PRELIMINARY

HYDROLOGY REPORT

FOR

SANDPIPER VILLA

Oceanside, CA

Prepared for:

VIRI ESTATES, LLC
420 N. Twin Oaks Valley Road
Suite 1209
San Marcos, California 92069
(760) 484-6774

Prepared by:

BUCCOLA ENGINEERING, INC.
3142 Vista Way, Suite 301
Oceanside, California 92056
(760) 721-2000

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Philip D. Buccola

Prepared By: lbr

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1. Vicinity Map

Exhibits

Exhibit A – Existing-Condition Hydrology Map
Exhibit B – Proposed-Condition Hydrology Map

SECTION 1.0

PROJECT DESCRIPTION

1.1 Site Description

The site is comprised of 2.01 acres of arable land, and contains remnants of an existing single-family residence, and outbuildings. There are multiple concrete slabs along the easterly portion of the site, and a paved driveway off Dixie Street to the concrete slab area. The topography gently slopes from the northeast to the southwest with approximately 9 feet of relief across the site. Elevations range from 160 Mean Sea Level (MSL) in the northeastern corner of the site; to 151 MSL at the southwest parcel boundary. The site is moderately vegetated with a mix of mature trees; low growing shrubs and grasses.

1.2 Existing Condition Drainage

The site is a tributary to the Loma Alta Creek, Loma Alta Slough, and the Pacific Ocean Shoreline at the Loma Alta Slough.

The site drainage patterns are characterized as sheet flow and tend from northeast to southwest. The flows concentrate at the existing curb located at northwest parcel boundary. The flows form a confluence with offsite runoff and travel by street/gutter flow to an existing curb inlet located north of the site on Dixie Street.

The drainage basin and runoff patterns are delineated on the "Pre-Development Condition Drainage Exhibit" and the results of the Rational Method Hydrology calculations are located in Section 3.0 – Summary and Conclusion.

1.3 Proposed Project Improvements

The proposed SANDPIPER VILLA development will consist of site development and construction of (4) Multi-Unit Residential Buildings for Senior Assisted Living Care. The onsite surface improvements are private, and include curb and gutter, solid unit paver drive aisle, and guest parking areas, concrete pedestrian walkways, private storm drainage systems to serve the Stormwater Treatment Control BMPs, and underground Detention/HMP facilities. Public underground utilities will include, sanitary sewer, storm drain systems, water mains and dry utilities. There is a single entry/exit driveway to the project from Dixie Street, and an offsite employee parking facility located at the NE corner of the adjacent Friendly Church of God in Christ Oceanside. The surface improvement to the offsite parking will include asphalt paving, concrete valley gutter, pedestrian sidewalk, and private storm drain catch basin and pipe system that also connects to the onsite Detention/HMP facilities.

1.4 Proposed Condition Drainage

The surface runoff from the offsite employee parking area will sheet flow to a PCC Valley Gutter that will carry the runoff to a curb opening catch basin at the SE corner of the Employee Parking lot. The flow will discharge to, and be carried by a private storm drain system that confluence with onsite storm water runoff from the onsite drainage basin areas. The offsite, and onsite flows discharge to (4) individual storm water treatment control BMPs facilities, manufactured by BioClean Environmental Services, Inc. The treatment facilities operate as a Modular Wetlands System and utilizes horizontal flow-through-filtration as it replicates the natural processes to remove a variety of pollutants from stormwater runoff. including fine TSS, bacteria, oils and grease, heavy metals and harmful nutrients like nitrate and phosphorus. While most systems utilize a single treatment method, the MWS incorporates screening, hydrodynamic separation, sorptive media filtration into a single completely modular system. The treated runoff is then piped to a downstream Hydromodification Management Practice Facility (HMP).

The HMP facility will consist of a 42" HDPE underground detention/storage pipe with a controlled outlet structure at the downstream end of the pipe. The outlet of the HMP structure has a double chamber with a built-in weir. The weir has multiple low flow orifice openings that release the runoff at a rate equal to or less than the existing (0.1) (Q_2) and (Q_{10}). The Peak unmitigated Q_{100} runoff will be attenuated to the existing condition runoff rate with added detention storage provide by the HMP storage pipe. An overflow weir will be sized to allow only a release rate of 3.38 cfs, equal to the existing project Q_{100} peak flow rate. The detention design, details, exhibits, volume and orifice sizing calculations are provided in the "Technical Memorandum: Determination for Pre- and Post- Developed 100-year Peak Flow" for Sandpiper Villa, prepared by: "Tory R.Walker Engineering", Revision dated: September 13, 2019, and is included in Section 4, Appendix A8 of this hydrology report.

The HMP outlet structure connects to a proposed 18" RCP storm drain system in Dixie Street, and carries the runoff westerly to an existing 36" RCP. The existing 36" RCP crosses Dixie Street, and connects to an existing catch basin box on the south side of the Street.

This Preliminary Hydrology Report has been prepared using methods described in the San Diego County Hydrology Manual (2003 edition). Supporting charts are included in the appendix of the report. A node-to-node computer analysis is used for the rational method calculations. Ultimate development runoff coefficients are used throughout the study.

The following reference documents were used in the preparation of this study:

- City of Oceanside ("Engineering Design and Processing Manual"), latest edition.
- Hydrology Manual, County of San Diego, 2003 ("County Design Manual").

SECTION 2.0

HYDROLOGY CALCULATIONS

The hydrological analysis utilized to calculate the storm runoff for the 100-year storm event was the Rational Method (Q = C * I * A). Using a computer program based on the San Diego County Flood Control Division 2003, 1981 Hydrology Manual © copyright 1982-2003 Advanced Engineering Software (AES) ver. 1.5A, release date: 1/1/03, determines each component of the Rational Method equation, in which:

Q	=	Runoff (cfs),
C	=	Runoff coefficient,
I_A	=	Rainfall intensity (inches/hour),
A	=	Area (acres),
T_C	=	Time of Concentration (initial, overland, street gutter, or pipe).

2.1 Determination of Runoff Coefficient

The runoff coefficient (C) is based on the soil group of the drainage basin. This project lies in Soil Group D, as determined by referencing the soil survey maps.

Runoff coefficients are also dependent on the proposed land use density of each basin. Coefficients for this project were based from the County of San Diego Hydrology Manual, 2003 edition. The runoff coefficient used in the calculation for the onsite developed areas is based on a Residential Density of 10.9 DU/A or less. (See Appendix A-2).

2.2 Determination of Intensity

Rainfall intensity (I) is a function of the six-hour precipitation measure and the time of concentration for the drainage basin, as defined by the County of San Diego Hydrology Manual (Appendix A-3, A-4, A-5).

2.3 Determination of Areas

The area (A) of each drainage basin was determined from the Drainage Area Map. The onsite drainage basins have been based on the ultimate anticipated land use. See the Hydrology Map Exhibit 'B" for the Onsite Drainage Basins.

2.4 Determination of Initial Time of Concentration

The initial T_c is the overland time required for runoff to travel from the farthest edge of a drainage basin to the street gutter and or storm drain collection system. The T_c is determined using the 2003 County of San Diego Hydrology Manual.

2.5 Flood Routing Method

The Modified Rational Method was utilized to calculate peak storm water flows and route the calculated flows through the proposed drainage system.

When two flows confluence at a junction point, the smaller of the flows has been decreased by using the Modified Rational Method. This procedure accounts for the differing times of concentration for the flows upstream of the confluence point. The smaller Q is reduced by either the ratio of the intensities or the ratio of the times of concentration.

2.6 Hydrology Calculations

The Rational Method Hydrology calculations for the current project Pre, and Post 2, 10 and 100-year conditions, are contained in Appendix A-6 and A-7. Each sub-basin is identified with its corresponding area, time of concentration and total flow.

SECTION 3.0

SUMMARY/CONCLUSIONS

Summary of existing/proposed basin comparisons:

The following tables present the Pre and un-mitigated Post development runoff, for the entire project tributary watershed. The discharge rates are shown for comparison purposes:

TABLE 3.1

Pre-Development Rational Method Hydrology Calculations – Entire Watershed – Node A1-A16						
Storm Frequency	P_6 (adjusted)	C_{AVG}	I (in/hr)	$AREA$ (ac.)	T_C	Peak Flowrate Q (cfs)
2-Year	1.20	0.46	1.81	2.01	11.87	1.57
10-Year	1.70	0.46	2.66	2.01	11.25	2.31
100-Year	2.70	0.46	4.35	2.01	10.70	3.78

TABLE 3.2

Post-Development Rational Method Hydrology Calculations – Entire Watershed – Node A1-A26						
Storm Frequency	P_6 (adjusted)	C_{AVG}	I (in/hr)	$AREA$ (ac.)	T_C	Peak Flowrate Q (cfs)
2-Year	1.20	0.76	2.63	2.01	6.63	4.05
10-Year	1.70	0.76	3.76	2.01	6.56	5.69
100-Year	2.70	0.76	6.17	2.01	6.24	9.28

Net increased Q100 runoff of 5.50 cfs.

Conclusion:

Tables 3.1 through 3.2 illustrate that the un-mitigated post-condition Q_{100} is increased when compared to the pre-development condition Q_{100}. This project is a Priority Development Project, as determined by the (HMP) Applicability Matrix within the approved SWMP. Hydro-modification Management Plan Requirements per the Regional Water Quality Control Board is required to mitigate the post condition Q_{2-} Q_{10} flows to no greater than 10% of the existing storm events. The design, details, exhibits, and calculations are shown in the "Technical Memorandum: SWMM Modeling for Hydromodification Compliance of: Sandpiper Villa" prepared by: "Tory R. Walker Engineering per Revision dated: September 13, 2019, and is included within the approved SWMP Section 27, Attachments.

In addition the City of Oceanside Engineering Department has determined the existing downstream drainage facilities are currently at maximum capacity, and are conditioning this project to provide onsite detention to limit the post runoff rate, equal to the existing condition flow rate. The onsite HMP facility will be designed to provide additional storage volume to attenuate the Q_{100} release rate to a Peak Q_{100} development runoff rate of 3.38 cfs (0.40 cfs less then pre-development runoff rate of 3.78 cfs). The detention design, details, exhibits, volume and calculations are provided in the "Technical Memorandum: Determination for Pre- and Post- Developed 100-year Peak Flow" for Sandpiper Villa, prepared by: "Tory R. Walker Engineering", Revision dated: September 13, 2019 in Section 4, Appendix A8 of this hydrology report.

SECTION 4.0

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A-6 Hydrology Calculations – Existing Onsite Conditions – 2, 10 & 100 Year

A-7 Hydrology Calculations – Proposed Onsite Conditions – 2, 10 & 100 Year

A-8 "Technical Memorandum: Determination for Pre- and Post- Developed 100-year Peak Flow" for Sandpiper Villa, prepared by: "Tory R. Walker Engineering", Revision dated: September 13, 2019.

A-1

HYDROLOGIC SOIL GROUP MAP

APPENDIX A-1

Hydrologic Soil Group—San Diego County Area, California
(Viri Estates (042-14))

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 8, Sep 17, 2014

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

Date(s) aerial images were photographed: Nov 3, 2014—Nov 22, 2014

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CfB	Chesterton fine sandy loam, 2 to 5 percent slopes	D	2.0	100.0%
Totals for Area of Interest			**2.0**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

A-2

RUNOFF COEFFICIENTS FOR URBAN AREAS

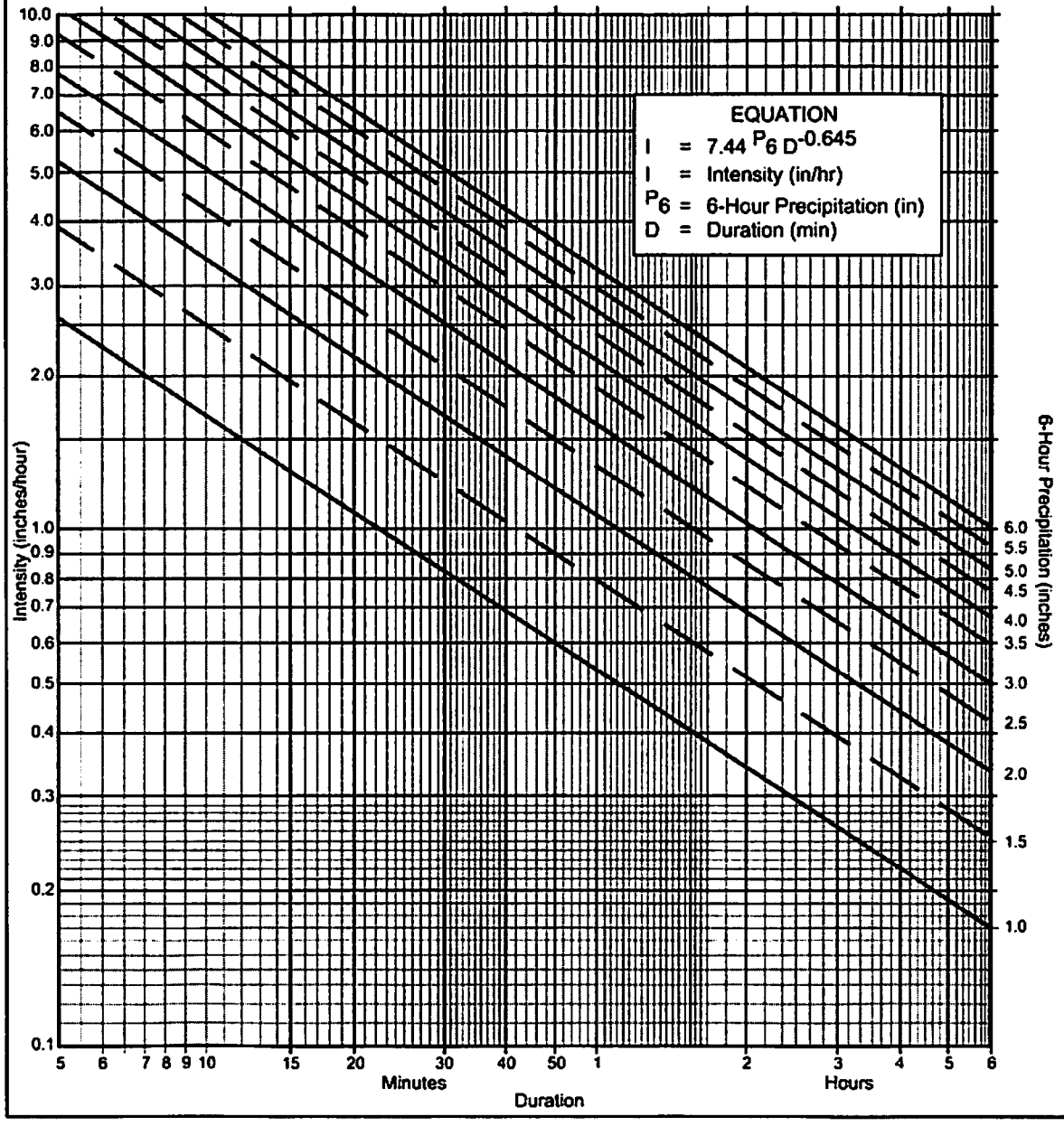
Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

A-3

INTENSITY - DURATION DESIGN CHARTS (2-YEAR)



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a tine through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 2 year

(b) P_6 = 1.2 in., P_{24} = 2.0, $\frac{P_6}{P_{24}}$ = 63 %(2)

(c) Adjusted $P_6^{(2)}$ = 1.2 in.

