PRELIMINARY PRIORITY PROJECT

HYDROLOGY STUDY

FOR:
CLEVELAND AVENUE RESIDENTIAL
ESCONDIDO, CA

PREPARED FOR:
THE TRUE LIFE COMPANIES

PREPARED BY:
EXCEL ENGINEERING
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Tel: (760) 745-8118
Project No: 24-021

DATE PREPARED:
NOVEMBER 17, 2025

DATE REVISED:

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1.0 PROJECT DESCRIPTION

1.1 Project Purpose

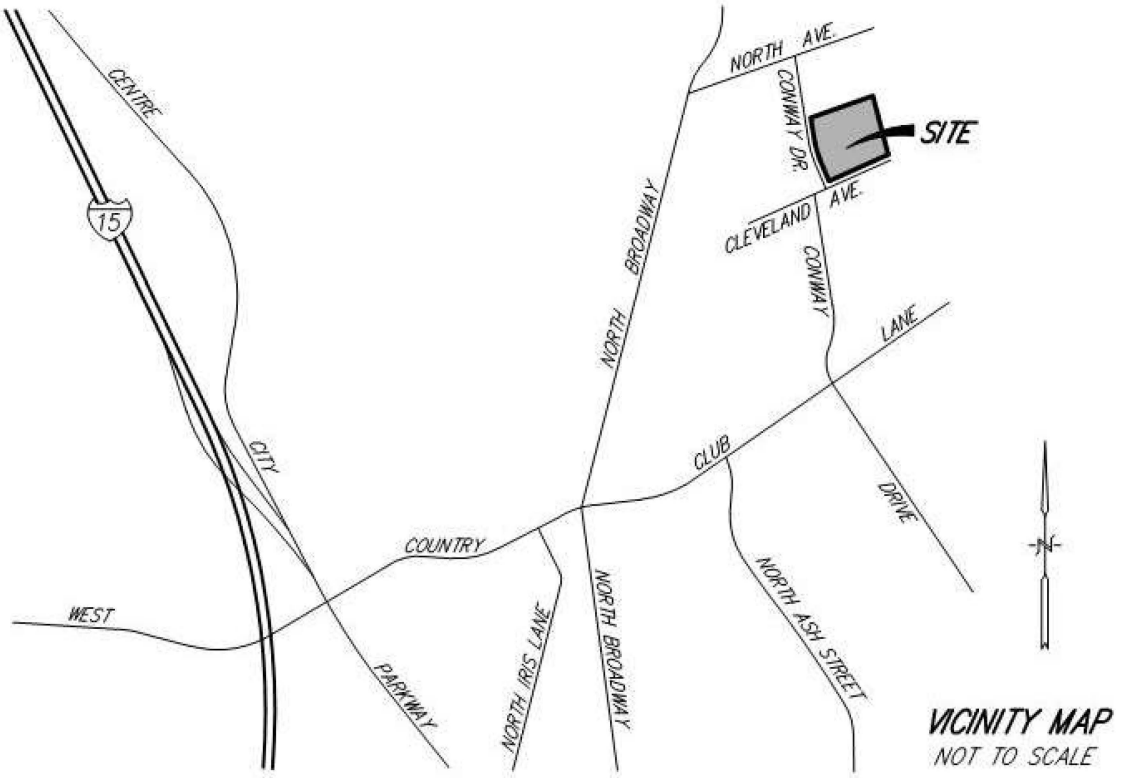
The purpose of this project is to receive approval from the City of Escondido to construct 29 single family residential homes and its associated infrastructure and improvements on an existing 10.38-acre parcel.

1.2 Project Proposed Facilities

The project includes 29 residential lots ranging from 6,000 to 19,000 square feet in size. As part of the new construction, associated improvements will include walkways, grass and landscaped areas, and all necessary utilities (storm, sewer, water, dry, etc.).

Normal uses of such a development will generate storm water runoff with the potential to carry pollutants to off-site tributaries. Biofiltration basins are planned to be incorporated throughout the site to treat runoff from impervious and landscaped areas.

2.0 VICINITY MAP



3.0 SITE MAP

Please see Attachment A – Site map

4.0 DESCRIPTION OF WATERSHED

4.1 Existing Conditions Topography

The existing parcel is currently an undeveloped lot. The majority of the lot sheet flows to an existing headwall inlet on the southwest corner of the lot and stormwater is routed to an existing curb inlet on Conway Drive (POC-1). At the curb inlet, offsite street flows confluence with the onsite flows and are routed underneath Conway Drive via an existing 24" RCP storm drain pipe and outlet at an existing headwall on the west side of Conway Drive.

A small portion of the lot and existing offsite area east of the property sheet flows to an existing drainage ditch at the southeast corner of the site where Cleveland Avenue ends (POC-2).

After drainage leaves the site at both POC-1 and POC-2, it flows to the south where the water travels through the Escondido sub-Hydrologic area southward to Escondido Creek. Once in Escondido creek, flows continue until they reach the Pacific Ocean at San Elijo Lagoon.
Please see Attachment C – Watershed Map.

4.2 Existing Conditions + Project Conditions Topography

The project proposes to develop the existing lot for the construction of 29 new single-family residential homes. Fill soil will be brought in to level the site, and the finished building pad grades is a relatively flat plane through the site in the direction of the existing flows away from the building pads towards the water quality treatment basins. Once within the water quality treatment systems, the stormwater infiltrates through the treatment medium into underdrains that route flows to the private onsite storm drainage system.

Approximately 1.8 acres of existing offsite runoff area east of the lot will be routed to a new brow ditch constructed along the property line of the site and routed as bypass flow through the site via a private storm drain system. The onsite flows will confluence with this offsite bypass flow before being routed to the existing curb inlet on Conway Drive (POC-1).

4.3 Hydrologic Unit Contribution

The project site is within the Carlsbad Hydrologic Unit (HU 904), Escondido Creek (HA 904.6), Escondido (HAS 904.62) and San Elijo (HAS 904.61). After drainage leaves the site, it flows to the Escondido sub Hydrologic area southward to Escondido Creek. Once in Escondido Creek, flows continue until they reach the Pacific Ocean at San Elijo Lagoon.

5.0 METHODOLOGY

This study complies with the 2003 San Diego Hydrology Manual. The rational method as presented in Section 3 of that manual and workbook examples were followed.

5.1 Hydrology Software

The "Rational Hydrology Method, San Diego County (2003 Manual)" module of the CIVILCADD/CIVIL DESIGN Engineering software version 7.9 is used in this study. This software was also used to developed hydrographs from the rational method results. This procedure also complies with the 2003 San Diego Hydrology Manual as presented in Section 6.

5.2 Routing Software

No routing calculations were performed for this site at this time. Should further routing be required upon further development of the site and possible site plan changes causing discharge rates to increase above the predeveloped rates, the existing hydromodification/water quality treatment ponds can be used as flow control facilities. In order to show this is the case, Hydraflow Hydrographs 2004 by Intelisolve would then be used in this step. The hydrograph developed from the rational method is then manually entered into this software and routed into each detention pond.

5.3 Hydraulics Software

No hydraulics calculations were performed at this time. If required on future submittals, the hydraulics for the onsite private storm drain system will be

performed using Hydraflow Storm Sewers Extension v.10.4, and Hydraflow Hydrographs Extension v. 10.4 by Autodesk, Inc. http://www.autodesk.com/civil3d-stormwater.

6.0 CALCULATIONS

The calculations to be performed are to determine the flows that will confluence at POC 1 and 2 for both the pre and post-development conditions. These values will then be used to appropriately size piping for HGL and travel flow, detention, and detention facilitates if necessary. The following calculation results are provided below for both the 50-year and 100 year storm frequencies.

Table 1: 50 Year POC-1

	Pre-Development	Post-Development
Area (Acres)	20.02	20.08
T_C (Min.)	13.17	18.09
Q_{50} (CFS)	23.97	25.80

Table 2: 50 Year POC-2

	Pre-Development	Post-Development
Area (Acres)	1.12	1.03
T_C (Min.)	10.53	11.91
Q_{50} (CFS)	1.96	2.09

Table 3: 100 Year POC-1

	Pre-Development	Post-Development
Area (Acres)	20.02	20.08
T_C (Min.)	12.89	15.48
Q_{100} (CFS)	29.11	31.31

Table 4: 100 Year POC-2

	Pre-Development	Post-Development
Area (Acres)	1.12	1.03
T_C (Min.)	10.48	11.82
Q_{100} (CFS)	2.36	2.52

These numbers will be used to size the proposed storm drain pipes and to doublecheck if the existing storm drain outlet facilities are adequate.

6.1 Determine the Watershed that affects the project

Please see the "Watershed Map" in Attachment C

6.2 Calculate Runoff Coefficient

The project site soil type varies across the site between type "A" and type "C" soil (See Attachment C – Soils Index Map). Therefore, a ratio of each soil type based on area will be used to determine the C factor within each subarea.

For this preliminary report, the C factors used are based on land use for each subarea. For pre-developed areas, the land use category used is Low Density Residential 1.0 DU/A or less. For onsite post-developed areas, the land use category used is Low Density Residential 2.9 DU/A or less.

6.3 Calculate Storm Flows using the Rational Method

The 50-year post-developed storm flow for this project was calculated to be 25.80 CFS at POC-1 and 2.09 CFS at POC-2. The discharge at both POC-1 and POC-2 is higher than the pre-development conditions, therefore mitigation will need to occur to keep within compliance. Mitigation results and calculations to follow.

Please see "Post Developed Q Calculations" in Attachment E and G for the 50 and 100-year developed conditions.

6.4 Design / Analyze Proposed Storm Drain Facilities

Storm facilities have been designed to accommodate the HGL and flowlines of the proposed storm drain pipes and structures fall within tolerance of the available Q100 flows and are adequately sized.

7.0 MITIGATION MEASURES

A Storm Water Management Plan (SWQMP) has been prepared for this project to discuss treatment and flow control of the lower flows (2-year and 10-year). This Hydrology study analyzes the higher 50 and 100-year flows.

7.1 Mitigate Increase Runoff

As discussed above, the 50 year post-developed runoff rate at POC-1 of 25.80 CFS is higher than the pre-developed rate of 23.97 CFS, and the 50 year post-developed runoff rate at POC-2 of 2.09 CFS is higher than the pre-developed rate of 1.96 CFS (see attachment F and G for calculations). The proposed site development has higher than anticipated flows and mitigation will need to occur in order to decrease the expected peak flows at each POC.

In order to decrease the flows at POC-1, a detention basin will be used to detain and slow runoff onsite at the southwest side of the site before connecting to the existing curb inlet and 24" storm drain line and confluence with the offsite street flows. After detention occurs, the resulting time of concentration at POC-1 is increased from 18.09 minutes to 20.76 minutes. As a result, the post-developed 50 year runoff rate at POC-1 of 25.80 CFS is decreased to 22.33 CFS which is lower than the pre-developed rate of 23.97 CFS.

In order to decrease the flows at POC-2, a detention basin will be used to detain and slow runoff onsite at the southeast corner of the site before outflowing through a curb outlet and confluence with the offsite street flows. After detention occurs, the resulting time of concentration at POC-2 is increased from 11.91 minutes to 13.87 minutes. As a result, the post-developed 50 year runoff rate at POC-2 of 2.09 CFS is decreased to 1.87 CFS which is lower than the pre-developed rate of 1.96 CFS. Tables 5 and 6 below summarize the pre-development, post-development unmitigated, and post-development mitigated conditions for POC-1 and POC-2 for the 50 year storm event. Please see attachment H for post-mitigated flow calculations.

Table 5: 50 Year POC-1 Mitigated

	Pre-Development	Post-Development Unmitigated	Post-Development Mitigated
Area (Acres)	20.02	20.08	20.08
T_C (Min.)	13.17	18.09	20.76
Q_{50} (CFS)	23.97	25.80	22.33

Table 6: 50 Year POC-2 Mitigated

	Pre-Development	Post-Development Unmitigated	Post-Development Mitigated
Area (Acres)	1.12	1.03	1.03
T_C (Min.)	10.53	11.91	13.87
Q_{50} (CFS)	1.96	2.09	1.87

7.2 Check Capacity of Existing Downstream Storm Drain Facilities

Since peak flows will be anticipated to be mitigated and reduced, no further capacity analysis of downstream storm drain facilities is necessary.

