Creek-Placentia project and tributary flow contributing to the westerly Wilson Avenue.

4.0 FLOOD CONTROL DISCUSSION

The project is expected to increase the peak flow rate as a result of the proposed improvements. However, based on the City's direction, the project plans to provide a frontage storm drain facility along Placentia Avenue from the PVSD Channel (downstream limit) up to the intersection of Wilson Avenue (upstream limit). The concept of the proposed frontage flood control facility is being coordinated with the City of Perris and the Riverside County Flood Control and Water Conservation District (RCFC&WCD) and the design will be processed separately in the offsite storm drain plan and associated hydraulic design report. Runoff from the project is expected to discharge into the proposed frontage storm drain facility, which then directly discharges into the existing Perris Valley Channel (flood control channel). The proposed frontage storm drain facility is expected to convey the tributary peak flow rate accounting for the ultimate buildout condition, including the proposed project and northwesterly tributary flow from Wilson Avenue; therefore, an on-site flood control detention (based on the increase runoff detention criteria) is not anticipated to be required. As a note, the project is situated in the Riverside County WAP HCOC Exemption area approved on April 20, 2017, and the project is considered exempt from the hydrologic condition of concern (HCOC) requirements.

5.0 CONCLUSION

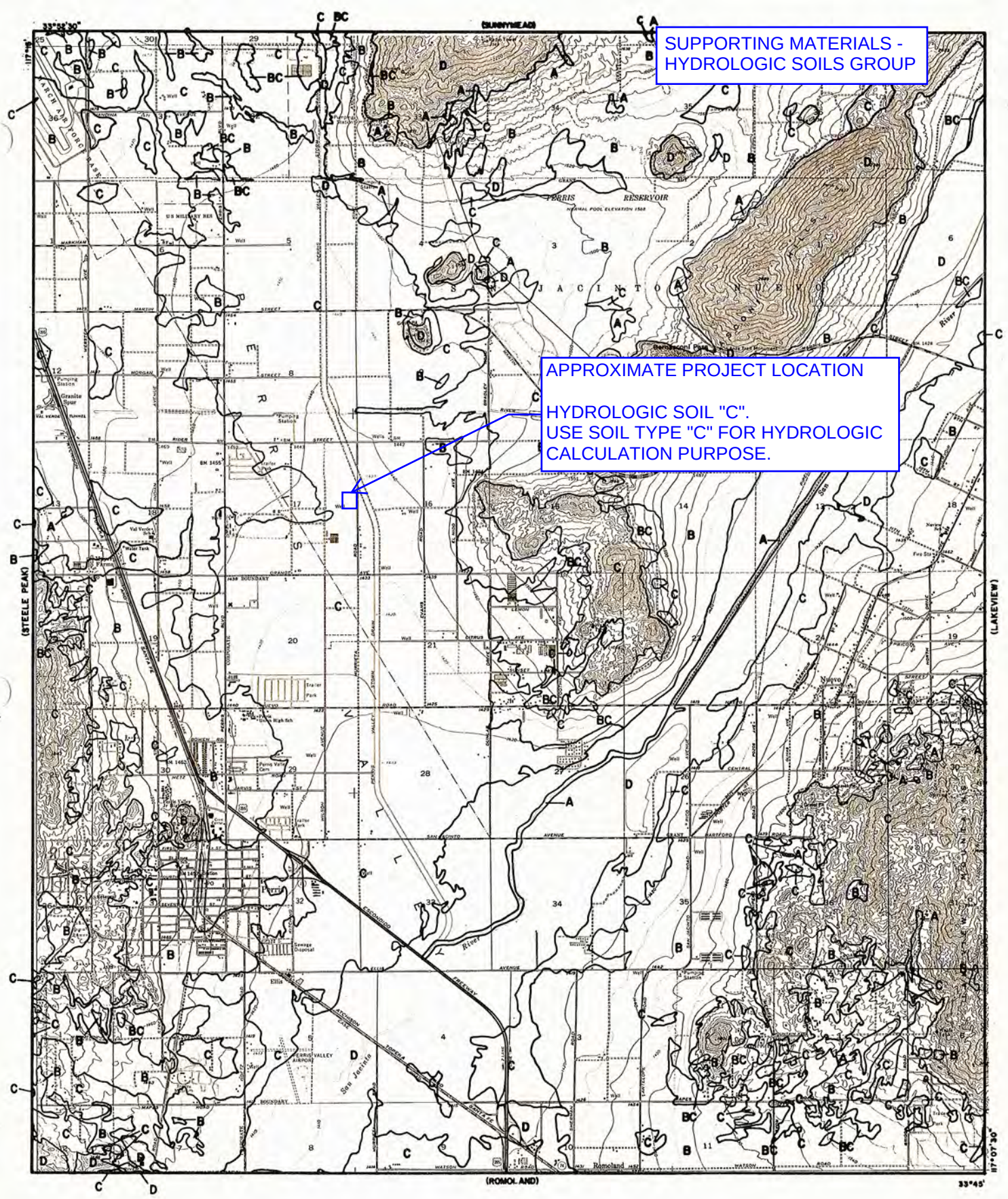
This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Lake Creek-Placentia project. Hydrologic calculations were computed in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual). The on-site peak discharge rates for the 10-year and 100-year, 1-hour storm events have been determined for the project. The relevant 10-year and 100-year peak flow rates were used to determine the on-site storm drain sizes. Flood control mitigation (increased runoff mitigation) is not anticipated to be required for this project since the project runoff will discharge into the proposed frontage storm drain facility along Placentia Avenue that will be designed for the ultimate buildout condition. The offsite/frontage storm drain design will be processed separately by an offsite storm drain plan and associated hydraulic design report. The project also plans to process a CLOMR separately through FEMA for the easterly portion of the proposed improvements that will be within the FEMA Zone AE flood fringe. The CLOMR is expected to be processed prior to issuance of the Building Permit from the City of Perris and subsequently a LOMR prior to issuance of Occupancy Permit. In summary, no adverse impacts are anticipated to the downstream drainage facilities as a result of the proposed improvements.

Appendix A

Hydrologic Backup Information

Includes:

1. RCFC&WCD Hydrologic Soils Group Map (Plate C-1.30)
2. RCFC&WCD Intensity-Duration Curves Data (Plate D-4.1) per NOAA Atlas 2
3. FEMA FIRMette



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR PERRIS

PLATE C-1.30

PROJECT WITHIN THIS AREA

RAINFALL INTENSITY–INCHES PER HOUR

MIRA LOMA			MURRIETA - TEMECULA & RANCHO CALIFORNIA			NORCO			PALM SPRINGS			PERRIS VALLEY		
DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR
5	2.84	4.48	5	3.45	5.10	5	2.77	4.16	5	4.23	6.76	5	2.64	3.78
6	2.58	4.07	6	3.12	4.61	6	2.53	3.79	6	3.80	6.08	6	2.41	3.46
7	2.37	3.75	7	2.87	4.24	7	2.34	3.51	7	3.48	5.56	7	2.24	3.21
8	2.21	3.49	8	2.67	3.94	8	2.19	3.29	8	3.22	5.15	8	2.09	3.01
9	2.08	3.28	9	2.50	3.69	9	2.07	3.10	9	3.01	4.81	9	1.98	2.84
10	1.96	3.10	10	2.36	3.48	10	1.96	2.94	10	2.83	4.52	10	1.88	2.69
11	1.87	2.95	11	2.24	3.30	11	1.87	2.80	11	2.67	4.28	11	1.79	2.57
12	1.78	2.82	12	2.13	3.15	12	1.79	2.68	12	2.54	4.07	12	1.72	2.46
13	1.71	2.70	13	2.04	3.01	13	1.72	2.58	13	2.43	3.88	13	1.65	2.37
14	1.64	2.60	14	1.96	2.89	14	1.66	2.48	14	2.33	3.72	14	1.59	2.29
15	1.58	2.50	15	1.89	2.79	15	1.60	2.40	15	2.23	3.58	15	1.54	2.21
16	1.53	2.42	16	1.82	2.69	16	1.55	2.32	16	2.15	3.44	16	1.49	2.14
17	1.48	2.34	17	1.76	2.60	17	1.50	2.25	17	2.08	3.32	17	1.45	2.08
18	1.44	2.27	18	1.71	2.52	18	1.46	2.19	18	2.01	3.22	18	1.41	2.02
19	1.40	2.21	19	1.66	2.45	19	1.42	2.13	19	1.95	3.12	19	1.37	1.97
20	1.36	2.15	20	1.61	2.38	20	1.39	2.08	20	1.89	3.03	20	1.34	1.92
22	1.29	2.04	22	1.53	2.26	22	1.32	1.98	22	1.79	2.86	22	1.28	1.83
24	1.24	1.95	24	1.46	2.15	24	1.26	1.90	24	1.70	2.72	24	1.22	1.75
26	1.18	1.87	26	1.39	2.06	26	1.22	1.82	26	1.62	2.60	26	1.18	1.69
28	1.14	1.80	28	1.34	1.98	28	1.17	1.76	28	1.56	2.49	28	1.13	1.63
30	1.10	1.73	30	1.29	1.90	30	1.13	1.70	30	1.49	2.39	30	1.10	1.57
32	1.06	1.67	32	1.24	1.84	32	1.10	1.64	32	1.44	2.30	32	1.06	1.52
34	1.03	1.62	34	1.20	1.78	34	1.06	1.59	34	1.39	2.22	34	1.03	1.48
36	1.00	1.57	36	1.17	1.72	36	1.03	1.55	36	1.34	2.15	36	1.00	1.44
38	.97	1.53	38	1.13	1.67	38	1.01	1.51	38	1.30	2.09	38	.98	1.40
40	.94	1.49	40	1.10	1.62	40	.98	1.47	40	1.27	2.02	40	.95	1.37
45	.89	1.40	45	1.03	1.52	45	.92	1.39	45	1.18	1.89	45	.90	1.29
50	.84	1.32	50	.97	1.44	50	.88	1.31	50	1.11	1.78	50	.85	1.22
55	.80	1.26	55	.92	1.36	55	.84	1.25	55	1.05	1.68	55	.81	1.17
60	.76	1.20	60	.88	1.30	60	.80	1.20	60	1.00	1.60	60	.78	1.12
65	.73	1.15	65	.84	1.24	65	.77	1.15	65	.95	1.53	65	.75	1.08
70	.70	1.11	70	.81	1.19	70	.74	1.11	70	.91	1.46	70	.72	1.04
75	.68	1.07	75	.78	1.15	75	.72	1.07	75	.88	1.41	75	.70	1.00
80	.65	1.03	80	.75	1.11	80	.69	1.04	80	.85	1.35	80	.68	.97
85	.63	1.00	85	.73	1.07	85	.67	1.01	85	.82	1.31	85	.66	.94
SLOPE = .530			SLOPE = .550			SLOPE = .500			SLOPE = .580			SLOPE = .490		

RCFC & WCD

HYDROLOGY MANUAL

STANDARD INTENSITY–DURATION CURVES DATA

PLATE D-4.1 (4 of 6)

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.