(d) t_x = _____ min.

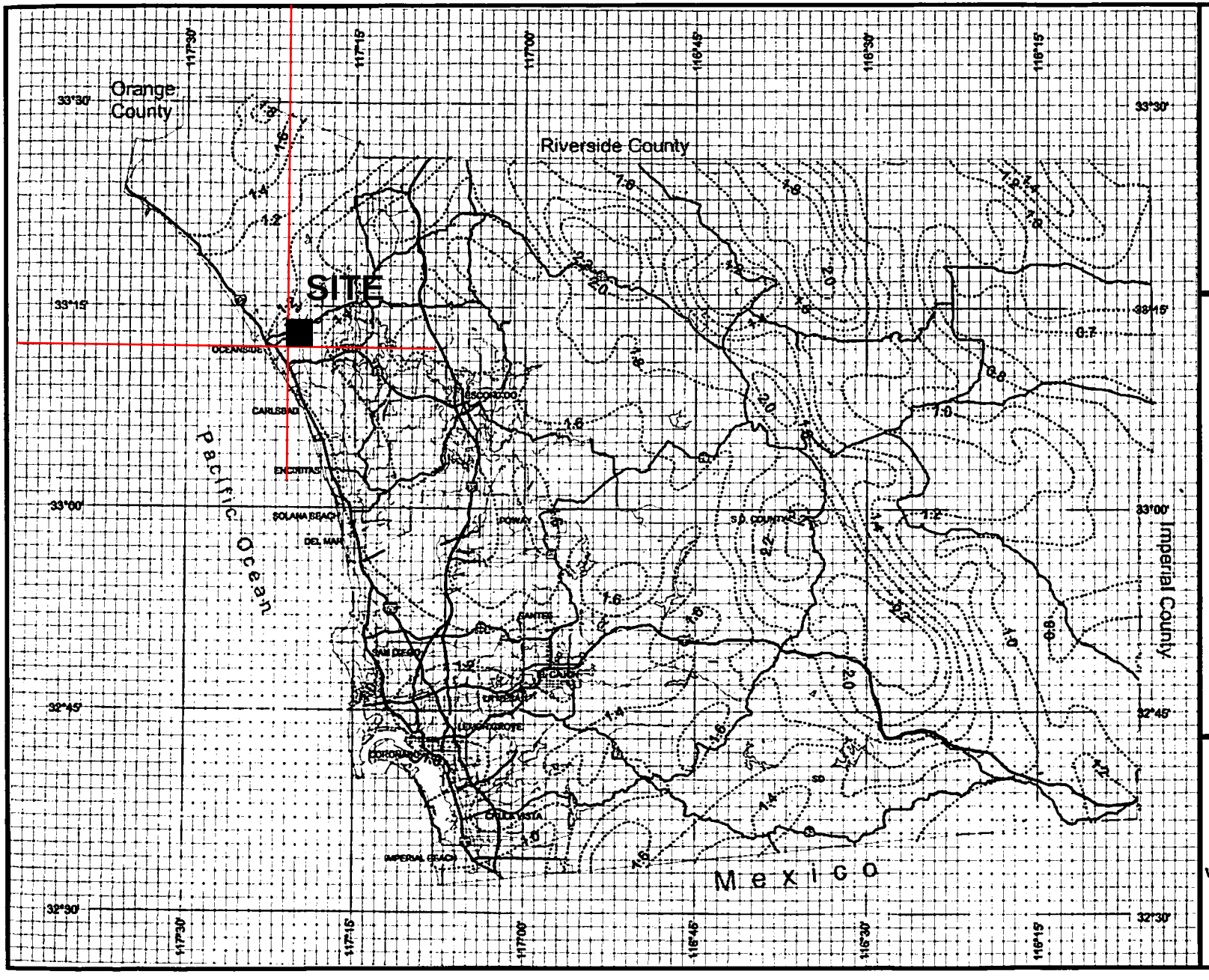
(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6 / Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1



County of San Diego Hydrology Manual

Rainfall Isopluvials

2 Year Rainfall Event - 6 Hours

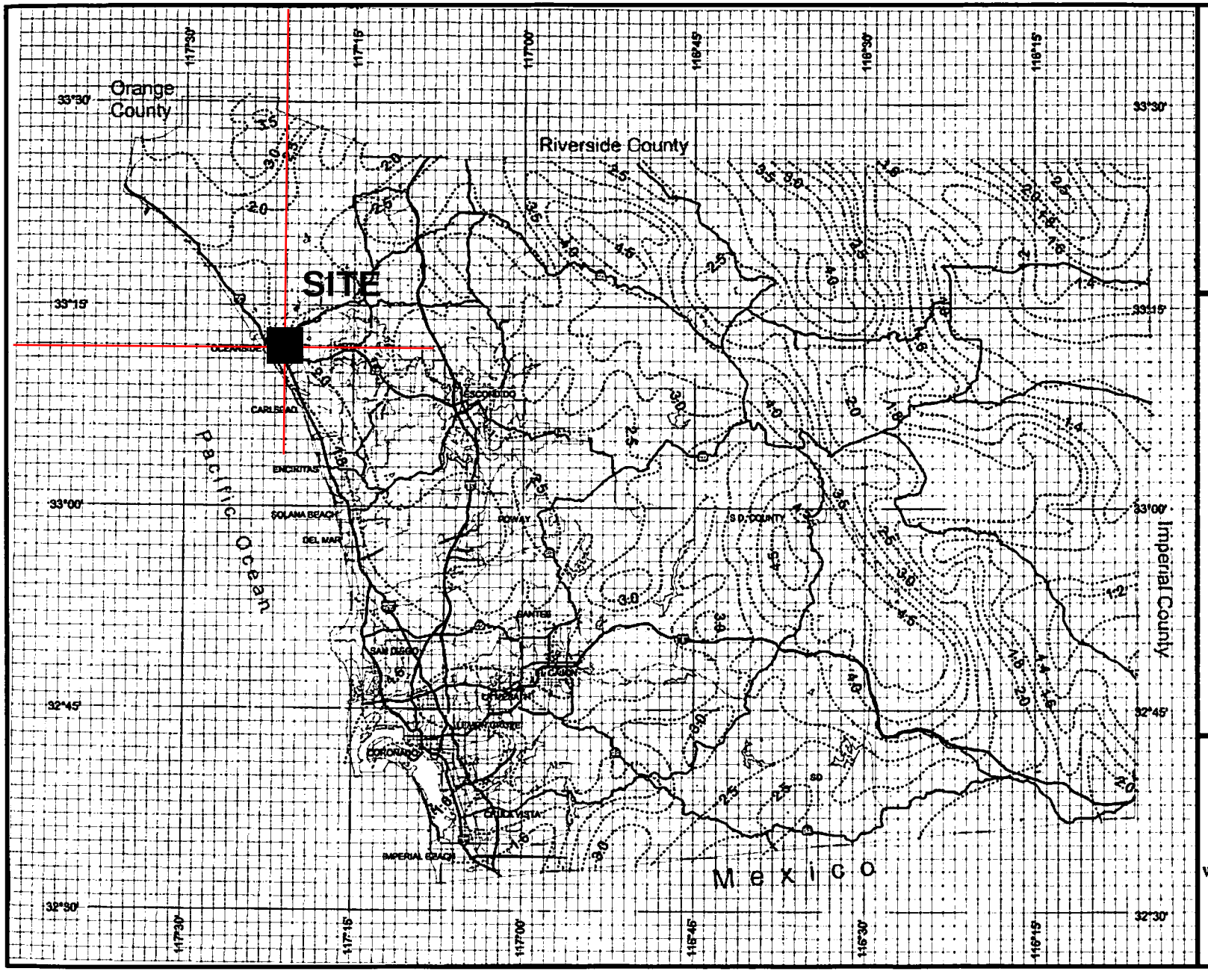
Isopluvial (inches)

DPW GIS

SanGIS

N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

2 Year Rainfall Event - 24 Hours

Isopluvial (inches)

DPW GIS

SanGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles

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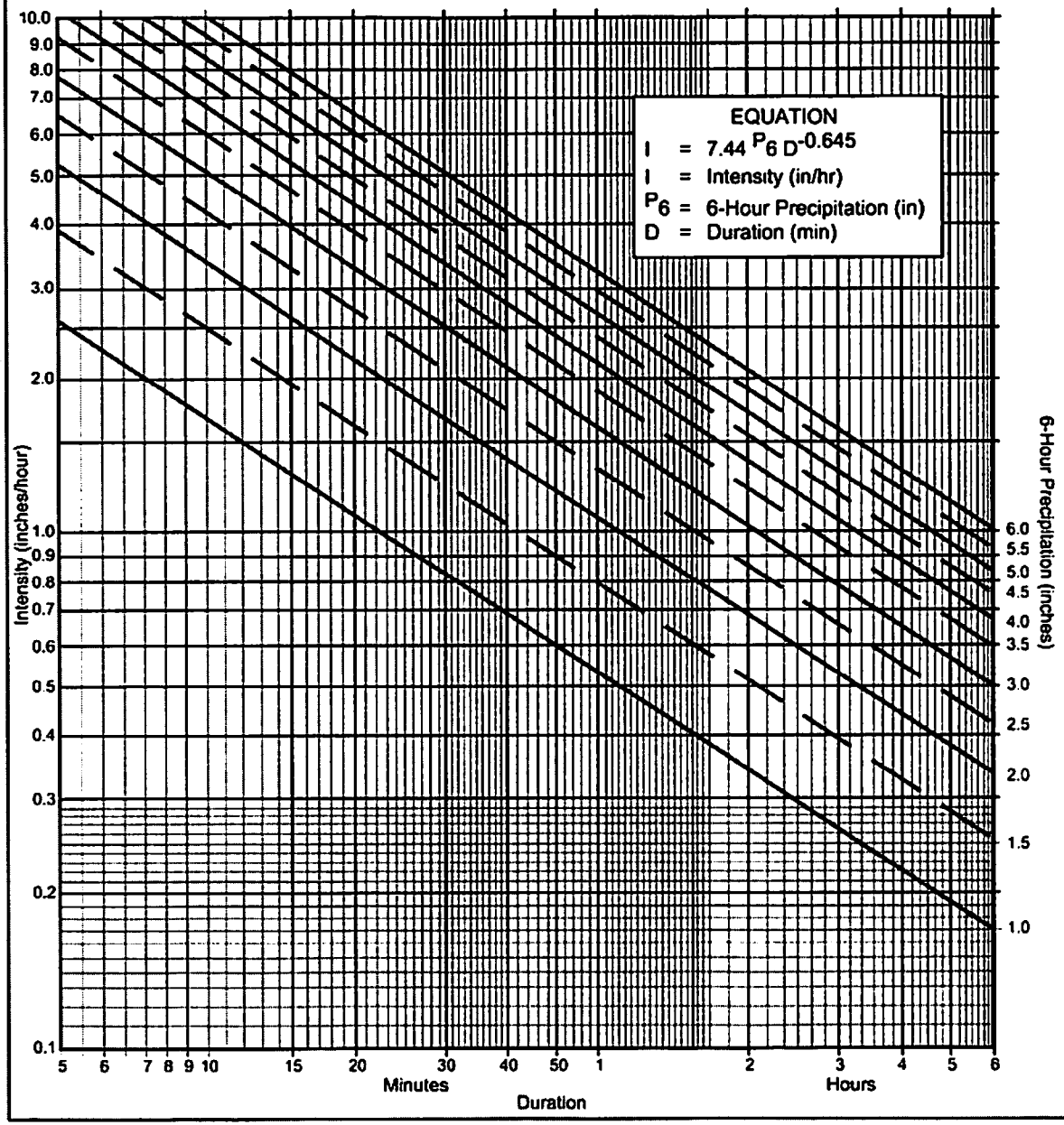
A-4

INTENSITY - DURATION DESIGN CHARTS (10-YEAR)



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 10 year

(b) P_6 = 1.7 in., P_{24} 3.25, $\frac{P_6}{P_{24}}$ = 52 %(2)

(c) Adjusted $P_6^{(2)}$ = 1.7 in.