8.0 SUMMARY

The proposed improvements of the project will increase the 50 year peak flows from the pre-developed rate of 23.97 CFS to 25.80 CFS at POC-1 and 1.96 CFS to 2.09 CFS at POC-2. Therefore, mitigation methods are proposed to detain and slow the runoff onsite before confluence with offsite flows at each POC. After detention occurs from the proposed detention basins, peak flows are reduced to 22.33 CFS at POC-1 and 1.87 CFS at POC-2. These post-mitigated 50 year runoff rates are below the pre-developed rates which satisfy the minimum requirements for detention.

9.0 REFERENCES

County of San Diego, Department of Public Works, Flood Control Section, June 2003 San Diego County Hydrology Manual

10.0 DECLARATION OF RESPONSIBLE CHARGE

I hereby declare that I am the engineer of work for this project. That I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions codes, and that the design is consistent with current design.

I understand that the check of the project drawings and specifications by the City of Escondido is confined to a review only and does not relieve me, as engineer of work, of my responsibilities for project design.

ENGINEER OF WORK
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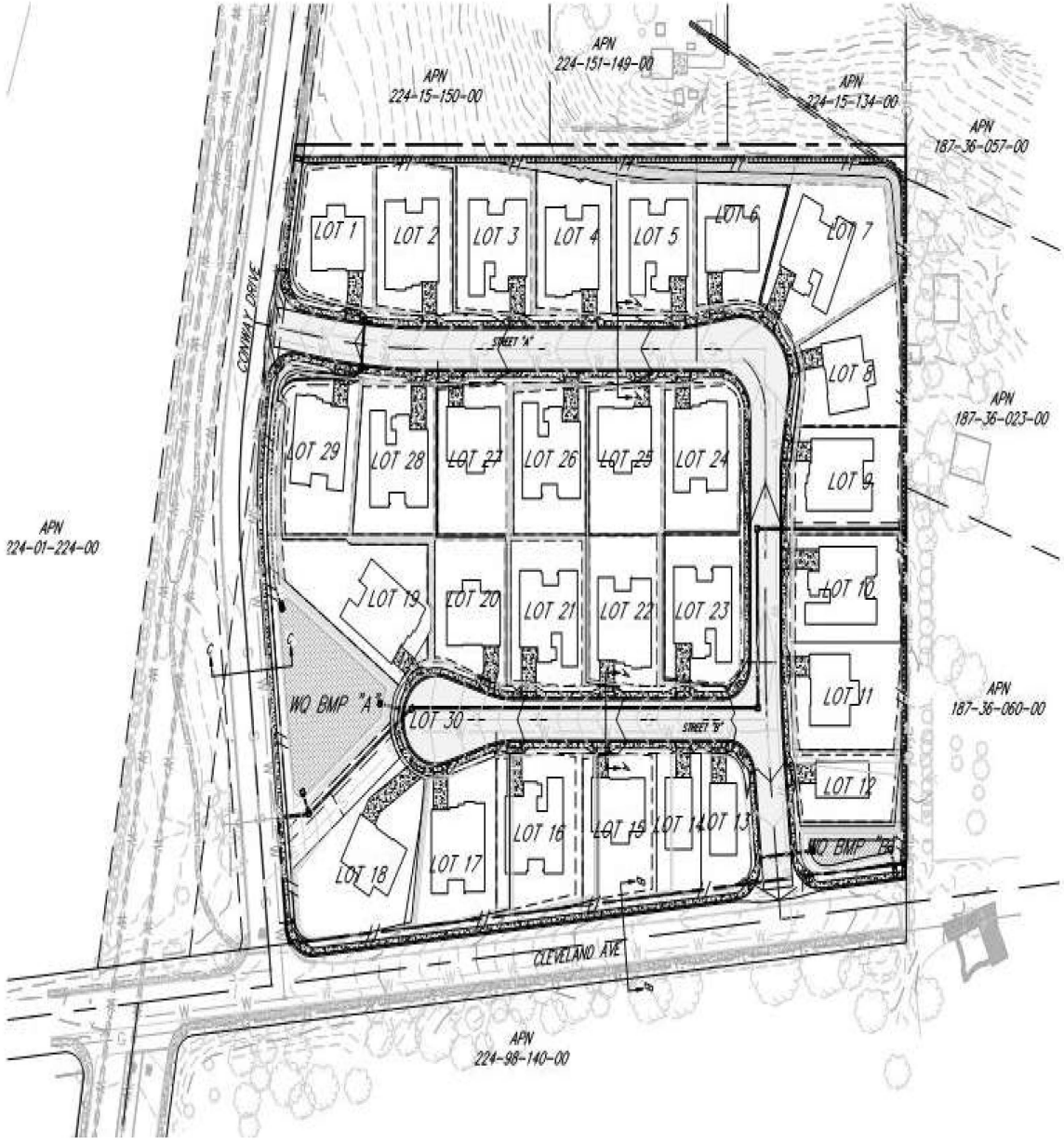
Tel – (760)745-8118
Fax – (760)745-1890

Project Number: 24-021

Robert D. Dentino, RCE 45629
Registration Expire: December 31, 2026

11/17/2025
Date

ATTACHMENT A
SITE MAP

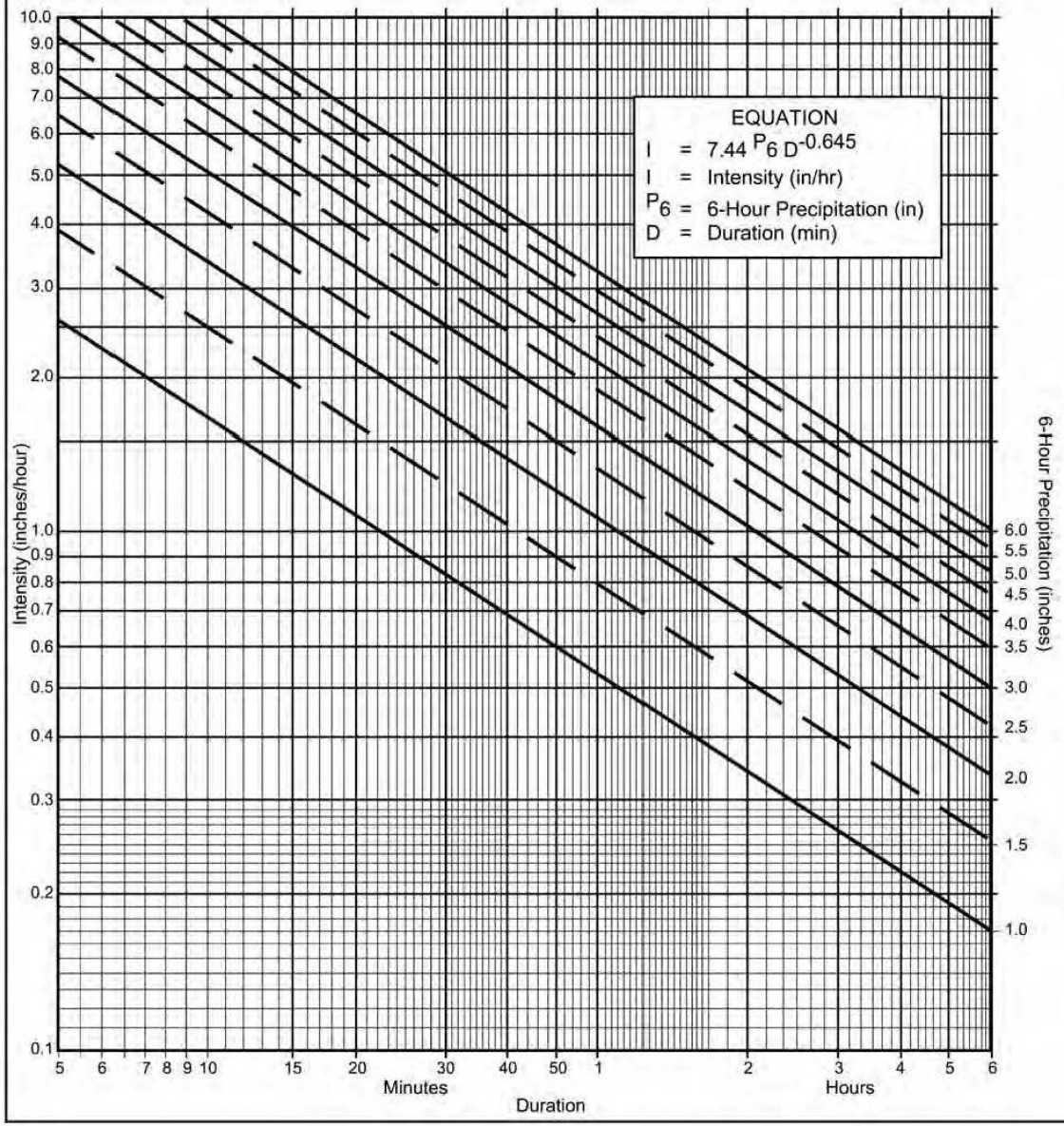


ATTACHMENT B
FIGURES & TABLES FROM THE SD HYDROLOGY MANUAL 2003

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



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 _____ year

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

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

(d) t_x = _____ min.

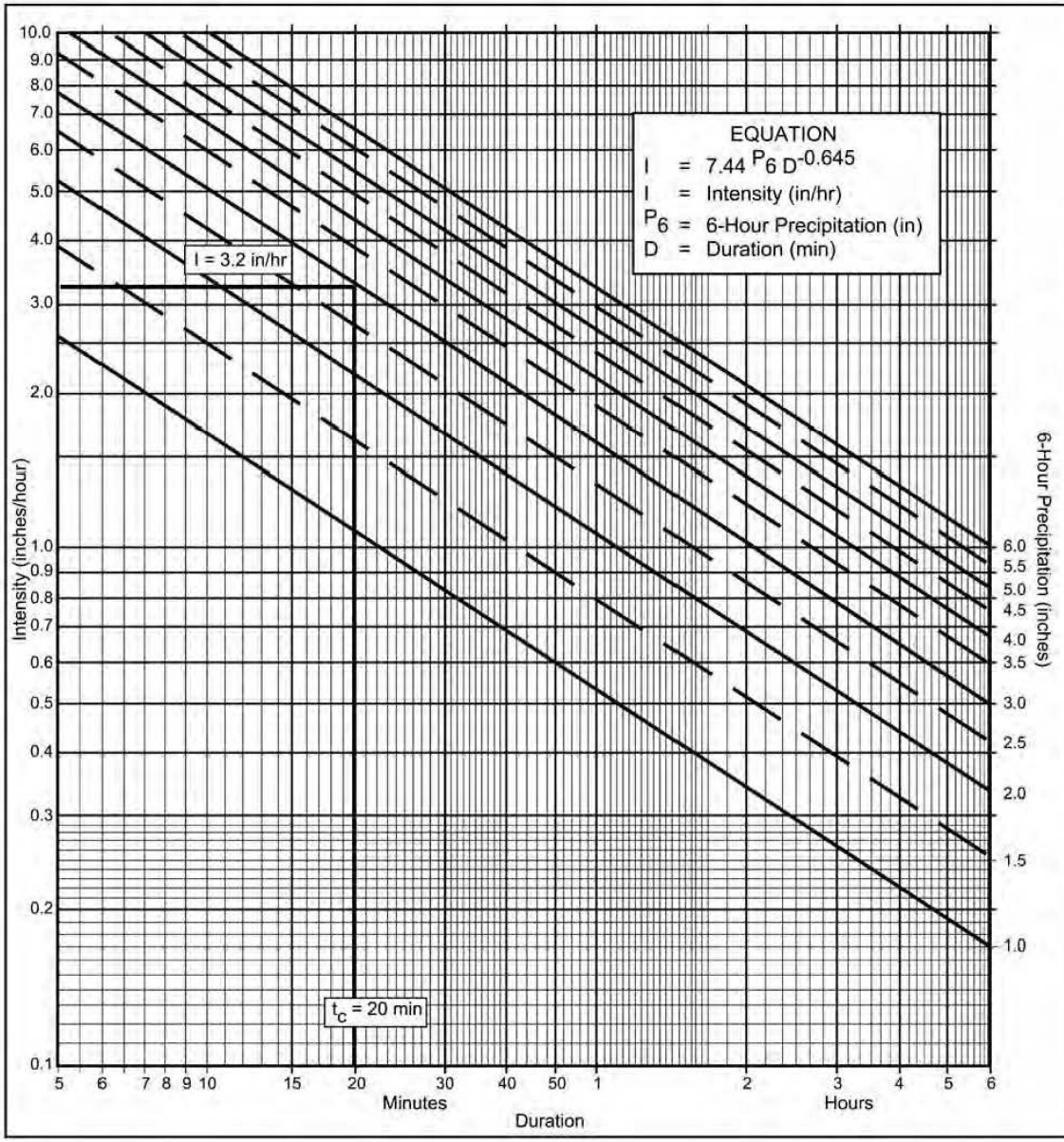
(e) I = _____ in./hr.