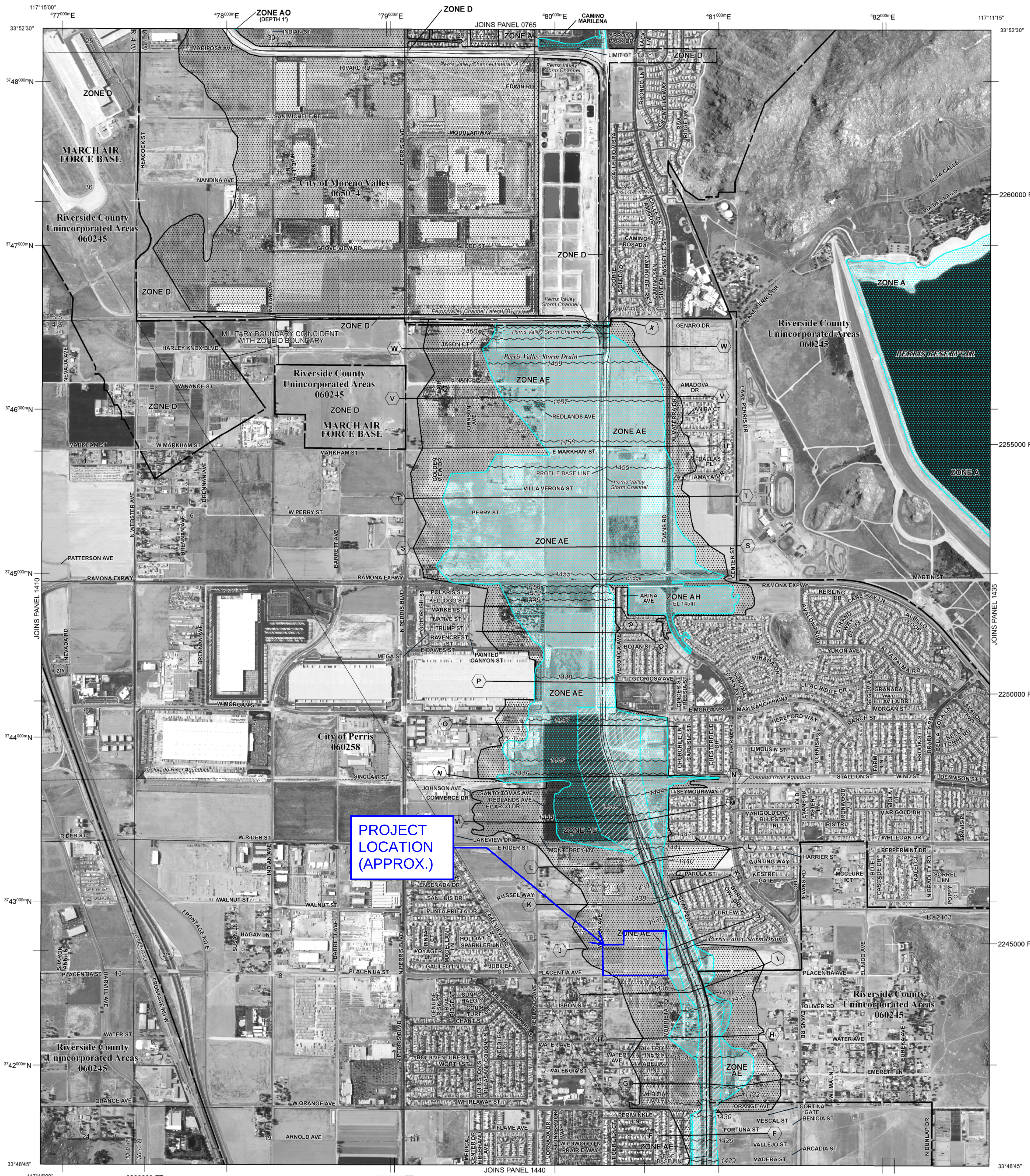
The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

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.

THE MAJORITY OF THE PROPOSED SITE WILL BE SITUATED IN FEMA ZONE X; HOWEVER, AN EASTERLY PORTION OF THE IMPROVEMENTS (PRIMARILY SURFACE PARKING AND ASSOCIATED LANDSCAPING) WILL BE IN THE FEMA ZONE AE FLOOD FRINGE. THE FINISHED FLOOR OF THE PROPOSED BUILDING WILL BE ABOVE THE BASE FLOOD ELEVATION. THE PROJECT PLANS TO PROCESS A CLOMR-F THROUGH FEMA FOR THE PORTION THAT IS WITHIN THE FLOOD FRINGE.



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
4275000mE — 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

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 1430H

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

PANEL 1430 OF 3805

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MORENO VALLEY, CITY OF	065074	1430	H
PERRIS, CITY OF	060258	1430	H
RIVERSIDE COUNTY UNINCORPORATED AREAS	060245	1430	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 06065C1430H

MAP REVISED AUGUST 18, 2014

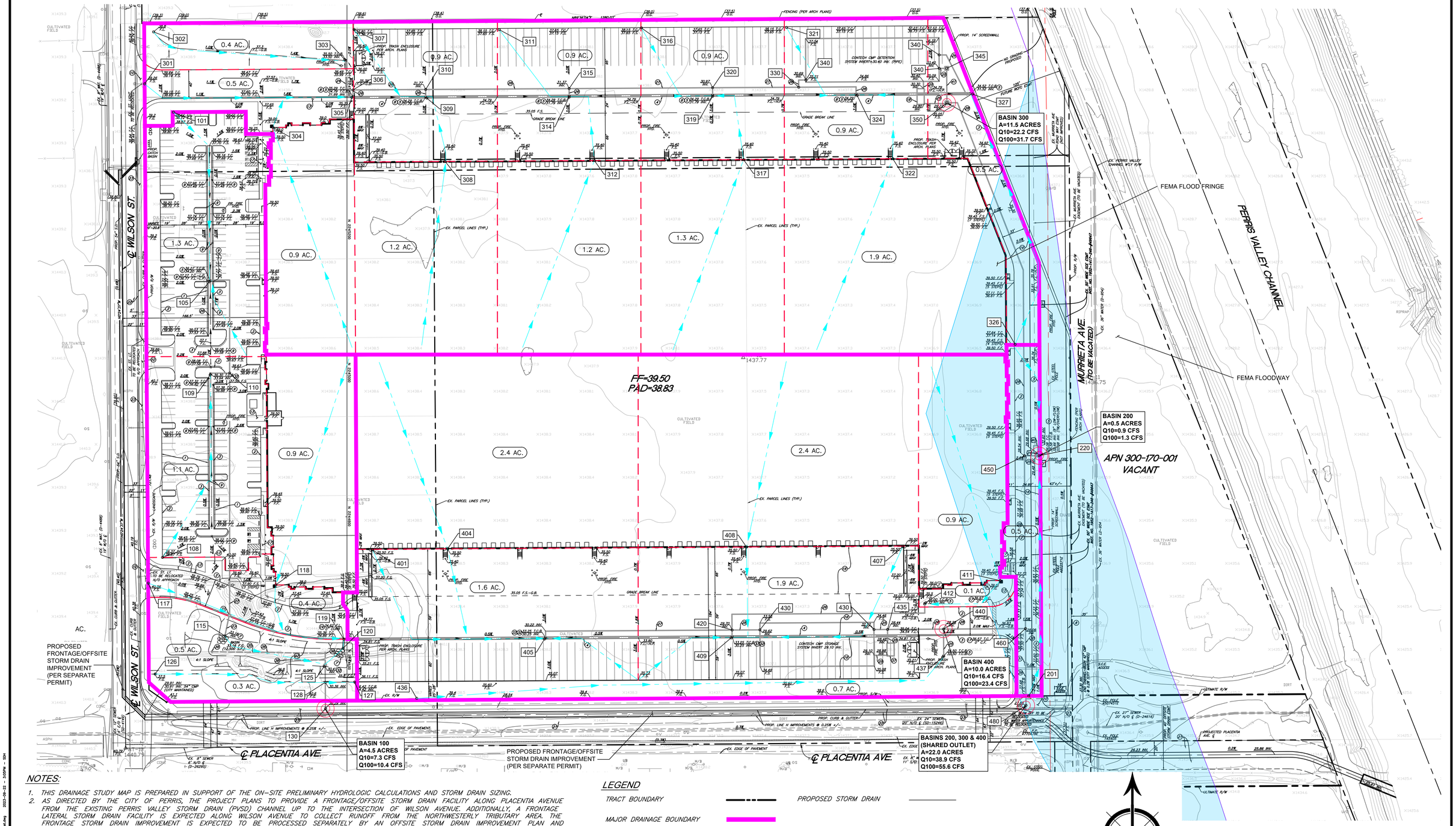
Federal Emergency Management Agency

Appendix B

Modified Rational Method Results

Includes:

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



NOTES:

1. THIS DRAINAGE STUDY MAP IS PREPARED IN SUPPORT OF THE ON-SITE PRELIMINARY HYDROLOGIC CALCULATIONS AND STORM DRAIN SIZING.
2. AS DIRECTED BY THE CITY OF PERRIS, THE PROJECT PLANS TO PROVIDE A FRONTAGE/OFFSITE STORM DRAIN FACILITY ALONG PLACENTIA AVENUE FROM THE EXISTING PERRIS VALLEY STORM DRAIN (PVSD) CHANNEL UP TO THE INTERSECTION OF WILSON AVENUE. ADDITIONALLY, A FRONTAGE LATERAL STORM DRAIN FACILITY IS EXPECTED ALONG WILSON AVENUE TO COLLECT RUNOFF FROM THE NORTHWESTERLY TRIBUTARY AREA. THE FRONTAGE STORM DRAIN IMPROVEMENT IS EXPECTED TO BE PROCESSED SEPARATELY BY AN OFFSITE STORM DRAIN IMPROVEMENT PLAN AND ASSOCIATED HYDRAULIC DESIGN REPORT.
3. THERE IS AN OFFSITE RUN-ON FROM THE NORTHWESTERLY AREA VIA AN EXISTING MID-BLOCK CROSS GUTTER ALONG WILSON AVENUE. IN THE POST-PROJECT CONDITION, THE OFFSITE RUN-ON IS EXPECTED TO BE CONVEYED VIA A PROPOSED STORM DRAIN ALONG WILSON AVENUE IN A SOUTHERLY DIRECTION AND CONNECT INTO THE AFOREMENTIONED PROPOSED FRONTAGE STORM DRAIN FACILITY ALONG PLACENTIA AVENUE. THERE MAY BE A MINOR RUN-ON FROM THE NORTHERLY EXISTING DEVELOPMENT. IF APPLICABLE, THE OFFSITE RUN-ON WILL BE CONVEYED VIA A PERIMETER DITCH IN AN EASTERLY DIRECTION TOWARDS MURRIETA AVE (TO BE VACATED) AND A VACANT PARCEL, IN ORDER TO CONSISTENT WITH THE EXISTING DRAINAGE CHARACTERISTICS.
4. THE SITE IS SITUATED ON HYDROLOGIC SOIL GROUPS C. FOR THE PURPOSE OF HYDROLOGIC CALCULATION (FOR MORE CONSERVATIVE APPROACH), SOIL GROUP C WAS USED IN THE CALCULATION.

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

N

0 50 60 120 180 240

SCALE 1"=60'

DRAINAGE STUDY MAP FOR LAKE CREEK-PLACENTIA (POST-PROJECT)

JN 2105 REVISED: 9/25/2023

S:\SDH DRAWINGS\LAKE CREEK - PLACENTIA\MXD\PDR\ Exh Post.dwg 2023-09-22 - 3:05PM - 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 *************************
* LAKE CREEK-PLACENTIA (JN 2105)                                         *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                   *
* BASIN 100                                                              *
 **************************************************************************

  FILE NAME: LCP1HP10.RAT
  TIME/DATE OF STUDY: 10:40 09/21/2023
--------------------------------------------------------------------------
  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) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.788
  SLOPE OF INTENSITY DURATION CURVE = 0.4910
  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 0.0312 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) =   255.00
  UPSTREAM ELEVATION(FEET) =     38.70
  DOWNSTREAM ELEVATION(FEET) =     36.30
  ELEVATION DIFFERENCE(FEET) =      2.40
  TC = 0.303*[(  255.00**3)/(     2.40)]**.2 =    7.071
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.251
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8811
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.58
  TOTAL AREA(ACRES) =      1.30   TOTAL RUNOFF(CFS) =      2.58

****************************************************************************
  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) =    34.20  DOWNSTREAM(FEET) =    33.89
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.37
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.58
  PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =    8.16
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     410.00 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.) =    8.16
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.10
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.58

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 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) =   274.00
  UPSTREAM ELEVATION(FEET) =     38.90
  DOWNSTREAM ELEVATION(FEET) =     36.30
  ELEVATION DIFFERENCE(FEET) =      2.60
  TC = 0.303*[(  274.00**3)/(     2.60)]**.2 =    7.265
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.221
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8809
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.15
  TOTAL AREA(ACRES) =      1.10   TOTAL RUNOFF(CFS) =      2.15

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.94  DOWNSTREAM(FEET) =    33.89
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.37
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.15
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    7.44
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    110.00 =     299.00 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.) =    7.44
  RAINFALL INTENSITY(INCH/HR) =   2.20
```

```
 TOTAL STREAM AREA(ACRES) =     1.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.15

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        2.58     8.16        2.098          1.30
     2        2.15     7.44        2.195          1.10

 ********************************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        4.50     7.44       2.195
     2        4.64     8.16       2.098

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.64   Tc(MIN.) =    8.16
 TOTAL AREA(ACRES) =        2.4
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.89  DOWNSTREAM(FEET) =    33.17
 FLOW LENGTH(FEET) =   367.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.19
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.64
 PIPE TRAVEL TIME(MIN.) =   1.92    Tc(MIN.) =   10.08
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    115.00 =     777.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =     33.17  DOWNSTREAM(FEET) =     33.16
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =  0.0001
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.406
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8731
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.30
  AVERAGE FLOW DEPTH(FEET) =   0.72   TRAVEL TIME(MIN.) =   8.36
  Tc(MIN.) =   18.43
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.61
  TOTAL AREA(ACRES) =        2.9         PEAK FLOW RATE(CFS) =       5.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.74   FLOW VELOCITY(FEET/SEC.) =   0.31
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    125.00 =     927.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 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.) =   18.43
  RAINFALL INTENSITY(INCH/HR) =   1.41
  TOTAL STREAM AREA(ACRES) =     2.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.25

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    119.00 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) =   286.00
  UPSTREAM ELEVATION(FEET) =     40.60
  DOWNSTREAM ELEVATION(FEET) =     34.62
  ELEVATION DIFFERENCE(FEET) =      5.98
  TC = 0.303*[(  286.00**3)/(     5.98)]**.2 =    6.311
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.380
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8819
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.84

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

```
 FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.380
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8819
 SOIL CLASSIFICATION IS "C"
 SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    1.89
 TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       2.73
 TC(MIN.) =    6.31

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    34.86  DOWNSTREAM(FEET) =    33.17
 FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.018
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.73
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    6.45
 LONGEST FLOWPATH FROM NODE    117.00 TO NODE    120.00 =     334.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     33.17  DOWNSTREAM(FEET) =     33.16
 CHANNEL LENGTH THRU SUBAREA(FEET) =    47.00   CHANNEL SLOPE =  0.0002
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.73
 FLOW VELOCITY(FEET/SEC.) =   0.35   FLOW DEPTH(FEET) =   0.36
 TRAVEL TIME(MIN.) =   2.24   Tc(MIN.) =    8.69
 LONGEST FLOWPATH FROM NODE    117.00 TO NODE    125.00 =     381.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 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.) =    8.69
```

```
 RAINFALL INTENSITY(INCH/HR) =   2.03
 TOTAL STREAM AREA(ACRES) =     1.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.73

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        5.25    18.43        1.406          2.90
     2        2.73     8.69        2.035          1.30

 ********************************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        5.20     8.69       2.035
     2        7.14    18.43       1.406

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       7.14   Tc(MIN.) =   18.43
 TOTAL AREA(ACRES) =        4.2
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    125.00 =     927.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    128.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    30.41  DOWNSTREAM(FEET) =    30.36
 FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.74
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.14
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   18.53
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    128.00 =     949.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 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.) =   18.53
  RAINFALL INTENSITY(INCH/HR) =   1.40
  TOTAL STREAM AREA(ACRES) =     4.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.14

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 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) =   278.00
  UPSTREAM ELEVATION(FEET) =     37.50
  DOWNSTREAM ELEVATION(FEET) =     36.42
  ELEVATION DIFFERENCE(FEET) =      1.08
  TC = 0.937*[(  278.00**3)/(     1.08)]**.2 =   27.019
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.166
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5945
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.42  DOWNSTREAM(FEET) =    30.36
  FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.67
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.21
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   27.13
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    128.00 =     317.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 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.) =   27.13
```

```
 RAINFALL INTENSITY(INCH/HR) =   1.16
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.21

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        7.14    18.53        1.403          4.20
     2        0.21    27.13        1.163          0.30

****************************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        7.28    18.53       1.403
     2        6.12    27.13       1.163

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       7.28   Tc(MIN.) =   18.53
 TOTAL AREA(ACRES) =        4.5
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    128.00 =     949.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    30.36  DOWNSTREAM(FEET) =    30.29
 FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  15.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.96
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.28
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   18.86
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =    1008.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        4.5  TC(MIN.) =     18.86
 PEAK FLOW RATE(CFS)   =       7.28
============================================================================
============================================================================
```

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 *************************
* LAKE CREEK-PLACENTIA (JN 2105)                                         *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                   *
* BASIN 200                                                              *
 **************************************************************************

  FILE NAME: LCP2HP10.RAT
  TIME/DATE OF STUDY: 10:41 09/21/2023
--------------------------------------------------------------------------
  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) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.788
  SLOPE OF INTENSITY DURATION CURVE = 0.4910
  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 0.0312 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    201.00 TO NODE    220.00 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) =   336.00
  UPSTREAM ELEVATION(FEET) =     37.70
  DOWNSTREAM ELEVATION(FEET) =     35.58
  ELEVATION DIFFERENCE(FEET) =      2.12
  TC = 0.303*[(  336.00**3)/(     2.12)]**.2 =    8.553
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.050
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8796
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.90
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      0.90

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    450.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    29.48  DOWNSTREAM(FEET) =    28.54
  FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.28
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.90
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    8.59
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    450.00 =     352.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.5  TC(MIN.) =      8.59
  PEAK FLOW RATE(CFS)   =       0.90
============================================================================
============================================================================
  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 *************************
* LAKE CREEK-PLACENTIA (JN 2105)                                         *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                   *
* BASIN 300                                                              *
 **************************************************************************

  FILE NAME: LCP3HP10.RAT
  TIME/DATE OF STUDY: 10:42 09/21/2023
--------------------------------------------------------------------------
  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) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.788
  SLOPE OF INTENSITY DURATION CURVE = 0.4910
  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 0.0312 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    301.00 TO NODE    305.00 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) =   296.00
  UPSTREAM ELEVATION(FEET) =     39.30
  DOWNSTREAM ELEVATION(FEET) =     34.79
  ELEVATION DIFFERENCE(FEET) =      4.51
  TC = 0.303*[(  296.00**3)/(     4.51)]**.2 =    6.816
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.292
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8814
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.01
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.01