(d) t_x = _____ min.

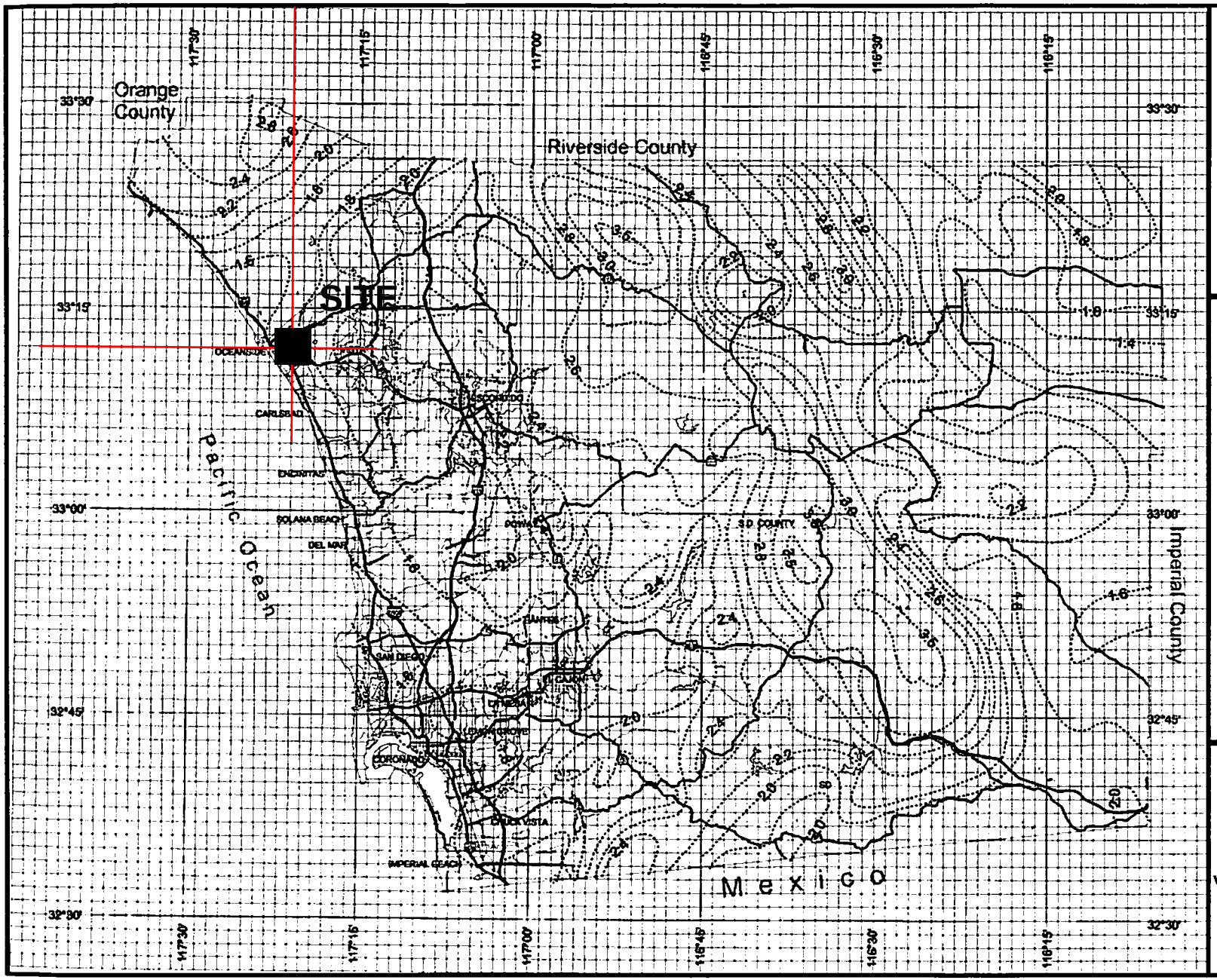
(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6 / Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1



County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 6 Hours

Isopluvial (inches)

DPW GIS

SanGIS
We Have San Diego Covered!

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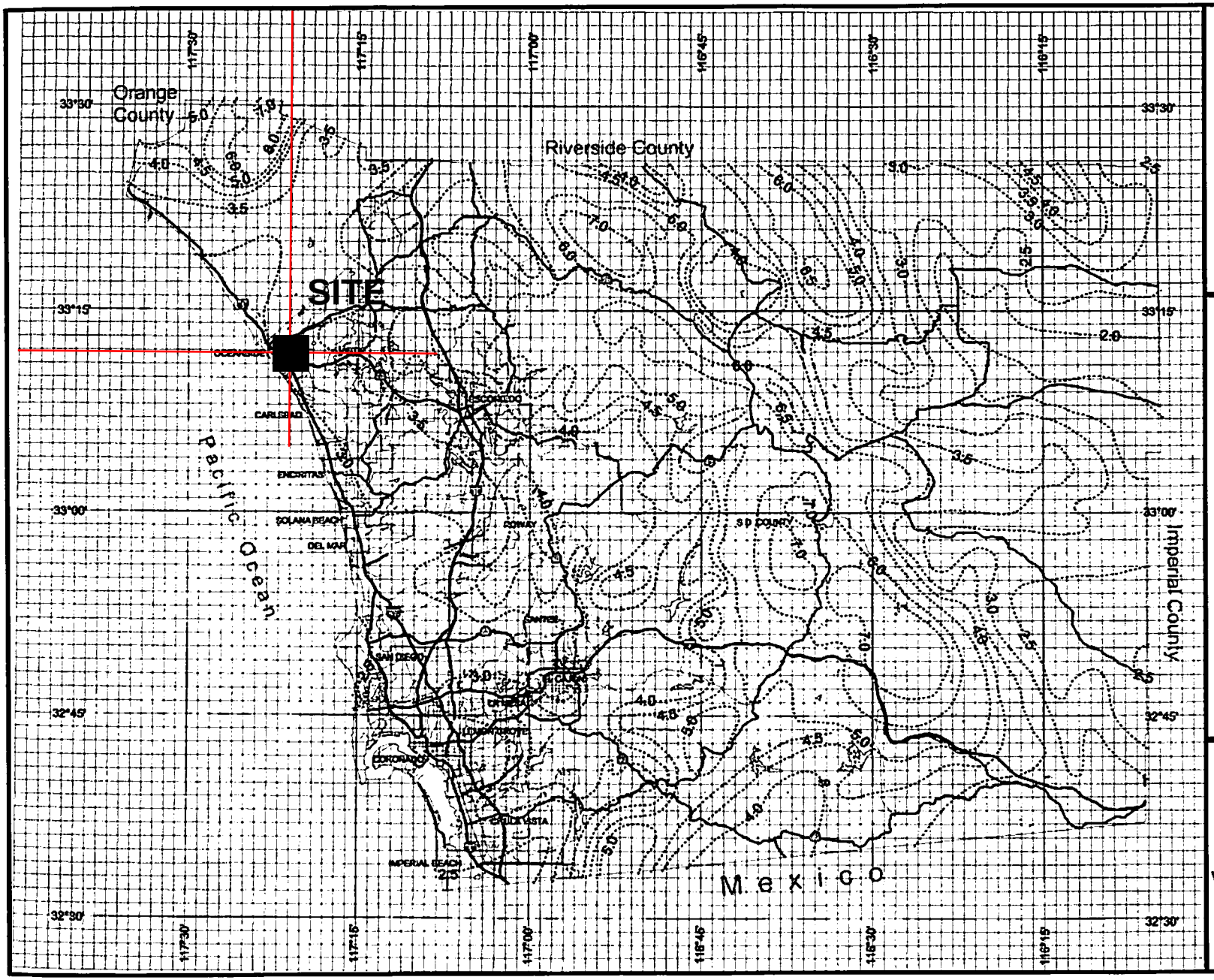
N W E S

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials



10 Year Rainfall Event - 24 Hours

Isopluvial (inches)

DPW GIS

SanGIS

N W E S

3 0 3 Miles

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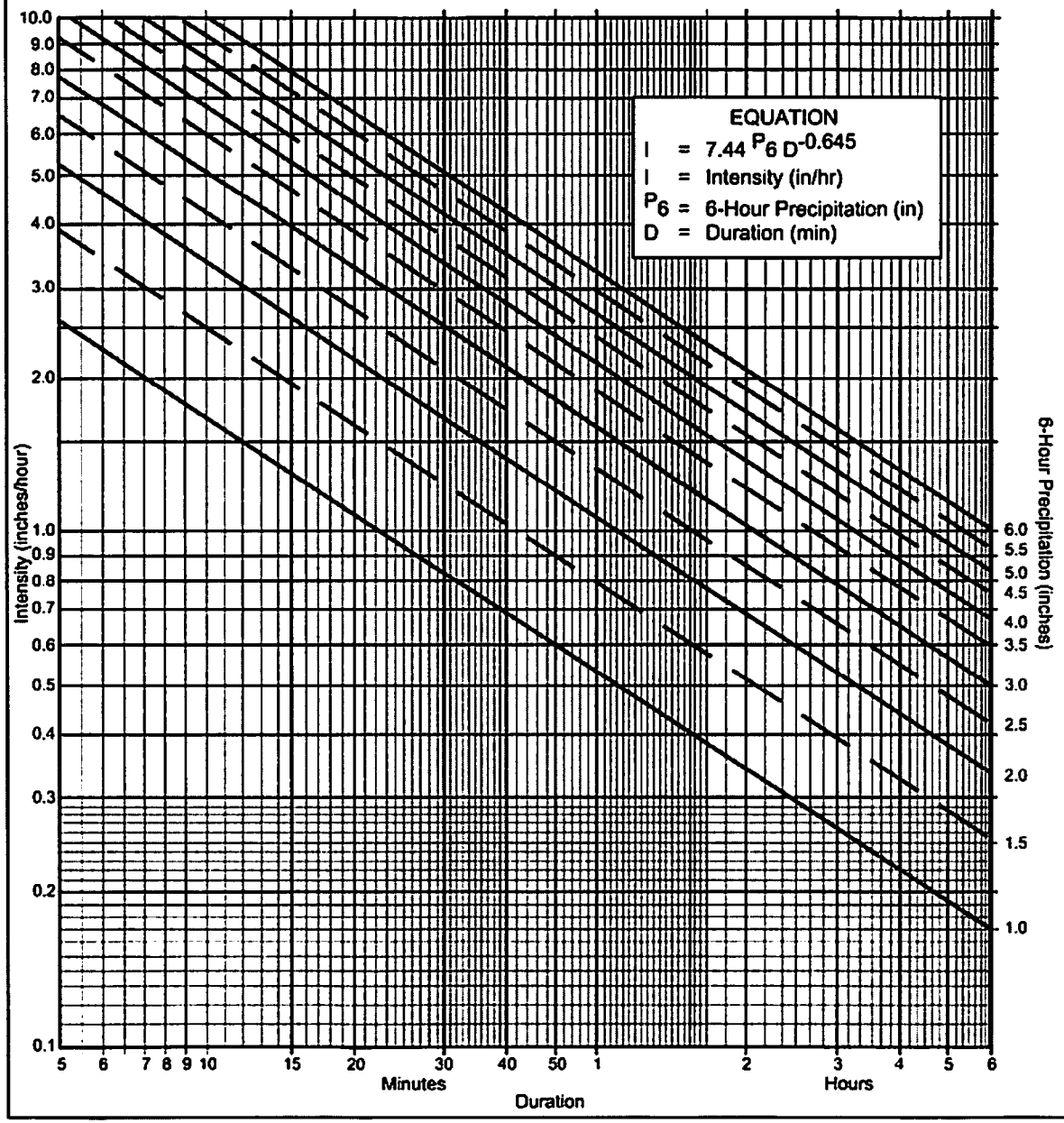
A-5

INTENSITY - DURATION DESIGN CHARTS (100-YEAR)



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 2.63 in., P_{24} = 5.05, $\frac{P_6}{P_{24}}$ = 52 %(2)

(c) Adjusted P_6(2) = 2.63 in.

(d) t_x = _____ min.