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

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
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



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 50 year

(b) P_6 = 3 in., P_{24} = 5.5, $\frac{P_6}{P_{24}}$ = 54.5 %(2)

(c) Adjusted P_6(2) = 3 in.

(d) t_x = 20 min.

(e) I = 3.2 in./hr.

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

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
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 - Example

FIGURE 3-2

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

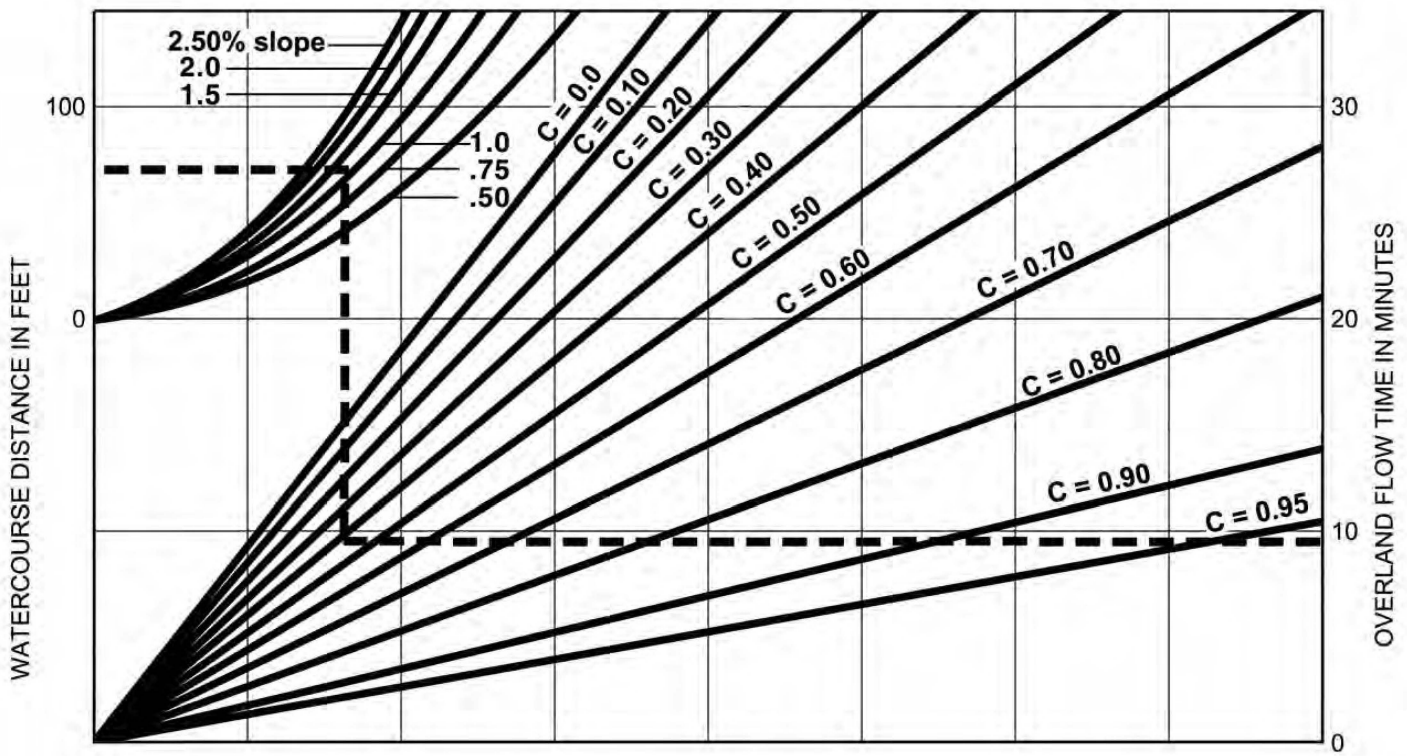
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M)
& INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description



EXAMPLE:

Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

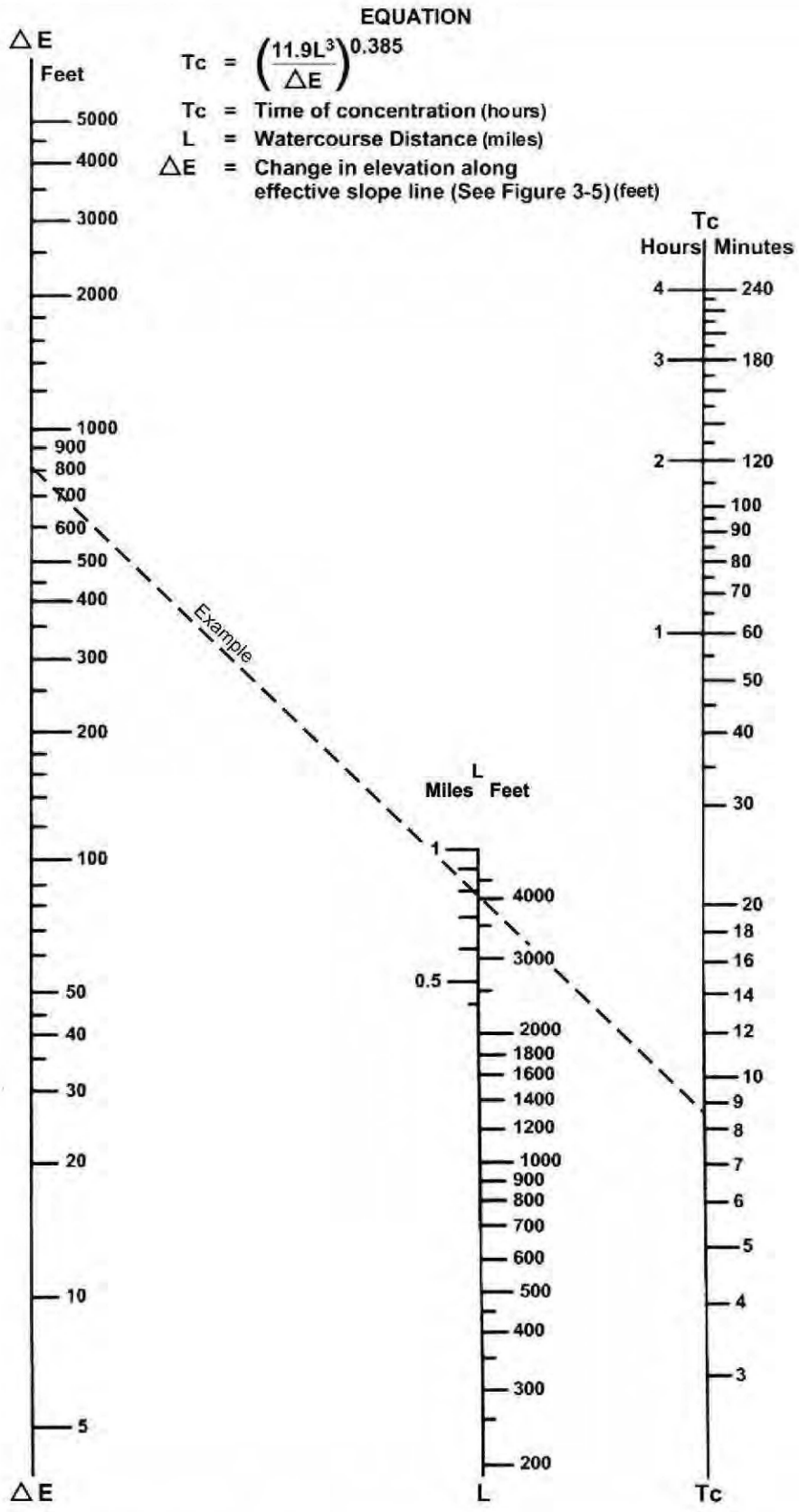
$$T = \frac{1.8\,(1.1\text{-}C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

FIGURE

Rational Formula - Overland Time of Flow Nomograph

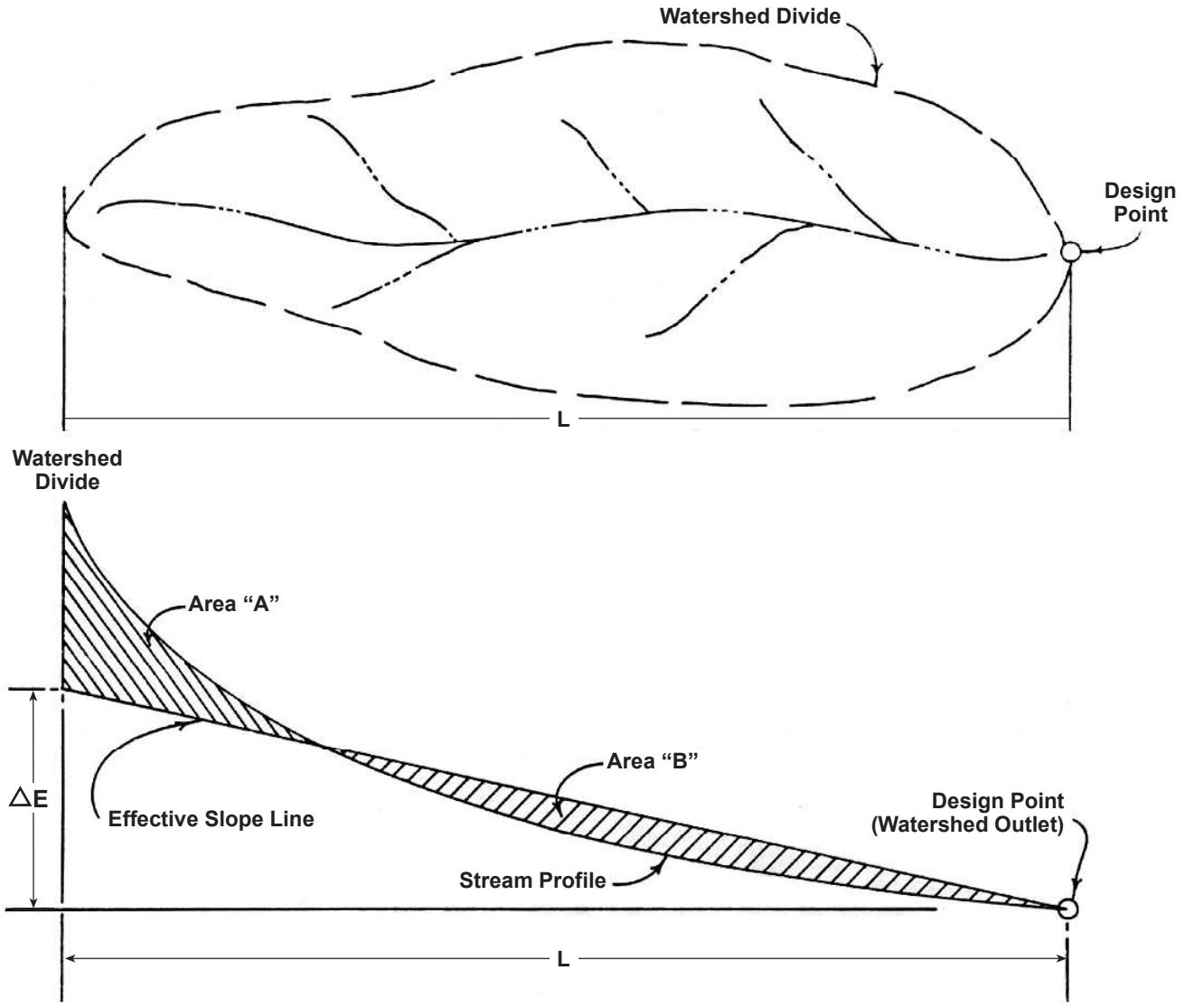
3-3



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE 3-4

Nomograph for Determination of Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds