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.292
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8814
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    1.82
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       2.83
  TC(MIN.) =    6.82

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    306.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.99  DOWNSTREAM(FEET) =    31.97
  FLOW LENGTH(FEET) =     7.50   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.17
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.83
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.86
```

```
 LONGEST FLOWPATH FROM NODE    301.00 TO NODE    306.00 =     303.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    306.00 TO NODE    306.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.86
 RAINFALL INTENSITY(INCH/HR) =   2.29
 TOTAL STREAM AREA(ACRES) =     1.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.83

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 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) =   276.00
 UPSTREAM ELEVATION(FEET) =     38.80
 DOWNSTREAM ELEVATION(FEET) =     35.50
 ELEVATION DIFFERENCE(FEET) =      3.30
 TC = 0.937*[(  276.00**3)/(     3.30)]**.2 =   21.516
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.303
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6166
 SOIL CLASSIFICATION IS "C"
 SUBAREA RUNOFF(CFS) =      0.32
 TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    306.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.50  DOWNSTREAM(FEET) =    31.97
 FLOW LENGTH(FEET) =    49.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.28
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.32
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   21.71
 LONGEST FLOWPATH FROM NODE    302.00 TO NODE    306.00 =     325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    306.00 TO NODE    306.00 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.) =   21.71
  RAINFALL INTENSITY(INCH/HR) =   1.30
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.32

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.83     6.86        2.286          1.40
      2        0.32    21.71        1.298          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        2.93     6.86       2.286
      2        1.93    21.71       1.298

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.93   Tc(MIN.) =    6.86
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    306.00 =     325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.97  DOWNSTREAM(FEET) =    31.77
  FLOW LENGTH(FEET) =   101.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.85
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.93
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =    7.45
```

```
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    310.00 =     426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.45
  RAINFALL INTENSITY(INCH/HR) =   2.19
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.93

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    309.00 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) =   148.00
  UPSTREAM ELEVATION(FEET) =     37.30
  DOWNSTREAM ELEVATION(FEET) =     34.29
  ELEVATION DIFFERENCE(FEET) =      3.01
  TC = 0.303*[(  148.00**3)/(     3.01)]**.2 =    4.876
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.12
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      2.12

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.20   SUBAREA RUNOFF(CFS) =    2.83
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       4.95
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.79  DOWNSTREAM(FEET) =    31.77
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.28
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.95
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.05
  LONGEST FLOWPATH FROM NODE    307.00 TO NODE    310.00 =     157.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.05
  RAINFALL INTENSITY(INCH/HR) =   2.66
  TOTAL STREAM AREA(ACRES) =     2.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.95

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.93     7.45        2.195          1.80
      2        4.95     5.05        2.657          2.10

 **********************************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        6.94     5.05       2.657
      2        7.02     7.45       2.195

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.94   Tc(MIN.) =    5.05
  TOTAL AREA(ACRES) =        3.9
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    310.00 =     426.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    315.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.77  DOWNSTREAM(FEET) =    31.37
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.54
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.94
  PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =    5.99
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    315.00 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.99
  RAINFALL INTENSITY(INCH/HR) =   2.44
  TOTAL STREAM AREA(ACRES) =     3.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.94

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    314.00 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) =   142.00
  UPSTREAM ELEVATION(FEET) =     37.70
  DOWNSTREAM ELEVATION(FEET) =     34.29
  ELEVATION DIFFERENCE(FEET) =      3.41
  TC = 0.303*[(  142.00**3)/(     3.41)]**.2 =    4.639
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.12
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      2.12

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    314.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.20   SUBAREA RUNOFF(CFS) =    2.83
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       4.95
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    315.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.79  DOWNSTREAM(FEET) =    31.37
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.47
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.95
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    5.01
  LONGEST FLOWPATH FROM NODE    311.00 TO NODE    315.00 =     151.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.01
  RAINFALL INTENSITY(INCH/HR) =   2.66
  TOTAL STREAM AREA(ACRES) =     2.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.95

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        6.94     5.99        2.443          3.90
      2        4.95     5.01        2.665          2.10

 ********************************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       10.76     5.01       2.665
      2       11.47     5.99       2.443

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.47   Tc(MIN.) =    5.99
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    315.00 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.37  DOWNSTREAM(FEET) =    30.97
  FLOW LENGTH(FEET) =   200.00   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) =      11.47
  PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =    6.87
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    320.00 =     826.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.87
  RAINFALL INTENSITY(INCH/HR) =   2.28
  TOTAL STREAM AREA(ACRES) =     6.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.47

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    319.00 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) =   153.00
  UPSTREAM ELEVATION(FEET) =     37.70
  DOWNSTREAM ELEVATION(FEET) =     34.29
  ELEVATION DIFFERENCE(FEET) =      3.41
  TC = 0.303*[(  153.00**3)/(     3.41)]**.2 =    4.851
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.12
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      2.12

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    319.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    3.07
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       5.19
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.79  DOWNSTREAM(FEET) =    30.97
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.49
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.19
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    5.01
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    320.00 =     162.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.01
  RAINFALL INTENSITY(INCH/HR) =   2.67
  TOTAL STREAM AREA(ACRES) =     2.20
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.19

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       11.47     6.87        2.283          6.00
     2        5.19     5.01        2.666          2.20

 ********************************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       13.56     5.01       2.666
     2       15.92     6.87       2.283

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.92   Tc(MIN.) =    6.87
 TOTAL AREA(ACRES) =        8.2
 LONGEST FLOWPATH FROM NODE    302.00 TO NODE    320.00 =     826.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    330.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    30.97  DOWNSTREAM(FEET) =    30.73
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.30
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.92
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =    7.34
 LONGEST FLOWPATH FROM NODE    302.00 TO NODE    330.00 =     946.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =    7.34
  RAINFALL INTENSITY(INCH/HR) =   2.21
  TOTAL STREAM AREA(ACRES) =     8.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.92

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    324.00 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) =   150.00
  UPSTREAM ELEVATION(FEET) =     37.70
  DOWNSTREAM ELEVATION(FEET) =     34.29
  ELEVATION DIFFERENCE(FEET) =      3.41
  TC = 0.303*[(  150.00**3)/(     3.41)]**.2 =    4.794
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.12
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      2.12

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    324.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    4.48
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       6.60
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    330.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.79  DOWNSTREAM(FEET) =    30.73
  FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.85
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.60
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    5.22
```

```
 LONGEST FLOWPATH FROM NODE    321.00 TO NODE    330.00 =     239.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.22
 RAINFALL INTENSITY(INCH/HR) =   2.61
 TOTAL STREAM AREA(ACRES) =     2.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.60

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       15.92     7.34        2.211          8.20
     2        6.60     5.22        2.614          2.80

 **********************************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       17.92     5.22       2.614
     2       21.50     7.34       2.211

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      21.50   Tc(MIN.) =    7.34
 TOTAL AREA(ACRES) =       11.0
 LONGEST FLOWPATH FROM NODE    302.00 TO NODE    330.00 =     946.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    340.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    30.73  DOWNSTREAM(FEET) =    30.69
 FLOW LENGTH(FEET) =    20.00   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) =      21.50
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.41
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    340.00 =     966.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.41
  RAINFALL INTENSITY(INCH/HR) =   2.20
  TOTAL STREAM AREA(ACRES) =    11.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.50

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    327.00 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) =   373.00
  UPSTREAM ELEVATION(FEET) =     37.10
  DOWNSTREAM ELEVATION(FEET) =     34.52
  ELEVATION DIFFERENCE(FEET) =      2.58
  TC = 0.303*[(  373.00**3)/(     2.58)]**.2 =    8.756
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.027
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8795
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.89
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      0.89

****************************************************************************
  FLOW PROCESS FROM NODE    327.00 TO NODE    340.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.52  DOWNSTREAM(FEET) =    30.69
  FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.76
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       0.89
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    9.10
  LONGEST FLOWPATH FROM NODE    326.00 TO NODE    340.00 =     451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 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.) =    9.10
  RAINFALL INTENSITY(INCH/HR) =   1.99
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.89

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       21.50     7.41        2.200         11.00
      2        0.89     9.10        1.989          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       22.23     7.41       2.200
      2       20.33     9.10       1.989

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      22.23   Tc(MIN.) =    7.41
  TOTAL AREA(ACRES) =       11.5
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    340.00 =     966.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    345.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.40  DOWNSTREAM(FEET) =    33.39
```

```
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.88
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.23
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    7.48
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    345.00 =     974.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    350.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.39  DOWNSTREAM(FEET) =    29.73
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.49
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   2
  PIPE-FLOW(CFS) =      22.23
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.53
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    350.00 =    1017.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    450.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    29.73  DOWNSTREAM(FEET) =    28.54
  FLOW LENGTH(FEET) =   522.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.67
  (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) =      22.23
  PIPE TRAVEL TIME(MIN.) =   1.86    Tc(MIN.) =    9.39
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    450.00 =    1539.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       11.5  TC(MIN.) =      9.39
  PEAK FLOW RATE(CFS)   =      22.23
============================================================================
============================================================================
  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 *************************
* LAKE CREEK-PLACENTIA (JN 2105)                                         *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                   *
* BASIN 400                                                              *
 **************************************************************************

  FILE NAME: LCP4HP10.RAT
  TIME/DATE OF STUDY: 10:42 09/21/2023
--------------------------------------------------------------------------
  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) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.788
  SLOPE OF INTENSITY DURATION CURVE = 0.4910
  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 0.0312 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    401.00 TO NODE    405.00 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) =   321.00
  UPSTREAM ELEVATION(FEET) =     35.50
  DOWNSTREAM ELEVATION(FEET) =     33.25
  ELEVATION DIFFERENCE(FEET) =      2.25
  TC = 0.303*[(  321.00**3)/(     2.25)]**.2 =    8.223
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.090
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8800
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.94
  TOTAL AREA(ACRES) =      1.60   TOTAL RUNOFF(CFS) =      2.94

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.090
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8800
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    4.41
  TOTAL AREA(ACRES) =        4.0   TOTAL RUNOFF(CFS) =       7.36
  TC(MIN.) =    8.22

