APPENDIX M – PRELIMINARY DRAINAGE REPORT

MORENO VALLEY MALL REDEVELOPMENT

MORENO VALLEY

Preliminary Drainage Report

MORENO VALLEY, CA 92553

PROJECT NO.: 195381002
APN: 291-110-037, 291-110-032, 291-110-033, 291-110-034, 291-110-036, 291-110-035

FEBRUARY 2022

Project Applicant:

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This Drainage Report has been prepared by Kimley-Horn and Associates, Inc. under the direct supervision of the following Registered Civil engineer. The undersigned attests to the technical data contained in this study, and to the qualifications of technical specialists providing engineering computations upon which the recommendations and conclusions are based.

_____   _____

Registered Civil Engineer   Date

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1   PROJECT DESCRIPTION

1.1   PROJECT DESCRIPTION

The Moreno Valley Mall Redevelopment project consists redeveloping approximately 60 acres of an existing mall to include residential, hospitality and office buildings. See **Figure 1-1** for Vicinity Map. The proposed project includes the construction of +/- 1,627 multifamily unit developments, retail shops, and a hotel with associated parking, landscaping, and sidewalk.

Figure 1–1 Vicinity Map
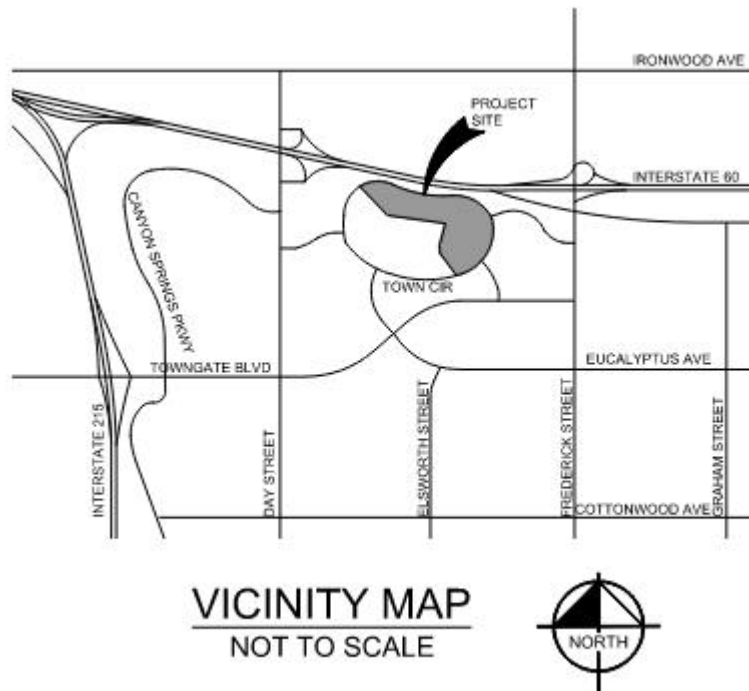
2 HYDROLOGIC ANALYSIS

2.1 ASSUMPTIONS

Aerial contour information, photographs, record drawings and site observations were used to delineate the watershed boundary and drainage sub-basins for the project.

2.2 METHODOLOGY

The City of Moreno valley is located within Riverside County. Drainage calculations comply with the requirements outlined in the Riverside County Flood Control and Water Conservation District's Hydrology Manual (RCFC & WCD) dated April 1978. Runoff values were calculated based on the 100-year storm event using the Modified Rational Method. The Rational Method was used to analyze the hydrology for the project. This methodology is typically used for small basins less than 500 acres in size because a uniform rainfall distribution is assumed for the entire duration.

Basin boundaries, initial subareas, and flow paths were delineated for each basin with AutoCAD Civil 3D software. These hydrologic parameters are shown for existing conditions and proposed conditions in **Exhibit A** and **Exhibit B** attached. Elevations, flow path slopes, and estimated shape of routing reaches was determined for each basin.

The RCFC & WCD Hydrology Manual was used to calculate loss rates and subsequent runoff coefficients for each basin based on land use type, hydrologic soil group, and Antecedent Moisture Condition (AMC). The AMC is a commonly used index used to describe how saturated a soil is before the design storm occurs. AMC III describes a watershed soil that is already saturated, typically used for the 100-year storm analysis. AMC II, a moderately wet condition, was used for the 10-year storm analysis.

For preliminary calculations, a runoff coefficient of 0.90 was used for each area. A 0.90 runoff coefficient for the project is conservative and corresponds with 100% impervious area per Plate D-5.7 of the RCFC & WCD Hydrology Manual.

Runoff calculations for the 10 year and 100 year storm were performed using the rational method computer program Advanced Engineering Software (AES), 2011 version. This method calculates time of concentration and runoff rates using criteria as specified in the Hydrology Manual. This report will identify that proposed discharge leaving the site will be less than existing conditions.

Excerpts from the Hydrology Manual are contained in **Appendix A**.

2.2.1 EXISTING SITE HYDROLOGY

The existing site is currently developed and consists of a large shopping mall with paved parking and parking structures. The site has various highpoints throughout Town Circle that surround the existing mall development. The site slopes at slight gradients and has elevations varying from approximately 1637 feet north of the site, to 1608 feet along the south perimeter of the site. There are various inlets located throughout the site to collect stormwater runoff that connect to existing storm infrastructure in Town Circle. Each time there is confluence of storm drainpipes at the mainline in Town Circle, flow was calculated for the contributing tributary areas. Runoff was evaluated in sixteen different tributary areas. Existing reinforced concrete pipe (RCP) circles around Town Circle and ultimately discharges to an existing RCP storm drain south of the site in Memorial Way.

Onsite flows were divided into drainage groups A and B. Drainage areas for group A start at the high point of the mainline in Town Circle north of the site and move clockwise around the site until connecting to the

existing storm drain pipe in Memorial Way. Drainage areas for group B start at the high point of the mainline in Town Circle north of the site and move counterclockwise around the site until connecting to the existing storm drain pipe in Memorial Way. Offsite flows are delineated as group C.

The offsite and onsite tributary areas have been defined on the attached **Existing Drainage Exhibit**. Refer to **Table 2-1** for the calculated discharge to associated inlets from the existing project site.

Table 2–1 Existing Hydrology Conditions-100 Year Storm

DMA	Runoff Coefficient	plot (acres)	T_c (min)	100Yr Intensity	Flow Rate 100 Year (cfs)
A-1	0.9	6.36	7.44	3.04	17.44
A-2	0.9	8.61	8.46	2.87	22.22
A-3	0.9	0.52	9.82	2.68	1.25
A-4	0.9	4.63	11.21	2.53	10.53
A-5	0.9	1.90	15.04	2.22	3.79
A-6	0.9	2.82	15.86	2.16	5.49
A-7	0.9	*	*	*	*
A-8	0.9	16.45	16.89	2.10	31.12
A-9	0.9	6.23	18.05	2.04	11.20
A-10	0.9	9.01	19.07	1.99	16.15
Total	0.9	56.53	19.07		119.19
B-1	0.9	6.37	6.78	3.17	18.22
B-2	0.9	11.72	12.27	2.43	25.59
B-3	0.9	1.96	12.76	2.38	4.21
B-4	0.9	0.38	13.27	2.34	0.80
B-5	0.9	6.86	14.03	2.29	14.11
B-6	0.9	5.41	15.06	2.21	10.78
Total	0.9	32.70	15.06		73.71
Computed Confluence Total:		89.10	19.75		185.18

*A-7 and A-8 values combined and shown in row A-8

2.2.2 PROPOSED SITE HYDROLOGY

The area of disturbance for the proposed is approximately 60 acres. The hydrology for the entire mall was performed and shown as DMA A-1, A-2, A-3, A-4, A-5, B-1, and B-3 excluding the Mall roof area on the attached **Proposed Drainage Exhibit**. The project proposes storm drain infrastructure to convey project runoff to existing discharge locations.

The project area had an anticipated total flow of 170.03cfs.

Table 2–2 Proposed Hydrology Conditions – 100 Year Storm

DMA	Runoff Coefficient	plot (acres)	T_c (min)	100Yr Intensity	Flow Rate 100 Year (cfs)
A	0.9	1.07	10.90	2.56	2.58
A-1	0.9	6.42	9.54	2.72	15.78
A-2	0.9	1.39	10.22	2.63	3.29
A-3	0.9	7.60	10.70	2.58	17.65
A-4	0.9	0.52	11.66	2.48	1.16
A-5	0.9	0.47	13.06	2.36	1.00
A-6	0.9	0.47	17.01	2.10	0.89
A-7	0.9	0.72	18.70	2.03	1.32
A-8	0.9	*	*	*	*
A-9	0.9	18.46	19.38	1.98	32.83
A-10	0.9	3.96	19.06	1.99	7.10
A-11	0.9	6.23	20.29	1.94	10.86
A-12	0.9	9.01	21.33	1.89	15.35
Total	0.9	56.32	21.33		109.81
B	0.9	6.84	9.96	2.66	8.08
B-1	0.9	0.95	10.10	2.65	2.26
B-2	0.9	2.48	12.71	2.39	5.33
B-3	0.9	8.02	14.25	2.27	16.38
B-4	0.9	1.96	14.75	2.23	3.94
B-5	0.9	0.39	15.28	2.20	0.77
B-6	0.9	6.86	16.05	2.15	13.28

B-7	0.9	5.41	17.08	2.09	10.18
Total	0.9	32.91	17.08		60.22
Computed Confluence Total:		89.10	22.02		171.31

*A-8 and A-9 values combined and shown in row A-9

The proposed project will reduce runoff below existing conditions as discussed in Section 4.1.

3 HYDRAULIC ANALYSIS

3.1 STORM DRAIN SIZE

During the preliminary phase of the project, storm drains are sized within the software program AES. During final engineering, detailed hydraulic analyses will be performed for the proposed final storm drain alignments.

4 RESULTS

4.1 DRAINAGE IMPROVEMENTS

Hydrology and hydraulic analyses were performed for the preliminary site layout. Drainage improvements include inlets, and storm drain. The proposed drainage facilities will be designed to adequately convey the 100-year flow rates. In a 100-year storm event, existing drainage patterns convey 185.18 cfs at the discharge connection point in Memorial Way. Proposed conditions will reduce runoff from the site and a peak flow of 171.31 cfs will be discharged through existing infrastructure at Memorial Way.