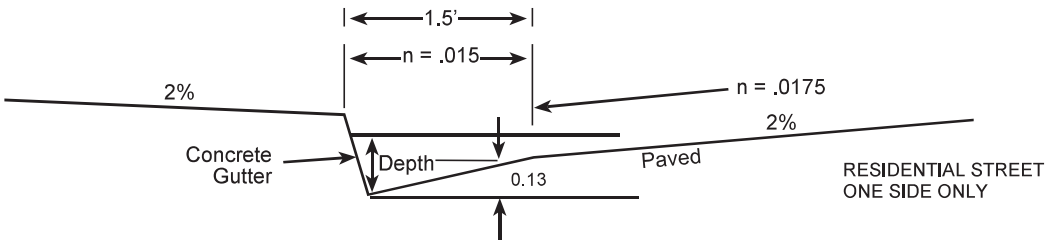
Area "A" = Area "B"

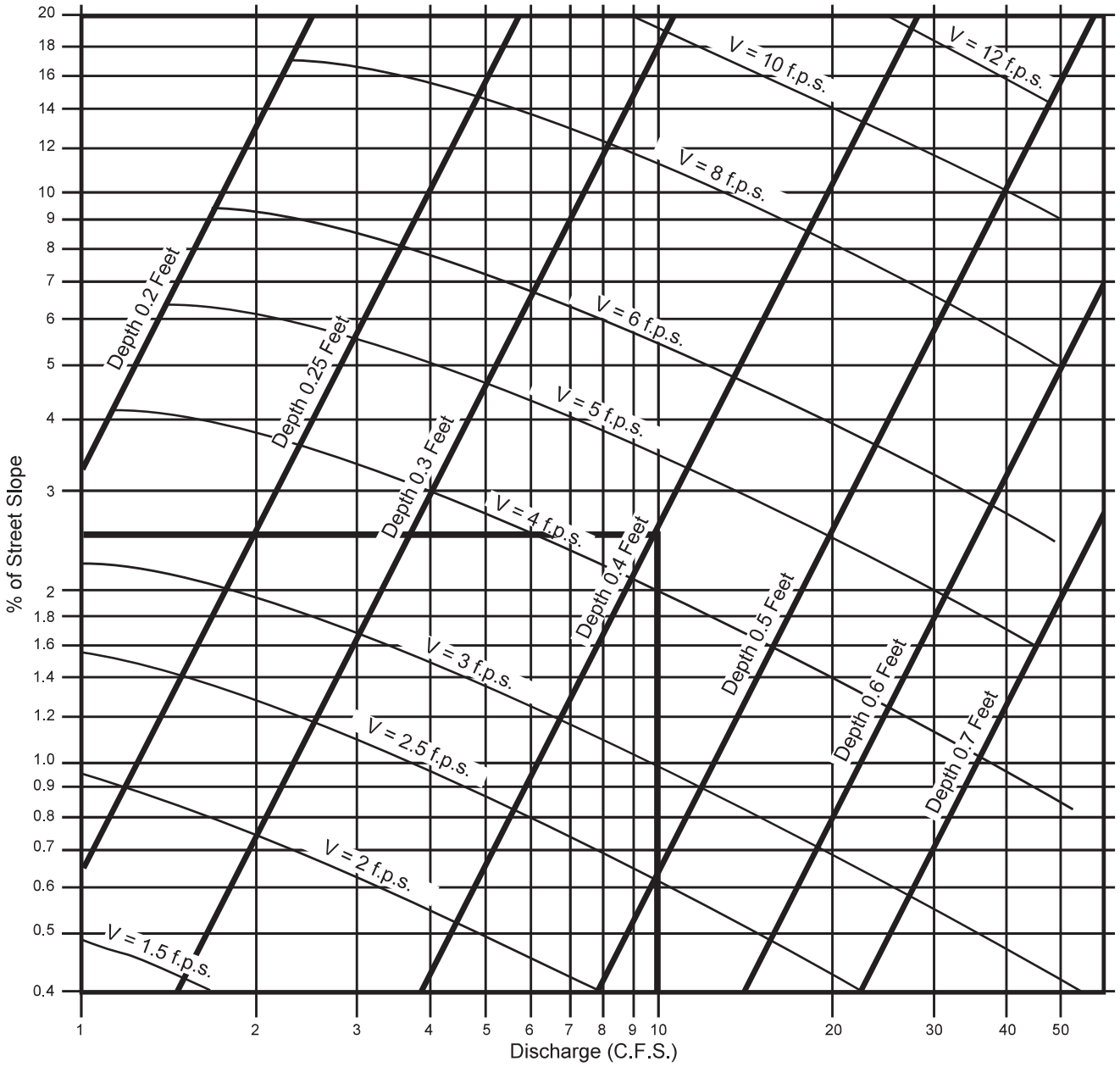
Í ÑËÎ ÝÛæÝ¿´º±®·¿ Ü·ª ~ ±² ±º Ø·¹ ¸©¿§- ø çì ï ÷¿² ¼Õ®·½ ø çì ð÷

F I G U R E

Computation of Effective Slope for Natural Watersheds

3-5





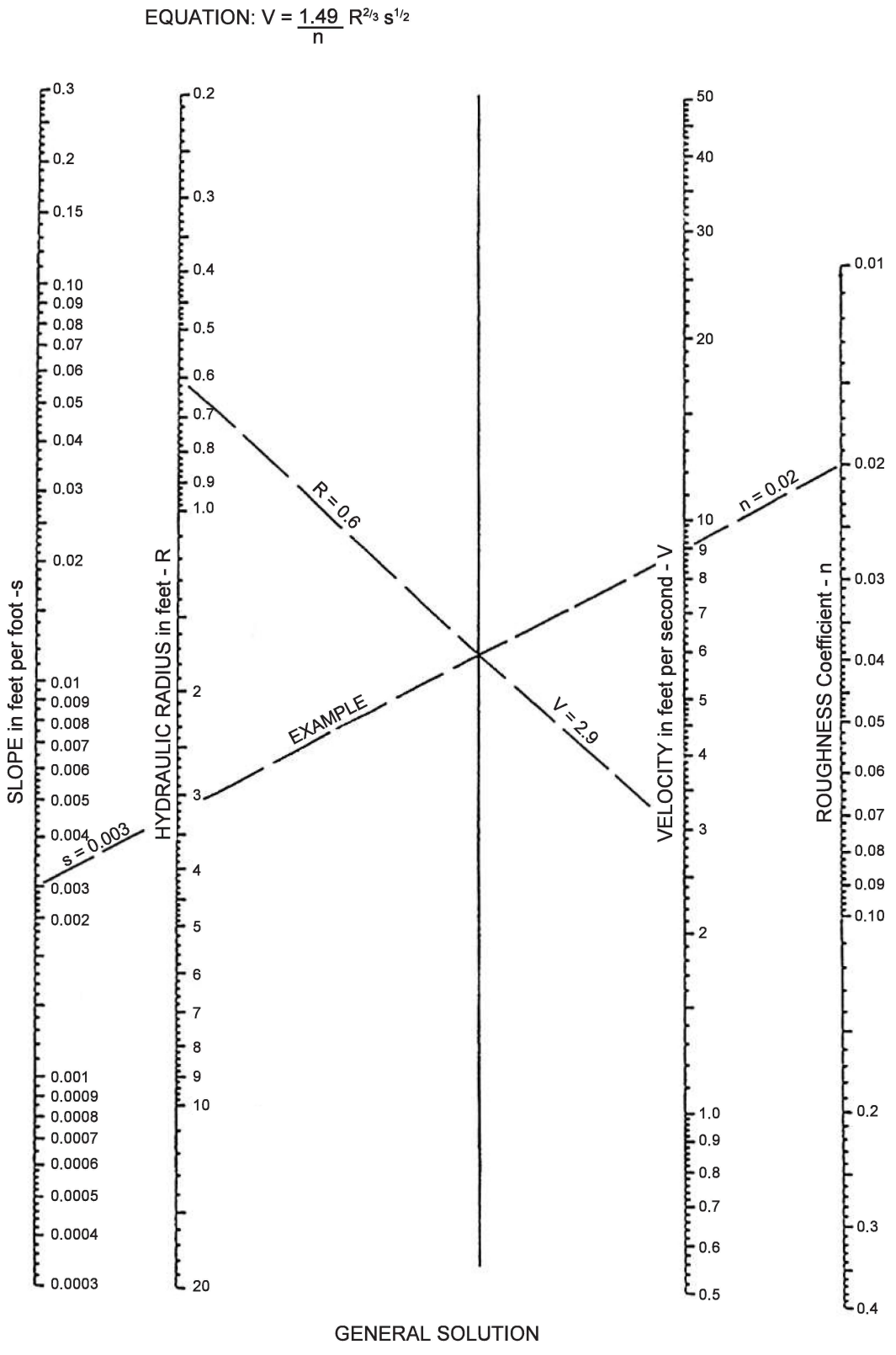
EXAMPLE:
Given: Q = 10 S = 2.5%
Chart gives: Depth = 0.4, Velocity = 4.4 f.p.s.

SOURCE: San Diego County Department of Special District Services Design Manual

Gutter and Roadway Discharge - Velocity Chart

FIGURE

3-6



SOURCE: USDOT, FHWA, HDS-3 (1961)

FIGURE

Manning's Equation Nomograph

3-7

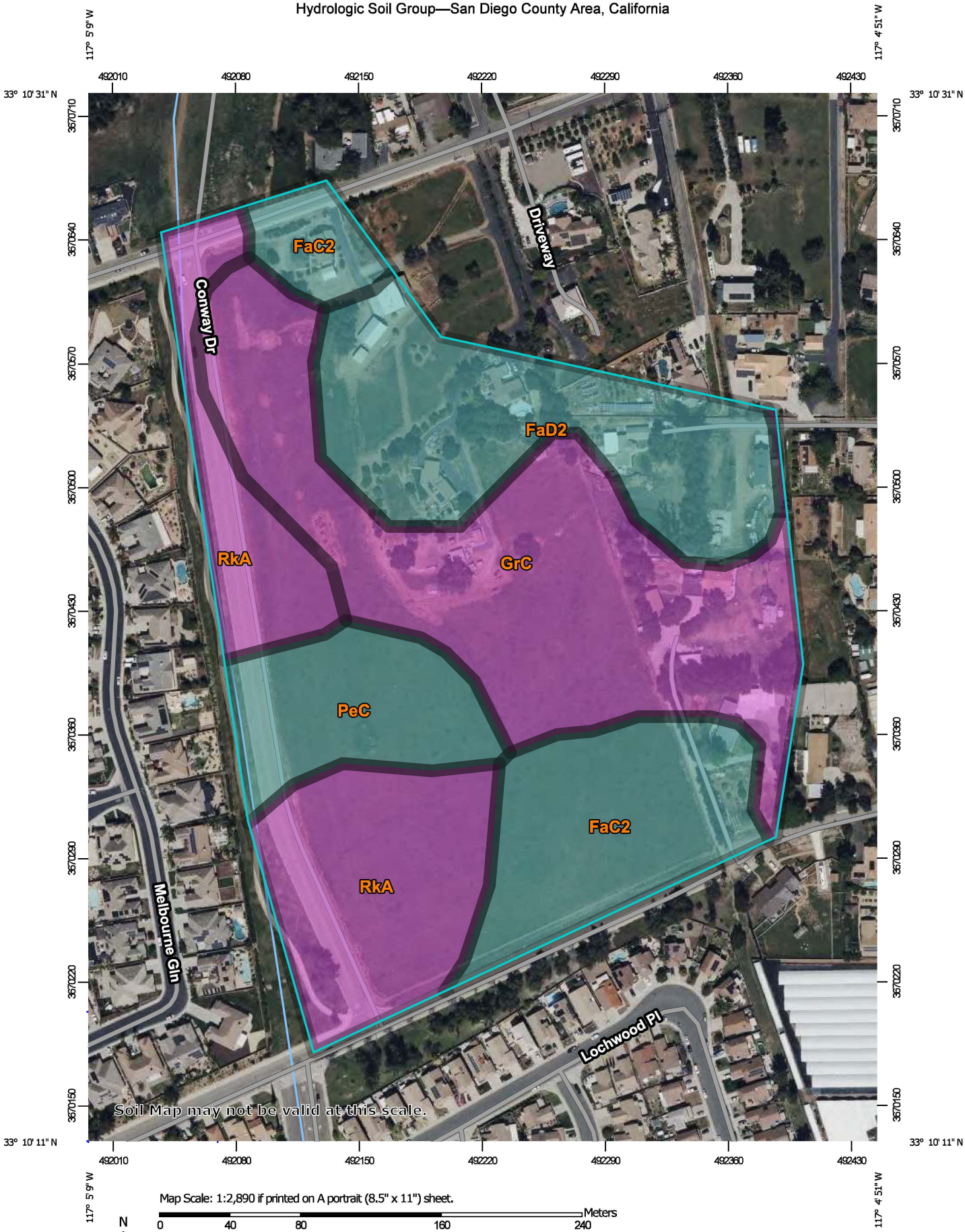
ATTACHMENT C

WATERSHED INFORMATION

Watershed Map
Soils Index Map
Point Rainfall Isopluvial

WATERSHED MAP
Legend
Conway Dr & Cleveland Ave
CARLSBAD WATERSHED, ESCONDIDO 904.62
N Broadway
Laurashawn Ln
North Ave
Conway Dr
Conway Dr & Cleveland Ave
Glenwood Way
Lake Forest St
Google Earth
Image © 2024 Airbus
N
2000 ft