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    420.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    30.25  DOWNSTREAM(FEET) =    29.70
  FLOW LENGTH(FEET) =   268.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.62
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.36
  PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =    9.46
```

```
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    420.00 =     589.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    420.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.46
  RAINFALL INTENSITY(INCH/HR) =   1.95
  TOTAL STREAM AREA(ACRES) =     4.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.36

****************************************************************************
  FLOW PROCESS FROM NODE    407.00 TO NODE    409.00 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) =   317.00
  UPSTREAM ELEVATION(FEET) =     35.50
  DOWNSTREAM ELEVATION(FEET) =     33.25
  ELEVATION DIFFERENCE(FEET) =      2.25
  TC = 0.303*[(  317.00**3)/(     2.25)]**.2 =    8.162
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.098
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8800
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.51
  TOTAL AREA(ACRES) =      1.90   TOTAL RUNOFF(CFS) =      3.51

****************************************************************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    409.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.098
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8800
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    4.43
  TOTAL AREA(ACRES) =        4.3   TOTAL RUNOFF(CFS) =       7.94
  TC(MIN.) =    8.16

****************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    420.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    30.25  DOWNSTREAM(FEET) =    29.70
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.40
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.94
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    8.17
  LONGEST FLOWPATH FROM NODE    407.00 TO NODE    420.00 =     325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    420.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.17
  RAINFALL INTENSITY(INCH/HR) =   2.10
  TOTAL STREAM AREA(ACRES) =     4.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.94

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    412.00 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) =   119.00
  UPSTREAM ELEVATION(FEET) =     39.00
  DOWNSTREAM ELEVATION(FEET) =     35.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  TC = 0.303*[(  119.00**3)/(     4.00)]**.2 =    4.041
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    412.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8835
  SOIL CLASSIFICATION IS "C"
```

```
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.12
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.36
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    412.00 TO NODE    420.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    32.50  DOWNSTREAM(FEET) =    29.70
  FLOW LENGTH(FEET) =   302.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.81
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.36
  PIPE TRAVEL TIME(MIN.) =   1.05    Tc(MIN.) =    6.05
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    420.00 =     421.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    420.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.05
  RAINFALL INTENSITY(INCH/HR) =   2.43
  TOTAL STREAM AREA(ACRES) =     1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.36

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.36     9.46        1.952          4.00
      2        7.94     8.17        2.097          4.30
      3        2.36     6.05        2.431          1.00

 ********************************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  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
```

```
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       12.94     6.05       2.431
      2       16.33     8.17       2.097
      3       16.64     9.46       1.952

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.33   Tc(MIN.) =    8.17
  TOTAL AREA(ACRES) =        9.3
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    420.00 =     589.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    430.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    29.70  DOWNSTREAM(FEET) =    29.62
  FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.37
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.33
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    8.32
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    430.00 =     628.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    435.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    32.10  DOWNSTREAM(FEET) =    28.44
  FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.30
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.33
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    8.33
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    435.00 =     647.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    435.00 TO NODE    440.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    28.44  DOWNSTREAM(FEET) =    28.29
  FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.012
```

```
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.25
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.33
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    8.64
 LONGEST FLOWPATH FROM NODE    401.00 TO NODE    440.00 =     725.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    440.00 TO NODE    440.00 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.) =    8.64
 RAINFALL INTENSITY(INCH/HR) =   2.04
 TOTAL STREAM AREA(ACRES) =     9.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.33

****************************************************************************
 FLOW PROCESS FROM NODE    436.00 TO NODE    437.00 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) =   751.00
 UPSTREAM ELEVATION(FEET) =     39.00
 DOWNSTREAM ELEVATION(FEET) =     34.50
 ELEVATION DIFFERENCE(FEET) =      4.50
 TC = 0.937*[(  751.00**3)/(     4.50)]**.2 =   36.869
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.001
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5630
 SOIL CLASSIFICATION IS "C"
 SUBAREA RUNOFF(CFS) =      0.39
 TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      0.39

****************************************************************************
 FLOW PROCESS FROM NODE    437.00 TO NODE    440.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    32.50  DOWNSTREAM(FEET) =    28.29
 FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.25
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.39
```

```
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   36.95
  LONGEST FLOWPATH FROM NODE    436.00 TO NODE    440.00 =     787.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    440.00 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.) =   36.95
  RAINFALL INTENSITY(INCH/HR) =   1.00
  TOTAL STREAM AREA(ACRES) =     0.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.39

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       16.33     8.64        2.040          9.30
      2        0.39    36.95        0.999          0.70

 ********************************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       16.42     8.64       2.040
      2        8.39    36.95       0.999

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.42   Tc(MIN.) =    8.64
  TOTAL AREA(ACRES) =       10.0
  LONGEST FLOWPATH FROM NODE    436.00 TO NODE    440.00 =     787.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    460.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    28.29  DOWNSTREAM(FEET) =    28.06
  FLOW LENGTH(FEET) =   192.00   MANNING'S N =  0.012
```

```
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.39
  (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) =      16.42
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =    9.59
  LONGEST FLOWPATH FROM NODE    436.00 TO NODE    460.00 =     979.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       10.0  TC(MIN.) =      9.59
  PEAK FLOW RATE(CFS)   =      16.42
============================================================================
============================================================================
  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 *************************
* LAKE CREEK-PLACENTIA (JN 2105)                                         *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                   *
* SHARED OUTLET @ NODE 480 - COMBINED BASINS 200, 300, AND 400           *
 ************************************************************************

  FILE NAME: LCPCP10.RAT
  TIME/DATE OF STUDY: 10:51 09/21/2023
--------------------------------------------------------------------------
  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) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.788
  SLOPE OF INTENSITY DURATION CURVE = 0.4910
  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 0.0312 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.*

+-------------------------------------------------------------------------+
| RUNOFF FROM BASIN 200 AND BASIN 300                                     |
| BASIN 200 RUNOFF FROM EAST                                              |
| BASIN 300 RUNOFF FROM NORTH                                             |
+-------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    450.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   8.59   RAIN INTENSITY(INCH/HOUR) =  2.05
  TOTAL AREA(ACRES) =     0.50   TOTAL RUNOFF(CFS) =      0.90

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    450.00 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.) =    8.59
  RAINFALL INTENSITY(INCH/HR) =   2.05
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.90

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    450.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.39   RAIN INTENSITY(INCH/HOUR) =  1.96
  TOTAL AREA(ACRES) =    11.50   TOTAL RUNOFF(CFS) =     22.23

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    450.00 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.) =    9.39
 RAINFALL INTENSITY(INCH/HR) =   1.96
 TOTAL STREAM AREA(ACRES) =    11.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.23

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        0.90     8.59        2.046          0.50
     2       22.23     9.39        1.958         11.50

 ********************************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       21.24     8.59       2.046
     2       23.09     9.39       1.958

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      23.09   Tc(MIN.) =    9.39
 TOTAL AREA(ACRES) =       12.0
 LONGEST FLOWPATH FROM NODE    436.00 TO NODE    450.00 =       0.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    450.00 TO NODE    460.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    28.54  DOWNSTREAM(FEET) =    28.06
 FLOW LENGTH(FEET) =   241.00   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) =      23.09
 PIPE TRAVEL TIME(MIN.) =   0.92    Tc(MIN.) =   10.31
 LONGEST FLOWPATH FROM NODE    436.00 TO NODE    460.00 =     241.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    460.00 TO NODE    460.00 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.) =   10.31
  RAINFALL INTENSITY(INCH/HR) =   1.87
  TOTAL STREAM AREA(ACRES) =    12.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.09

+--------------------------------------------------------------------------+
| RUNOFF FROM BASIN 400                                                    |
| FROM WEST OF NODE 460                                                    |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    460.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.59   RAIN INTENSITY(INCH/HOUR) =  1.94
  TOTAL AREA(ACRES) =    10.00   TOTAL RUNOFF(CFS) =     16.42

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    460.00 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.) =    9.59
  RAINFALL INTENSITY(INCH/HR) =   1.94
  TOTAL STREAM AREA(ACRES) =    10.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.42

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       23.09    10.31        1.871         12.00
      2       16.42     9.59        1.938         10.00

 ********************************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       37.90     9.59       1.938
      2       38.94    10.31       1.871

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      38.94   Tc(MIN.) =   10.31
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE    436.00 TO NODE    460.00 =     241.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    480.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    28.06  DOWNSTREAM(FEET) =    27.85
  FLOW LENGTH(FEET) =   107.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.34
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.94
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   10.64
  LONGEST FLOWPATH FROM NODE    436.00 TO NODE    480.00 =     348.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       22.0  TC(MIN.) =     10.64
  PEAK FLOW RATE(CFS)   =      38.94
============================================================================
============================================================================
  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 *************************
* LAKE CREEK-PLACENTIA (JN 2105)                                         *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 100                                                              *
 **************************************************************************

  FILE NAME: LCP1HP00.RAT
  TIME/DATE OF STUDY: 10:03 09/21/2023
--------------------------------------------------------------------------
  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) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.120
  SLOPE OF INTENSITY DURATION CURVE = 0.4890
  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 0.0312 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) =   255.00
  UPSTREAM ELEVATION(FEET) =     38.70
  DOWNSTREAM ELEVATION(FEET) =     36.30
  ELEVATION DIFFERENCE(FEET) =      2.40
  TC = 0.303*[(  255.00**3)/(     2.40)]**.2 =    7.071
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.187
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8858
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.67
  TOTAL AREA(ACRES) =      1.30   TOTAL RUNOFF(CFS) =      3.67

****************************************************************************
  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) =    34.20  DOWNSTREAM(FEET) =    33.89
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.37
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.67
  PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =    8.16
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     410.00 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.) =    8.16
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.97
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.67

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 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) =   274.00
  UPSTREAM ELEVATION(FEET) =     38.90
  DOWNSTREAM ELEVATION(FEET) =     36.30
  ELEVATION DIFFERENCE(FEET) =      2.60
  TC = 0.303*[(  274.00**3)/(     2.60)]**.2 =    7.265
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.145
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8856
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.06
  TOTAL AREA(ACRES) =      1.10   TOTAL RUNOFF(CFS) =      3.06