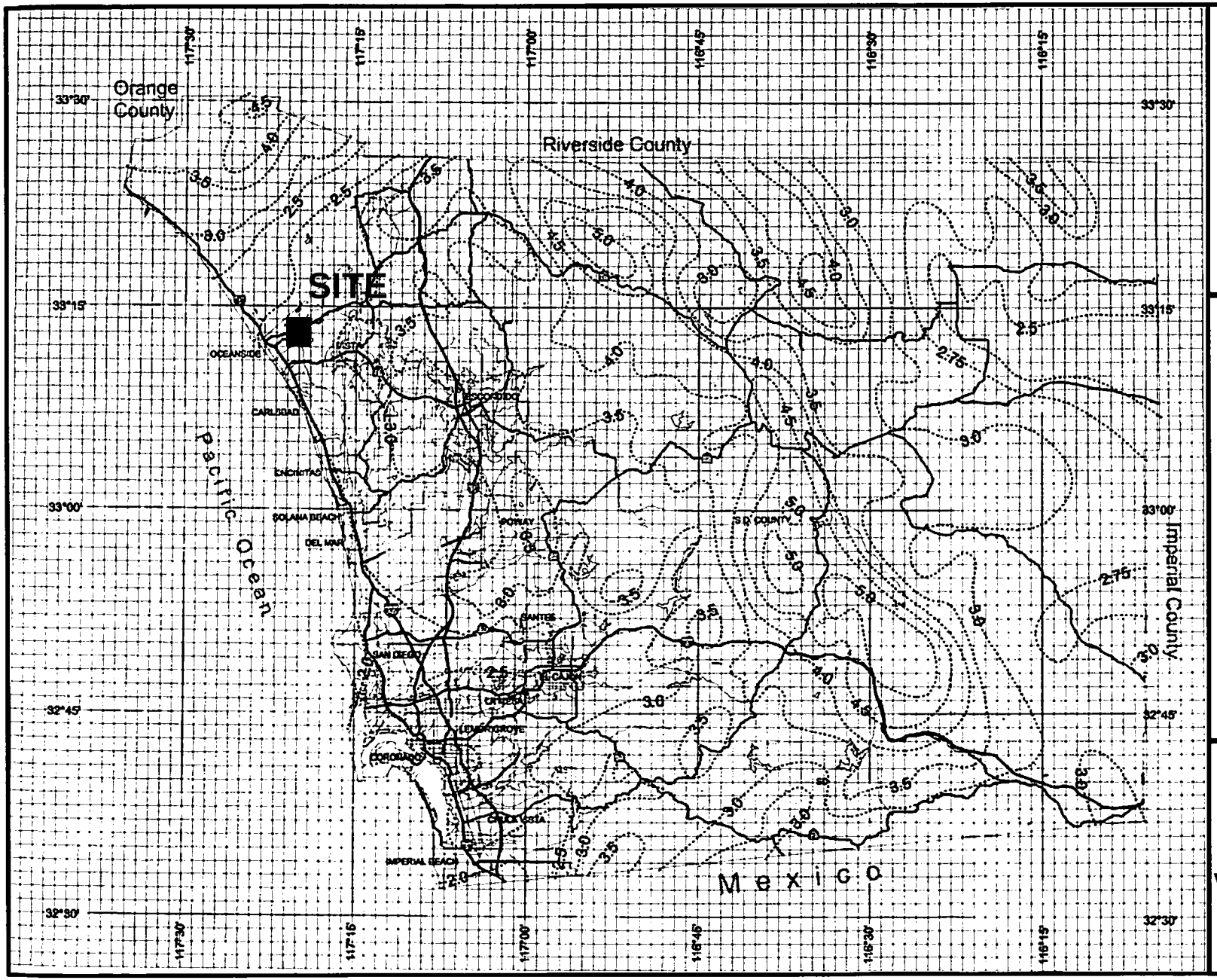
(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6 / Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

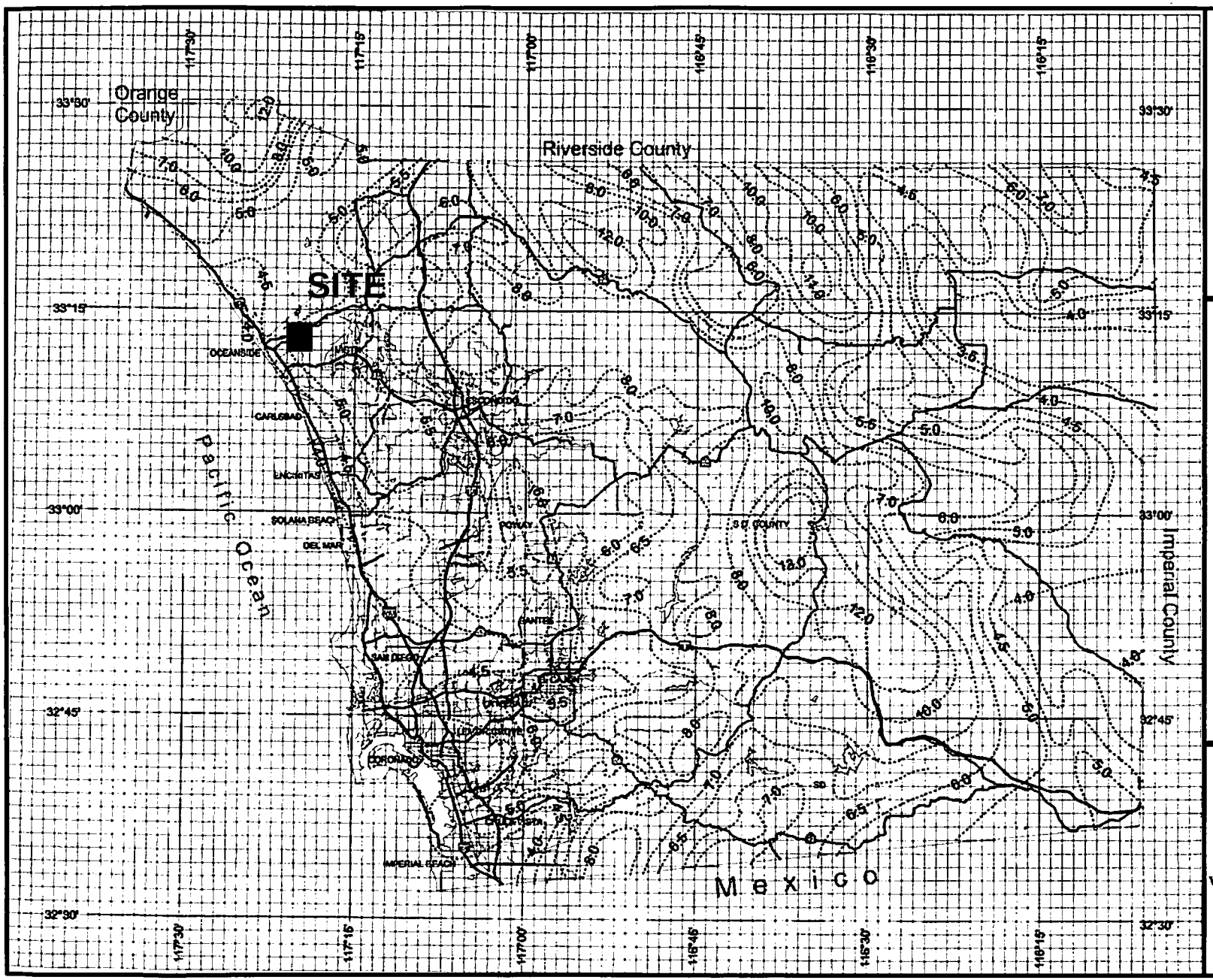
Isopluvial (inches)

DPW GIS

SanGIS

N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

DPW GIS

SanGIS

N

W E

S

3 0 3 Miles

A – 6

RATIONAL METHOD HYDROLOGY
ONSITE PRE-CONDITION
Q-2, 10 & 100 YEAR ANALYSIS

(SEE MAP EXHIBIT A)

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2012 Advanced Engineering Software (aes)
              Ver. 17.5 Release Date: 07/05/2012  License ID 1463

                              Analysis prepared by:

                            Buccola Engineering, Inc.
                            3142 Vista Way, Suite 301
                               Oceanside, CA 92056
                                  (760) 721-2000

 ************************** DESCRIPTION OF STUDY **************************
* Sandpiper Villa - Preliminary Hydrology Report                           *
* Pre-Development Condition Rational Method for 2-Year Storm Event         *
*                                                                          *
 **************************************************************************

  FILE NAME: G:\1664\EX2.DAT
  TIME/DATE OF STUDY: 16:56 01/04/2017
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =   2.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  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    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    160.10
  DOWNSTREAM ELEVATION(FEET) =    156.50
  ELEVATION DIFFERENCE(FEET) =      3.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.517
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.431
```

```
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    156.50  DOWNSTREAM(FEET) =    151.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =  0.0162
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.810
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.30
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   4.35
  Tc(MIN.) =   11.87
  SUBAREA AREA(ACRES) =     1.48       SUBAREA RUNOFF(CFS) =    1.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =        1.6         PEAK FLOW RATE(CFS) =       1.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   1.59
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =   11.87
  RAINFALL INTENSITY(INCH/HR) =   1.81
  TOTAL STREAM AREA(ACRES) =     1.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.35

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   128.00
  UPSTREAM ELEVATION(FEET) =    156.50
  DOWNSTREAM ELEVATION(FEET) =    155.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.789
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    61.25
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.050
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.18

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

```
 FLOW PROCESS FROM NODE    501.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    155.50  DOWNSTREAM(FEET) =    151.10
 CHANNEL LENGTH THRU SUBAREA(FEET) =   220.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  50.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.553
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  84
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.25
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.70
 AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   5.26
 Tc(MIN.) =   15.05
 SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.14
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
 TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.28

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   0.77
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    104.00 =     348.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =   15.05
 RAINFALL INTENSITY(INCH/HR) =   1.55
 TOTAL STREAM AREA(ACRES) =     0.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.28

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.35    11.87        1.810          1.62
     2        0.28    15.05        1.553          0.39

 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        1.57    11.87       1.810
     2        1.44    15.05       1.553

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       1.57   Tc(MIN.) =   11.87
 TOTAL AREA(ACRES) =        2.0
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     440.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        2.0  TC(MIN.) =     11.87
 PEAK FLOW RATE(CFS)   =       1.57
============================================================================
============================================================================
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. 17.5 Release Date: 07/05/2012  License ID 1463

                              Analysis prepared by:

                            Buccola Engineering, Inc.
                            3142 Vista Way, Suite 301
                               Oceanside, CA 92056
                                  (760) 721-2000

 ************************** DESCRIPTION OF STUDY **************************
* Sandpiper Villa - Preliminary Hydrology Report                           *
* Pre-Development Condition Rational Method for 10-Year Storm Event        *
*                                                                          *
 **************************************************************************

  FILE NAME: G:\1664\EX10.DAT
  TIME/DATE OF STUDY: 16:55 01/04/2017
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.700
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  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    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    160.10
  DOWNSTREAM ELEVATION(FEET) =    156.50
  ELEVATION DIFFERENCE(FEET) =      3.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.517
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.443
```

```
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    156.50  DOWNSTREAM(FEET) =    151.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =  0.0162
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.655
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.52
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   3.73
  Tc(MIN.) =   11.25
  SUBAREA AREA(ACRES) =     1.48       SUBAREA RUNOFF(CFS) =    1.81
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =        1.6         PEAK FLOW RATE(CFS) =       1.98

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   1.86
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =   11.25
  RAINFALL INTENSITY(INCH/HR) =   2.66
  TOTAL STREAM AREA(ACRES) =     1.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.98

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   128.00
  UPSTREAM ELEVATION(FEET) =    156.50
  DOWNSTREAM ELEVATION(FEET) =    155.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.789
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    61.25
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.904
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.25

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

```
 FLOW PROCESS FROM NODE    501.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    155.50  DOWNSTREAM(FEET) =    151.10
 CHANNEL LENGTH THRU SUBAREA(FEET) =   220.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  50.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.277
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  84
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.36
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.82
 AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   4.49
 Tc(MIN.) =   14.28
 SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.21
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
 TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.41

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   0.89
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    104.00 =     348.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =   14.28
 RAINFALL INTENSITY(INCH/HR) =   2.28
 TOTAL STREAM AREA(ACRES) =     0.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.41

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.98    11.25        2.655          1.62
     2        0.41    14.28        2.277          0.39

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        2.31    11.25       2.655
     2        2.11    14.28       2.277

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.31   Tc(MIN.) =   11.25
 TOTAL AREA(ACRES) =        2.0
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     440.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        2.0  TC(MIN.) =     11.25
 PEAK FLOW RATE(CFS)   =       2.31
============================================================================
============================================================================
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2012 Advanced Engineering Software (aes)
              Ver. 17.5 Release Date: 07/05/2012  License ID 1463

                              Analysis prepared by:

                            Buccola Engineering, Inc.
                            3142 Vista Way, Suite 301
                               Oceanside, CA 92056
                                  (760) 721-2000

 ************************** DESCRIPTION OF STUDY **************************
* Sandpiper Villa - Preliminary Hydrology Report                          *
* Pre-Development Condition Rational Method for 100-Year Storm Event      *
*                                                                         *
 *************************************************************************

  FILE NAME: G:\1664\EX100.DAT
  TIME/DATE OF STUDY: 16:14 01/04/2017
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.700
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  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    102.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    160.10
  DOWNSTREAM ELEVATION(FEET) =    156.50
  ELEVATION DIFFERENCE(FEET) =      3.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.517
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.469
```

```
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.36

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    156.50  DOWNSTREAM(FEET) =    151.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =  0.0162
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.354
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.78
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   3.19
  Tc(MIN.) =   10.70
  SUBAREA AREA(ACRES) =     1.48       SUBAREA RUNOFF(CFS) =    2.97
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =        1.6         PEAK FLOW RATE(CFS) =       3.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =   2.18
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.70
  RAINFALL INTENSITY(INCH/HR) =   4.35
  TOTAL STREAM AREA(ACRES) =     1.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.26

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   128.00
  UPSTREAM ELEVATION(FEET) =    156.50
  DOWNSTREAM ELEVATION(FEET) =    155.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.789
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    61.25
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.612
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.40