4.2 CEQA

- The proposed project will discharge runoff at existing locations and runoff rates.
- The proposed improvements will have no negative impacts to any adjacent properties.
- The proposed project is subject to the requirements as set forth in the general permit.
- The project is subject to Regional Board Order No. R9-2013-0001 as amended by Order No. R9-2015-0001 and Order No. R9-2015-0100

EXISTING CONDITIONS DRAINAGE EXHIBIT
MORENO VALLEY MALL
MORENO VALLEY, CALIFORNIA

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LEGEND

⊗⊗ / ⊗⊗	DMA ID / DMA ACREAGE

DMA BOUNDARY
SUB BASIN BOUNDARY
FLOW PATH
FLOW DIRECTION
EXISTING STORM DRAIN
PROPERTY LINE
ROAD CENTERLINE

MORENO VALLEY FREEWAY

EXST. 66" RCP STORM PIPE
EXST. 48" RCP STORM PIPE
EXST. 66" RCP STORM PIPE
EXST. 54" RCP STORM PIPE
EXST. 48" RCP STORM PIPE
EXST. 72" RCP STORM PIPE
EXST. 60" RCP STORM PIPE
EXST. 54" RCP STORM PIPE

TOWN CIRCLE
CAMPUS PKWY
CENTERPOINT DRIVE
HERITAGE WAY
MEMORIAL WAY

EXISTING MALL

CONFLUENCE OF OFFSITE FLOWS
(NOT INCLUDE IN Q VALUES)

112 / 209
ONSITE FLOWS ONLY
EX Q10 = 111.71 CFS
EX Q100 = 185.18 CFS

NORTH

GRAPHIC SCALE IN FEET
0   50   100   200

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LEGEND

- DMA ID
- DMA ACREAGE

—— —— ——	DMA BOUNDARY
—— —— ——	SUB BASIN BOUNDARY
—·—·—	FLOW PATH
→	FLOW DIRECTION
(XXXX)	EXISTING ELEVATION
XXXX	PROPOSED ELEVATION
——	EXISTING STORM DRAIN
——	PROPOSED STORM DRAIN
—— ——	PROPERTY LINE
—·—·—	ROAD CENTERLINE

MORENO VALLEY FREEWAY

TOWN CIRCLE

EXISTING MALL

CENTERPOINT DRIVE

TOWN CIRCLE

HERITAGE WAY

CAMPUS PKWY

MEMORIAL WAY

TOWN CIRCLE

CONFLUENCE OF OFFSITE FLOWS
(NOT INCLUDE IN Q VALUES)

112 / 211
ONSITE FLOWS ONLY
PR Q10 = 103.10 CFS
PR Q100 = 171.31 CFS

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PROPOSED CONDITIONS DRAINAGE EXHIBIT
MORENO VALLEY MALL
MORENO VALLEY, CALIFORNIA

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APPENDICES

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APPENDIX A

HYDROLOGY EXCERPTS

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HYDROLOGIC SOILS GROUP MAP

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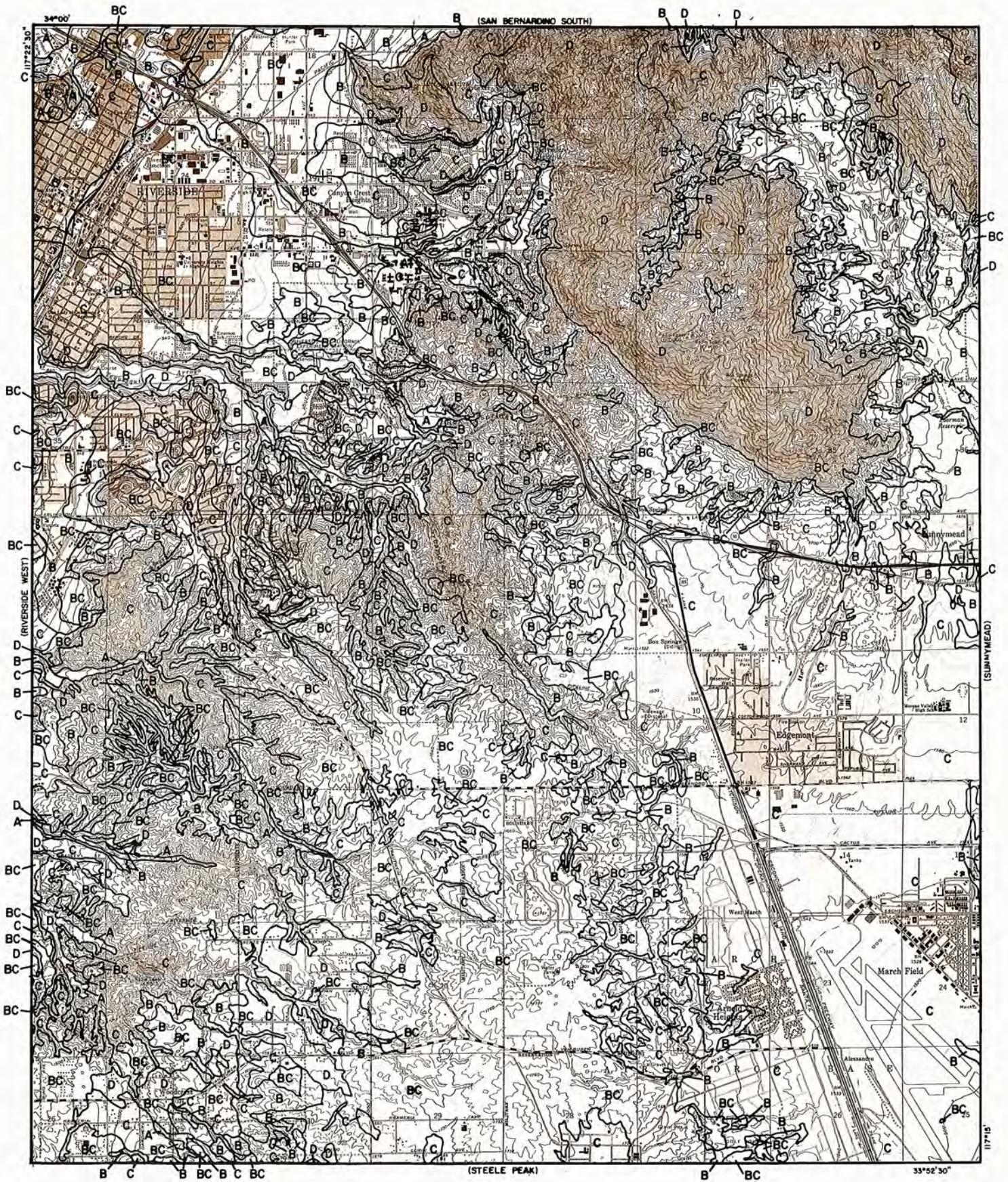
RIVERSIDE—EAST

LEGEND

—— SOILS GROUP BOUNDARY
A SOILS GROUP DESIGNATION

RCFC & WCD
HYDROLOGY MANUAL

0 FEET 5000

PLATE C-1.16

RAINFALL INTENSITY—INCHES PER HOUR

	SUNNYMEAD – MORENO			WOODCREST	
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR
5	2.84	4.16	5	3.37	5.30
6	2.59	3.79	6	3.05	4.79
7	2.40	3.51	7	2.80	4.40
8	2.25	3.29	8	2.60	4.09
9	2.12	3.10	9	2.44	3.83
10	2.01	2.94	10	2.30	3.62
11	1.92	2.80	11	2.19	3.43
12	1.83	2.68	12	2.08	3.27
13	1.76	2.58	13	1.99	3.13
14	1.70	2.48	14	1.91	3.01
15	1.64	2.40	15	1.84	2.89
16	1.59	2.32	16	1.78	2.79
17	1.54	2.25	17	1.72	2.70
18	1.50	2.19	18	1.67	2.62
19	1.46	2.13	19	1.62	2.54
20	1.42	2.08	20	1.57	2.47
22	1.35	1.98	22	1.49	2.34
24	1.30	1.90	24	1.42	2.23
26	1.25	1.82	26	1.36	2.14
28	1.20	1.76	28	1.31	2.05
30	1.16	1.70	30	1.26	1.98
32	1.12	1.64	32	1.22	1.91
34	1.09	1.59	34	1.18	1.85
36	1.06	1.55	36	1.14	1.79
38	1.03	1.51	38	1.11	1.74
40	1.00	1.47	40	1.07	1.69
45	.95	1.39	45	1.01	1.58
50	.90	1.31	50	.95	1.49
55	.86	1.25	55	.90	1.42
60	.82	1.20	60	.86	1.35
65	.79	1.15	65	.82	1.29
70	.76	1.11	70	.79	1.24
75	.73	1.07	75	.76	1.19
80	.71	1.04	80	.73	1.15
85	.69	1.01	85	.71	1.11

SLOPE = .500   SLOPE = .550

STANDARD
INTENSITY—DURATION
CURVES DATA

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

RCFC & WCD
HYDROLOGY MANUAL

IMPERVIOUS COVER
FOR
DEVELOPED AREAS

RUNOFF COEFFICIENT CURVE DATA

The data in the following tables may be used to develop runoff coefficient (C) curves for any combination of runoff index (RI) number and antecedent mositure condition (AMC). For an RI number with an AMC of II (from Plate D-5.5) enter the tables on the following pages and plot the "C" curve data directly on Plate D-5.8. "C" curve data is given for even RI numbers only, but values may easily be interpolated for odd RI numbers.

For an AMC of I or III enter the tabulation on this page with the RI for AMC II, and read the appropriate RI for AMC I or III. Use this revised RI to enter the tables on the following pages to determine "C". For example if RI = 40 for AMC II, then RI = 22 for AMC I and RI = 60 for AMC III.

AMC ADJUSTMENT RELATIONSHIPS

RI FOR AMC II	RI FOR OTHER AMC CONDITIONS: AMC I	RI FOR OTHER AMC CONDITIONS: AMC III	RI FOR AMC II	RI FOR OTHER AMC CONDITIONS: AMC I	RI FOR OTHER AMC CONDITIONS: AMC III
10	--	22	55	35	74
11	--	24	56	36	75
12	--	25	57	37	75
13	--	27	58	38	76
14	--	28	59	39	77
15	--	30	60	40	78
16	--	31	61	41	78
17	--	33	62	42	79
18	--	34	63	43	80
19	--	36	64	44	81
20	--	37	65	45	82
21	10	38	66	46	82
22	10	39	67	47	83
23	11	41	68	48	84
24	11	42	69	50	84
25	12	43	70	51	85
26	12	44	71	52	86
27	13	46	72	53	86
28	14	47	73	54	87
29	14	49	74	55	88
30	15	50	75	57	88
31	16	51	76	58	89
32	16	52	77	59	89
33	17	53	78	60	90
34	18	54	79	62	91
35	18	55	80	63	91
36	19	56	81	64	92
37	20	57	82	66	92
38	21	58	83	67	93
39	21	59	84	68	93
40	22	60	85	70	94
41	23	61	86	72	94
42	24	62	87	73	95
43	25	63	88	75	95
44	25	64	89	76	96
45	26	65	90	78	96
46	27	66	91	80	97
47	28	67	92	81	97
48	29	68	93	83	98
49	30	69	94	85	98
50	31	70	95	87	98
51	31	70	96	89	99
52	32	71	97	91	99
53	33	72	98	94	99
54	34	73	99	97	--

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF COEFFICIENT
CURVE DATA

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
NATURAL COVERS –					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs – buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS –					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS –					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREAS

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
AGRICULTURAL COVERS (cont.) –					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)		See Note 4			
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops – tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.

2. Quality of cover definitions:
     Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.
     Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.
     Good-Heavy or dense cover with more than 75 percent of the ground surface protected.

3. See Plate C-2 for a detailed description of cover types.

4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.