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.94  DOWNSTREAM(FEET) =    33.89
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.37
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.06
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    7.44
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    110.00 =     299.00 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.) =    7.44
  RAINFALL INTENSITY(INCH/HR) =   3.11
```

```
 TOTAL STREAM AREA(ACRES) =     1.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.06

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        3.67     8.16        2.971          1.30
     2        3.06     7.44        3.108          1.10

 ********************************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        6.41     7.44       3.108
     2        6.60     8.16       2.971

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.60   Tc(MIN.) =    8.16
 TOTAL AREA(ACRES) =        2.4
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.89  DOWNSTREAM(FEET) =    33.17
 FLOW LENGTH(FEET) =   367.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.48
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.60
 PIPE TRAVEL TIME(MIN.) =   1.76    Tc(MIN.) =    9.92
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    115.00 =     777.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =     33.17  DOWNSTREAM(FEET) =     33.16
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =  0.0001
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.056
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8797
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.34
  AVERAGE FLOW DEPTH(FEET) =   0.89   TRAVEL TIME(MIN.) =   7.41
  Tc(MIN.) =   17.33
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.90
  TOTAL AREA(ACRES) =        2.9         PEAK FLOW RATE(CFS) =       7.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.92   FLOW VELOCITY(FEET/SEC.) =   0.35
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    125.00 =     927.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 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.) =   17.33
  RAINFALL INTENSITY(INCH/HR) =   2.06
  TOTAL STREAM AREA(ACRES) =     2.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.50

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    119.00 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) =   286.00
  UPSTREAM ELEVATION(FEET) =     40.60
  DOWNSTREAM ELEVATION(FEET) =     34.62
  ELEVATION DIFFERENCE(FEET) =      5.98
  TC = 0.303*[(  286.00**3)/(     5.98)]**.2 =    6.311
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.369
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8864
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.19
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.19

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

```
 FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.369
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8864
 SOIL CLASSIFICATION IS "C"
 SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.69
 TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       3.88
 TC(MIN.) =    6.31

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    34.86  DOWNSTREAM(FEET) =    33.17
 FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.018
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.44
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.88
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    6.43
 LONGEST FLOWPATH FROM NODE    117.00 TO NODE    120.00 =     334.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     33.17  DOWNSTREAM(FEET) =     33.16
 CHANNEL LENGTH THRU SUBAREA(FEET) =    47.00   CHANNEL SLOPE =  0.0002
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.88
 FLOW VELOCITY(FEET/SEC.) =   0.40   FLOW DEPTH(FEET) =   0.45
 TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =    8.40
 LONGEST FLOWPATH FROM NODE    117.00 TO NODE    125.00 =     381.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 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.) =    8.40
```

```
 RAINFALL INTENSITY(INCH/HR) =   2.93
 TOTAL STREAM AREA(ACRES) =     1.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.88

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        7.50    17.33        2.056          2.90
     2        3.88     8.40        2.929          1.30

 ********************************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        7.52     8.40       2.929
     2       10.23    17.33       2.056

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      10.23   Tc(MIN.) =   17.33
 TOTAL AREA(ACRES) =        4.2
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    125.00 =     927.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    128.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    30.41  DOWNSTREAM(FEET) =    30.36
 FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.11
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.23
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   17.42
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    128.00 =     949.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 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.) =   17.42
  RAINFALL INTENSITY(INCH/HR) =   2.05
  TOTAL STREAM AREA(ACRES) =     4.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.23

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 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) =   278.00
  UPSTREAM ELEVATION(FEET) =     37.50
  DOWNSTREAM ELEVATION(FEET) =     36.42
  ELEVATION DIFFERENCE(FEET) =      1.08
  TC = 0.937*[(  278.00**3)/(     1.08)]**.2 =   27.019
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.654
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6608
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.42  DOWNSTREAM(FEET) =    30.36
  FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.59
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.33
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   27.12
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    128.00 =     317.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 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.) =   27.12
```

```
 RAINFALL INTENSITY(INCH/HR) =   1.65
 TOTAL STREAM AREA(ACRES) =     0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.33

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       10.23    17.42        2.051          4.20
     2        0.33    27.12        1.652          0.30

 ********************************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       10.44    17.42       2.051
     2        8.57    27.12       1.652

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      10.44   Tc(MIN.) =   17.42
 TOTAL AREA(ACRES) =        4.5
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    128.00 =     949.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    30.36  DOWNSTREAM(FEET) =    30.29
 FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  18.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.22
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.44
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   17.73
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =    1008.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        4.5  TC(MIN.) =     17.73
 PEAK FLOW RATE(CFS)   =      10.44
============================================================================
============================================================================
```

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 *************************
* LAKE CREEK-PLACENTIA (JN 2105)                                         *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 200                                                              *
 **************************************************************************

  FILE NAME: LCP2HP00.RAT
  TIME/DATE OF STUDY: 10:05 09/21/2023
--------------------------------------------------------------------------
  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) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.120
  SLOPE OF INTENSITY DURATION CURVE = 0.4890
  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 0.0312 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    201.00 TO NODE    220.00 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) =   336.00
  UPSTREAM ELEVATION(FEET) =     37.70
  DOWNSTREAM ELEVATION(FEET) =     35.58
  ELEVATION DIFFERENCE(FEET) =      2.12
  TC = 0.303*[(  336.00**3)/(     2.12)]**.2 =    8.553
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.904
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8846
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.28
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.28

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    450.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    29.48  DOWNSTREAM(FEET) =    28.54
  FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.04
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.28
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    8.59
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    450.00 =     352.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.5  TC(MIN.) =      8.59
  PEAK FLOW RATE(CFS)   =       1.28
============================================================================
============================================================================
  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 *************************
* LAKE CREEK-PLACENTIA (JN 2105)                                         *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 300                                                              *
 **************************************************************************

  FILE NAME: LCP3HP00.RAT
  TIME/DATE OF STUDY: 10:07 09/21/2023
--------------------------------------------------------------------------
  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) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.120
  SLOPE OF INTENSITY DURATION CURVE = 0.4890
  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 0.0312 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    301.00 TO NODE    305.00 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) =   296.00
  UPSTREAM ELEVATION(FEET) =     39.30
  DOWNSTREAM ELEVATION(FEET) =     34.79
  ELEVATION DIFFERENCE(FEET) =      4.51
  TC = 0.303*[(  296.00**3)/(     4.51)]**.2 =    6.816
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.245
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8860
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.44
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.44

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.245
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8860
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.59
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       4.02
  TC(MIN.) =    6.82

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    306.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.99  DOWNSTREAM(FEET) =    31.97
  FLOW LENGTH(FEET) =     7.50   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.43
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.02
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.85
```

```
  LONGEST FLOWPATH FROM NODE    301.00 TO NODE    306.00 =     303.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    306.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.85
  RAINFALL INTENSITY(INCH/HR) =   3.24
  TOTAL STREAM AREA(ACRES) =     1.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.02

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 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) =   276.00
  UPSTREAM ELEVATION(FEET) =     38.80
  DOWNSTREAM ELEVATION(FEET) =     35.50
  ELEVATION DIFFERENCE(FEET) =      3.30
  TC = 0.937*[(  276.00**3)/(     3.30)]**.2 =   21.516
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.849
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6798
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.50
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.50

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    306.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.50  DOWNSTREAM(FEET) =    31.97
  FLOW LENGTH(FEET) =    49.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.90
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.50
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   21.68
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    306.00 =     325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    306.00 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.) =   21.68
  RAINFALL INTENSITY(INCH/HR) =   1.84
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.50

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.02     6.85        3.236          1.40
      2        0.50    21.68        1.842          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        4.18     6.85       3.236
      2        2.79    21.68       1.842

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.18   Tc(MIN.) =    6.85
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    306.00 =     325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.97  DOWNSTREAM(FEET) =    31.77
  FLOW LENGTH(FEET) =   101.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.06
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.18
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =    7.40
```

```
 LONGEST FLOWPATH FROM NODE    302.00 TO NODE    310.00 =     426.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.40
 RAINFALL INTENSITY(INCH/HR) =   3.12
 TOTAL STREAM AREA(ACRES) =     1.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.18

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    309.00 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) =   148.00
 UPSTREAM ELEVATION(FEET) =     37.30
 DOWNSTREAM ELEVATION(FEET) =     34.29
 ELEVATION DIFFERENCE(FEET) =      3.01
 TC = 0.303*[(  148.00**3)/(     3.01)]**.2 =    4.876
 COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
 SOIL CLASSIFICATION IS "C"
 SUBAREA RUNOFF(CFS) =      3.02
 TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      3.02

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
 SOIL CLASSIFICATION IS "C"
 SUBAREA AREA(ACRES) =    1.20   SUBAREA RUNOFF(CFS) =    4.02
 TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       7.04
 TC(MIN.) =    5.00

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.79  DOWNSTREAM(FEET) =    31.77
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.28
  (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) =       7.04
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.05
  LONGEST FLOWPATH FROM NODE    307.00 TO NODE    310.00 =     157.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.05
  RAINFALL INTENSITY(INCH/HR) =   3.76
  TOTAL STREAM AREA(ACRES) =     2.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.04

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.18     7.40        3.116          1.80
      2        7.04     5.05        3.759          2.10

 **********************************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        9.89     5.05       3.759
      2       10.02     7.40       3.116

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.89   Tc(MIN.) =    5.05
  TOTAL AREA(ACRES) =        3.9
```

```
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    310.00 =     426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    315.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.77  DOWNSTREAM(FEET) =    31.37
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.76
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.89
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =    5.93
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    315.00 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.93
  RAINFALL INTENSITY(INCH/HR) =   3.47
  TOTAL STREAM AREA(ACRES) =     3.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.89

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    314.00 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) =   142.00
  UPSTREAM ELEVATION(FEET) =     37.70
  DOWNSTREAM ELEVATION(FEET) =     34.29
  ELEVATION DIFFERENCE(FEET) =      3.41
  TC = 0.303*[(  142.00**3)/(     3.41)]**.2 =    4.639
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.02
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      3.02