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

```
 FLOW PROCESS FROM NODE    501.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    155.50  DOWNSTREAM(FEET) =    151.10
 CHANNEL LENGTH THRU SUBAREA(FEET) =   220.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  50.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.713
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  84
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.57
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.94
 AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   3.91
 Tc(MIN.) =   13.70
 SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.34
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
 TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.67

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   1.05
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    104.00 =     348.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =   13.70
 RAINFALL INTENSITY(INCH/HR) =   3.71
 TOTAL STREAM AREA(ACRES) =     0.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.67

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        3.26    10.70        4.354          1.63
     2        0.67    13.70        3.713          0.39

 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        3.78    10.70       4.354
     2        3.45    13.70       3.713

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       3.78   Tc(MIN.) =   10.70
 TOTAL AREA(ACRES) =        2.0
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     440.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        2.0  TC(MIN.) =     10.70
 PEAK FLOW RATE(CFS)   =       3.78
============================================================================
============================================================================
```

A – 7

RATIONAL METHOD HYDROLOGY
ONSITE POST CONDITION
Q- 2, 10 & 100 YEAR
ANALYSIS

(SEE MAP EXHIBIT B)

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2012 Advanced Engineering Software (aes)
              Ver. 17.5 Release Date: 07/05/2012  License ID 1463

                              Analysis prepared by:

                            Buccola Engineering, Inc.
                            3142 Vista Way, Suite 301
                               Oceanside, CA 92056
                                  (760) 721-2000

 ************************** DESCRIPTION OF STUDY **************************
* Sandpiper Villa - Preliminary Hydrology Report                           *
* Post-Development Condition Rational Method for 2-Year Storm Event        *
*                                                                          *
 **************************************************************************

  FILE NAME: G:\1664\P2.DAT
  TIME/DATE OF STUDY: 16:13 01/12/2017
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =   2.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.760
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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<<<<<
==========================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    153.10
  DOWNSTREAM ELEVATION(FEET) =    152.50
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.741
```

```
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   151.80  DOWNSTREAM(FEET) =   151.56
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.05
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.14
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    5.03
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =      95.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.151
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.19
  TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.34
  TC(MIN.) =    5.03

****************************************************************************
  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) =   151.56  DOWNSTREAM(FEET) =   151.38
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.41
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.34
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    5.22
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     123.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.076
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.15   SUBAREA RUNOFF(CFS) =    0.35
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.68
```

```
 TC(MIN.) =    5.22

****************************************************************************
 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) =   151.38  DOWNSTREAM(FEET) =   150.81
 FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.64
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.68
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    5.44
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     171.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.995
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.07
 TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.73
 TC(MIN.) =    5.44

****************************************************************************
 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) =   150.81  DOWNSTREAM(FEET) =   149.90
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.37
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.73
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    5.61
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     216.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.61
 RAINFALL INTENSITY(INCH/HR) =   2.94
 TOTAL STREAM AREA(ACRES) =     0.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.73

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    153.10
  DOWNSTREAM ELEVATION(FEET) =    152.20
  ELEVATION DIFFERENCE(FEET) =      0.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.934
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.07
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.07

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.08   RAIN INTENSITY(INCH/HOUR) =  3.13
  TOTAL AREA(ACRES) =     0.03   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   151.20  DOWNSTREAM(FEET) =   150.80
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.84
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.10
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    5.58
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     145.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.947
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8617
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.13
  TOTAL AREA(ACRES) =       0.1   TOTAL RUNOFF(CFS) =       0.23
  TC(MIN.) =    5.58

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.947
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8304
  SUBAREA AREA(ACRES) =    0.04   SUBAREA RUNOFF(CFS) =    0.09
  TOTAL AREA(ACRES) =       0.1   TOTAL RUNOFF(CFS) =       0.32
  TC(MIN.) =    5.58

****************************************************************************
  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) =   150.80  DOWNSTREAM(FEET) =   150.25
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.84
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.32
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    5.90
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.842
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8058
  SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.15
  TOTAL AREA(ACRES) =       0.2   TOTAL RUNOFF(CFS) =       0.46
  TC(MIN.) =    5.90

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.842
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7998
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.06
  TOTAL AREA(ACRES) =       0.2   TOTAL RUNOFF(CFS) =       0.52
  TC(MIN.) =    5.90

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 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) =   150.25  DOWNSTREAM(FEET) =   149.90
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.08
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.52
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    6.09
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    105.00 =     235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.09
  RAINFALL INTENSITY(INCH/HR) =   2.78
  TOTAL STREAM AREA(ACRES) =     0.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.52

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.73     5.61        2.935          0.32
      2        0.52     6.09        2.785          0.23

  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        1.21     5.61       2.935
      2        1.21     6.09       2.785

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.21   Tc(MIN.) =    6.09
  TOTAL AREA(ACRES) =        0.6
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    105.00 =     235.00 FEET.

****************************************************************************
  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) =   149.90  DOWNSTREAM(FEET) =   149.30
  FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.29
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.21
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    6.27
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    106.00 =     283.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.27
```

```
 RAINFALL INTENSITY(INCH/HR) =   2.73
 TOTAL STREAM AREA(ACRES) =     0.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.21

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
 UPSTREAM ELEVATION(FEET) =    153.00
 DOWNSTREAM ELEVATION(FEET) =    152.75
 ELEVATION DIFFERENCE(FEET) =      0.25
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.994
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.10
 TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =   5.14   RAIN INTENSITY(INCH/HOUR) =  3.11
 TOTAL AREA(ACRES) =     0.04   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  152.75  DOWNSTREAM ELEVATION(FEET) =  152.26
 STREET LENGTH(FEET) =    82.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.25
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.20
   HALFSTREET FLOOD WIDTH(FEET) =    2.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.68
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.33
 STREET FLOW TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =    5.96
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.825
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.770
  SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.30
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   2.72
  FLOW VELOCITY(FEET/SEC.) =  1.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.32
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    106.00 =     127.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.96
  RAINFALL INTENSITY(INCH/HR) =   2.82
  TOTAL STREAM AREA(ACRES) =     0.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.39

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.21     6.27        2.731          0.55
      2        0.39     5.96        2.825          0.18

  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        1.57     5.96       2.825
      2        1.59     6.27       2.731

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.59   Tc(MIN.) =    6.27
  TOTAL AREA(ACRES) =        0.7
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    106.00 =     283.00 FEET.

****************************************************************************
  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) =   148.00  DOWNSTREAM(FEET) =   147.50
  FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.49
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.59
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.32
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    107.00 =     299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    57.00
 UPSTREAM ELEVATION(FEET) =    156.10
 DOWNSTREAM ELEVATION(FEET) =    153.90
 ELEVATION DIFFERENCE(FEET) =      2.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.946
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.13
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.13

**************************************************************************
 FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  91
--------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION(FEET) =    153.90
 DOWNSTREAM NODE ELEVATION(FEET) =    153.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    58.00
 "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.030   MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.03500
 MAXIMUM DEPTH(FEET) =   0.20
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.29
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.75
 AVERAGE FLOW DEPTH(FEET) =   0.08   FLOOD WIDTH(FEET) =    3.05
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.55   Tc(MIN.) =    3.50
 SUBAREA AREA(ACRES) =    0.14       SUBAREA RUNOFF(CFS) =    0.32
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
 TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.46

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.10   FLOOD WIDTH(FEET) =    3.91
 FLOW VELOCITY(FEET/SEC.) =   2.07   DEPTH*VELOCITY(FT*FT/SEC) =   0.20
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =     115.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    502.00 TO NODE    503.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   151.10  DOWNSTREAM(FEET) =   150.70
 FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.54
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.46
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    3.94
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    503.00 =     182.00 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    503.00 TO NODE    503.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.06
 TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       0.52
 TC(MIN.) =    3.94

**************************************************************************
 FLOW PROCESS FROM NODE    503.00 TO NODE    504.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   150.70  DOWNSTREAM(FEET) =   150.50
 FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.56
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.52
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    4.17
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    504.00 =     218.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    504.00 TO NODE    504.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.17
 TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.68
 TC(MIN.) =    4.17

**************************************************************************
 FLOW PROCESS FROM NODE    504.00 TO NODE    504.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.13
 TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.82
 TC(MIN.) =    4.17

**************************************************************************
 FLOW PROCESS FROM NODE    504.00 TO NODE    505.00 IS CODE =  31
--------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.50  DOWNSTREAM(FEET) =   150.20
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.84
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.82
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    4.49
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    505.00 =     273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.18
  TOTAL AREA(ACRES) =       0.4   TOTAL RUNOFF(CFS) =       1.00
  TC(MIN.) =    4.49

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.07
  TOTAL AREA(ACRES) =       0.4   TOTAL RUNOFF(CFS) =       1.07
  TC(MIN.) =    4.49

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    506.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.20  DOWNSTREAM(FEET) =   149.30
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.91
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.07
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    4.86
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    506.00 =     358.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    506.00 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.) =    4.86
 RAINFALL INTENSITY(INCH/HR) =   3.16
 TOTAL STREAM AREA(ACRES) =     0.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.07

****************************************************************************
 FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
 UPSTREAM ELEVATION(FEET) =    153.00
 DOWNSTREAM ELEVATION(FEET) =    152.75
 ELEVATION DIFFERENCE(FEET) =      0.25
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.994
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE    601.00 TO NODE    506.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  152.75  DOWNSTREAM ELEVATION(FEET) =  152.26
 STREET LENGTH(FEET) =    81.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.30
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.20
   HALFSTREET FLOOD WIDTH(FEET) =    2.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.69
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.33
 STREET FLOW TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =    5.79
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.875
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
 SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.29
 TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.44

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   3.53
 FLOW VELOCITY(FEET/SEC.) =  1.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.32
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    506.00 =     126.00 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    506.00 TO NODE    506.00 IS CODE =   1
--------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.79
 RAINFALL INTENSITY(INCH/HR) =   2.88
 TOTAL STREAM AREA(ACRES) =     0.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.44

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.07     4.86        3.162          0.45
     2        0.44     5.79        2.875          0.20

 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        1.44     4.86       3.162
     2        1.41     5.79       2.875

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       1.44   Tc(MIN.) =    4.86
 TOTAL AREA(ACRES) =        0.6
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    506.00 =     358.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    506.00 TO NODE    507.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   148.00  DOWNSTREAM(FEET) =   147.50
 FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.33
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.44
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    4.90
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    507.00 =     374.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    507.00 TO NODE    107.00 IS CODE =  11
--------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        1.44     4.90       3.162        0.65
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    107.00 =     374.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
```

```
    1        1.59     6.32        2.720        0.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    107.00 =     299.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       2.67       4.90        3.162
      2       2.83       6.32        2.720

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.83   Tc(MIN.) =    6.32
  TOTAL AREA(ACRES) =        1.4

****************************************************************************
  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) =   147.50  DOWNSTREAM(FEET) =   146.40
  FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.07
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.83
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    6.63
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    108.00 =     471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.63
  RAINFALL INTENSITY(INCH/HR) =   2.63
  TOTAL STREAM AREA(ACRES) =     1.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.83

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    152.40
  DOWNSTREAM ELEVATION(FEET) =    151.70
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.07
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.07