5. Reference Bibliography item 17.

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREAS

APPENDIX B

EXISTING RATIONAL METHOD

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                RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
              RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                        (RCFC&WCD)  1978 HYDROLOGY MANUAL
                  (c) Copyright 1982-2011 Advanced Engineering Software (aes)
                            (Rational Tabling Version 18.0)
                        Release Date: 07/01/2011  License ID 1499


                              Analysis prepared by:

                          Kimley-Horn and Associates, Inc.
                                   401 B Street
                                    Suite 600
                                San Diego, CA 92101

      ************************* DESCRIPTION OF STUDY *************************
      * MORENO VALLEY MALL REDEVELOPMENT                                    *
      * EXISTING 10 YEAR
     *                                                                      *
       **********************************************************************


       FILE NAME: MOVAL2.DAT
       TIME/DATE OF STUDY: 07:46 02/17/2022
     --------------------------------------------------------------------------
       USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
     --------------------------------------------------------------------------
       USER SPECIFIED STORM EVENT(YEAR) =  10.00
       SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
       SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
       10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.640
       10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.737
       100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.660
       100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.190
       SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4464123
       SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4489289
       COMPUTED RAINFALL INTENSITY DATA:
       STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.744
       SLOPE OF INTENSITY DURATION CURVE = 0.4464
       SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.900
       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   30.0      20.0     0.018/0.018/0.020   0.67   2.00 0.0313 0.167 0.0150

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


     ***************************************************************************
       FLOW PROCESS FROM NODE   100.00 TO NODE   101.00 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) =   100.00
   UPSTREAM ELEVATION(FEET) =   1612.48
   DOWNSTREAM ELEVATION(FEET) =   1611.80
   ELEVATION DIFFERENCE(FEET) =      0.68
   TC = 0.303*[(  100.00**3)/(     0.68)]**.2 =    5.189
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.220
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA RUNOFF(CFS) =      0.20
   TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS) =       0.20

****************************************************************************
   FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   1611.80  DOWNSTREAM(FEET) =   1607.85
   CHANNEL LENGTH THRU SUBAREA(FEET) =   281.38   CHANNEL SLOPE = 0.0140
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 99.000
   MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.856
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.83
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.83
   AVERAGE FLOW DEPTH(FEET) =   0.12    TRAVEL TIME(MIN.) =   2.56
   Tc(MIN.) =    7.75
   SUBAREA AREA(ACRES) =      3.13      SUBAREA RUNOFF(CFS) =    5.23
   TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       5.43

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.16   FLOW VELOCITY(FEET/SEC.) =   2.21
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    381.38 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE = 81
----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.856
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    3.13   SUBAREA RUNOFF(CFS) =    5.23
   TOTAL AREA(ACRES) =       6.4   TOTAL RUNOFF(CFS) =      10.66
   TC(MIN.) =    7.75

****************************************************************************
   FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE = 31
----------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1602.50  DOWNSTREAM(FEET) = 1602.00
   FLOW LENGTH(FEET) =    51.80   MANNING'S N =  0.013
   DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
   ESTIMATED PIPE DIAMETER(INCH) = 21.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     10.66
   PIPE TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =    7.88
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     433.18 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) = 1602.00  DOWNSTREAM(FEET) = 1598.58
 FLOW LENGTH(FEET) =  397.87   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.52
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       10.66
 PIPE TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =    8.89
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    831.05 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.746
 *USER SPECIFIED(GLOBAL):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 SUBAREA AREA(ACRES) =    8.61   SUBAREA RUNOFF(CFS) =   13.53
 TOTAL AREA(ACRES) =       15.0   TOTAL RUNOFF(CFS) =      24.18
 TC(MIN.) =    8.89

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) = 1598.58  DOWNSTREAM(FEET) = 1597.00
 FLOW LENGTH(FEET) =  502.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.45
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       24.18
 PIPE TRAVEL TIME(MIN.) =   1.54   Tc(MIN.) =   10.43
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =   1333.95 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.625
 *USER SPECIFIED(GLOBAL):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 SUBAREA AREA(ACRES) =    0.52   SUBAREA RUNOFF(CFS) =    0.76
 TOTAL AREA(ACRES) =       15.5   TOTAL RUNOFF(CFS) =      24.94
 TC(MIN.) =   10.43

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) = 1597.00  DOWNSTREAM(FEET) = 1595.98
 FLOW LENGTH(FEET) =  454.12   MANNING'S N =  0.013
```

```
   DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.85
   ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      24.94
   PIPE TRAVEL TIME(MIN.) =   1.56    Tc(MIN.) =   11.99
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =   1788.07 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
 -----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =============================================================================
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.527
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    4.63   SUBAREA RUNOFF(CFS) =    6.36
   TOTAL AREA(ACRES) =       20.1   TOTAL RUNOFF(CFS) =      31.31
   TC(MIN.) =   11.99

 *****************************************************************************
   FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  31
 -----------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =============================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1595.98 DOWNSTREAM(FEET) = 1595.89
   FLOW LENGTH(FEET) =   506.94   MANNING'S N =  0.013
   DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.6 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   1.96
   ESTIMATED PIPE DIAMETER(INCH) = 60.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      31.31
   PIPE TRAVEL TIME(MIN.) =   4.32    Tc(MIN.) =   16.31
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =   2295.01 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
 -----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =============================================================================
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.331
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    2.28
   TOTAL AREA(ACRES) =       22.0   TOTAL RUNOFF(CFS) =      33.59
   TC(MIN.) =   16.31

 *****************************************************************************
   FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  31
 -----------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =============================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1595.89 DOWNSTREAM(FEET) = 1593.80
   FLOW LENGTH(FEET) =   397.71   MANNING'S N =  0.013
   DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.4 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.12
   ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      33.59
   PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   17.24
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =   2692.72 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
```

```
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.299
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    2.82   SUBAREA RUNOFF(CFS) =    3.30
  TOTAL AREA(ACRES) =       24.8   TOTAL RUNOFF(CFS) =      36.88
  TC(MIN.) =   17.24

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1593.80  DOWNSTREAM(FEET) = 1591.60
  FLOW LENGTH(FEET) =    482.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.96
  ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.88
  PIPE TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =   18.40
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =   3175.02 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.262
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =   16.45   SUBAREA RUNOFF(CFS) =   18.68
  TOTAL AREA(ACRES) =       41.3   TOTAL RUNOFF(CFS) =      55.56
  TC(MIN.) =   18.40

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1591.60  DOWNSTREAM(FEET) = 1590.20
  FLOW LENGTH(FEET) =    501.47   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.37
  ESTIMATED PIPE DIAMETER(INCH) = 45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      55.56
  PIPE TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =   19.71
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   3676.49 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.224
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    6.10   SUBAREA RUNOFF(CFS) =    6.72
  TOTAL AREA(ACRES) =       47.4   TOTAL RUNOFF(CFS) =      62.28
  TC(MIN.) =   19.71
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) = 1590.20  DOWNSTREAM(FEET) = 1588.44
 FLOW LENGTH(FEET) =   494.26   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.19
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      62.28
 PIPE TRAVEL TIME(MIN.) =   1.15   Tc(MIN.) =   20.85
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =   4170.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.193
 *USER SPECIFIED(GLOBAL):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 SUBAREA AREA(ACRES) =    9.01   SUBAREA RUNOFF(CFS) =    9.67
 TOTAL AREA(ACRES) =       56.4   TOTAL RUNOFF(CFS) =      71.95
 TC(MIN.) =   20.85

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) = 1588.44  DOWNSTREAM(FEET) = 1586.08
 FLOW LENGTH(FEET) =   410.44   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.80
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      71.95
 PIPE TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =   21.63
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =   4581.19 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   21.63
 RAINFALL INTENSITY(INCH/HR) =   1.17
 TOTAL STREAM AREA(ACRES) =    56.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     71.95

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 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) =   100.00
   UPSTREAM ELEVATION(FEET) =   1612.37
   DOWNSTREAM ELEVATION(FEET) =   1611.24
   ELEVATION DIFFERENCE(FEET) =      1.13
   TC = 0.303*[(  100.00**3)/(     1.13)]**.2 =    4.688
   COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.257
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA RUNOFF(CFS) =      0.20
   TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS) =       0.20

****************************************************************************
   FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   1611.24  DOWNSTREAM(FEET) =   1607.90
   CHANNEL LENGTH THRU SUBAREA(FEET) =   232.00   CHANNEL SLOPE = 0.0144
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 99.000
   MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.932
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.95
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.85
   AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   2.09
   Tc(MIN.) =    7.09
   SUBAREA AREA(ACRES) =      3.14     SUBAREA RUNOFF(CFS) =    5.46
   TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =      5.66

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.16   FLOW VELOCITY(FEET/SEC.) =  2.15
   LONGEST FLOWPATH FROM NODE   200.00 TO NODE   202.00 =    332.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE = 81
--------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.932
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    3.14   SUBAREA RUNOFF(CFS) =    5.46
   TOTAL AREA(ACRES) =       6.4   TOTAL RUNOFF(CFS) =      11.12
   TC(MIN.) =    7.09

****************************************************************************
   FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE = 31
--------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1601.75  DOWNSTREAM(FEET) = 1601.50
   FLOW LENGTH(FEET) =   247.00   MANNING'S N = 0.013
   DEPTH OF FLOW IN  30.0 INCH PIPE IS 21.7 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   2.92
   ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      11.12
   PIPE TRAVEL TIME(MIN.) =  1.41   Tc(MIN.) =    8.50
   LONGEST FLOWPATH FROM NODE   200.00 TO NODE   203.00 =    579.00 FEET.
```

```
**************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1601.50  DOWNSTREAM(FEET) = 1598.78
  FLOW LENGTH(FEET) = 1147.74   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.06
  ESTIMATED PIPE DIAMETER(INCH) = 27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       11.12
  PIPE TRAVEL TIME(MIN.) =   4.71    Tc(MIN.) =   13.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =    1726.74 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.463
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =   11.72   SUBAREA RUNOFF(CFS) =   15.43
  TOTAL AREA(ACRES) =       18.1   TOTAL RUNOFF(CFS) =       26.55
  TC(MIN.) =   13.21

**************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1598.78  DOWNSTREAM(FEET) = 1597.90
  FLOW LENGTH(FEET) =   206.68   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.28
  ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       26.55
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   13.75
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1933.42 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.437
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    1.96   SUBAREA RUNOFF(CFS) =    2.53
  TOTAL AREA(ACRES) =       20.1   TOTAL RUNOFF(CFS) =       29.09
  TC(MIN.) =   13.75

**************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1597.90  DOWNSTREAM(FEET) = 1596.70
  FLOW LENGTH(FEET) =   237.58   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.2 INCHES
```

```
     PIPE-FLOW VELOCITY(FEET/SEC.) =    6.84
     ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES =   1
     PIPE-FLOW(CFS) =       29.09
     PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   14.33
     LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =   2171.00 FEET.

 **************************************************************************
   FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE = 81
 --------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ==========================================================================
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.411
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    0.48
   TOTAL AREA(ACRES) =       20.4   TOTAL RUNOFF(CFS) =       29.57
   TC(MIN.) =   14.33

 **************************************************************************
   FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE = 31
 --------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1596.70  DOWNSTREAM(FEET) = 1594.00
   FLOW LENGTH(FEET) =   393.08   MANNING'S N = 0.013
   DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.1 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =    7.63
   ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       29.57
   PIPE TRAVEL TIME(MIN.) =   0.86    Tc(MIN.) =   15.19
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.00 =   2564.08 FEET.

 **************************************************************************
   FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE = 81
 --------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ==========================================================================

     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.374
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    6.86   SUBAREA RUNOFF(CFS) =    8.49
   TOTAL AREA(ACRES) =       27.3   TOTAL RUNOFF(CFS) =       38.05
   TC(MIN.) =   15.19

 **************************************************************************
   FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE = 31
 --------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1594.00  DOWNSTREAM(FEET) = 1590.45
   FLOW LENGTH(FEET) =   548.29   MANNING'S N = 0.013
   DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =    7.92
   ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       38.05
   PIPE TRAVEL TIME(MIN.) =   1.15    Tc(MIN.) =   16.35
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    208.00 =   3112.37 FEET.