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

```
 FLOW PROCESS FROM NODE    312.00 TO NODE    314.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
 SOIL CLASSIFICATION IS "C"
 SUBAREA AREA(ACRES) =    1.20   SUBAREA RUNOFF(CFS) =    4.02
 TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       7.04
 TC(MIN.) =    5.00

****************************************************************************
 FLOW PROCESS FROM NODE    314.00 TO NODE    315.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    31.79  DOWNSTREAM(FEET) =    31.37
 FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.55
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.04
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    5.01
 LONGEST FLOWPATH FROM NODE    311.00 TO NODE    315.00 =     151.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.01
 RAINFALL INTENSITY(INCH/HR) =   3.77
 TOTAL STREAM AREA(ACRES) =     2.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.04

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        9.89     5.93        3.473          3.90
     2        7.04     5.01        3.771          2.10

 ********************************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       15.40     5.01       3.771
      2       16.37     5.93       3.473

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.37   Tc(MIN.) =    5.93
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    315.00 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.37  DOWNSTREAM(FEET) =    30.97
  FLOW LENGTH(FEET) =   200.00   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) =      16.37
  PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =    6.82
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    320.00 =     826.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.82
  RAINFALL INTENSITY(INCH/HR) =   3.24
  TOTAL STREAM AREA(ACRES) =     6.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.37

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    319.00 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) =   153.00
  UPSTREAM ELEVATION(FEET) =     37.70
  DOWNSTREAM ELEVATION(FEET) =     34.29
  ELEVATION DIFFERENCE(FEET) =      3.41
  TC = 0.303*[(  153.00**3)/(     3.41)]**.2 =    4.851
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.02
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      3.02

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    319.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    4.36
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       7.37
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.79  DOWNSTREAM(FEET) =    30.97
  FLOW LENGTH(FEET) =     9.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.90
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.37
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    5.01
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    320.00 =     162.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.01
```

```
 RAINFALL INTENSITY(INCH/HR) =   3.77
 TOTAL STREAM AREA(ACRES) =     2.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.37

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       16.37     6.82        3.245          6.00
     2        7.37     5.01        3.772          2.20

 ********************************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       19.41     5.01       3.772
     2       22.71     6.82       3.245

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      22.71   Tc(MIN.) =    6.82
 TOTAL AREA(ACRES) =        8.2
 LONGEST FLOWPATH FROM NODE    302.00 TO NODE    320.00 =     826.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    330.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    30.97  DOWNSTREAM(FEET) =    30.73
 FLOW LENGTH(FEET) =   120.00   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) =      22.71
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =    7.27
 LONGEST FLOWPATH FROM NODE    302.00 TO NODE    330.00 =     946.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.27
  RAINFALL INTENSITY(INCH/HR) =   3.14
  TOTAL STREAM AREA(ACRES) =     8.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.71

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    324.00 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) =   150.00
  UPSTREAM ELEVATION(FEET) =     37.70
  DOWNSTREAM ELEVATION(FEET) =     34.29
  ELEVATION DIFFERENCE(FEET) =      3.41
  TC = 0.303*[(  150.00**3)/(     3.41)]**.2 =    4.794
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.02
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      3.02

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    324.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    6.37
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       9.38
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    330.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.79  DOWNSTREAM(FEET) =    30.73
  FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.39
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.38
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    5.20
  LONGEST FLOWPATH FROM NODE    321.00 TO NODE    330.00 =     239.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.20
  RAINFALL INTENSITY(INCH/HR) =   3.70
  TOTAL STREAM AREA(ACRES) =     2.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.38

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       22.71     7.27        3.143          8.20
      2        9.38     5.20        3.703          2.80

 ********************************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       25.63     5.20       3.703
      2       30.68     7.27       3.143

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      30.68   Tc(MIN.) =    7.27
  TOTAL AREA(ACRES) =       11.0
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    330.00 =     946.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    340.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    30.73  DOWNSTREAM(FEET) =    30.69
  FLOW LENGTH(FEET) =    20.00   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) =      30.68
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.35
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    340.00 =     966.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.35
  RAINFALL INTENSITY(INCH/HR) =   3.13
  TOTAL STREAM AREA(ACRES) =    11.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     30.68

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    327.00 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) =   373.00
  UPSTREAM ELEVATION(FEET) =     37.10
  DOWNSTREAM ELEVATION(FEET) =     34.52
  ELEVATION DIFFERENCE(FEET) =      2.58
  TC = 0.303*[(  373.00**3)/(     2.58)]**.2 =    8.756
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.871
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8845
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.27
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.27

****************************************************************************
  FLOW PROCESS FROM NODE    327.00 TO NODE    340.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.52  DOWNSTREAM(FEET) =    30.69
```

```
  FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.19
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.27
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    9.07
  LONGEST FLOWPATH FROM NODE    326.00 TO NODE    340.00 =     451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 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.) =    9.07
  RAINFALL INTENSITY(INCH/HR) =   2.82
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.27

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       30.68     7.35        3.127         11.00
      2        1.27     9.07        2.822          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       31.71     7.35       3.127
      2       28.95     9.07       2.822

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      31.71   Tc(MIN.) =    7.35
  TOTAL AREA(ACRES) =       11.5
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    340.00 =     966.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    345.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.40  DOWNSTREAM(FEET) =    33.39
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.88
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.71
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    7.42
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    345.00 =     974.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    350.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.39  DOWNSTREAM(FEET) =    29.73
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.49
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   2
  PIPE-FLOW(CFS) =      31.71
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.47
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    350.00 =    1017.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    450.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    29.73  DOWNSTREAM(FEET) =    28.54
  FLOW LENGTH(FEET) =   522.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.67
  (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) =      31.71
  PIPE TRAVEL TIME(MIN.) =   1.86    Tc(MIN.) =    9.33
  LONGEST FLOWPATH FROM NODE    302.00 TO NODE    450.00 =    1539.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       11.5  TC(MIN.) =      9.33
```

```
  PEAK FLOW RATE(CFS)   =      31.71
================================================================================
================================================================================
  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 *************************
* LAKE CREEK-PLACENTIA (JN 2105)                                         *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 400                                                              *
 **************************************************************************

  FILE NAME: LCP4HP00.RAT
  TIME/DATE OF STUDY: 10:10 09/21/2023
--------------------------------------------------------------------------
  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) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.120
  SLOPE OF INTENSITY DURATION CURVE = 0.4890
  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 0.0312 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    401.00 TO NODE    405.00 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) =   321.00
  UPSTREAM ELEVATION(FEET) =     35.50
  DOWNSTREAM ELEVATION(FEET) =     33.25
  ELEVATION DIFFERENCE(FEET) =      2.25
  TC = 0.303*[(  321.00**3)/(     2.25)]**.2 =    8.223
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.960
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8849
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      4.19
  TOTAL AREA(ACRES) =      1.60   TOTAL RUNOFF(CFS) =      4.19

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.960
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8849
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    6.29
  TOTAL AREA(ACRES) =        4.0   TOTAL RUNOFF(CFS) =      10.48
  TC(MIN.) =    8.22

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    420.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    30.25  DOWNSTREAM(FEET) =    29.70
  FLOW LENGTH(FEET) =   268.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.82
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.48
  PIPE TRAVEL TIME(MIN.) =   1.17    Tc(MIN.) =    9.39
```

```
 LONGEST FLOWPATH FROM NODE    401.00 TO NODE    420.00 =     589.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    420.00 TO NODE    420.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.39
 RAINFALL INTENSITY(INCH/HR) =   2.77
 TOTAL STREAM AREA(ACRES) =     4.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.48

****************************************************************************
 FLOW PROCESS FROM NODE    407.00 TO NODE    409.00 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) =   317.00
 UPSTREAM ELEVATION(FEET) =     35.50
 DOWNSTREAM ELEVATION(FEET) =     33.25
 ELEVATION DIFFERENCE(FEET) =      2.25
 TC = 0.303*[(  317.00**3)/(     2.25)]**.2 =    8.162
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.971
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8849
 SOIL CLASSIFICATION IS "C"
 SUBAREA RUNOFF(CFS) =      5.00
 TOTAL AREA(ACRES) =      1.90   TOTAL RUNOFF(CFS) =      5.00

****************************************************************************
 FLOW PROCESS FROM NODE    408.00 TO NODE    409.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.971
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8849
 SOIL CLASSIFICATION IS "C"
 SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    6.31
 TOTAL AREA(ACRES) =        4.3   TOTAL RUNOFF(CFS) =      11.30
 TC(MIN.) =    8.16

****************************************************************************
 FLOW PROCESS FROM NODE    409.00 TO NODE    420.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    30.25  DOWNSTREAM(FEET) =    29.70
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.82
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.30
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    8.17
  LONGEST FLOWPATH FROM NODE    407.00 TO NODE    420.00 =     325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    420.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.17
  RAINFALL INTENSITY(INCH/HR) =   2.97
  TOTAL STREAM AREA(ACRES) =     4.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.30

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    412.00 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) =   119.00
  UPSTREAM ELEVATION(FEET) =     39.00