Hydrologic Soil Group—San Diego County Area, California



Map Scale: 1:2,890 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

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:
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 20, Aug 30, 2024

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

Date(s) aerial images were photographed: Mar 14, 2022—Mar 17, 2022

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	C	4.9	16.8%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	C	5.6	19.6%
GrC	Greenfield sandy loam, 5 to 9 percent slopes	A	9.3	32.3%
PeC	Placentia sandy loam, 2 to 9 percent slopes, warm MAAT, MLRA 19	C	2.7	9.5%
RkA	Reiff fine sandy loam, 0 to 2 percent slopes	A	6.3	21.7%
Totals for Area of Interest			**28.9**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

PROJECT SITE
i_6 = 3.5 in

Orange County

Riverside County

Pacific Ocean

Imperial County

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
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N W E S

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

PROJECT SITE
i_{24}= 8.0 in

Orange County

Riverside County

Imperial County

Mexico

Pacific Ocean

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

33°30'
33°15'
33°00'
32°45'
32°30'
117°30'
117°15'
117°00'
116°45'
116°30'
116°15'

DPW GIS
Department of Public Works
Geographic Information Services

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N W E S

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 6 Hours

Isopluvial (inches)

PROJECT SITE
i_6 = 3.0 in

Orange County
Riverside County
Imperial County
Pacific Ocean
Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
SD

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
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3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 24 Hours

Isopluvial (inches)

PROJECT SITE
i_{24}= 6.5 in

Orange County
Riverside County
Imperial County
Pacific Ocean
Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
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N W E S

3 0 3 Miles

ATTACHMENT D

50 Year Pre Development Calculations

Steps Taken To Analyze This Condition

The Rational Method as outlined in section 3 of the June 2003 San Diego County Hydrology Manual is followed here. The software that we are using is the *"Rational Hydrology Method, San Diego County (2003 Manual)"* module of the CIVILCADD/CIVIL DESIGN Engineering software version 7.9.

Please see the subsequent pages for the calculations. These calculations are for the Q50. The results are outlined/summarized in Section 8.

```
1
2                San Diego County Rational Hydrology Program
3
4       CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1
5
6       Rational method hydrology  program based on
7       San Diego County Flood Control Division 2003 hydrology manual
8           Rational Hydrology Study        Date: 11/26/24
9       ------------------------------------------------------------------------
10      24021 CONWAY DRIVE
11      PRE-DEVELOPMENT
12      Q50 YEAR
13      POC-1
14      ------------------------------------------------------------------------
15       *********   Hydrology Study Control Information **********
16
17      ------------------------------------------------------------------------
18
19
20      Program License Serial Number 6332
21
22      ------------------------------------------------------------------------
23      Rational hydrology study storm event year is    50.0
24      English (in-lb) input data Units used
25
26      Map data precipitation entered:
27      6 hour,  precipitation(inches) =  3.000
28      24 hour precipitation(inches) =  6.500
29      P6/P24 =    46.2%
30      San Diego hydrology manual 'C' values used
31
32
33      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
34      Process from Point/Station      101.000 to Point/Station      102.000
35      **** INITIAL AREA EVALUATION ****
36
37      Decimal fraction soil group A = 0.000
38      Decimal fraction soil group B = 0.000
39      Decimal fraction soil group C = 1.000
40      Decimal fraction soil group D = 0.000
41      [LOW DENSITY RESIDENTIAL                    ]
42      (1.0 DU/A or Less       )
43      Impervious value, Ai = 0.100
44      Sub-Area C Value = 0.360
45      Initial subarea total flow distance  =  100.000(Ft.)
46      Highest elevation =  840.000(Ft.)
47      Lowest elevation =  836.000(Ft.)
48      Elevation difference =    4.000(Ft.) Slope =  4.000 %
49      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
50      The maximum overland flow distance is 100.00 (Ft)
51      for the top area slope value of   4.00 %, in a development type of
52       1.0 DU/A or Less
53      In Accordance With Figure 3-3
54      Initial Area Time of Concentration =   8.39 minutes
55      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
56      TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   4.000^(1/3)]=   8.39
57      Rainfall intensity (I) =      5.660(In/Hr) for a    50.0 year storm
58      Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
59      Subarea runoff =      0.155(CFS)
60      Total initial stream area =        0.076(Ac.)
61
62
63      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
64      Process from Point/Station      102.000 to Point/Station      103.000
65      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
66
67      Estimated mean flow rate at midpoint of channel =      5.400(CFS)
68      Depth of flow =   0.227(Ft.), Average velocity =   4.195(Ft/s)
69          ******* Irregular Channel Data ***********
```

```
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              2.00
    2             50.00              0.00
    3            100.00              2.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      5.400(CFS)
  '     '    flow top width =     11.347(Ft.)
  '     '    velocity=    4.195(Ft/s)
  '     '    area =      1.287(Sq.Ft)
  '     '    Froude number =     2.195

Upstream point elevation =   836.000(Ft.)
Downstream point elevation =   766.000(Ft.)
Flow length =   535.600(Ft.)
Travel time  =    2.13 min.
Time of concentration =   10.52 min.
Depth of flow =   0.227(Ft.)
Average velocity =   4.195(Ft/s)
Total irregular channel flow =     5.400(CFS)
Irregular channel normal depth above invert elev. =   0.227(Ft.)
Average velocity of channel(s) =   4.195(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.892(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.306
Rainfall intensity =      4.892(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.307  CA =      2.162
Subarea runoff =     10.422(CFS) for      6.976(Ac.)
Total runoff =     10.577(CFS)  Total area =       7.052(Ac.)
Depth of flow =   0.292(Ft.), Average velocity =   4.962(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

_________________________________________________________________________
Estimated mean flow rate at midpoint of channel =     10.606(CFS)
Depth of flow =   0.503(Ft.), Average velocity =   2.566(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.52
    2             19.50              0.13
    3             21.00              0.00
    4             21.00              0.50
    5             31.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =     10.607(CFS)
  '     '    flow top width =     20.201(Ft.)
  '     '    velocity=    2.566(Ft/s)
  '     '    area =      4.133(Sq.Ft)
  '     '    Froude number =     1.000

Upstream point elevation =   766.000(Ft.)
Downstream point elevation =   762.000(Ft.)
Flow length =   695.000(Ft.)
Travel time  =    4.51 min.
```

```
Time of concentration =   15.03 min.
Depth of flow =   0.503(Ft.)
Average velocity =   2.566(Ft/s)
Total irregular channel flow =    10.606(CFS)
Irregular channel normal depth above invert elev. =   0.503(Ft.)
Average velocity of channel(s) =   2.566(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      3.886(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.750
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.250
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.292
The area added to the existing stream causes a
a lower flow rate of Q =      9.108(CFS)
therefore the upstream flow rate of Q =     10.577(CFS) is being used
Rainfall intensity =      3.886(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.305  CA =      2.344
Subarea runoff =      0.000(CFS) for      0.621(Ac.)
Total runoff =     10.577(CFS)  Total area =       7.673(Ac.)
Depth of flow =   0.502(Ft.), Average velocity =   2.565(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Depth of flow =   0.496(Ft.), Average velocity =   2.649(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00               0.52
    2             19.50               0.13
    3             21.00               0.00
    4             21.00               0.50
    5             31.00               1.00
Manning's 'N' friction factor =   0.015
-----------------------------------------------------------------
Sub-Channel flow  =     10.577(CFS)
  '     '    flow top width =     19.794(Ft.)
  '     '    velocity=    2.649(Ft/s)
  '     '    area =      3.993(Sq.Ft)
  '     '    Froude number =     1.039

Upstream point elevation =   762.000(Ft.)
Downstream point elevation =   759.500(Ft.)
Flow length =   400.000(Ft.)
Travel time  =    2.52 min.
Time of concentration =   17.55 min.
Depth of flow =   0.496(Ft.)
Average velocity =   2.649(Ft/s)
Total irregular channel flow =    10.577(CFS)
Irregular channel normal depth above invert elev. =   0.496(Ft.)
Average velocity of channel(s) =   2.649(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      203.000
**** CONFLUENCE OF MINOR STREAMS ****

------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.673(Ac.)
Runoff from this stream =     10.577(CFS)
Time of concentration =   17.55 min.
```

```
Rainfall intensity =     3.517(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****

------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                      ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  840.000(Ft.)
Lowest elevation =  834.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  6.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.33 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   6.000^(1/3)]=   7.33
Rainfall intensity (I) =      6.176(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.409(CFS)
Total initial stream area =        0.184(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      8.256(CFS)
Depth of flow =   0.307(Ft.), Average velocity =   3.501(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              2.00
    2             50.00              0.00
    3            100.00              2.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      8.256(CFS)
  '     '    flow top width =     15.357(Ft.)
  '     '    velocity=    3.501(Ft/s)
  '     '    area =      2.358(Sq.Ft)
  '     '    Froude number =     1.574

Upstream point elevation =   834.000(Ft.)
Downstream point elevation =   759.500(Ft.)
Flow length =  1225.400(Ft.)
Travel time  =    5.83 min.
Time of concentration =   13.16 min.
Depth of flow =   0.307(Ft.)
Average velocity =   3.501(Ft/s)
Total irregular channel flow =     8.256(CFS)
Irregular channel normal depth above invert elev. =   0.307(Ft.)
Average velocity of channel(s) =   3.501(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.233(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
```

```
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.306
Rainfall intensity =      4.233(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.307  CA =      3.788
Subarea runoff =     15.624(CFS) for     12.161(Ac.)
Total runoff =     16.034(CFS)  Total area =      12.345(Ac.)
Depth of flow =   0.394(Ft.), Average velocity =   4.132(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      203.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     12.345(Ac.)
Runoff from this stream =     16.034(CFS)
Time of concentration =   13.16 min.
Rainfall intensity =     4.233(In/Hr)
Summary of stream data:

Stream    Flow rate      TC            Rainfall Intensity
 No.        (CFS)       (min)                 (In/Hr)


1        10.577      17.55             3.517
2        16.034      13.16             4.233
Qmax(1) =
       1.000 *    1.000 *    10.577) +
       0.831 *    1.000 *    16.034) + =      23.897
Qmax(2) =
       1.000 *    0.750 *    10.577) +
       1.000 *    1.000 *    16.034) + =      23.968

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.577      16.034
Maximum flow rates at confluence using above data:
       23.897       23.968
Area of streams before confluence:
        7.673       12.345
Results of confluence:
Total flow rate =     23.968(CFS)
Time of concentration =    13.165 min.
Effective stream area after confluence =     20.018(Ac.)
End of computations, total study area =          20.018 (Ac.)
```

```
1
2               San Diego County Rational Hydrology Program
3
4       CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1
5
6       Rational method hydrology  program based on
7       San Diego County Flood Control Division 2003 hydrology manual
8           Rational Hydrology Study        Date: 11/26/24
9       ------------------------------------------------------------------------
10      24021 CONWAY DRIVE
11      PRE-DEVELOPMENT
12      Q50 YEAR
13      POC-2
14      ------------------------------------------------------------------------
15       *********   Hydrology Study Control Information **********
16
17      ------------------------------------------------------------------------
18
19
20      Program License Serial Number 6332
21
22      ------------------------------------------------------------------------
23      Rational hydrology study storm event year is    50.0
24      English (in-lb) input data Units used
25
26      Map data precipitation entered:
27      6 hour,  precipitation(inches) =  3.000
28      24 hour precipitation(inches) =  6.500
29      P6/P24 =    46.2%
30      San Diego hydrology manual 'C' values used
31
32
33      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
34      Process from Point/Station      301.000 to Point/Station      302.000
35      **** INITIAL AREA EVALUATION ****
36
37      Decimal fraction soil group A = 0.000
38      Decimal fraction soil group B = 0.000
39      Decimal fraction soil group C = 1.000
40      Decimal fraction soil group D = 0.000
41      [LOW DENSITY RESIDENTIAL                    ]
42      (1.0 DU/A or Less       )
43      Impervious value, Ai = 0.100
44      Sub-Area C Value = 0.360
45      Initial subarea total flow distance  =   85.000(Ft.)
46      Highest elevation =  783.000(Ft.)
47      Lowest elevation =  780.500(Ft.)
48      Elevation difference =    2.500(Ft.) Slope =  2.941 %
49      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
50      The maximum overland flow distance is 100.00 (Ft)
51      for the top area slope value of   2.94 %, in a development type of
52       1.0 DU/A or Less
53      In Accordance With Figure 3-3
54      Initial Area Time of Concentration =   9.30 minutes
55      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
56      TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   2.941^(1/3)]=   9.30
57      Rainfall intensity (I) =      5.298(In/Hr) for a    50.0 year storm
58      Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
59      Subarea runoff =      0.483(CFS)
60      Total initial stream area =        0.253(Ac.)
61
62
63      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
64      Process from Point/Station      302.000 to Point/Station      303.000
65      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
66
67      Estimated mean flow rate at midpoint of channel =      1.264(CFS)
68      Depth of flow =   0.226(Ft.), Average velocity =   2.479(Ft/s)
69          ******* Irregular Channel Data ***********
```

```
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2             10.00              0.00
    3             20.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      1.264(CFS)
  '     '    flow top width =      4.516(Ft.)
  '     '    velocity=    2.479(Ft/s)
  '     '    area =      0.510(Sq.Ft)
  '     '    Froude number =     1.300

Upstream point elevation =   780.500(Ft.)
Downstream point elevation =   772.000(Ft.)
Flow length =   184.000(Ft.)
Travel time  =    1.24 min.
Time of concentration =   10.53 min.
Depth of flow =   0.226(Ft.)
Average velocity =   2.479(Ft/s)
Total irregular channel flow =     1.264(CFS)
Irregular channel normal depth above invert elev. =   0.226(Ft.)
Average velocity of channel(s) =   2.479(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.888(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Rainfall intensity =      4.888(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.360  CA =      0.401
Subarea runoff =      1.479(CFS) for      0.862(Ac.)
Total runoff =      1.962(CFS)  Total area =       1.115(Ac.)
Depth of flow =   0.266(Ft.), Average velocity =   2.767(Ft/s)
End of computations, total study area =           1.115 (Ac.)
```