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

```
 FLOW PROCESS FROM NODE    701.00 TO NODE    701.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.16
 TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.23
 TC(MIN.) =    4.97

****************************************************************************
 FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   150.60  DOWNSTREAM(FEET) =   150.18
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   1.93
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.23
 PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =    5.75
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =     165.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    702.00 TO NODE    702.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.890
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.12
 TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       0.33
 TC(MIN.) =    5.75

****************************************************************************
 FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   150.18  DOWNSTREAM(FEET) =   149.90
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.19
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.33
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =    6.17
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    703.00 =     220.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    703.00 TO NODE    704.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.60  DOWNSTREAM(FEET) =   147.13
  FLOW LENGTH(FEET) =    14.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.78
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.33
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.20
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    704.00 =     234.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    704.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.752
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.16   SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.64
  TC(MIN.) =    6.20

****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    705.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   147.13  DOWNSTREAM(FEET) =   146.40
  FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.62
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.64
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.23
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    705.00 =     246.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    705.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.23
  RAINFALL INTENSITY(INCH/HR) =   2.74
  TOTAL STREAM AREA(ACRES) =     0.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.64

****************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    801.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    152.40
  DOWNSTREAM ELEVATION(FEET) =    151.70
  ELEVATION DIFFERENCE(FEET) =      0.70
```

```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.07
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.07

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    801.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.162
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.13
  TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.20
  TC(MIN.) =    4.97

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    802.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.60  DOWNSTREAM(FEET) =   150.15
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.94
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.20
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =    5.74
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    802.00 =     165.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    802.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.891
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.14
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       0.33
  TC(MIN.) =    5.74

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.15  DOWNSTREAM(FEET) =   149.90
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.6 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.05
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.33
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    6.19
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    803.00 =     220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    804.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.60  DOWNSTREAM(FEET) =   147.13
  FLOW LENGTH(FEET) =    14.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.79
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.33
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.22
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    804.00 =     234.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    804.00 TO NODE    804.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.745
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.16   SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.64
  TC(MIN.) =    6.22

****************************************************************************
  FLOW PROCESS FROM NODE    804.00 TO NODE    805.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   147.13  DOWNSTREAM(FEET) =   146.40
  FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.60
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.64
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.25
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    805.00 =     246.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    805.00 TO NODE    705.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.25
  RAINFALL INTENSITY(INCH/HR) =   2.74
  TOTAL STREAM AREA(ACRES) =     0.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.64
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.83     6.63        2.635          1.38
      2        0.64     6.23        2.743          0.31
      3        0.64     6.25        2.736          0.31

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        3.93     6.23       2.743
      2        3.94     6.25       2.736
      3        4.05     6.63       2.635

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.05   Tc(MIN.) =    6.63
  TOTAL AREA(ACRES) =        2.0
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    705.00 =     471.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.0  TC(MIN.) =      6.63
  PEAK FLOW RATE(CFS)   =       4.05
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2012 Advanced Engineering Software (aes)
              Ver. 17.5 Release Date: 07/05/2012  License ID 1463

                              Analysis prepared by:

                            Buccola Engineering, Inc.
                            3142 Vista Way, Suite 301
                               Oceanside, CA 92056
                                  (760) 721-2000

 ************************** DESCRIPTION OF STUDY **************************
* Sandpiper Villa - Preliminary Hydrology Report                           *
* Post-Development Condition Rational Method for 10-Year Storm Event       *
*                                                                          *
 **************************************************************************

  FILE NAME: G:\1664\P10.DAT
  TIME/DATE OF STUDY: 16:14 01/12/2017
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.700
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.760
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  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<<<<<
==========================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    153.10
  DOWNSTREAM ELEVATION(FEET) =    152.50
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.741
```

```
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.20
 TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   151.80  DOWNSTREAM(FEET) =   151.56
 FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.22
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.20
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    5.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =      95.00 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) =  4.477
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.27
 TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.48
 TC(MIN.) =    5.00

****************************************************************************
 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) =   151.56  DOWNSTREAM(FEET) =   151.38
 FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.65
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.48
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    5.18
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     123.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.378
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.15   SUBAREA RUNOFF(CFS) =    0.50
 TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.96
```

```
 TC(MIN.) =    5.18

****************************************************************************
 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) =   151.38  DOWNSTREAM(FEET) =   150.81
 FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.99
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.96
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    5.38
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     171.00 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) =  4.272
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.10
 TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       1.04
 TC(MIN.) =    5.38

****************************************************************************
 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) =   150.81  DOWNSTREAM(FEET) =   149.90
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.96
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.04
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    5.53
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     216.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.53
 RAINFALL INTENSITY(INCH/HR) =   4.20
 TOTAL STREAM AREA(ACRES) =     0.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.04

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    153.10
  DOWNSTREAM ELEVATION(FEET) =    152.20
  ELEVATION DIFFERENCE(FEET) =      0.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.934
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.08   RAIN INTENSITY(INCH/HOUR) =  4.43
  TOTAL AREA(ACRES) =     0.03   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   151.20  DOWNSTREAM(FEET) =   150.80
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.84
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.10
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    5.58
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     145.00 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) =  4.175
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7573
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.19
  TOTAL AREA(ACRES) =       0.1   TOTAL RUNOFF(CFS) =      0.28
  TC(MIN.) =    5.58

****************************************************************************
  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) =  4.175
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7581
  SUBAREA AREA(ACRES) =    0.04   SUBAREA RUNOFF(CFS) =    0.13
  TOTAL AREA(ACRES) =       0.1   TOTAL RUNOFF(CFS) =       0.41
  TC(MIN.) =    5.58

****************************************************************************
  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) =   150.80  DOWNSTREAM(FEET) =   150.25
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.00
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.41
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    5.88
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.034
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7588
  SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.21
  TOTAL AREA(ACRES) =       0.2   TOTAL RUNOFF(CFS) =       0.61
  TC(MIN.) =    5.88

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.034
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7589
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.09
  TOTAL AREA(ACRES) =       0.2   TOTAL RUNOFF(CFS) =       0.70
  TC(MIN.) =    5.88

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 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) =   150.25  DOWNSTREAM(FEET) =   149.90
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.44
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.70
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    6.05
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    105.00 =     235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.05
  RAINFALL INTENSITY(INCH/HR) =   3.96
  TOTAL STREAM AREA(ACRES) =     0.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.70

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.04     5.53        4.197          0.32
      2        0.70     6.05        3.961          0.23

  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        1.68     5.53       4.197
      2        1.68     6.05       3.961

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.68   Tc(MIN.) =    6.05
  TOTAL AREA(ACRES) =        0.6
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    105.00 =     235.00 FEET.

****************************************************************************
  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) =   149.90  DOWNSTREAM(FEET) =   149.30
  FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.53
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.68
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    6.23
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    106.00 =     283.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.23
```

```
 RAINFALL INTENSITY(INCH/HR) =   3.89
 TOTAL STREAM AREA(ACRES) =     0.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.68

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
 UPSTREAM ELEVATION(FEET) =    153.00
 DOWNSTREAM ELEVATION(FEET) =    152.75
 ELEVATION DIFFERENCE(FEET) =      0.25
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.994
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.14
 TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  152.75  DOWNSTREAM ELEVATION(FEET) =  152.26
 STREET LENGTH(FEET) =    82.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.35
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.20
   HALFSTREET FLOOD WIDTH(FEET) =    2.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.68
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.33
 STREET FLOW TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =    5.81
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.066
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
 SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.43
 TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.56

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   4.78
 FLOW VELOCITY(FEET/SEC.) =  1.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.35
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    106.00 =     127.00 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1
--------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.81
 RAINFALL INTENSITY(INCH/HR) =   4.07
 TOTAL STREAM AREA(ACRES) =     0.18
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.56

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.68     6.23        3.888          0.55
     2        0.56     5.81        4.066          0.18

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        2.17     5.81       4.066
     2        2.22     6.23       3.888

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.22   Tc(MIN.) =    6.23
 TOTAL AREA(ACRES) =        0.7
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    106.00 =     283.00 FEET.

**************************************************************************
 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) =   148.00  DOWNSTREAM(FEET) =   147.50
 FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.99
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.22
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.27
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    107.00 =     299.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  10
--------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    57.00
```

```
  UPSTREAM ELEVATION(FEET) =    156.10
  DOWNSTREAM ELEVATION(FEET) =    153.90
  ELEVATION DIFFERENCE(FEET) =      2.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.946
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    153.90
  DOWNSTREAM NODE ELEVATION(FEET) =    153.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    58.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.030   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.03500
  MAXIMUM DEPTH(FEET) =   0.20
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.03
  AVERAGE FLOW DEPTH(FEET) =   0.09   FLOOD WIDTH(FEET) =    3.70
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =    3.42
  SUBAREA AREA(ACRES) =    0.14       SUBAREA RUNOFF(CFS) =    0.46
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.65

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOOD WIDTH(FEET) =    4.88
  FLOW VELOCITY(FEET/SEC.) =   2.20   DEPTH*VELOCITY(FT*FT/SEC) =   0.25
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =     115.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    503.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   151.10  DOWNSTREAM(FEET) =   150.70
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.79
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.65
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    3.82
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    503.00 =     182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    503.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
```

```
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.09
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       0.73
  TC(MIN.) =    3.82

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    504.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.70  DOWNSTREAM(FEET) =   150.50
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.80
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.73
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    4.04
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    504.00 =     218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    504.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.24
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.97
  TC(MIN.) =    4.04

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    504.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.19
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       1.16
  TC(MIN.) =    4.04

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    505.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.50  DOWNSTREAM(FEET) =   150.20
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.00
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.16
```

```
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    4.34
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    505.00 =     273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.26
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       1.41
  TC(MIN.) =    4.34

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.10
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       1.51
  TC(MIN.) =    4.34

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    506.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.20  DOWNSTREAM(FEET) =   149.30
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.15
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.51
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    4.68
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    506.00 =     358.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    506.00 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.) =    4.68
  RAINFALL INTENSITY(INCH/HR) =   4.48
  TOTAL STREAM AREA(ACRES) =     0.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.51

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
  UPSTREAM ELEVATION(FEET) =    153.00
  DOWNSTREAM ELEVATION(FEET) =    152.75
  ELEVATION DIFFERENCE(FEET) =      0.25
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.994
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    506.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  152.75  DOWNSTREAM ELEVATION(FEET) =  152.26
  STREET LENGTH(FEET) =    81.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    3.34
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.32
  STREET FLOW TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =    5.92
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.016
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
  SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.41
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   5.16
  FLOW VELOCITY(FEET/SEC.) =  1.42   DEPTH*VELOCITY(FT*FT/SEC.) =   0.36
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    506.00 =     126.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    506.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.92
```

```
 RAINFALL INTENSITY(INCH/HR) =   4.02
 TOTAL STREAM AREA(ACRES) =     0.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.61

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.51     4.68        4.479          0.45
     2        0.61     5.92        4.016          0.20

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        2.00     4.68       4.479
     2        1.97     5.92       4.016

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.00   Tc(MIN.) =    4.68
 TOTAL AREA(ACRES) =        0.6
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    506.00 =     358.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    506.00 TO NODE    507.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   148.00  DOWNSTREAM(FEET) =   147.50
 FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.00
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    4.72
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    507.00 =     374.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    507.00 TO NODE    107.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        2.00     4.72       4.479         0.65
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    107.00 =     374.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        2.22     6.27       3.872         0.73
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    107.00 =     299.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1       3.67       4.72       4.479
     2       3.94       6.27       3.872
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       3.94   Tc(MIN.) =    6.27
 TOTAL AREA(ACRES) =        1.4

****************************************************************************
 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) =   147.50  DOWNSTREAM(FEET) =   146.40
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.57
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.94
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    6.56
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    108.00 =     471.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.56
 RAINFALL INTENSITY(INCH/HR) =   3.76
 TOTAL STREAM AREA(ACRES) =     1.38
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.94

****************************************************************************
 FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    152.40
 DOWNSTREAM ELEVATION(FEET) =    151.70
 ELEVATION DIFFERENCE(FEET) =      0.70
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.10
 TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
 FLOW PROCESS FROM NODE    701.00 TO NODE    701.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
```

```
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.22
 TOTAL AREA(ACRES) =       0.1   TOTAL RUNOFF(CFS) =       0.32
 TC(MIN.) =    4.97

****************************************************************************
 FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   150.60  DOWNSTREAM(FEET) =   150.18
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.10
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.32
 PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =    5.68
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =     165.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    702.00 TO NODE    702.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.123
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.17
 TOTAL AREA(ACRES) =       0.2   TOTAL RUNOFF(CFS) =       0.47
 TC(MIN.) =    5.68

****************************************************************************
 FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   150.18  DOWNSTREAM(FEET) =   149.90
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.42
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.47
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    6.06
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    703.00 =     220.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    703.00 TO NODE    704.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   148.60  DOWNSTREAM(FEET) =   147.13
 FLOW LENGTH(FEET) =    14.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.45
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.47
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.10
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    704.00 =     234.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    704.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.942
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.16   SUBAREA RUNOFF(CFS) =    0.46
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.91
  TC(MIN.) =    6.10

****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    705.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   147.13  DOWNSTREAM(FEET) =   146.40
  FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.20
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.91
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.12
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    705.00 =     246.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    705.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.12
  RAINFALL INTENSITY(INCH/HR) =   3.93
  TOTAL STREAM AREA(ACRES) =     0.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.91

****************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    801.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    152.40
  DOWNSTREAM ELEVATION(FEET) =    151.70
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.10
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    801.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.19
  TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.29
  TC(MIN.) =    4.97

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    802.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.60  DOWNSTREAM(FEET) =   150.15
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.14
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.29
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =    5.67
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    802.00 =     165.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    802.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.130
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.20
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       0.47
  TC(MIN.) =    5.67

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.15  DOWNSTREAM(FEET) =   149.90
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.33
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.47
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    6.06
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    803.00 =     220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    804.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.60  DOWNSTREAM(FEET) =   147.13
  FLOW LENGTH(FEET) =    14.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.46
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.47
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.10
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    804.00 =     234.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    804.00 TO NODE    804.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.942
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.16   SUBAREA RUNOFF(CFS) =    0.46
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.91
  TC(MIN.) =    6.10

****************************************************************************
  FLOW PROCESS FROM NODE    804.00 TO NODE    805.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   147.13  DOWNSTREAM(FEET) =   146.40
  FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.20
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.91
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.12
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    805.00 =     246.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    805.00 TO NODE    705.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.12
  RAINFALL INTENSITY(INCH/HR) =   3.93
  TOTAL STREAM AREA(ACRES) =     0.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.91

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.94     6.56        3.761          1.38
      2        0.91     6.12        3.930          0.31
      3        0.91     6.12        3.930          0.31

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.
```

```
  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.51     6.12       3.930
      2        5.51     6.12       3.930
      3        5.69     6.56       3.761

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.69   Tc(MIN.) =    6.56
  TOTAL AREA(ACRES) =        2.0
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    705.00 =     471.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.0  TC(MIN.) =      6.56
  PEAK FLOW RATE(CFS)   =       5.69
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2012 Advanced Engineering Software (aes)
              Ver. 17.5 Release Date: 07/05/2012  License ID 1463

                              Analysis prepared by:

                            Buccola Engineering, Inc.
                            3142 Vista Way, Suite 301
                               Oceanside, CA 92056
                                  (760) 721-2000

 ************************** DESCRIPTION OF STUDY **************************
* Sandpiper Villa - Preliminary Hydrology Report                           *
* Post-Development Condition Rational Method for 100-Year Storm Event      *
*                                                                          *
 **************************************************************************

  FILE NAME: G:\1664\P100.DAT
  TIME/DATE OF STUDY: 16:08 01/12/2017
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.700
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.760
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  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<<<<<
==========================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    153.10
  DOWNSTREAM ELEVATION(FEET) =    152.50
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.741
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.32
TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   151.80  DOWNSTREAM(FEET) =   151.56
FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   2.48
ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       0.32
PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    4.98
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =      95.00 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) =  7.114
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
*USER SPECIFIED(GLOBAL):
RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  88
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.43
TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.76
TC(MIN.) =    4.98

****************************************************************************
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) =   151.56  DOWNSTREAM(FEET) =   151.38
FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   2.98
ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       0.76
PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    5.13
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     123.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.995
*USER SPECIFIED(GLOBAL):
RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  88
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
SUBAREA AREA(ACRES) =    0.15   SUBAREA RUNOFF(CFS) =    0.80
```

```
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       1.54
  TC(MIN.) =    5.13

****************************************************************************
  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) =   151.38  DOWNSTREAM(FEET) =   150.81
  FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.38
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.54
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    5.32
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     171.00 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) =  6.839
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.16
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       1.66
  TC(MIN.) =    5.32

****************************************************************************
  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) =   150.81  DOWNSTREAM(FEET) =   149.90
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.53
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.66
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    5.45
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     216.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.45
  RAINFALL INTENSITY(INCH/HR) =   6.73
  TOTAL STREAM AREA(ACRES) =     0.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.66

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

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    153.10
  DOWNSTREAM ELEVATION(FEET) =    152.20
  ELEVATION DIFFERENCE(FEET) =      0.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.934
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   151.20  DOWNSTREAM(FEET) =   150.80
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.11
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.16
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    5.37
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     145.00 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) =  6.795
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.31
  TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.46
  TC(MIN.) =    5.37

****************************************************************************
  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) =  6.795
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.04   SUBAREA RUNOFF(CFS) =    0.21
  TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.67
```

```
  TC(MIN.) =    5.37

****************************************************************************
  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) =   150.80  DOWNSTREAM(FEET) =   150.25
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.41
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.67
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    5.64
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.584
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.35
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       1.00
  TC(MIN.) =    5.64

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.584
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.15
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       1.15
  TC(MIN.) =    5.64

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 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) =   150.25  DOWNSTREAM(FEET) =   149.90
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.87
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.15
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    5.79
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    105.00 =     235.00 FEET.

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