 **************************************************************************
   FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 IS CODE = 81
```

```
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.330
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    5.41   SUBAREA RUNOFF(CFS) =    6.48
  TOTAL AREA(ACRES) =        32.7   TOTAL RUNOFF(CFS) =       44.53
  TC(MIN.) =   16.35

********************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    209.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1590.45  DOWNSTREAM(FEET) = 1586.08
  FLOW LENGTH(FEET) =   292.02   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.29
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      44.53
  PIPE TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =   16.78
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    209.00 =   3404.39 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.78
  RAINFALL INTENSITY(INCH/HR) =   1.31
  TOTAL STREAM AREA(ACRES) =    32.71
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     44.53

  ** CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1        71.95     21.63        1.174        56.40
     2        44.53     16.78        1.315        32.71

 *********************************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       100.33     16.78        1.315
     2       111.71     21.63        1.174

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      111.71   Tc(MIN.) =   21.63
  TOTAL AREA(ACRES) =         89.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    209.00 =   4581.19 FEET.
```

```
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        89.1  TC(MIN.) =      21.63
  PEAK FLOW RATE(CFS)    =      111.71
==========================================================================
==========================================================================
  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 1982-2011 Advanced Engineering Software (aes)
                         (Rational Tabling Version 18.0)
                    Release Date: 07/01/2011  License ID 1499


                           Analysis prepared by:

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                              401 B Street
                                Suite 600
                            San Diego, CA 92101

  ************************* DESCRIPTION OF STUDY *************************
 * MORENO VALLEY MALL REDEVELOPMENT                                        *
 * EXISTING 100 YEAR                                                       *
 *                                                                         *
  **************************************************************************


   FILE NAME: MOVAL3.DAT
   TIME/DATE OF STUDY: 09:07 02/17/2022
  -----------------------------------------------------------------------
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
  -----------------------------------------------------------------------
   USER SPECIFIED STORM EVENT(YEAR) =  100.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
   10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.640
   10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.737
   100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.660
   100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.190
   SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4464123
   SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4489289
   COMPUTED RAINFALL INTENSITY DATA:
   STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.190
   SLOPE OF INTENSITY DURATION CURVE = 0.4489
   SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.900
   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  30.0    20.0    0.018/0.018/0.020   0.67   2.00 0.0313 0.167 0.0150

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


   **************************************************************************
   FLOW PROCESS FROM NODE   100.00 TO NODE   101.00 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) =   100.00
   UPSTREAM ELEVATION(FEET) =   1612.48
   DOWNSTREAM ELEVATION(FEET) =   1611.80
   ELEVATION DIFFERENCE(FEET) =      0.68
   TC = 0.303*[(  100.00**3)/(      0.68)]**.2 =    5.189
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.571
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA RUNOFF(CFS) =       0.32
   TOTAL AREA(ACRES) =        0.10   TOTAL RUNOFF(CFS) =       0.32

****************************************************************************
   FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   1611.80  DOWNSTREAM(FEET) =   1607.85
   CHANNEL LENGTH THRU SUBAREA(FEET) =   281.38   CHANNEL SLOPE = 0.0140
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR = 99.000
   MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.038
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        4.63
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.08
   AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   2.25
   Tc(MIN.) =    7.44
   SUBAREA AREA(ACRES) =       3.13      SUBAREA RUNOFF(CFS) =    8.56
   TOTAL AREA(ACRES) =         3.2        PEAK FLOW RATE(CFS) =       8.88

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.19   FLOW VELOCITY(FEET/SEC.) =   2.39
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    381.38 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE = 81
----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.038
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =     3.13   SUBAREA RUNOFF(CFS) =    8.56
   TOTAL AREA(ACRES) =        6.4   TOTAL RUNOFF(CFS) =       17.44
   TC(MIN.) =    7.44

****************************************************************************
   FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE = 31
----------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1602.50  DOWNSTREAM(FEET) = 1602.00
   FLOW LENGTH(FEET) =    51.80   MANNING'S N = 0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.67
   ESTIMATED PIPE DIAMETER(INCH) = 24.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      17.44
   PIPE TRAVEL TIME(MIN.) =  0.11   Tc(MIN.) =    7.55
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    433.18 FEET.
```

```
*****************************************************************************
   FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
  ---------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =  1602.00  DOWNSTREAM(FEET) = 1598.58
   FLOW LENGTH(FEET) =   397.87   MANNING'S N =  0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.31
   ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      17.44
   PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =    8.46
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    831.05 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
  ---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
  ===========================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.868
    *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    8.61   SUBAREA RUNOFF(CFS) =   22.22
   TOTAL AREA(ACRES) =       15.0   TOTAL RUNOFF(CFS) =       39.66
   TC(MIN.) =    8.46

*****************************************************************************
   FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
  ---------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =  1598.58  DOWNSTREAM(FEET) =  1597.00
   FLOW LENGTH(FEET) =   502.90   MANNING'S N =  0.013
   DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.4 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
   ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      39.66
   PIPE TRAVEL TIME(MIN.) =   1.37    Tc(MIN.) =    9.82
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =   1333.95 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
  ---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
  ===========================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.681
    *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    0.52   SUBAREA RUNOFF(CFS) =    1.25
   TOTAL AREA(ACRES) =       15.5   TOTAL RUNOFF(CFS) =       40.91
   TC(MIN.) =    9.82

*****************************************************************************
   FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
  ---------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =  1597.00  DOWNSTREAM(FEET) = 1595.98
   FLOW LENGTH(FEET) =   454.12   MANNING'S N =  0.013
```

```
   DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.6 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.45
   ESTIMATED PIPE DIAMETER(INCH) = 42.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      40.91
   PIPE TRAVEL TIME(MIN.) =   1.39   Tc(MIN.) =   11.21
   LONGEST FLOWPATH FROM NODE   100.00 TO NODE   106.00 =   1788.07 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE   106.00 TO NODE   106.00 IS CODE =  81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.527
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    4.63   SUBAREA RUNOFF(CFS) =   10.53
  TOTAL AREA(ACRES) =       20.1   TOTAL RUNOFF(CFS) =      51.44
  TC(MIN.) =   11.21

******************************************************************************
   FLOW PROCESS FROM NODE   106.00 TO NODE   107.00 IS CODE =  31
------------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1595.98 DOWNSTREAM(FEET) = 1595.89
   FLOW LENGTH(FEET) =   506.94   MANNING'S N =  0.013
   DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   2.21
   ESTIMATED PIPE DIAMETER(INCH) = 72.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      51.44
   PIPE TRAVEL TIME(MIN.) =   3.82   Tc(MIN.) =   15.04
   LONGEST FLOWPATH FROM NODE   100.00 TO NODE   107.00 =   2295.01 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE   107.00 TO NODE   107.00 IS CODE =  81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.215
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    3.79
  TOTAL AREA(ACRES) =       22.0   TOTAL RUNOFF(CFS) =      55.23
  TC(MIN.) =   15.04

******************************************************************************
   FLOW PROCESS FROM NODE   107.00 TO NODE   108.00 IS CODE =  31
------------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1595.89 DOWNSTREAM(FEET) = 1593.80
   FLOW LENGTH(FEET) =   397.71   MANNING'S N =  0.013
   DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   8.00
   ESTIMATED PIPE DIAMETER(INCH) = 39.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      55.23
   PIPE TRAVEL TIME(MIN.) =   0.83   Tc(MIN.) =   15.86
   LONGEST FLOWPATH FROM NODE   100.00 TO NODE   108.00 =   2692.72 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE   108.00 TO NODE   108.00 IS CODE =  81
```

```
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.162
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    2.82   SUBAREA RUNOFF(CFS) =    5.49
  TOTAL AREA(ACRES) =       24.8   TOTAL RUNOFF(CFS) =      60.72
  TC(MIN.) =   15.86

*******************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1593.80  DOWNSTREAM(FEET) =  1591.60
  FLOW LENGTH(FEET) =   482.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.72
  PIPE TRAVEL TIME(MIN.) =   1.03   Tc(MIN.) =   16.89
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =   3175.02 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.102
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =   16.45   SUBAREA RUNOFF(CFS) =   31.12
  TOTAL AREA(ACRES) =       41.3   TOTAL RUNOFF(CFS) =      91.84
  TC(MIN.) =   16.89

*******************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1591.60  DOWNSTREAM(FEET) =  1590.20
  FLOW LENGTH(FEET) =   501.47   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.21
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      91.84
  PIPE TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =   18.05
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   3676.49 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.040
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    6.10   SUBAREA RUNOFF(CFS) =   11.20
  TOTAL AREA(ACRES) =       47.4   TOTAL RUNOFF(CFS) =     103.04
  TC(MIN.) =   18.05
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1590.20  DOWNSTREAM(FEET) = 1588.44
  FLOW LENGTH(FEET) =   494.26   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.14
  ESTIMATED PIPE DIAMETER(INCH) = 54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     103.04
  PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =   19.07
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =   4170.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.991
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    9.01   SUBAREA RUNOFF(CFS) =   16.15
  TOTAL AREA(ACRES) =       56.4   TOTAL RUNOFF(CFS) =     119.18
  TC(MIN.) =   19.07

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1588.44  DOWNSTREAM(FEET) = 1586.08
  FLOW LENGTH(FEET) =    410.44   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.01
  ESTIMATED PIPE DIAMETER(INCH) = 51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     119.18
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   19.75
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =   4581.19 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.75
  RAINFALL INTENSITY(INCH/HR) =   1.96
  TOTAL STREAM AREA(ACRES) =    56.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    119.18

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 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) =    100.00
    UPSTREAM ELEVATION(FEET) =    1612.37
    DOWNSTREAM ELEVATION(FEET) =   1611.24
    ELEVATION DIFFERENCE(FEET) =      1.13
    TC = 0.303*[(  100.00**3)/(     1.13)]**.2 =    4.688
    COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.631
    *USER SPECIFIED(GLOBAL):
    COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
    SUBAREA RUNOFF(CFS) =        0.33
    TOTAL AREA(ACRES) =        0.10   TOTAL RUNOFF(CFS) =        0.33

******************************************************************************
   FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    1611.24  DOWNSTREAM(FEET) =    1607.90
   CHANNEL LENGTH THRU SUBAREA(FEET) =    232.00   CHANNEL SLOPE = 0.0144
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR = 99.000
   MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    0.50
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.166
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.17
   AVERAGE FLOW DEPTH(FEET) =    0.15   TRAVEL TIME(MIN.) =    1.78
   Tc(MIN.) =     6.78
   SUBAREA AREA(ACRES) =      3.14       SUBAREA RUNOFF(CFS) =    8.95
   TOTAL AREA(ACRES) =         3.2       PEAK FLOW RATE(CFS) =       9.28

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.19    FLOW VELOCITY(FEET/SEC.) =   2.50
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    332.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE = 81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.166
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =     3.14    SUBAREA RUNOFF(CFS) =     8.95
   TOTAL AREA(ACRES) =        6.4    TOTAL RUNOFF(CFS) =       18.22
   TC(MIN.) =     6.78

******************************************************************************
   FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE = 31
------------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1601.75  DOWNSTREAM(FEET) = 1601.50
   FLOW LENGTH(FEET) =    247.00   MANNING'S N = 0.013
   DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =    3.30
   ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      18.22
   PIPE TRAVEL TIME(MIN.) =  1.25   Tc(MIN.) =    8.03
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =    579.00 FEET.
```

```
*****************************************************************************
   FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  31
-----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1601.50  DOWNSTREAM(FEET) = 1598.78
  FLOW LENGTH(FEET) = 1147.74   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.51
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.22
  PIPE TRAVEL TIME(MIN.) =   4.25   Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =    1726.74 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
-----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.426
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =   11.72   SUBAREA RUNOFF(CFS) =   25.59
  TOTAL AREA(ACRES) =       18.1   TOTAL RUNOFF(CFS) =       43.82
  TC(MIN.) =   12.27

*****************************************************************************
   FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  31
-----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1598.78  DOWNSTREAM(FEET) = 1597.90
  FLOW LENGTH(FEET) =   206.68   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.08
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.82
  PIPE TRAVEL TIME(MIN.) =   0.49   Tc(MIN.) =   12.76
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1933.42 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
-----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.384
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    1.96   SUBAREA RUNOFF(CFS) =    4.21
  TOTAL AREA(ACRES) =       20.1   TOTAL RUNOFF(CFS) =       48.02
  TC(MIN.) =   12.76

*****************************************************************************
   FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  31
-----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1597.90  DOWNSTREAM(FEET) = 1596.70
  FLOW LENGTH(FEET) =   237.58   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.4 INCHES
```

```
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.72
   ESTIMATED PIPE DIAMETER(INCH) = 39.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      48.02
   PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   13.27
   LONGEST FLOWPATH FROM NODE   200.00 TO NODE   206.00 =   2171.00 FEET.