ATTACHMENT E
50 Year POST DEVELOPED Q CALCULATIONS

Steps Taken To Analyze This Condition
The Rational Method as outlined in section 3 of the June 2003 San Diego County Hydrology Manual is followed here. The software that we are using is the *"Rational Hydrology Method, San Diego County (2003 Manual)"* module of the CIVILCADD/CIVIL DESIGN Engineering software version 7.9.

Please see the subsequent pages for the calculations. These calculations are for the Q50. The results are outlined/summarized in Section 8.

```
1
2               San Diego County Rational Hydrology Program
3
4       CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1
5
6       Rational method hydrology  program based on
7       San Diego County Flood Control Division 2003 hydrology manual
8           Rational Hydrology Study        Date: 11/27/24
9       ------------------------------------------------------------------------
10      24021 CONWAY DRIVE
11      POST-DEVELOPMENT
12      Q50 YR
13      POC-1
14      ------------------------------------------------------------------------
15       *********   Hydrology Study Control Information **********
16
17      ------------------------------------------------------------------------
18
19
20      Program License Serial Number 6332
21
22      ------------------------------------------------------------------------
23      Rational hydrology study storm event year is    50.0
24      English (in-lb) input data Units used
25
26      Map data precipitation entered:
27      6 hour,  precipitation(inches) =  3.000
28      24 hour precipitation(inches) =  6.500
29      P6/P24 =    46.2%
30      San Diego hydrology manual 'C' values used
31
32
33      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
34      Process from Point/Station      101.000 to Point/Station      102.000
35      **** INITIAL AREA EVALUATION ****
36
37      Decimal fraction soil group A = 0.000
38      Decimal fraction soil group B = 0.000
39      Decimal fraction soil group C = 1.000
40      Decimal fraction soil group D = 0.000
41      [LOW DENSITY RESIDENTIAL                    ]
42      (1.0 DU/A or Less       )
43      Impervious value, Ai = 0.100
44      Sub-Area C Value = 0.360
45      Initial subarea total flow distance  =  100.000(Ft.)
46      Highest elevation =  840.000(Ft.)
47      Lowest elevation =  836.000(Ft.)
48      Elevation difference =    4.000(Ft.) Slope =  4.000 %
49      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
50      The maximum overland flow distance is 100.00 (Ft)
51      for the top area slope value of   4.00 %, in a development type of
52       1.0 DU/A or Less
53      In Accordance With Figure 3-3
54      Initial Area Time of Concentration =   8.39 minutes
55      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
56      TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   4.000^(1/3)]=   8.39
57      Rainfall intensity (I) =      5.660(In/Hr) for a    50.0 year storm
58      Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
59      Subarea runoff =      0.155(CFS)
60      Total initial stream area =        0.076(Ac.)
61
62
63      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
64      Process from Point/Station      102.000 to Point/Station      103.000
65      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
66
67      Estimated mean flow rate at midpoint of channel =      3.696(CFS)
68      Depth of flow =   0.197(Ft.), Average velocity =   3.815(Ft/s)
69          ******* Irregular Channel Data ***********
```

```
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              2.00
    2             50.00              0.00
    3            100.00              2.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      3.696(CFS)
  '     '    flow top width =      9.842(Ft.)
  '     '    velocity=    3.815(Ft/s)
  '     '    area =      0.969(Sq.Ft)
  '     '    Froude number =     2.143

Upstream point elevation =   836.000(Ft.)
Downstream point elevation =   766.000(Ft.)
Flow length =   535.600(Ft.)
Travel time  =    2.34 min.
Time of concentration =   10.73 min.
Depth of flow =   0.197(Ft.)
Average velocity =   3.815(Ft/s)
Total irregular channel flow =     3.696(CFS)
Irregular channel normal depth above invert elev. =   0.197(Ft.)
Average velocity of channel(s) =   3.815(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.830(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.306
Rainfall intensity =      4.830(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.307  CA =      1.479
Subarea runoff =      6.987(CFS) for      4.743(Ac.)
Total runoff =      7.142(CFS)  Total area =       4.819(Ac.)
Depth of flow =   0.252(Ft.), Average velocity =   4.498(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      7.189(CFS)
Depth of flow =   0.447(Ft.), Average velocity =   2.333(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.52
    2             19.50              0.13
    3             21.00              0.00
    4             21.00              0.50
    5             31.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      7.189(CFS)
  '     '    flow top width =     17.340(Ft.)
  '     '    velocity=    2.333(Ft/s)
  '     '    area =      3.082(Sq.Ft)
  '     '    Froude number =     0.975

Upstream point elevation =   766.000(Ft.)
Downstream point elevation =   762.910(Ft.)
Flow length =   537.900(Ft.)
Travel time  =    3.84 min.
```

```
Time of concentration =   14.57 min.
Depth of flow =   0.447(Ft.)
Average velocity =   2.333(Ft/s)
Total irregular channel flow =     7.189(CFS)
Irregular channel normal depth above invert elev. =   0.447(Ft.)
Average velocity of channel(s) =   2.333(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      3.965(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.900
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.279
The area added to the existing stream causes a
a lower flow rate of Q =      6.426(CFS)
therefore the upstream flow rate of Q =      7.142(CFS) is being used
Rainfall intensity =      3.965(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.304  CA =      1.621
Subarea runoff =      0.000(CFS) for      0.510(Ac.)
Total runoff =      7.142(CFS)  Total area =       5.329(Ac.)
Depth of flow =   0.446(Ft.), Average velocity =   2.329(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.329(Ac.)
Runoff from this stream =      7.142(CFS)
Time of concentration =   14.57 min.
Rainfall intensity =     3.965(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  840.000(Ft.)
Lowest elevation =  834.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  6.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.33 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   6.000^(1/3)]=   7.33
Rainfall intensity (I) =      6.176(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.409(CFS)
Total initial stream area =        0.184(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station      202.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      2.605(CFS)
Depth of flow =   0.168(Ft.), Average velocity =   3.686(Ft/s)
    ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              2.00
    2             50.00              0.00
    3            100.00              2.00
Manning's 'N' friction factor =   0.030
-------------------------------------------------------------------
Sub-Channel flow  =      2.605(CFS)
  '     '    flow top width =      8.407(Ft.)
  '     '    velocity=    3.686(Ft/s)
  '     '    area =      0.707(Sq.Ft)
  '     '    Froude number =     2.240

Upstream point elevation =   834.000(Ft.)
Downstream point elevation =   790.370(Ft.)
Flow length =   289.900(Ft.)
Travel time  =    1.31 min.
Time of concentration =    8.64 min.
Depth of flow =   0.168(Ft.)
Average velocity =   3.686(Ft/s)
Total irregular channel flow =     2.605(CFS)
Irregular channel normal depth above invert elev. =   0.168(Ft.)
Average velocity of channel(s) =   3.686(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.554(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.800
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.288
Rainfall intensity =      5.554(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.293  CA =      0.854
Subarea runoff =      4.332(CFS) for      2.734(Ac.)
Total runoff =      4.741(CFS)  Total area =       2.918(Ac.)
Depth of flow =   0.210(Ft.), Average velocity =   4.281(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Depth of flow =   0.745(Ft.), Average velocity =   8.553(Ft/s)
    ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2              1.00              0.00
    3              2.00              1.00
Manning's 'N' friction factor =   0.015
-------------------------------------------------------------------
Sub-Channel flow  =      4.741(CFS)
  '     '    flow top width =      1.489(Ft.)
  '     '    velocity=    8.553(Ft/s)
  '     '    area =      0.554(Sq.Ft)
  '     '    Froude number =     2.470

Upstream point elevation =   790.370(Ft.)
```

```
Downstream point elevation =   762.910(Ft.)
Flow length =   621.500(Ft.)
Travel time  =    1.21 min.
Time of concentration =    9.85 min.
Depth of flow =   0.745(Ft.)
Average velocity =   8.553(Ft/s)
Total irregular channel flow =     4.741(CFS)
Irregular channel normal depth above invert elev. =   0.745(Ft.)
Average velocity of channel(s) =   8.553(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.918(Ac.)
Runoff from this stream =      4.741(CFS)
Time of concentration =    9.85 min.
Rainfall intensity =     5.103(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        7.142     14.57             3.965
2        4.741      9.85             5.103
Qmax(1) =
       1.000 *    1.000 *     7.142) +
       0.777 *    1.000 *     4.741) + =      10.825
Qmax(2) =
       1.000 *    0.676 *     7.142) +
       1.000 *    1.000 *     4.741) + =       9.569

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.142       4.741
Maximum flow rates at confluence using above data:
       10.825        9.569
Area of streams before confluence:
        5.329        2.918
Results of confluence:
Total flow rate =     10.825(CFS)
Time of concentration =    14.574 min.
Effective stream area after confluence =      8.247(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      204.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =     10.874(CFS)
Depth of flow =   0.502(Ft.), Average velocity =   2.644(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.52
    2             19.50              0.13
    3             21.00              0.00
    4             21.00              0.50
    5             31.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =     10.874(CFS)
  '     '    flow top width =     20.133(Ft.)
  '     '    velocity=    2.644(Ft/s)
  '     '    area =      4.113(Sq.Ft)
```

```
'     '    Froude number =     1.031

Upstream point elevation =   762.910(Ft.)
Downstream point elevation =   759.500(Ft.)
Flow length =   557.300(Ft.)
Travel time  =    3.51 min.
Time of concentration =   18.09 min.
Depth of flow =   0.502(Ft.)
Average velocity =   2.644(Ft/s)
Total irregular channel flow =    10.874(CFS)
Irregular channel normal depth above invert elev. =   0.502(Ft.)
Average velocity of channel(s) =   2.644(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      3.449(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.422
The area added to the existing stream causes a
a lower flow rate of Q =     10.261(CFS)
therefore the upstream flow rate of Q =     10.825(CFS) is being used
Rainfall intensity =      3.449(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.315  CA =      2.975
Subarea runoff =      0.000(CFS) for      1.186(Ac.)
Total runoff =     10.825(CFS)  Total area =       9.433(Ac.)
Depth of flow =   0.501(Ft.), Average velocity =   2.642(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** CONFLUENCE OF MAIN STREAMS ****

------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.433(Ac.)
Runoff from this stream =     10.825(CFS)
Time of concentration =   18.09 min.
Rainfall intensity =     3.449(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****

------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.450
Initial subarea total flow distance  =   70.000(Ft.)
Highest elevation =  784.000(Ft.)
Lowest elevation =  783.300(Ft.)
Elevation difference =    0.700(Ft.) Slope =  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 2.9 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.79 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
```

```
TC = [1.8*(1.1-0.4500)*(  70.000^.5)/(   1.000^(1/3)]=   9.79
Rainfall intensity (I) =      5.125(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.334(CFS)
Total initial stream area =        0.145(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      2.628(CFS)
Depth of flow =   0.257(Ft.), Average velocity =   2.759(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.33
    2             16.50              0.13
    3             18.00              0.00
    4             18.00              0.50
    5             23.50              0.58
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      2.628(CFS)
  '     '    flow top width =     11.973(Ft.)
  '     '    velocity=    2.759(Ft/s)
  '     '    area =      0.953(Sq.Ft)
  '     '    Froude number =     1.723

Upstream point elevation =   783.300(Ft.)
Downstream point elevation =   764.900(Ft.)
Flow length =   788.900(Ft.)
Travel time  =    4.77 min.
Time of concentration =   14.56 min.
Depth of flow =   0.257(Ft.)
Average velocity =   2.759(Ft/s)
Total irregular channel flow =     2.628(CFS)
Irregular channel normal depth above invert elev. =   0.257(Ft.)
Average velocity of channel(s) =   2.759(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      3.968(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.700
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                      ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.401
Rainfall intensity =      3.968(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.403  CA =      1.221
Subarea runoff =      4.508(CFS) for      2.881(Ac.)
Total runoff =      4.843(CFS)  Total area =       3.026(Ac.)
Depth of flow =   0.298(Ft.), Average velocity =   3.189(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   762.220(Ft.)
Downstream point/station elevation =   762.040(Ft.)
Pipe length  =    36.00(Ft.) Slope =   0.0050  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.843(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     4.843(CFS)
Normal flow depth in pipe =   10.59(In.)
```