```
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.79
 RAINFALL INTENSITY(INCH/HR) =   6.47
 TOTAL STREAM AREA(ACRES) =     0.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.15

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.66     5.45        6.728          0.32
     2        1.15     5.79        6.473          0.23

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        2.75     5.45       6.728
     2        2.75     5.79       6.473

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.75   Tc(MIN.) =    5.79
 TOTAL AREA(ACRES) =        0.6
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    105.00 =     235.00 FEET.

****************************************************************************
 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) =   149.90  DOWNSTREAM(FEET) =   149.30
 FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.25
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.75
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    5.94
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    106.00 =     283.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.94
 RAINFALL INTENSITY(INCH/HR) =   6.37
 TOTAL STREAM AREA(ACRES) =     0.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.75

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
  UPSTREAM ELEVATION(FEET) =    153.00
  DOWNSTREAM ELEVATION(FEET) =    152.75
  ELEVATION DIFFERENCE(FEET) =      0.25
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.994
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.22

******************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    106.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  152.75  DOWNSTREAM ELEVATION(FEET) =  152.26
  STREET LENGTH(FEET) =    82.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    4.72
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.35
  STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =    5.96
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.350
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
  SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.68
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   6.66
  FLOW VELOCITY(FEET/SEC.) =  1.47   DEPTH*VELOCITY(FT*FT/SEC.) =   0.41
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    106.00 =     127.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =    5.96
  RAINFALL INTENSITY(INCH/HR) =   6.35
  TOTAL STREAM AREA(ACRES) =     0.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.87

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.75     5.94        6.366          0.55
      2        0.87     5.96        6.350          0.18

  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        3.62     5.94       6.366
      2        3.61     5.96       6.350

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.62   Tc(MIN.) =    5.94
  TOTAL AREA(ACRES) =        0.7
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    106.00 =     283.00 FEET.

****************************************************************************
  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) =   148.00  DOWNSTREAM(FEET) =   147.50
  FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.97
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.62
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    5.97
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    107.00 =     299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    57.00
  UPSTREAM ELEVATION(FEET) =    156.10
  DOWNSTREAM ELEVATION(FEET) =    153.90
  ELEVATION DIFFERENCE(FEET) =      2.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.946
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.30
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    153.90
  DOWNSTREAM NODE ELEVATION(FEET) =    153.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    58.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.030   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.03500
  MAXIMUM DEPTH(FEET) =   0.20
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.66
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.25
  AVERAGE FLOW DEPTH(FEET) =   0.11   FLOOD WIDTH(FEET) =    4.88
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    3.38
  SUBAREA AREA(ACRES) =    0.14       SUBAREA RUNOFF(CFS) =    0.73
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       1.03

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOOD WIDTH(FEET) =    6.16
  FLOW VELOCITY(FEET/SEC.) =   2.46   DEPTH*VELOCITY(FT*FT/SEC) =   0.33
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =     115.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    503.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   151.10  DOWNSTREAM(FEET) =   150.70
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.07
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.03
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    3.74
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    503.00 =     182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    503.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.14
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       1.16
  TC(MIN.) =    3.74

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    504.00 IS CODE =  31
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.70  DOWNSTREAM(FEET) =   150.50
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.02
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.16
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    3.94
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    504.00 =     218.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    504.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.38
  TOTAL AREA(ACRES) =       0.3   TOTAL RUNOFF(CFS) =       1.54
  TC(MIN.) =    3.94

************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    504.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.30
  TOTAL AREA(ACRES) =       0.3   TOTAL RUNOFF(CFS) =       1.84
  TC(MIN.) =    3.94

************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    505.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.50  DOWNSTREAM(FEET) =   150.20
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.48
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.84
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    4.20
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    505.00 =     273.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
*USER SPECIFIED(GLOBAL):
RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
S.C.S. CURVE NUMBER (AMC II) =  79
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.41
TOTAL AREA(ACRES) =       0.4   TOTAL RUNOFF(CFS) =      2.24
TC(MIN.) =    4.20

****************************************************************************
FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
*USER SPECIFIED(GLOBAL):
RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
S.C.S. CURVE NUMBER (AMC II) =  79
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.16
TOTAL AREA(ACRES) =       0.4   TOTAL RUNOFF(CFS) =      2.41
TC(MIN.) =    4.20

****************************************************************************
FLOW PROCESS FROM NODE    505.00 TO NODE    506.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   150.20  DOWNSTREAM(FEET) =   149.30
FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.78
ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       2.41
PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    4.50
LONGEST FLOWPATH FROM NODE    500.00 TO NODE    506.00 =     358.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    506.00 TO NODE    506.00 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.) =    4.50
RAINFALL INTENSITY(INCH/HR) =   7.11
TOTAL STREAM AREA(ACRES) =     0.45
PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.41

****************************************************************************
FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(GLOBAL):
RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
S.C.S. CURVE NUMBER (AMC II) =  79
INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
UPSTREAM ELEVATION(FEET) =    153.00
DOWNSTREAM ELEVATION(FEET) =    152.75
```

```
 ELEVATION DIFFERENCE(FEET) =      0.25
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.994
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.35
 TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
 FLOW PROCESS FROM NODE    601.00 TO NODE    506.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  152.75  DOWNSTREAM ELEVATION(FEET) =  152.26
 STREET LENGTH(FEET) =    81.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

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

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.68
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    5.59
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.43
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.38
 STREET FLOW TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =    5.94
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.369
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.760
 SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.65
 TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.97

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   7.09
 FLOW VELOCITY(FEET/SEC.) =  1.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.44
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    506.00 =     126.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    506.00 TO NODE    506.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.94
 RAINFALL INTENSITY(INCH/HR) =   6.37
 TOTAL STREAM AREA(ACRES) =     0.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.97

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        2.41     4.50        7.114          0.45
```

```
     2        0.97     5.94        6.369          0.20

  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        3.14     4.50       7.114
      2        3.12     5.94       6.369

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.14   Tc(MIN.) =    4.50
  TOTAL AREA(ACRES) =        0.6
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    506.00 =     358.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    507.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.00  DOWNSTREAM(FEET) =   147.50
  FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.70
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.14
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    4.53
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    507.00 =     374.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    107.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        3.14     4.53       7.114        0.65
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    107.00 =     374.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        3.62     5.97       6.343        0.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    107.00 =     299.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       5.88       4.53       7.114
      2       6.42       5.97       6.343

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.42   Tc(MIN.) =    5.97
  TOTAL AREA(ACRES) =        1.4

****************************************************************************
  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) =   147.50  DOWNSTREAM(FEET) =   146.40
  FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.06
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.42
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    6.24
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    108.00 =     471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.24
  RAINFALL INTENSITY(INCH/HR) =   6.17
  TOTAL STREAM AREA(ACRES) =     1.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.42

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    152.40
  DOWNSTREAM ELEVATION(FEET) =    151.70
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    701.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.35
  TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.51
  TC(MIN.) =    4.97

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.60  DOWNSTREAM(FEET) =   150.18
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.39
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.51
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    5.60
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =     165.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    702.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.615
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.28
  TOTAL AREA(ACRES) =       0.2   TOTAL RUNOFF(CFS) =       0.75
  TC(MIN.) =    5.60

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.18  DOWNSTREAM(FEET) =   149.90
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.73
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.75
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    5.93
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    703.00 =     220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    703.00 TO NODE    704.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.60  DOWNSTREAM(FEET) =   147.13
  FLOW LENGTH(FEET) =    14.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.50
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.75
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    5.96
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    704.00 =     234.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    704.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.352
  *USER SPECIFIED(GLOBAL):
```

```
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.16   SUBAREA RUNOFF(CFS) =    0.75
  TOTAL AREA(ACRES) =       0.3   TOTAL RUNOFF(CFS) =      1.47
  TC(MIN.) =    5.96

****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    705.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   147.13  DOWNSTREAM(FEET) =   146.40
  FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.18
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.47
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.98
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    705.00 =     246.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    705.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.98
  RAINFALL INTENSITY(INCH/HR) =   6.34
  TOTAL STREAM AREA(ACRES) =     0.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.47

****************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    801.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    152.40
  DOWNSTREAM ELEVATION(FEET) =    151.70
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    801.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.30
  TOTAL AREA(ACRES) =       0.1   TOTAL RUNOFF(CFS) =      0.46
  TC(MIN.) =    4.97

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    802.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.60  DOWNSTREAM(FEET) =   150.15
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.39
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.46
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    5.60
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    802.00 =     165.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    802.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.614
  *USER SPECIFIED(GLOBAL):
  RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =  79
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.33
  TOTAL AREA(ACRES) =       0.2   TOTAL RUNOFF(CFS) =      0.75
  TC(MIN.) =    5.60

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.15  DOWNSTREAM(FEET) =   149.90
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.60
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.75
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    5.95
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    803.00 =     220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    804.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.60  DOWNSTREAM(FEET) =   147.13
  FLOW LENGTH(FEET) =    14.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.50
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =       0.75
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    5.98
 LONGEST FLOWPATH FROM NODE    800.00 TO NODE    804.00 =     234.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    804.00 TO NODE    804.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.340
 *USER SPECIFIED(GLOBAL):
 RESIDENTIAL (10.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  79
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7600
 SUBAREA AREA(ACRES) =    0.16   SUBAREA RUNOFF(CFS) =    0.75
 TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       1.47
 TC(MIN.) =    5.98

****************************************************************************
 FLOW PROCESS FROM NODE    804.00 TO NODE    805.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   147.13  DOWNSTREAM(FEET) =   146.40
 FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.17
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.47
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.00
 LONGEST FLOWPATH FROM NODE    800.00 TO NODE    805.00 =     246.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    805.00 TO NODE    705.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.00
 RAINFALL INTENSITY(INCH/HR) =   6.32
 TOTAL STREAM AREA(ACRES) =     0.31
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.47

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        6.42     6.24        6.167          1.38
     2        1.47     5.98        6.335          0.31
     3        1.47     6.00        6.323          0.31

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        9.09     5.98        6.335
     2        9.11     6.00        6.323
     3        9.28     6.24        6.167
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.28   Tc(MIN.) =    6.24
  TOTAL AREA(ACRES) =        2.0
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    705.00 =     471.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.0  TC(MIN.) =      6.24
  PEAK FLOW RATE(CFS)   =       9.28
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

A - 8

"Technical Memorandum: Determination for Pre- and Post- Developed 100-year Peak Flow" for: Sandpiper Villa, prepared by: "Tory R. Walker Engineering", Revision dated: September 13, 2019