 ****************************************************************************
   FLOW PROCESS FROM NODE   206.00 TO NODE   206.00 IS CODE = 81
 ---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ===========================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.342
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    0.80
   TOTAL AREA(ACRES) =       20.4   TOTAL RUNOFF(CFS) =      48.82
   TC(MIN.) =   13.27

 ****************************************************************************
   FLOW PROCESS FROM NODE   206.00 TO NODE   207.00 IS CODE = 31
 ---------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1596.70  DOWNSTREAM(FEET) = 1594.00
   FLOW LENGTH(FEET) =   393.08   MANNING'S N =  0.013
   DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   8.63
   ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      48.82
   PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   14.03
   LONGEST FLOWPATH FROM NODE   200.00 TO NODE   207.00 =   2564.08 FEET.

 ****************************************************************************
   FLOW PROCESS FROM NODE   207.00 TO NODE   207.00 IS CODE = 81
 ---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ===========================================================================

    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.285
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    6.86   SUBAREA RUNOFF(CFS) =   14.11
   TOTAL AREA(ACRES) =       27.3   TOTAL RUNOFF(CFS) =      62.93
   TC(MIN.) =   14.03

 ****************************************************************************
   FLOW PROCESS FROM NODE   207.00 TO NODE   208.00 IS CODE = 31
 ---------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1594.00  DOWNSTREAM(FEET) = 1590.45
   FLOW LENGTH(FEET) =   548.29   MANNING'S N =  0.013
   DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   8.90
   ESTIMATED PIPE DIAMETER(INCH) = 39.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      62.93
   PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =   15.06
   LONGEST FLOWPATH FROM NODE   200.00 TO NODE   208.00 =   3112.37 FEET.

 ****************************************************************************
   FLOW PROCESS FROM NODE   208.00 TO NODE   208.00 IS CODE = 81
```

```
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.213
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    5.41   SUBAREA RUNOFF(CFS) =   10.78
  TOTAL AREA(ACRES) =        32.7   TOTAL RUNOFF(CFS) =      73.71
  TC(MIN.) =   15.06

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE     209.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1590.45  DOWNSTREAM(FEET) = 1586.08
  FLOW LENGTH(FEET) =   292.02   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) = 12.78
  ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      73.71
  PIPE TRAVEL TIME(MIN.) =   0.38   Tc(MIN.) =   15.44
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    209.00 =   3404.39 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE     209.00 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.) =   15.44
  RAINFALL INTENSITY(INCH/HR) =   2.19
  TOTAL STREAM AREA(ACRES) =    32.71
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      73.71

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY      AREA
  NUMBER     (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1      119.18    19.75       1.960         56.40
     2       73.71    15.44       2.189         32.71

 ********************************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      166.89    15.44       2.189
     2      185.18    19.75       1.960

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      185.18  Tc(MIN.) =   19.75
  TOTAL AREA(ACRES) =        89.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    209.00 =   4581.19 FEET.
```

```
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        89.1  TC(MIN.) =      19.75
  PEAK FLOW RATE(CFS)    =      185.18
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX C

PROPOSED RATIONAL METHOD

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```
_____
 *****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
            RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
             (c) Copyright 1982-2011 Advanced Engineering Software (aes)
                          (Rational Tabling Version 18.0)
                    Release Date: 07/01/2011  License ID 1499

                              Analysis prepared by:

                        Kimley-Horn and Associates, Inc.
                                   401 B Street
                                    Suite 600
                                San Diego, CA 92101

 ************************** DESCRIPTION OF STUDY **************************
 * MORENO VALLEY MALL REDEVELOPMENT                                          *
 * PROPOSED 10 YEAR                                                          *
 *                                                                          *
 ************************************************************************

   FILE NAME: MOVAL4.DAT
   TIME/DATE OF STUDY: 09:37 02/17/2022
 -----------------------------------------------------------------------------
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 -----------------------------------------------------------------------------
   USER SPECIFIED STORM EVENT(YEAR) =  10.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
   10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.640
   10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.737
   100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.660
   100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.190
   SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4464123
   SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4489289
   COMPUTED RAINFALL INTENSITY DATA:
   STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.744
   SLOPE OF INTENSITY DURATION CURVE = 0.4464
   SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.900
   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   30.0     20.0     0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

 *****************************************************************************
   FLOW PROCESS FROM NODE    97.00 TO NODE    98.00 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) =   100.00
   UPSTREAM ELEVATION(FEET) =   1636.67
   DOWNSTREAM ELEVATION(FEET) =   1633.33
   ELEVATION DIFFERENCE(FEET) =      3.34
   TC = 0.303*[(  100.00**3)/(     3.34)]**.2 =    3.774
   COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.257
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA RUNOFF(CFS) =       0.20
   TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS) =       0.20

***************************************************************************
   FLOW PROCESS FROM NODE     98.00 TO NODE     99.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   1633.33  DOWNSTREAM(FEET) =   1607.27
   CHANNEL LENGTH THRU SUBAREA(FEET) =   737.50   CHANNEL SLOPE = 0.0353
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 99.000
   MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.518
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.54
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.72
   AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   7.15
   Tc(MIN.) =   12.15
   SUBAREA AREA(ACRES) =       0.49      SUBAREA RUNOFF(CFS) =   0.67
   TOTAL AREA(ACRES) =         0.6         PEAK FLOW RATE(CFS) =       0.87

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.07   FLOW VELOCITY(FEET/SEC.) =   2.04
   LONGEST FLOWPATH FROM NODE     97.00 TO NODE     99.00 =    837.50 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE     99.00 TO NODE     99.00 IS CODE = 81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.518
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    0.49   SUBAREA RUNOFF(CFS) =   0.67
   TOTAL AREA(ACRES) =        1.1   TOTAL RUNOFF(CFS) =       1.54
   TC(MIN.) =   12.15

***************************************************************************
   FLOW PROCESS FROM NODE     99.00 TO NODE    103.00 IS CODE = 31
---------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =  1603.27  DOWNSTREAM(FEET) =  1601.49
   FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
   DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.81
   ESTIMATED PIPE DIAMETER(INCH) = 12.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =        1.54
   PIPE TRAVEL TIME(MIN.) =   0.12   Tc(MIN.) =   12.27
```

```
   LONGEST FLOWPATH FROM NODE     97.00 TO NODE    103.00 =     887.50 FEET.


*****************************************************************************
   FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 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.) =   12.27
   RAINFALL INTENSITY(INCH/HR) =   1.51
   TOTAL STREAM AREA(ACRES) =      1.08
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.54


*****************************************************************************
   FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 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) =   100.00
   UPSTREAM ELEVATION(FEET) =    1612.71
   DOWNSTREAM ELEVATION(FEET) =   1611.93
   ELEVATION DIFFERENCE(FEET) =      0.78
   TC = 0.303*[(  100.00**3)/(      0.78)]**.2 =    5.049
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.247
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA RUNOFF(CFS) =       0.20
   TOTAL AREA(ACRES) =       0.10    TOTAL RUNOFF(CFS) =       0.20


*****************************************************************************
   FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =   51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   1611.93 DOWNSTREAM(FEET) =   1609.90
   CHANNEL LENGTH THRU SUBAREA(FEET) =   384.69   CHANNEL SLOPE =  0.0053
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 99.000
   MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.657
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.59
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.30
   AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   4.94
   Tc(MIN.) =    9.99
   SUBAREA AREA(ACRES) =      3.16        SUBAREA RUNOFF(CFS) =    4.71
   TOTAL AREA(ACRES) =         3.3        PEAK FLOW RATE(CFS) =       4.91

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.19   FLOW VELOCITY(FEET/SEC.) =  1.44
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    484.69 FEET.


*****************************************************************************
   FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =   81
-----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.657
```

```
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    3.16   SUBAREA RUNOFF(CFS) =    4.71
  TOTAL AREA(ACRES) =       6.4   TOTAL RUNOFF(CFS) =       9.63
  TC(MIN.) =    9.99

**************************************************************************
  FLOW PROCESS FROM NODE   102.00 TO NODE    103.00 IS CODE = 31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1604.90  DOWNSTREAM(FEET) = 1601.49
  FLOW LENGTH(FEET) =    27.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) = 17.25
  ESTIMATED PIPE DIAMETER(INCH) = 12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.63
  PIPE TRAVEL TIME(MIN.) =  0.03   Tc(MIN.) =   10.02
  LONGEST FLOWPATH FROM NODE   100.00 TO NODE   103.00 =    512.19 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   103.00 TO NODE    103.00 IS CODE =  1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.02
  RAINFALL INTENSITY(INCH/HR) =  1.66
  TOTAL STREAM AREA(ACRES) =      6.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.63

  ** CONFLUENCE DATA **
  STREAM      RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.54     12.27       1.512         1.08
     2        9.63     10.02       1.655         6.42

 *******************************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       10.89     10.02       1.655
     2       10.34     12.27       1.512

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.89   Tc(MIN.) =   10.02
  TOTAL AREA(ACRES) =        7.5
  LONGEST FLOWPATH FROM NODE    97.00 TO NODE   103.00 =    887.50 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   103.00 TO NODE    104.00 IS CODE = 31
--------------------------------------------------------------------------
```

```
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) = 1601.49  DOWNSTREAM(FEET) = 1598.58
 FLOW LENGTH(FEET) =   305.34   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.82
 ESTIMATED PIPE DIAMETER(INCH) = 21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       10.89
 PIPE TRAVEL TIME(MIN.) =   0.75   Tc(MIN.) =   10.76
 LONGEST FLOWPATH FROM NODE     97.00 TO NODE    104.00 =   1192.84 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE = 81
--------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.603
 *USER SPECIFIED(GLOBAL):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 SUBAREA AREA(ACRES) =    1.39   SUBAREA RUNOFF(CFS) =    2.01
 TOTAL AREA(ACRES) =        8.9   TOTAL RUNOFF(CFS) =       12.89
 TC(MIN.) =   10.76

*******************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE = 31
--------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) = 1598.58  DOWNSTREAM(FEET) = 1598.11
 FLOW LENGTH(FEET) =   149.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.69
 ESTIMATED PIPE DIAMETER(INCH) = 27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       12.89
 PIPE TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =   11.29
 LONGEST FLOWPATH FROM NODE     97.00 TO NODE    105.00 =   1341.84 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE = 81
--------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.569
 *USER SPECIFIED(GLOBAL):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 SUBAREA AREA(ACRES) =    7.60   SUBAREA RUNOFF(CFS) =   10.73
 TOTAL AREA(ACRES) =       16.5   TOTAL RUNOFF(CFS) =       23.62
 TC(MIN.) =   11.29

*******************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE = 31
--------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) = 1598.11  DOWNSTREAM(FEET) = 1597.00
 FLOW LENGTH(FEET) =   353.89   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.42
 ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       23.62
```

```
   PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =   12.38
   LONGEST FLOWPATH FROM NODE    97.00 TO NODE    106.00 =   1695.73 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.506
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    0.52   SUBAREA RUNOFF(CFS) =    0.70
  TOTAL AREA(ACRES) =       17.0   TOTAL RUNOFF(CFS) =      24.33
  TC(MIN.) =   12.38