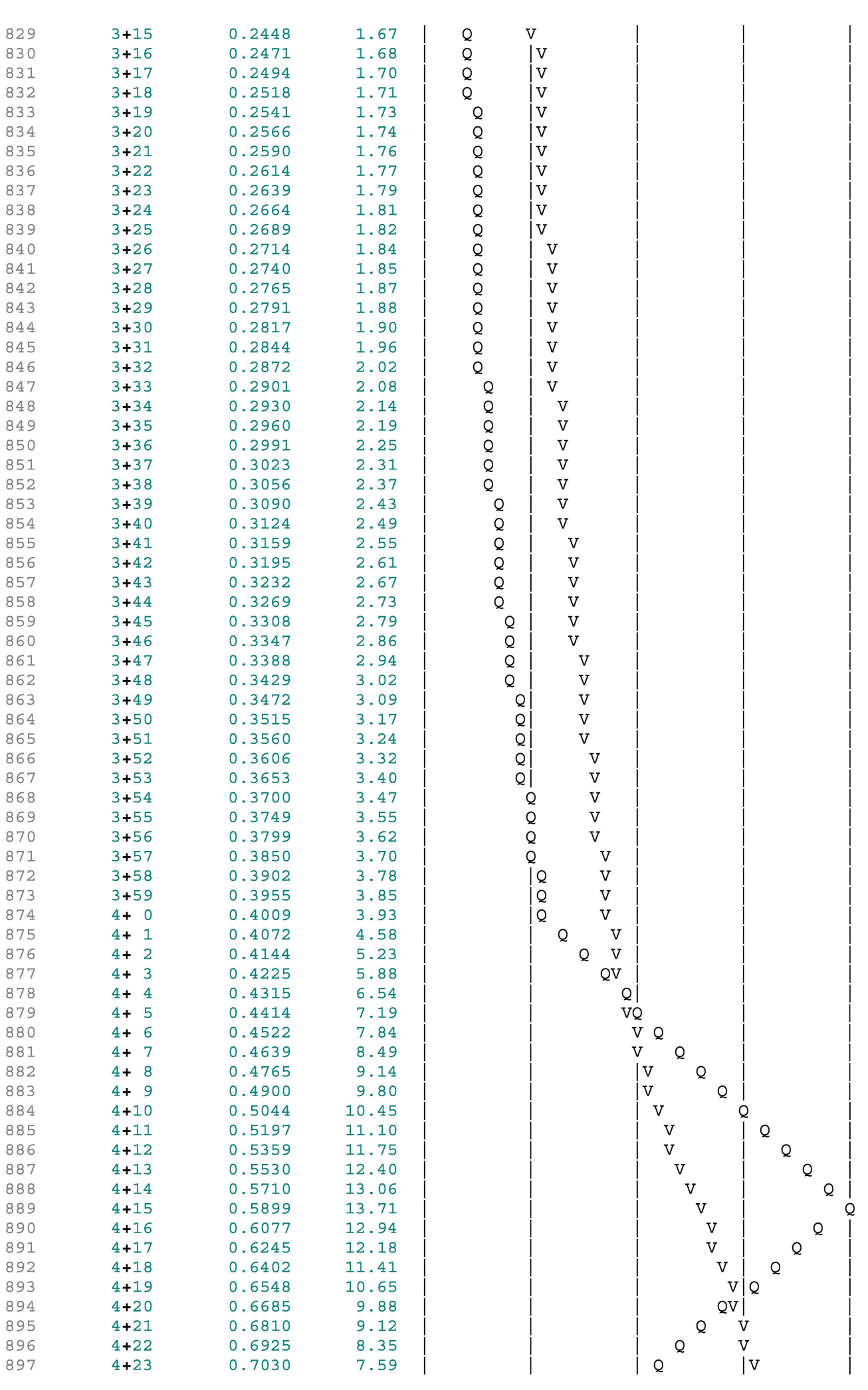
```
Flow top width inside pipe =   17.72(In.)
Critical Depth =   10.15(In.)
Pipe flow velocity =      4.48(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    14.69 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      304.000
**** SUBAREA FLOW ADDITION ****

------------------------------------------------------------------------
Rainfall intensity (I) =      3.944(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.422
Time of concentration =    14.69 min.
Rainfall intensity =      3.944(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.410  CA =      1.929
Subarea runoff =      2.768(CFS) for      1.680(Ac.)
Total runoff =      7.611(CFS)  Total area =       4.706(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      305.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------
Upstream point/station elevation =   761.840(Ft.)
Downstream point/station elevation =   761.300(Ft.)
Pipe length  =   107.10(Ft.) Slope =   0.0050  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.611(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.611(CFS)
Normal flow depth in pipe =   11.63(In.)
Flow top width inside pipe =   23.99(In.)
Critical Depth =   11.76(In.)
Pipe flow velocity =      5.04(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =    15.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      306.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Depth of flow =   1.307(Ft.), Average velocity =   4.716(Ft/s)
!!Warning: Water is above left or right bank elevations
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2              1.00              0.00
    3              2.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      7.611(CFS)
  '     '    flow top width =      2.000(Ft.)
  '     '    velocity=    4.716(Ft/s)
  '     '    area =      1.614(Sq.Ft)
  '     '    Froude number =     0.925

Upstream point elevation =   761.300(Ft.)
Downstream point elevation =   760.500(Ft.)
```