SECTION 5.0

FIGURES AND EXHIBITS

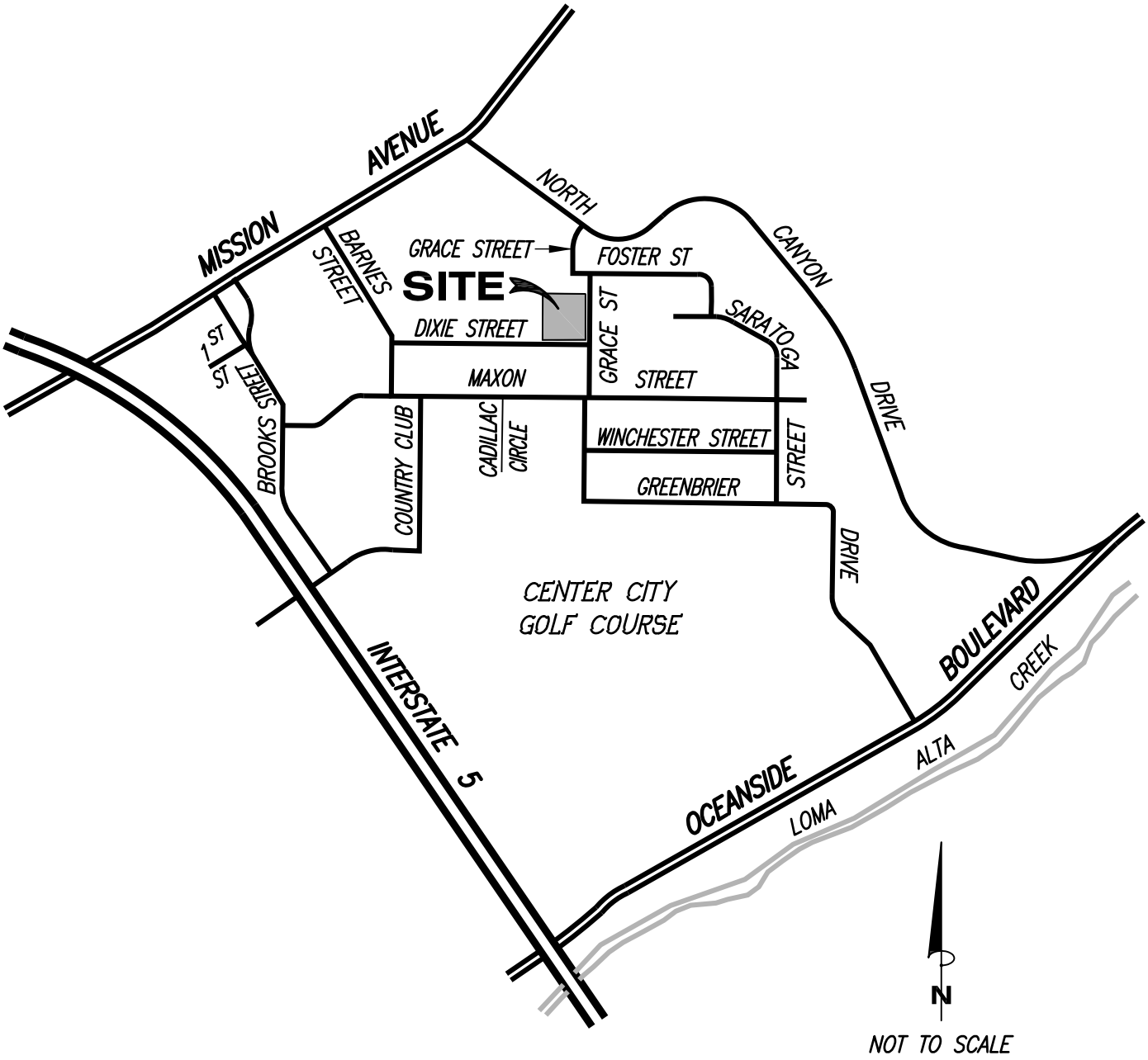
Figure

1. Vicinity Map

Exhibits

Exhibit A – Existing-Condition Hydrology Map

Exhibit B – Proposed-Condition Hydrology Map



PRELIMINARY HYDROLOGY REPORT

FOR

SANDPIPER VILLA
(ZA15-00007, D15-00014, CUP16-00005)

FIGURE 1

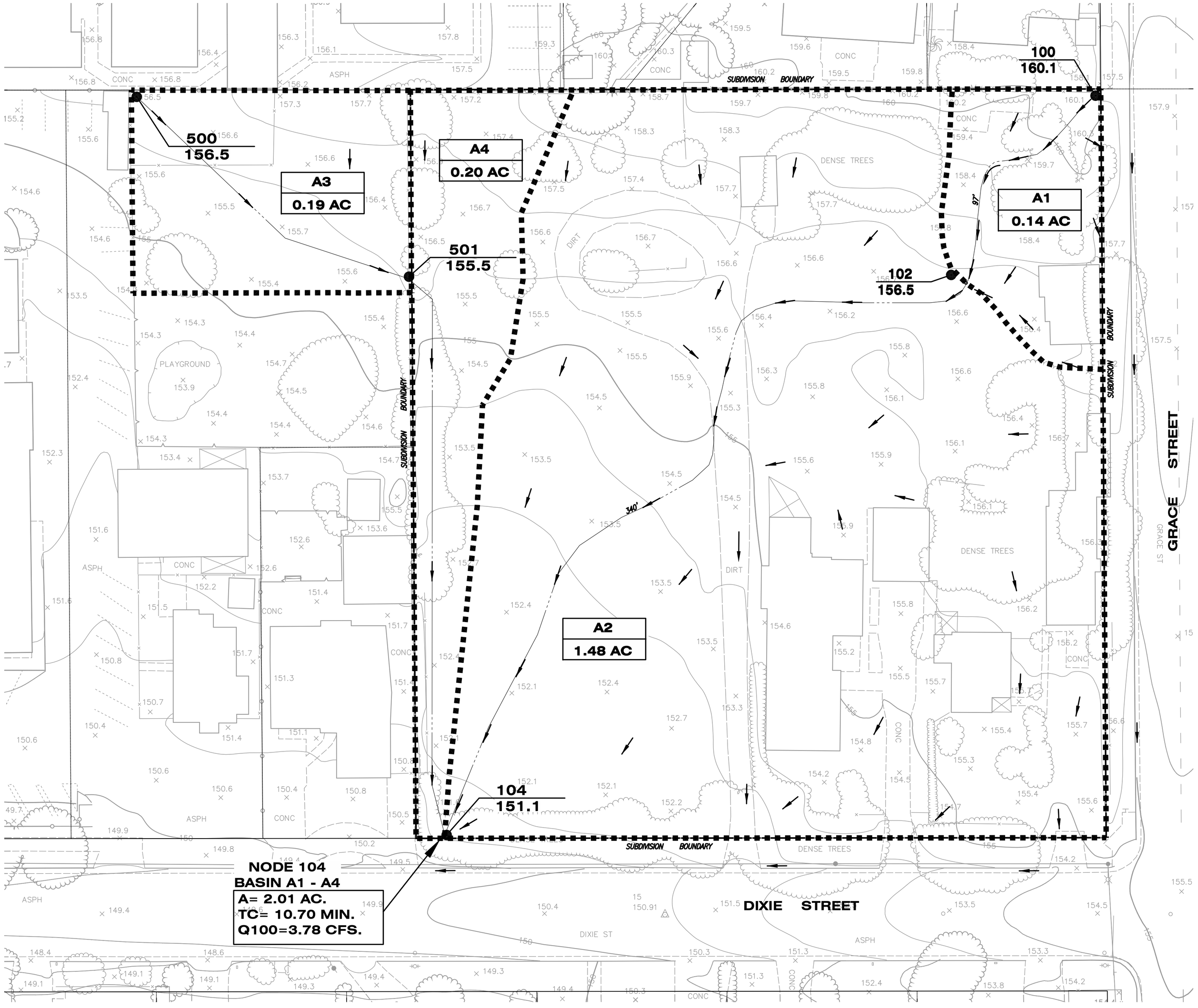
VICINITY MAP

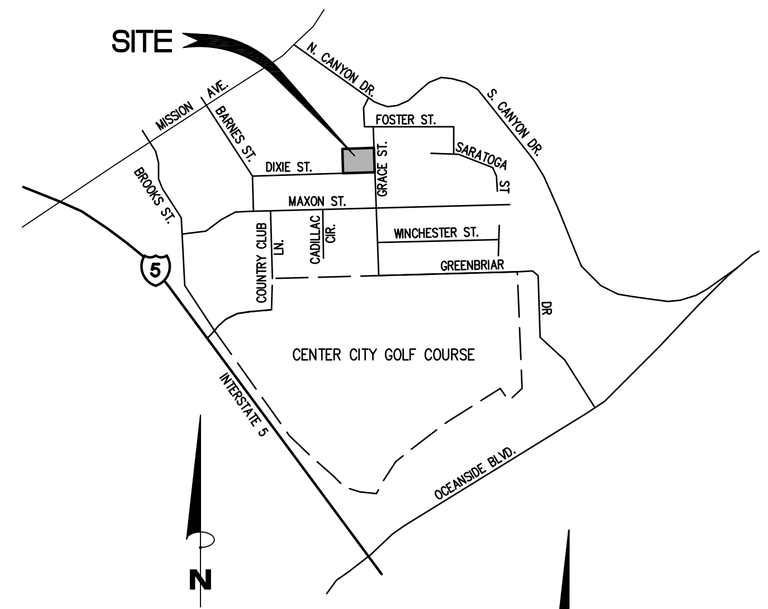
PREPARED IN THE OFFICE OF:

BUCCOLA ENGINEERING, inc

760/721-2000

3142 Vista Way, Suite 301, Oceanside, CA 92056





LEGEND

BASIN BOUNDARY	▪▪▪▪▪
SUB-BASIN DESIGNATION	A1
SUB-BASIN AREA ACRES	0.03ac.
DIRECTION OF FLOW	→
NODE DESIGNATION FS OR IE ELEVATION	102 122.0

EXHIBIT A

EXISTING CONDITION HYDROLOGY MAP

FOR

SANDPIPER VILLA

ASSISTED LIVING FACILITY

OCEANSIDE, CA

PREPARED IN THE OFFICE OF:

BUCCOLA ENGINEERING, inc

760/721-2000

3142 Vista Way, Suite 301, Oceanside, CA 92056

ZA19-00005
D19-00011
CUP19-00011

BUTLER, GROVES AND GLEICHNER'S ADDITION
PORTION LOTS 9, 10 AND 11, MAP 341
VESTING: DOC. 2007-0228928

MAP NO. 4048
MISSION PARK TRACT NO. 3

DIXIE HEIGHTS ADDITION
LOT 6 AND PORTION LOT 7, MAP 1836
VESTING: DOC. 2003-0379132

PORTION LOT 7, MAP 1836
VESTING: DOC. 2004-0603714

LOTS 10-17
DIXIE HEIGHTS ADDITION
MAP 1836

OFFSITE EMPLOYEE PARKING

CURB INLET

PVC STORM DRAIN TYP.

2-42"HDPE PIPES-TOTAL LENGTH 725'
W/DETENTION STORAGE VOL.=6919 CF

4 EA. PROPRIETARY VAULT/TREE WELL-MODULAR WETLANDS LINEAR FILTRATION SYSTEM

DETENTION & HMP OUTLET CONTROL STRUCTURE

18" RCP STORM DRAIN PIPE-CONNECT TO EXIST. 18"ACP-APPROX. 400' DOWNSTREAM.

ABANDONED PORTION OF EX 18"ACP

PROPOSED STORM DRAIN CLEANOUT, TYP.

EX 18" ACP SD PER DWG S-585

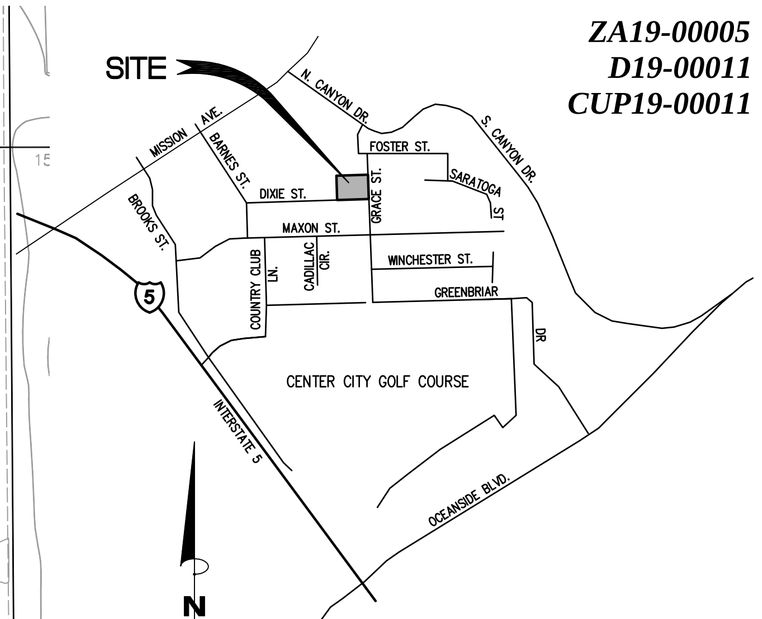
DIXIE STREET

GRACE STREET

18" RCP - PIPE
FLOW Q100R=
3.38 CFS.

NODE 805-705
BASIN A1 - A28
A=2.01 AC.
TC= 6.24 MIN.
Q100=9.28 CFS.

PEAK Q100 FLOW ATTENUATED BY (2-42") HDPE PIPES, TOTAL 725 LF W/CONTROL OUTLET, DET. STORAGE VOL=6919 CF, AND A RELEASE RATE Q100R=3.38 CFS. SEE TECH. MEMORANDUM BY: TORY R. WALKER ENGINEERING INC. DATED: JANUARY 13, 2017



VICINITY MAP
NOT TO SCALE

LEGEND

- SUB-BASIN BOUNDARY
- SUB-BASIN DESIGNATION — E1
- SUB-BASIN AREA ACRES — 0.03ac.
- DIRECTION OF FLOW
- NODE DESIGNATION / FS OR IE ELEVATION — 102 / 122.0
- IMPERVIOUS-PCC CONCRETE
- SOLID UNIT PAVERS

SCALE 1" = 20'

EXHIBIT B

PROPOSED CONDITION
HYDROLOGY MAP

FOR

SANDPIPER VILLA

ASSISTED LIVING FACILITY

OCEANSIDE, CA

PREPARED IN THE OFFICE OF:

BUCCOLA ENGINEERING, inc 760/721-2000

3142 Vista Way, Suite 301, Oceanside, CA 92056