  DOWNSTREAM ELEVATION(FEET) =     35.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  TC = 0.303*[(  119.00**3)/(     4.00)]**.2 =    4.041
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    412.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
  SOIL CLASSIFICATION IS "C"
```

```
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    3.02
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       3.35
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    412.00 TO NODE    420.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    32.50  DOWNSTREAM(FEET) =    29.70
  FLOW LENGTH(FEET) =   302.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.11
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.35
  PIPE TRAVEL TIME(MIN.) =   0.99    Tc(MIN.) =    5.99
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    420.00 =     421.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    420.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.99
  RAINFALL INTENSITY(INCH/HR) =   3.46
  TOTAL STREAM AREA(ACRES) =     1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.35

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.48     9.39        2.774          4.00
      2       11.30     8.17        2.969          4.30
      3        3.35     5.99        3.457          1.00

 ********************************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  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
```

```
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       18.31     5.99       3.457
      2       23.30     8.17       2.969
      3       23.73     9.39       2.774

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      23.30   Tc(MIN.) =    8.17
  TOTAL AREA(ACRES) =        9.3
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    420.00 =     589.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    430.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    29.70  DOWNSTREAM(FEET) =    29.62
  FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.43
  (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) =      23.30
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    8.32
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    430.00 =     628.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    435.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    32.10  DOWNSTREAM(FEET) =    28.44
  FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.30
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.30
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    8.33
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    435.00 =     647.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    435.00 TO NODE    440.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    28.44  DOWNSTREAM(FEET) =    28.29
  FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.29
  (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) =      23.30
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    8.63
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    440.00 =     725.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    440.00 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.) =    8.63
  RAINFALL INTENSITY(INCH/HR) =   2.89
  TOTAL STREAM AREA(ACRES) =     9.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.30

****************************************************************************
  FLOW PROCESS FROM NODE    436.00 TO NODE    437.00 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) =   751.00
  UPSTREAM ELEVATION(FEET) =     39.00
  DOWNSTREAM ELEVATION(FEET) =     34.50
  ELEVATION DIFFERENCE(FEET) =      4.50
  TC = 0.937*[(  751.00**3)/(     4.50)]**.2 =   36.869
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.421
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6331
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.63
  TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      0.63

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    440.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    32.50  DOWNSTREAM(FEET) =    28.29
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.012
```

```
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.31
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.63
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   36.94
 LONGEST FLOWPATH FROM NODE    436.00 TO NODE    440.00 =     787.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    440.00 TO NODE    440.00 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.) =   36.94
 RAINFALL INTENSITY(INCH/HR) =   1.42
 TOTAL STREAM AREA(ACRES) =     0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.63

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       23.30     8.63        2.890          9.30
     2        0.63    36.94        1.420          0.70

 **********************************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       23.44     8.63       2.890
     2       12.07    36.94       1.420

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      23.44   Tc(MIN.) =    8.63
 TOTAL AREA(ACRES) =       10.0
 LONGEST FLOWPATH FROM NODE    436.00 TO NODE    440.00 =     787.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    440.00 TO NODE    460.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    28.29  DOWNSTREAM(FEET) =    28.06
  FLOW LENGTH(FEET) =   192.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.39
  (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) =      23.44
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =    9.58
  LONGEST FLOWPATH FROM NODE    436.00 TO NODE    460.00 =     979.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       10.0  TC(MIN.) =      9.58
  PEAK FLOW RATE(CFS)   =      23.44
============================================================================
============================================================================
  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 *************************
* LAKE CREEK-PLACENTIA (JN 2105)                                         *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                  *
* SHARED OUTLET @ NODE 480 - COMBINED BASINS 200, 300, AND 400           *
 ************************************************************************

  FILE NAME: LCPCP00.RAT
  TIME/DATE OF STUDY: 10:14 09/21/2023
--------------------------------------------------------------------------
  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) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.120
  SLOPE OF INTENSITY DURATION CURVE = 0.4890
  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 0.0312 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.*

+-------------------------------------------------------------------------+
| RUNOFF FROM BASIN 200 AND BASIN 300                                     |
| BASIN 200 RUNOFF FROM EAST                                              |
| BASIN 300 RUNOFF FROM NORTH                                             |
+-------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    450.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   8.59   RAIN INTENSITY(INCH/HOUR) =  2.90
  TOTAL AREA(ACRES) =     0.50   TOTAL RUNOFF(CFS) =      1.28

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    450.00 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.) =    8.59
  RAINFALL INTENSITY(INCH/HR) =   2.90
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.28

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    450.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.33   RAIN INTENSITY(INCH/HOUR) =  2.78
  TOTAL AREA(ACRES) =    11.50   TOTAL RUNOFF(CFS) =     31.71

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    450.00 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.) =    9.33
 RAINFALL INTENSITY(INCH/HR) =   2.78
 TOTAL STREAM AREA(ACRES) =    11.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.71

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.28     8.59        2.898          0.50
     2       31.71     9.33        2.783         11.50

 ********************************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       30.47     8.59       2.898
     2       32.94     9.33       2.783

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      32.94   Tc(MIN.) =    9.33
 TOTAL AREA(ACRES) =       12.0
 LONGEST FLOWPATH FROM NODE    436.00 TO NODE    450.00 =       0.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    450.00 TO NODE    460.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    28.54  DOWNSTREAM(FEET) =    28.06
 FLOW LENGTH(FEET) =   241.00   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) =      32.94
 PIPE TRAVEL TIME(MIN.) =   0.92    Tc(MIN.) =   10.25
 LONGEST FLOWPATH FROM NODE    436.00 TO NODE    460.00 =     241.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    460.00 TO NODE    460.00 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.) =   10.25
  RAINFALL INTENSITY(INCH/HR) =   2.66
  TOTAL STREAM AREA(ACRES) =    12.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.94

+--------------------------------------------------------------------------+
| RUNOFF FROM BASIN 400                                                    |
| FROM WEST OF NODE 460                                                    |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    460.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.58   RAIN INTENSITY(INCH/HOUR) =  2.75
  TOTAL AREA(ACRES) =    10.00   TOTAL RUNOFF(CFS) =     23.44

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    460.00 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.) =    9.58
  RAINFALL INTENSITY(INCH/HR) =   2.75
  TOTAL STREAM AREA(ACRES) =    10.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.44

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       32.94    10.25        2.658         12.00
      2       23.44     9.58        2.747         10.00

 ********************************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       54.23     9.58       2.747
      2       55.62    10.25       2.658

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      55.62   Tc(MIN.) =   10.25
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE    436.00 TO NODE    460.00 =     241.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    480.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    28.06  DOWNSTREAM(FEET) =    27.85
  FLOW LENGTH(FEET) =   107.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.42
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      55.62
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   10.58
  LONGEST FLOWPATH FROM NODE    436.00 TO NODE    480.00 =     348.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       22.0  TC(MIN.) =     10.58
  PEAK FLOW RATE(CFS)   =      55.62
============================================================================
============================================================================
  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

Lake Creek-Placentia
Job # 2105
9/20/2023

Storm Drain Sizing Summary

The purpose of this table is to provide an estimated pipe sizes to convey the anticipated 100-year peak flow rates with a sizing bump-up factor to account for potential head losses through the pipe.

Manning's n: 0.012 HDPE or equivalent

Sizing Bump-up (%): 30

			Storm Drain Sizes at Various Slopes						
		Slope at:	0.2%		0.5%		1.0%		
Node ID's:	**Q_{100} (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)**	**RECOMMENDATIONS[3]**
105 - 110	3.7	4.8	1.47	18"	1.24	18"	1.08	18"	**Use 12" HDPE @ 0.2% MIN.**
109 - 110	3.1	4.0	1.37	18"	1.16	18"	1.02	18"	**Use 12" HDPE @ 0.2% MIN.**
110 - 115	6.6	8.6	1.82	24"	1.53	24"	1.35	18"	**Use 24" HDPE @ 0.2% MIN.**
125 - 128	10.2	13.3	2.15	30"	1.81	24"	1.59	24"	**Use 30" HDPE @ 0.2% MIN.**
128 - 130 (Outlet - Basin 100)	10.4	13.5	2.16	30"	1.82	24"	1.60	24"	**Use 30" RCP @ 0.2% MIN.**
220 - 450	1.3	1.7	0.99	12"	0.83	10"	0.73	10"	**Use 12" HDPE @ 0.5% MIN.**
303 - 305	0.5	0.7	0.69	10"	0.58	8"	0.51	6"	**Use 12" HDPE @ 0.2% MIN.**
305 - 306	4.0	5.2	1.51	18"	1.27	18"	1.12	18"	**Use 18" HDPE @ 0.2% MIN.**
306 - 310	4.2	5.5	1.54	24"	1.30	18"	1.14	18"	**Use 24" HDPE @ 0.2% MIN.**
309 - 310	7.0	9.1	1.86	24"	1.57	24"	1.38	18"	**Use 24" HDPE @ 0.2% MIN.**
310 - 315	9.9	12.9	2.12	30"	1.79	24"	1.57	24"	**Use 24" HDPE @ 0.2% MIN.**
314 - 315	7.0	9.1	1.86	24"	1.57	24"	1.38	18"	**Use 24" HDPE @ 0.2% MIN.**
315 - 320	16.4	21.3	2.56	36"	2.16	30"	1.90	24"	**Use 30" HDPE @ 0.2% MIN.**
315 - 320	16.4	21.3	2.56	36"	2.16	30"	1.90	24"	**Use 30" HDPE @ 0.2% MIN.**
320 - 330	22.7	29.5	2.90	36"	2.44	30"	2.14	30"	**Use 30" HDPE @ 0.2% MIN.**
324 - 330	9.4	12.2	2.08	30"	1.75	24"	1.54	24"	**Use 24" HDPE @ 0.2% MIN.**
330 - 340	30.7	39.9	3.24	42"	2.73	36"	2.40	30"	**Use 30" HDPE @ 0.2% MIN.**
345 - 350	31.7	41.2	3.28	42"	2.76	36"	2.43	30"	**Use 2-12" HDPE @ 1.0% MIN.**
350 - 450	41.7	54.2	3.64	48"	3.06	42"	2.69	36"	**Use 42" HDPE @ 0.2% MIN.**

Lake Creek-Placentia
Job # 2105
9/20/2023

			Storm Drain Sizes at Various Slopes						
		Slope at:	0.2%		0.5%		1.0%		
Node ID's:	**Q_{100} (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)**	**RECOMMENDATIONS[3]**
405 - 420	10.5	13.7	2.17	30"	1.83	24"	1.60	24"	**Use 24" HDPE @ 0.2% MIN.**
409 - 420	11.3	14.7	2.23	30"	1.88	24"	1.65	24"	**Use 24" HDPE @ 0.2% MIN.**
420 - 430	23.3	30.3	2.93	36"	2.46	30"	2.16	30"	**Use 30" HDPE @ 0.2% MIN.**
435 - 440	23.3	30.3	2.93	36"	2.46	30"	2.16	30"	**Use 30" HDPE @ 0.2% MIN.**
437 - 440	0.6	0.8	0.74	10"	0.62	8"	0.55	8"	**Use 12" HDPE @ 0.2% MIN.**
440 - 460	23.4	30.4	2.93	36"	2.47	30"	2.17	30"	**Use 30" HDPE @ 0.2% MIN.**
450 - 460	32.9	42.8	3.33	42"	2.80	36"	2.46	30"	**Use 36" HDPE @ 0.2% MIN.**
460 - 480 (Shared Outlet - Basins 200/300/400)	55.6	72.3	4.05	54"	3.41	42"	3.00	36"	**Use 48" RCP @ 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.