***************************************************************************
   FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  31
---------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1597.00  DOWNSTREAM(FEET) = 1595.98
  FLOW LENGTH(FEET) =   454.12   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.69
  ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.33
  PIPE TRAVEL TIME(MIN.) =   1.61    Tc(MIN.) =   14.00
  LONGEST FLOWPATH FROM NODE    97.00 TO NODE    107.00 =   2149.85 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.426
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    0.47   SUBAREA RUNOFF(CFS) =    0.60
  TOTAL AREA(ACRES) =       17.5   TOTAL RUNOFF(CFS) =      24.93
  TC(MIN.) =   14.00

***************************************************************************
   FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  31
---------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1595.98  DOWNSTREAM(FEET) = 1595.89
  FLOW LENGTH(FEET) =   498.74   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.84
  ESTIMATED PIPE DIAMETER(INCH) = 54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.93
  PIPE TRAVEL TIME(MIN.) =   4.51    Tc(MIN.) =   18.50
  LONGEST FLOWPATH FROM NODE    97.00 TO NODE    108.00 =   2648.59 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.259
```

```
 *USER SPECIFIED(GLOBAL):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 SUBAREA AREA(ACRES) =    0.47   SUBAREA RUNOFF(CFS) =    0.53
 TOTAL AREA(ACRES) =       17.9   TOTAL RUNOFF(CFS) =       25.46
 TC(MIN.) =   18.50

 *****************************************************************************
   FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE = 31
 -----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =============================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1595.89  DOWNSTREAM(FEET) = 1593.80
  FLOW LENGTH(FEET) =   506.94   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.4 INCHES

  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
  ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       25.46
  PIPE TRAVEL TIME(MIN.) =   1.42   Tc(MIN.) =   19.92
  LONGEST FLOWPATH FROM NODE      97.00 TO NODE    109.00 =   3155.53 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE = 81
 -----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.218
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    0.72   SUBAREA RUNOFF(CFS) =    0.79
  TOTAL AREA(ACRES) =       18.7   TOTAL RUNOFF(CFS) =       26.25
  TC(MIN.) =   19.92

 *****************************************************************************
   FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE = 31
 -----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =============================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1593.80  DOWNSTREAM(FEET) = 1591.60
  FLOW LENGTH(FEET) =   390.78   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.89
  ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       26.25
  PIPE TRAVEL TIME(MIN.) =   0.95   Tc(MIN.) =   20.87
  LONGEST FLOWPATH FROM NODE      97.00 TO NODE    110.00 =   3546.31 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE = 81
 -----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.193
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    3.96   SUBAREA RUNOFF(CFS) =    4.25
  TOTAL AREA(ACRES) =       22.6   TOTAL RUNOFF(CFS) =       30.50
  TC(MIN.) =   20.87

 *****************************************************************************
   FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE = 31
```

```
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1591.60  DOWNSTREAM(FEET) =  1591.27
  FLOW LENGTH(FEET) =   118.33   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.49
  ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       30.50
  PIPE TRAVEL TIME(MIN.) =  0.36    Tc(MIN.) =   21.22
  LONGEST FLOWPATH FROM NODE     97.00 TO NODE    111.00 =    3664.64 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.184
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =   18.46   SUBAREA RUNOFF(CFS) =   19.67
  TOTAL AREA(ACRES) =       41.1   TOTAL RUNOFF(CFS) =       50.17
  TC(MIN.) =   21.22

********************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1591.27  DOWNSTREAM(FEET) =  1590.20
  FLOW LENGTH(FEET) =   380.42   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.16
  ESTIMATED PIPE DIAMETER(INCH) = 42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       50.17
  PIPE TRAVEL TIME(MIN.) =  1.03    Tc(MIN.) =   22.25
  LONGEST FLOWPATH FROM NODE     97.00 TO NODE    112.00 =    4045.06 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.159
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    6.23   SUBAREA RUNOFF(CFS) =    6.50
  TOTAL AREA(ACRES) =       47.3   TOTAL RUNOFF(CFS) =       56.67
  TC(MIN.) =   22.25

********************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1590.20  DOWNSTREAM(FEET) =  1588.44
  FLOW LENGTH(FEET) =   494.26   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.93
  ESTIMATED PIPE DIAMETER(INCH) = 42.00    NUMBER OF PIPES =   1
```

```
   PIPE-FLOW(CFS) =     56.67
   PIPE TRAVEL TIME(MIN.) =   1.19   Tc(MIN.) =   23.44
   LONGEST FLOWPATH FROM NODE     97.00 TO NODE     113.00 =   4539.32 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE = 81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.132
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    9.01   SUBAREA RUNOFF(CFS) =    9.18
   TOTAL AREA(ACRES) =       56.3   TOTAL RUNOFF(CFS) =      65.85
   TC(MIN.) =   23.44

*******************************************************************************
   FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE = 31
-------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1588.44  DOWNSTREAM(FEET) = 1586.08
   FLOW LENGTH(FEET) =    410.44   MANNING'S N = 0.013
   DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.7 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   8.73
   ESTIMATED PIPE DIAMETER(INCH) = 42.00     NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      65.85
   PIPE TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =   24.23
   LONGEST FLOWPATH FROM NODE     97.00 TO NODE     114.00 =   4949.76 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 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.) =   24.23
   RAINFALL INTENSITY(INCH/HR) =   1.12
   TOTAL STREAM AREA(ACRES) =    56.33
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     65.85

*******************************************************************************
   FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 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) =   100.00
   UPSTREAM ELEVATION(FEET) =   1612.17
   DOWNSTREAM ELEVATION(FEET) =   1611.46
   ELEVATION DIFFERENCE(FEET) =      0.71
   TC = 0.303*[(  100.00**3)/(     0.71)]**.2 =   5.144
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.229
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA RUNOFF(CFS) =      0.20
   TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.20


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

```
   FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1611.76  DOWNSTREAM(FEET) =   1608.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =   412.00   CHANNEL SLOPE = 0.0072
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.655
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.41
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   4.87
  Tc(MIN.) =   10.01
  SUBAREA AREA(ACRES) =      3.37       SUBAREA RUNOFF(CFS) =    5.02
  TOTAL AREA(ACRES) =        3.5       PEAK FLOW RATE(CFS) =       5.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   1.66
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    512.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.655
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =   3.37   SUBAREA RUNOFF(CFS) =    5.02
  TOTAL AREA(ACRES) =        6.8   TOTAL RUNOFF(CFS) =      10.24
  TC(MIN.) =   10.01

*****************************************************************************
   FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
-------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1604.81  DOWNSTREAM(FEET) = 1601.60
  FLOW LENGTH(FEET) =    23.00   MANNING'S N = 0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) = 18.30
  ESTIMATED PIPE DIAMETER(INCH) = 12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.24
  PIPE TRAVEL TIME(MIN.) =   0.02   Tc(MIN.) =   10.04
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =    535.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  31
-------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1601.60  DOWNSTREAM(FEET) = 1601.50
  FLOW LENGTH(FEET) =    33.46   MANNING'S N = 0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.31
  ESTIMATED PIPE DIAMETER(INCH) = 24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.24
  PIPE TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   10.17
```

```
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     568.46 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.644
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    0.95   SUBAREA RUNOFF(CFS) =    1.41
  TOTAL AREA(ACRES) =       7.8   TOTAL RUNOFF(CFS) =      11.65
  TC(MIN.) =   10.17

***************************************************************************
   FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  31
---------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1601.50  DOWNSTREAM(FEET) = 1599.84
  FLOW LENGTH(FEET) =   705.54   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.09
  ESTIMATED PIPE DIAMETER(INCH) = 27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.65
  PIPE TRAVEL TIME(MIN.) =   2.88   Tc(MIN.) =   13.04
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =   1274.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.471
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    2.48   SUBAREA RUNOFF(CFS) =    3.28
  TOTAL AREA(ACRES) =      10.3   TOTAL RUNOFF(CFS) =      14.93
  TC(MIN.) =   13.04

***************************************************************************
   FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  31
---------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1599.84  DOWNSTREAM(FEET) = 1598.78
  FLOW LENGTH(FEET) =   444.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.38
  ESTIMATED PIPE DIAMETER(INCH) = 30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.93
  PIPE TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =   14.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =   1718.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.393
  *USER SPECIFIED(GLOBAL):
```

```
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    8.02   SUBAREA RUNOFF(CFS) =   10.06
   TOTAL AREA(ACRES) =       18.3   TOTAL RUNOFF(CFS) =       24.99
   TC(MIN.) =   14.73

   ****************************************************************************
    FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  31
   ----------------------------------------------------------------------------
    >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
   ============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =  1598.78  DOWNSTREAM(FEET) =  1597.90
    FLOW LENGTH(FEET) =   206.68   MANNING'S N =  0.013
    DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =   6.05
    ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =       24.99
    PIPE TRAVEL TIME(MIN.) =   0.57   Tc(MIN.) =   15.30
    LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.00 =   1924.68 FEET.

   ****************************************************************************
    FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
   ----------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
   ============================================================================
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.370
    *USER SPECIFIED(GLOBAL):
    COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
    SUBAREA AREA(ACRES) =    1.96   SUBAREA RUNOFF(CFS) =    2.42
    TOTAL AREA(ACRES) =       20.2   TOTAL RUNOFF(CFS) =       27.41
    TC(MIN.) =   15.30

   ****************************************************************************
    FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  31
   ----------------------------------------------------------------------------
    >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
   ============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =  1597.90  DOWNSTREAM(FEET) =  1596.70
    FLOW LENGTH(FEET) =   237.58   MANNING'S N =  0.013
    DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.7 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =   6.59
    ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =       27.41
    PIPE TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =   15.90
    LONGEST FLOWPATH FROM NODE    200.00 TO NODE    208.00 =   2162.26 FEET.

   ****************************************************************************
    FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 IS CODE =  81
   ----------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
   ============================================================================
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.347
    *USER SPECIFIED(GLOBAL):
    COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
    SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    0.47
    TOTAL AREA(ACRES) =       20.6   TOTAL RUNOFF(CFS) =       27.88
    TC(MIN.) =   15.90

   ****************************************************************************
    FLOW PROCESS FROM NODE    208.00 TO NODE    209.00 IS CODE =  31
   ----------------------------------------------------------------------------
    >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =  1596.70  DOWNSTREAM(FEET) =  1594.00
   FLOW LENGTH(FEET) =   393.08   MANNING'S N =  0.013
   DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.57
   ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       27.88
   PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   16.77
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    209.00 =   2555.34 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.315
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    6.86   SUBAREA RUNOFF(CFS) =    8.12
   TOTAL AREA(ACRES) =        27.5   TOTAL RUNOFF(CFS) =       36.00
   TC(MIN.) =   16.77

****************************************************************************
   FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  31
--------------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =  1594.00  DOWNSTREAM(FEET) =  1590.45
   FLOW LENGTH(FEET) =   548.29   MANNING'S N =  0.013
   DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.8 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.86
   ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       36.00
   PIPE TRAVEL TIME(MIN.) =   1.16    Tc(MIN.) =   17.93
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =   3103.63 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.276
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    5.41   SUBAREA RUNOFF(CFS) =    6.21
   TOTAL AREA(ACRES) =        32.9   TOTAL RUNOFF(CFS) =       42.21
   TC(MIN.) =   17.93

****************************************************************************
   FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  31
--------------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =  1590.45  DOWNSTREAM(FEET) =  1586.08
   FLOW LENGTH(FEET) =   292.02   MANNING'S N =  0.013
   DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.5 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  11.21
   ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       42.21
```

```
   PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   18.36
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    211.00 =   3395.65 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 IS CODE =   1
----------------------------------------------------------------------------
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
   >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
   TIME OF CONCENTRATION(MIN.) =   18.36
   RAINFALL INTENSITY(INCH/HR) =   1.26
   TOTAL STREAM AREA(ACRES) =    32.91
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     42.21

   ** CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY      AREA
   NUMBER     (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       65.85     24.23      1.116        56.33
      2       42.21     18.36      1.263        32.91

   ********************************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       92.12     18.36      1.263
      2      103.15     24.23      1.116

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      103.15   Tc(MIN.) =   24.23
   TOTAL AREA(ACRES) =       89.2
   LONGEST FLOWPATH FROM NODE     97.00 TO NODE    211.00 =   4949.76 FEET.
============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =       89.2  TC(MIN.) =     24.23
   PEAK FLOW RATE(CFS)   =     103.15
============================================================================
============================================================================
   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 1982-2011 Advanced Engineering Software (aes)
                          (Rational Tabling Version 18.0)
                     Release Date: 07/01/2011  License ID 1499


                            Analysis prepared by:

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                              San Diego, CA 92101

 ************************** DESCRIPTION OF STUDY **************************
 * MORENO VALLEY MALL REDEVELOPMENT                                      *
 * PROPOSED 100 YEAR                                                     *
 *                                                                       *
 ************************************************************************

   FILE NAME: MOVAL5.DAT
   TIME/DATE OF STUDY: 09:41 02/17/2022
 --------------------------------------------------------------------------
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 --------------------------------------------------------------------------
   USER SPECIFIED STORM EVENT(YEAR) =  100.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
   10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.640
   10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.737
   100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.660
   100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.190
   SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4464123
   SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4489289
   COMPUTED RAINFALL INTENSITY DATA:
   STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.190
   SLOPE OF INTENSITY DURATION CURVE = 0.4489
   SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.900
   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   30.0     20.0     0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

 ****************************************************************************
   FLOW PROCESS FROM NODE    97.00 TO NODE    98.00 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) =   100.00
    UPSTREAM ELEVATION(FEET) =   1636.67
    DOWNSTREAM ELEVATION(FEET) =   1633.33
    ELEVATION DIFFERENCE(FEET) =     3.34
    TC = 0.303*[(  100.00**3)/(    3.34)]**.2 =    3.774
    COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.631
    *USER SPECIFIED(GLOBAL):
    COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
    SUBAREA RUNOFF(CFS) =       0.33
    TOTAL AREA(ACRES) =        0.10   TOTAL RUNOFF(CFS) =       0.33

 **************************************************************************
    FLOW PROCESS FROM NODE    98.00 TO NODE     99.00 IS CODE = 51
 ------------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   1633.33  DOWNSTREAM(FEET) =   1607.27
    CHANNEL LENGTH THRU SUBAREA(FEET) =   737.50   CHANNEL SLOPE = 0.0353
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 99.000
    MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.559
    *USER SPECIFIED(GLOBAL):
    COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.89
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.08
    AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   5.90
    Tc(MIN.) =   10.90
    SUBAREA AREA(ACRES) =       0.49      SUBAREA RUNOFF(CFS) =    1.13
    TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =      1.46

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.08   FLOW VELOCITY(FEET/SEC.) =   2.24
    LONGEST FLOWPATH FROM NODE     97.00 TO NODE     99.00 =     837.50 FEET.

 **************************************************************************
    FLOW PROCESS FROM NODE    99.00 TO NODE     99.00 IS CODE = 81
 ------------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ==============================================================================
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.559
    *USER SPECIFIED(GLOBAL):
    COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
    SUBAREA AREA(ACRES) =    0.49   SUBAREA RUNOFF(CFS) =    1.13
    TOTAL AREA(ACRES) =        1.1   TOTAL RUNOFF(CFS) =       2.58
    TC(MIN.) =   10.90

 **************************************************************************
    FLOW PROCESS FROM NODE    99.00 TO NODE    103.00 IS CODE = 31
 ------------------------------------------------------------------------------
    >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ==============================================================================
    ELEVATION DATA: UPSTREAM(FEET) = 1603.27  DOWNSTREAM(FEET) = 1601.49
    FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
    DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.2 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =   7.84
    ESTIMATED PIPE DIAMETER(INCH) = 12.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =        2.58
    PIPE TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =   11.01
```

```
   LONGEST FLOWPATH FROM NODE     97.00 TO NODE    103.00 =      887.50 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =   1
--------------------------------------------------------------------------
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
   TIME OF CONCENTRATION(MIN.) =   11.01
   RAINFALL INTENSITY(INCH/HR) =   2.55
   TOTAL STREAM AREA(ACRES) =     1.08
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.58

****************************************************************************
   FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 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) =   100.00
   UPSTREAM ELEVATION(FEET) =   1612.71
   DOWNSTREAM ELEVATION(FEET) =   1611.93
   ELEVATION DIFFERENCE(FEET) =      0.78
   TC = 0.303*[(  100.00**3)/(     0.78)]**.2 =    5.049
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.615
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA RUNOFF(CFS) =       0.33
   TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS) =       0.33

****************************************************************************
   FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   1611.93 DOWNSTREAM(FEET) =   1609.90
   CHANNEL LENGTH THRU SUBAREA(FEET) =   384.69   CHANNEL SLOPE =  0.0053
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 99.000
   MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.717
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.21
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.43
   AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   4.49
   Tc(MIN.) =    9.54
   SUBAREA AREA(ACRES) =      3.16        SUBAREA RUNOFF(CFS) =    7.73
   TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =       8.05

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.22   FLOW VELOCITY(FEET/SEC.) =   1.62
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     484.69 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
--------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.717
```

```
      *USER SPECIFIED(GLOBAL):
      COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
      SUBAREA AREA(ACRES) =     3.16   SUBAREA RUNOFF(CFS) =     7.73
      TOTAL AREA(ACRES) =        6.4   TOTAL RUNOFF(CFS) =        15.78
      TC(MIN.) =     9.54


  ****************************************************************************
      FLOW PROCESS FROM NODE     102.00 TO NODE     103.00 IS CODE =   31
  ----------------------------------------------------------------------------
      >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
      >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ============================================================================
      ELEVATION DATA: UPSTREAM(FEET) =  1604.90  DOWNSTREAM(FEET) =  1601.49
      FLOW LENGTH(FEET) =     27.50   MANNING'S N =  0.013
      DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.4 INCHES
      PIPE-FLOW VELOCITY(FEET/SEC.) =  19.61
      ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =    1
      PIPE-FLOW(CFS) =       15.78
      PIPE TRAVEL TIME(MIN.) =   0.02   Tc(MIN.) =     9.56
      LONGEST FLOWPATH FROM NODE     100.00 TO NODE     103.00 =     512.19 FEET.


  ****************************************************************************
      FLOW PROCESS FROM NODE     103.00 TO NODE     103.00 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.) =    9.56
      RAINFALL INTENSITY(INCH/HR) =    2.71
      TOTAL STREAM AREA(ACRES) =       6.42
      PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.78

      ** CONFLUENCE DATA **
      STREAM     RUNOFF      Tc       INTENSITY      AREA
      NUMBER     (CFS)     (MIN.)   (INCH/HOUR)     (ACRE)
         1        2.58     11.01       2.548         1.08
         2       15.78      9.56       2.714         6.42

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

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

      ** PEAK FLOW RATE TABLE **
      STREAM     RUNOFF      Tc       INTENSITY
      NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
         1       18.03      9.56       2.714
         2       17.40     11.01       2.548

      COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
      PEAK FLOW RATE(CFS) =        18.03   Tc(MIN.) =     9.56
      TOTAL AREA(ACRES) =           7.5
      LONGEST FLOWPATH FROM NODE      97.00 TO NODE     103.00 =     887.50 FEET.


  ****************************************************************************
      FLOW PROCESS FROM NODE     103.00 TO NODE     104.00 IS CODE =   31
  ----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1601.49  DOWNSTREAM(FEET) =  1598.58
  FLOW LENGTH(FEET) =   305.34   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.67
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       18.03
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   10.22
  LONGEST FLOWPATH FROM NODE     97.00 TO NODE    104.00 =   1192.84 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.634
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    1.39   SUBAREA RUNOFF(CFS) =    3.29
  TOTAL AREA(ACRES) =        8.9   TOTAL RUNOFF(CFS) =       21.32
  TC(MIN.) =   10.22

***************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
---------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1598.58  DOWNSTREAM(FEET) =  1598.11
  FLOW LENGTH(FEET) =   149.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.21
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       21.32
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   10.70
  LONGEST FLOWPATH FROM NODE     97.00 TO NODE    105.00 =   1341.84 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.580
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    7.60   SUBAREA RUNOFF(CFS) =   17.65
  TOTAL AREA(ACRES) =       16.5   TOTAL RUNOFF(CFS) =       38.97
  TC(MIN.) =   10.70

***************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
---------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1598.11  DOWNSTREAM(FEET) =  1597.00
  FLOW LENGTH(FEET) =   353.89   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.11
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       38.97
```

```
   PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =    11.66
   LONGEST FLOWPATH FROM NODE     97.00 TO NODE    106.00 =    1695.73 FEET.


 *****************************************************************************
   FLOW PROCESS FROM NODE    106.00 TO NODE     106.00 IS CODE =  81
 -----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.482
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    0.52   SUBAREA RUNOFF(CFS) =    1.16
   TOTAL AREA(ACRES) =        17.0   TOTAL RUNOFF(CFS) =       40.13
   TC(MIN.) =    11.66


 *****************************************************************************
   FLOW PROCESS FROM NODE    106.00 TO NODE     107.00 IS CODE =  31
 -----------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =============================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1597.00  DOWNSTREAM(FEET) = 1595.98
   FLOW LENGTH(FEET) =   454.12   MANNING'S N =  0.013
   DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.1 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.44
   ESTIMATED PIPE DIAMETER(INCH) = 42.00     NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       40.13
   PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =    13.06
   LONGEST FLOWPATH FROM NODE     97.00 TO NODE    107.00 =    2149.85 FEET.


 *****************************************************************************
   FLOW PROCESS FROM NODE    107.00 TO NODE     107.00 IS CODE =  81
 -----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.360
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    0.47   SUBAREA RUNOFF(CFS) =    1.00
   TOTAL AREA(ACRES) =        17.5   TOTAL RUNOFF(CFS) =       41.13
   TC(MIN.) =    13.06


 *****************************************************************************
   FLOW PROCESS FROM NODE    107.00 TO NODE     108.00 IS CODE =  31
 -----------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =============================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1595.98  DOWNSTREAM(FEET) = 1595.89
   FLOW LENGTH(FEET) =   498.74   MANNING'S N =  0.013
   DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.6 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   2.10
   ESTIMATED PIPE DIAMETER(INCH) = 66.00     NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       41.13
   PIPE TRAVEL TIME(MIN.) =   3.95    Tc(MIN.) =    17.01
   LONGEST FLOWPATH FROM NODE     97.00 TO NODE    108.00 =    2648.59 FEET.


 *****************************************************************************
   FLOW PROCESS FROM NODE    108.00 TO NODE     108.00 IS CODE =  81
 -----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.096
```

```
    *USER SPECIFIED(GLOBAL):
    COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
    SUBAREA AREA(ACRES) =    0.47   SUBAREA RUNOFF(CFS) =    0.89
    TOTAL AREA(ACRES) =        17.9   TOTAL RUNOFF(CFS) =       42.02
    TC(MIN.) =   17.01

    *****************************************************************************
     FLOW PROCESS FROM NODE    108.00 TO NODE     109.00 IS CODE =  31
    -----------------------------------------------------------------------------
     >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
     >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
    =============================================================================
     ELEVATION DATA: UPSTREAM(FEET) = 1595.89  DOWNSTREAM(FEET) = 1593.80
     FLOW LENGTH(FEET) =   506.94   MANNING'S N =  0.013
     DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.7 INCHES

     PIPE-FLOW VELOCITY(FEET/SEC.) =   6.94
     ESTIMATED PIPE DIAMETER(INCH) = 39.00    NUMBER OF PIPES =   1
     PIPE-FLOW(CFS) =       42.02
     PIPE TRAVEL TIME(MIN.) =   1.22   Tc(MIN.) =   18.23
     LONGEST FLOWPATH FROM NODE     97.00 TO NODE    109.00 =   3155.53 FEET.

    *****************************************************************************
     FLOW PROCESS FROM NODE    109.00 TO NODE     109.00 IS CODE =  81
    -----------------------------------------------------------------------------
     >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
    =============================================================================
      100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.032
     *USER SPECIFIED(GLOBAL):
     COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
     SUBAREA AREA(ACRES) =    0.72   SUBAREA RUNOFF(CFS) =    1.32
     TOTAL AREA(ACRES) =        18.7   TOTAL RUNOFF(CFS) =       43.33
     TC(MIN.) =   18.23

    *****************************************************************************
     FLOW PROCESS FROM NODE    109.00 TO NODE     110.00 IS CODE =  31
    -----------------------------------------------------------------------------
     >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
     >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
    =============================================================================
     ELEVATION DATA: UPSTREAM(FEET) = 1593.80  DOWNSTREAM(FEET) = 1591.60
     FLOW LENGTH(FEET) =   390.78   MANNING'S N =  0.013
     DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.4 INCHES
     PIPE-FLOW VELOCITY(FEET/SEC.) =   7.80
     ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES =   1
     PIPE-FLOW(CFS) =       43.33
     PIPE TRAVEL TIME(MIN.) =   0.84   Tc(MIN.) =   19.06
     LONGEST FLOWPATH FROM NODE     97.00 TO NODE    110.00 =   3546.31 FEET.

    *****************************************************************************
     FLOW PROCESS FROM NODE    110.00 TO NODE     110.00 IS CODE =  81
    -----------------------------------------------------------------------------
     >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
    =============================================================================
      100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.991
     *USER SPECIFIED(GLOBAL):
     COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
     SUBAREA AREA(ACRES) =    3.96   SUBAREA RUNOFF(CFS) =    7.10
     TOTAL AREA(ACRES) =        22.6   TOTAL RUNOFF(CFS) =       50.43
     TC(MIN.) =   19.06

    *****************************************************************************
     FLOW PROCESS FROM NODE    110.00 TO NODE     111.00 IS CODE =  31
```

```
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1591.60  DOWNSTREAM(FEET) = 1591.27
  FLOW LENGTH(FEET) =   118.33   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
  ESTIMATED PIPE DIAMETER(INCH) = 42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.43
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   19.38
  LONGEST FLOWPATH FROM NODE     97.00 TO NODE    111.00 =    3664.64 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.976
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =   18.46   SUBAREA RUNOFF(CFS) =   32.83
  TOTAL AREA(ACRES) =       41.1   TOTAL RUNOFF(CFS) =       83.26
  TC(MIN.) =   19.38

********************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1591.27  DOWNSTREAM(FEET) = 1590.20
  FLOW LENGTH(FEET) =   380.42   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) = 51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      83.26
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   20.29
  LONGEST FLOWPATH FROM NODE     97.00 TO NODE    112.00 =    4045.06 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.936
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    6.23   SUBAREA RUNOFF(CFS) =   10.86
  TOTAL AREA(ACRES) =       47.3   TOTAL RUNOFF(CFS) =       94.12
  TC(MIN.) =   20.29

********************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1590.20  DOWNSTREAM(FEET) = 1588.44
  FLOW LENGTH(FEET) =   494.26   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  40.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.88
  ESTIMATED PIPE DIAMETER(INCH) = 51.00    NUMBER OF PIPES =   1
```

```
    PIPE-FLOW(CFS) =      94.12
    PIPE TRAVEL TIME(MIN.) =   1.05    Tc(MIN.) =    21.33
    LONGEST FLOWPATH FROM NODE     97.00 TO NODE    113.00 =    4539.32 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.893
    *USER SPECIFIED(GLOBAL):
    COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
    SUBAREA AREA(ACRES) =    9.01   SUBAREA RUNOFF(CFS) =   15.35
    TOTAL AREA(ACRES) =       56.3   TOTAL RUNOFF(CFS) =      109.47
    TC(MIN.) =    21.33

****************************************************************************
   FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  31
----------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
    ELEVATION DATA: UPSTREAM(FEET) = 1588.44  DOWNSTREAM(FEET) = 1586.08
    FLOW LENGTH(FEET) =    410.44   MANNING'S N =  0.013
    DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.0 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =   9.92
    ESTIMATED PIPE DIAMETER(INCH) = 51.00     NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =     109.47
    PIPE TRAVEL TIME(MIN.) =   0.69    Tc(MIN.) =    22.02
    LONGEST FLOWPATH FROM NODE     97.00 TO NODE    114.00 =    4949.76 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 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.) =   22.02
    RAINFALL INTENSITY(INCH/HR) =   1.87
    TOTAL STREAM AREA(ACRES) =    56.33
    PEAK FLOW RATE(CFS) AT CONFLUENCE =    109.47

****************************************************************************
   FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 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) =   100.00
    UPSTREAM ELEVATION(FEET) =   1612.17
    DOWNSTREAM ELEVATION(FEET) =   1611.76
    ELEVATION DIFFERENCE(FEET) =      0.41
    TC = 0.303*[(  100.00**3)/(     0.41)]**.2 =    5.741
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.412
    *USER SPECIFIED(GLOBAL):
    COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
    SUBAREA RUNOFF(CFS) =       0.31
    TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS) =       0.31


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

```
   FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1611.76  DOWNSTREAM(FEET) =   1608.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =   412.00   CHANNEL SLOPE =  0.0072
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.664
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.63
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   4.22
  Tc(MIN.) =    9.96
  SUBAREA AREA(ACRES) =      3.37       SUBAREA RUNOFF(CFS) =    8.08
  TOTAL AREA(ACRES) =        3.5        PEAK FLOW RATE(CFS) =       8.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   FLOW VELOCITY(FEET/SEC.) =  1.91
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    512.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.664
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    3.37   SUBAREA RUNOFF(CFS) =    8.08
  TOTAL AREA(ACRES) =        6.8   TOTAL RUNOFF(CFS) =       16.47
  TC(MIN.) =    9.96

*******************************************************************************
   FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
-------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1604.81  DOWNSTREAM(FEET) = 1601.60
  FLOW LENGTH(FEET) =   23.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) = 20.74
  ESTIMATED PIPE DIAMETER(INCH) = 15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.47
  PIPE TRAVEL TIME(MIN.) =   0.02   Tc(MIN.) =    9.98
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =    535.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  31
-------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1601.60  DOWNSTREAM(FEET) = 1601.50
  FLOW LENGTH(FEET) =   33.46   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.73
  ESTIMATED PIPE DIAMETER(INCH) = 27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.47
  PIPE TRAVEL TIME(MIN.) =   0.12   Tc(MIN.) =   10.10
```

```
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =    568.46 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.648
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    0.95   SUBAREA RUNOFF(CFS) =    2.26
   TOTAL AREA(ACRES) =       7.8   TOTAL RUNOFF(CFS) =      18.73
   TC(MIN.) =   10.10

***************************************************************************
   FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  31
---------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1601.50  DOWNSTREAM(FEET) = 1599.84
   FLOW LENGTH(FEET) =   705.54   MANNING'S N =  0.013
   DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.7 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.50
   ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     18.73
   PIPE TRAVEL TIME(MIN.) =   2.61   Tc(MIN.) =   12.71
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =   1274.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.388
   *USER SPECIFIED(GLOBAL):
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   SUBAREA AREA(ACRES) =    2.48   SUBAREA RUNOFF(CFS) =    5.33
   TOTAL AREA(ACRES) =      10.3   TOTAL RUNOFF(CFS) =      24.06
   TC(MIN.) =   12.71

***************************************************************************
   FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  31
---------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) = 1599.84  DOWNSTREAM(FEET) = 1598.78
   FLOW LENGTH(FEET) =   444.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.8 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.83
   ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     24.06
   PIPE TRAVEL TIME(MIN.) =   1.53   Tc(MIN.) =   14.25
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =   1718.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.269
   *USER SPECIFIED(GLOBAL):
```

```
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 SUBAREA AREA(ACRES) =    8.02   SUBAREA RUNOFF(CFS) =   16.38
 TOTAL AREA(ACRES) =       18.3   TOTAL RUNOFF(CFS) =      40.44
 TC(MIN.) =   14.25


*****************************************************************************
  FLOW PROCESS FROM NODE   206.00 TO NODE    207.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1598.78  DOWNSTREAM(FEET) = 1597.90
  FLOW LENGTH(FEET) =   206.68   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
  ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.44
  PIPE TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   14.75
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.00 =   1924.68 FEET.


*****************************************************************************
  FLOW PROCESS FROM NODE   207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.234
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    1.96   SUBAREA RUNOFF(CFS) =    3.94
  TOTAL AREA(ACRES) =       20.2   TOTAL RUNOFF(CFS) =      44.39
  TC(MIN.) =   14.75


*****************************************************************************
  FLOW PROCESS FROM NODE   207.00 TO NODE    208.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 1597.90  DOWNSTREAM(FEET) = 1596.70
  FLOW LENGTH(FEET) =   237.58   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.44
  ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      44.39
  PIPE TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =   15.28
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    208.00 =   2162.26 FEET.


*****************************************************************************
  FLOW PROCESS FROM NODE   208.00 TO NODE    208.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.199
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    0.77
  TOTAL AREA(ACRES) =       20.6   TOTAL RUNOFF(CFS) =      45.16
  TC(MIN.) =   15.28


*****************************************************************************
  FLOW PROCESS FROM NODE   208.00 TO NODE    209.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
    >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1596.70  DOWNSTREAM(FEET) =  1594.00
  FLOW LENGTH(FEET) =   393.08   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.54
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.16
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   16.05
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    209.00 =   2555.34 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =  81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.151
   *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    6.86   SUBAREA RUNOFF(CFS) =   13.28
  TOTAL AREA(ACRES) =       27.5   TOTAL RUNOFF(CFS) =      58.44
  TC(MIN.) =   16.05

******************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  31
------------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1594.00  DOWNSTREAM(FEET) =  1590.45
  FLOW LENGTH(FEET) =   548.29   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.84
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.44
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =   17.08
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =   3103.63 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.092
   *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  SUBAREA AREA(ACRES) =    5.41   SUBAREA RUNOFF(CFS) =   10.18
  TOTAL AREA(ACRES) =       32.9   TOTAL RUNOFF(CFS) =      68.62
  TC(MIN.) =   17.08

******************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  31
------------------------------------------------------------------------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1590.45  DOWNSTREAM(FEET) =  1586.08
  FLOW LENGTH(FEET) =   292.02   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.66
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      68.62
```

```
    PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   17.47
    LONGEST FLOWPATH FROM NODE    200.00 TO NODE    211.00 =   3395.65 FEET.


**************************************************************************
   FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 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.) =   17.47
   RAINFALL INTENSITY(INCH/HR) =    2.07
   TOTAL STREAM AREA(ACRES) =    32.91
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      68.62

   ** CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY      AREA
   NUMBER     (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      109.47     22.02       1.866        56.33
      2       68.62     17.47       2.071        32.91


 ********************************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      155.44     17.47       2.071
      2      171.31     22.02       1.866

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      171.31   Tc(MIN.) =   22.02
   TOTAL AREA(ACRES) =        89.2
   LONGEST FLOWPATH FROM NODE     97.00 TO NODE    211.00 =   4949.76 FEET.
==========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =        89.2  TC(MIN.) =     22.02
   PEAK FLOW RATE(CFS)   =      171.31
==========================================================================
==========================================================================
   END OF RATIONAL METHOD ANALYSIS
```