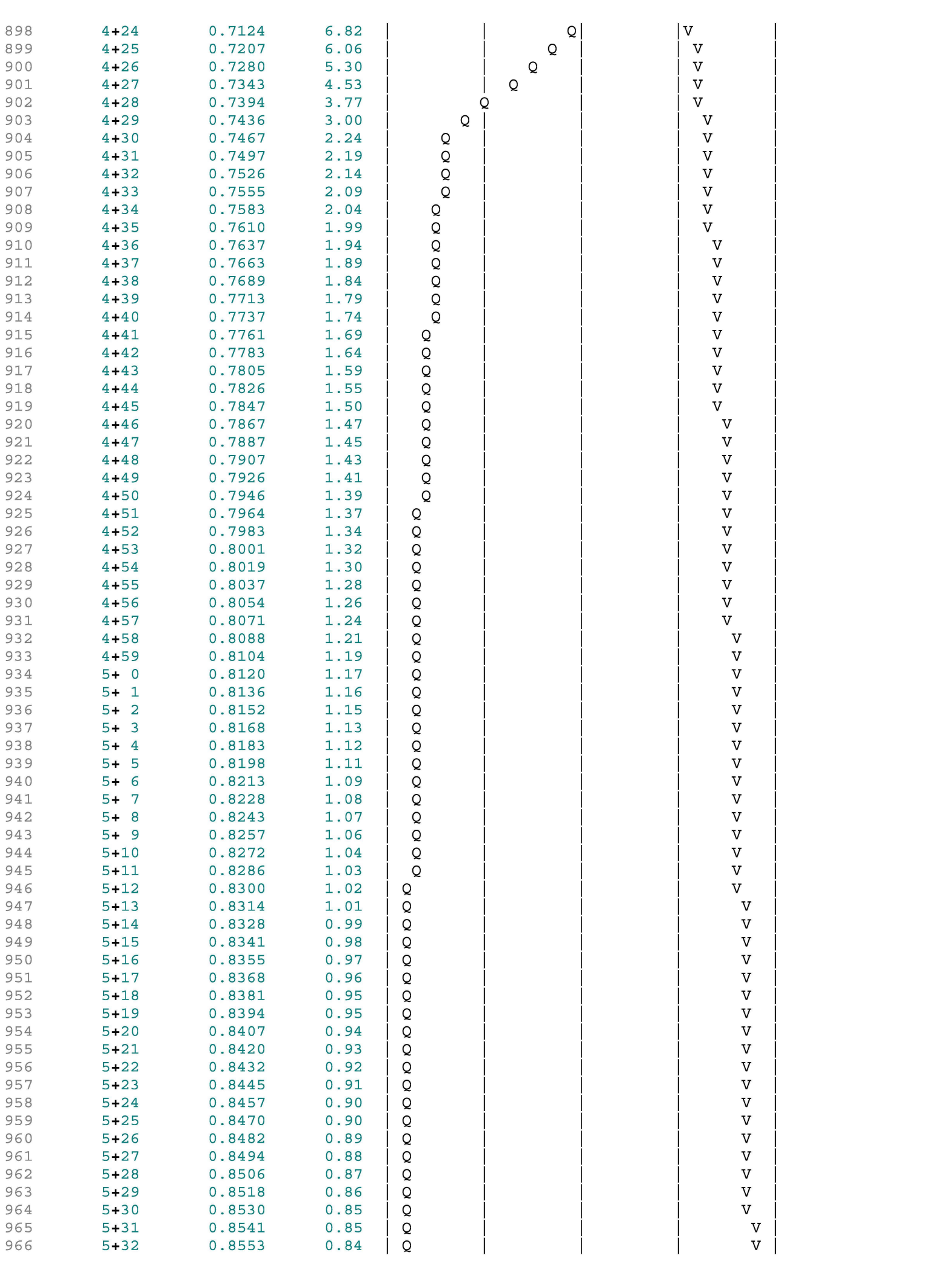
```
Flow length =   167.000(Ft.)
Travel time  =    0.59 min.
Time of concentration =   15.63 min.
Depth of flow =   1.307(Ft.)
Average velocity =   4.716(Ft/s)
Total irregular channel flow =     7.611(CFS)
Irregular channel normal depth above invert elev. =   1.307(Ft.)
Average velocity of channel(s) =   4.716(Ft/s)
!!Warning: Water is above left or right bank elevations


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      306.000
**** SUBAREA FLOW ADDITION ****

------------------------------------------------------------------------
Rainfall intensity (I) =      3.789(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.408
Time of concentration =    15.63 min.
Rainfall intensity =      3.789(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.409  CA =      3.618
Subarea runoff =      6.097(CFS) for      4.138(Ac.)
Total runoff =     13.708(CFS)  Total area =       8.844(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      306.000
**** 6 HOUR HYDROGRAPH ****

------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003


Time of Concentration =  15.63
Basin Area =    18.28 Acres
6 Hour Rainfall =  3.000 Inches
Runoff Coefficient =  0.198
Peak Discharge =    13.71 CFS
     Time (Min)     Discharge (CFS)
          0              0.000
         15              0.652
         30              0.671
         45              0.712
         60              0.736
         75              0.789
         90              0.820
        105              0.891
        120              0.933
        135              1.035
        150              1.097
        165              1.258
        180              1.364
        195              1.667
        210              1.899
        225              2.788
        240              3.928
        255             13.708
        270              2.236
        285              1.496
        300              1.170
        315              0.980
        330              0.853
```

```
            345               0.761
            360               0.691
            375               0.635
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        6 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
  ----------------------------------------------------------------------------
                  Hydrograph in   1   Minute intervals ((CFS))

  ----------------------------------------------------------------------------
Time(h+m) Volume Ac.Ft    Q(CFS)  0         3.4        6.9       10.3       13.7
----------------------------------------------------------------------------
  0+ 0       0.0000       0.00  Q          |          |          |          |
  0+ 1       0.0001       0.04  Q          |          |          |          |
  0+ 2       0.0002       0.09  Q          |          |          |          |
  0+ 3       0.0004       0.13  Q          |          |          |          |
  0+ 4       0.0006       0.17  Q          |          |          |          |
  0+ 5       0.0009       0.22  Q          |          |          |          |
  0+ 6       0.0013       0.26  Q          |          |          |          |
  0+ 7       0.0017       0.30  Q          |          |          |          |
  0+ 8       0.0022       0.35  VQ         |          |          |          |
  0+ 9       0.0027       0.39  VQ         |          |          |          |
  0+10       0.0033       0.43  VQ         |          |          |          |
  0+11       0.0040       0.48  VQ         |          |          |          |
  0+12       0.0047       0.52  VQ         |          |          |          |
  0+13       0.0055       0.57  VQ         |          |          |          |
  0+14       0.0063       0.61  VQ         |          |          |          |
  0+15       0.0072       0.65  VQ         |          |          |          |
  0+16       0.0081       0.65  VQ         |          |          |          |
  0+17       0.0090       0.65  VQ         |          |          |          |
  0+18       0.0099       0.66  VQ         |          |          |          |
  0+19       0.0108       0.66  VQ         |          |          |          |
  0+20       0.0117       0.66  VQ         |          |          |          |
  0+21       0.0126       0.66  VQ         |          |          |          |
  0+22       0.0135       0.66  VQ         |          |          |          |
  0+23       0.0144       0.66  VQ         |          |          |          |
  0+24       0.0154       0.66  VQ         |          |          |          |
  0+25       0.0163       0.66  VQ         |          |          |          |
  0+26       0.0172       0.67  VQ         |          |          |          |
  0+27       0.0181       0.67  VQ         |          |          |          |
  0+28       0.0190       0.67  VQ         |          |          |          |
  0+29       0.0199       0.67  VQ         |          |          |          |
  0+30       0.0209       0.67  VQ         |          |          |          |
  0+31       0.0218       0.67  VQ         |          |          |          |
  0+32       0.0227       0.68  |Q         |          |          |          |
  0+33       0.0237       0.68  |Q         |          |          |          |
  0+34       0.0246       0.68  |Q         |          |          |          |
  0+35       0.0255       0.68  |Q         |          |          |          |
  0+36       0.0265       0.69  |VQ        |          |          |          |
  0+37       0.0274       0.69  |VQ        |          |          |          |
  0+38       0.0284       0.69  |VQ        |          |          |          |
  0+39       0.0294       0.70  |VQ        |          |          |          |
  0+40       0.0303       0.70  |VQ        |          |          |          |
  0+41       0.0313       0.70  |VQ        |          |          |          |
  0+42       0.0323       0.70  |VQ        |          |          |          |
  0+43       0.0332       0.71  |VQ        |          |          |          |
  0+44       0.0342       0.71  |VQ        |          |          |          |
  0+45       0.0352       0.71  |VQ        |          |          |          |
  0+46       0.0362       0.71  |VQ        |          |          |          |
  0+47       0.0372       0.72  |VQ        |          |          |          |
  0+48       0.0381       0.72  |VQ        |          |          |          |
  0+49       0.0391       0.72  |VQ        |          |          |          |
  0+50       0.0401       0.72  |VQ        |          |          |          |
  0+51       0.0411       0.72  |VQ        |          |          |          |
  0+52       0.0421       0.72  |VQ        |          |          |          |
  0+53       0.0431       0.72  |VQ        |          |          |          |
  0+54       0.0441       0.73  |VQ        |          |          |          |
  0+55       0.0451       0.73  | Q        |          |          |          |
  0+56       0.0461       0.73  | Q        |          |          |          |
```

691	0+57	0.0471	0.73	Q				
692	0+58	0.0481	0.73	Q				
693	0+59	0.0492	0.73	Q				
694	1+ 0	0.0502	0.74	Q				
695	1+ 1	0.0512	0.74	Q				
696	1+ 2	0.0522	0.74	Q				
697	1+ 3	0.0532	0.75	Q				
698	1+ 4	0.0543	0.75	Q				
699	1+ 5	0.0553	0.75	Q				
700	1+ 6	0.0564	0.76	Q				
701	1+ 7	0.0574	0.76	Q				
702	1+ 8	0.0585	0.76	Q				
703	1+ 9	0.0595	0.77	Q				
704	1+10	0.0606	0.77	Q				
705	1+11	0.0616	0.77	Q				
706	1+12	0.0627	0.78	Q				
707	1+13	0.0638	0.78	Q				
708	1+14	0.0649	0.79	Q				
709	1+15	0.0660	0.79	Q				
710	1+16	0.0670	0.79	Q				
711	1+17	0.0681	0.79	QV				
712	1+18	0.0692	0.80	QV				
713	1+19	0.0703	0.80	QV				
714	1+20	0.0714	0.80	QV				
715	1+21	0.0725	0.80	QV				
716	1+22	0.0736	0.80	QV				
717	1+23	0.0748	0.81	QV				
718	1+24	0.0759	0.81	QV				
719	1+25	0.0770	0.81	QV				
720	1+26	0.0781	0.81	QV				
721	1+27	0.0792	0.81	QV				
722	1+28	0.0803	0.82	QV				
723	1+29	0.0815	0.82	QV				
724	1+30	0.0826	0.82	QV				
725	1+31	0.0837	0.82	QV				
726	1+32	0.0849	0.83	QV				
727	1+33	0.0860	0.83	QV				
728	1+34	0.0872	0.84	QV				
729	1+35	0.0883	0.84	QV				
730	1+36	0.0895	0.85	QV				
731	1+37	0.0907	0.85	Q V				
732	1+38	0.0919	0.86	Q V				
733	1+39	0.0931	0.86	Q V				
734	1+40	0.0942	0.87	Q V				
735	1+41	0.0954	0.87	Q V				
736	1+42	0.0967	0.88	Q V				
737	1+43	0.0979	0.88	Q V				
738	1+44	0.0991	0.89	Q V				
739	1+45	0.1003	0.89	Q V				
740	1+46	0.1015	0.89	Q V				
741	1+47	0.1028	0.90	Q V				
742	1+48	0.1040	0.90	Q V				
743	1+49	0.1053	0.90	Q V				
744	1+50	0.1065	0.90	Q V				
745	1+51	0.1078	0.91	Q V				
746	1+52	0.1090	0.91	Q V				
747	1+53	0.1103	0.91	Q V				
748	1+54	0.1115	0.92	Q V				
749	1+55	0.1128	0.92	Q V				
750	1+56	0.1141	0.92	Q V				
751	1+57	0.1153	0.92	Q V				
752	1+58	0.1166	0.93	Q V				
753	1+59	0.1179	0.93	Q V				
754	2+ 0	0.1192	0.93	Q V				
755	2+ 1	0.1205	0.94	Q V				
756	2+ 2	0.1218	0.95	Q V				
757	2+ 3	0.1231	0.95	Q V				
758	2+ 4	0.1244	0.96	Q V				
759	2+ 5	0.1257	0.97	Q V				

760	2+ 6	0.1271	0.97	Q V			
761	2+ 7	0.1284	0.98	Q V			
762	2+ 8	0.1298	0.99	Q V			
763	2+ 9	0.1312	0.99	Q V			
764	2+10	0.1325	1.00	Q V			
765	2+11	0.1339	1.01	Q V			
766	2+12	0.1353	1.01	Q V			
767	2+13	0.1367	1.02	Q V			
768	2+14	0.1382	1.03	Q V			
769	2+15	0.1396	1.03	Q V			
770	2+16	0.1410	1.04	Q V			
771	2+17	0.1424	1.04	Q V			
772	2+18	0.1439	1.05	Q V			
773	2+19	0.1453	1.05	Q V			
774	2+20	0.1468	1.06	Q V			
775	2+21	0.1483	1.06	Q V			
776	2+22	0.1497	1.06	Q V			
777	2+23	0.1512	1.07	Q V			
778	2+24	0.1527	1.07	Q V			
779	2+25	0.1541	1.08	Q V			
780	2+26	0.1556	1.08	Q V			
781	2+27	0.1571	1.08	Q V			
782	2+28	0.1586	1.09	Q V			
783	2+29	0.1601	1.09	Q V			
784	2+30	0.1616	1.10	Q V			
785	2+31	0.1632	1.11	Q V			
786	2+32	0.1647	1.12	Q V			
787	2+33	0.1663	1.13	Q V			
788	2+34	0.1678	1.14	Q V			
789	2+35	0.1694	1.15	Q V			
790	2+36	0.1710	1.16	Q V			
791	2+37	0.1726	1.17	Q V			
792	2+38	0.1743	1.18	Q V			
793	2+39	0.1759	1.19	Q V			
794	2+40	0.1776	1.20	Q V			
795	2+41	0.1792	1.21	Q V			
796	2+42	0.1809	1.23	Q V			
797	2+43	0.1826	1.24	Q V			
798	2+44	0.1844	1.25	Q V			
799	2+45	0.1861	1.26	Q V			
800	2+46	0.1878	1.26	Q V			
801	2+47	0.1896	1.27	Q V			
802	2+48	0.1913	1.28	Q V			
803	2+49	0.1931	1.29	Q V			
804	2+50	0.1949	1.29	Q V			
805	2+51	0.1967	1.30	Q V			
806	2+52	0.1985	1.31	Q V			
807	2+53	0.2003	1.31	Q V			
808	2+54	0.2021	1.32	Q V			
809	2+55	0.2039	1.33	Q V			
810	2+56	0.2058	1.34	Q V			
811	2+57	0.2076	1.34	Q V			
812	2+58	0.2095	1.35	Q V			
813	2+59	0.2114	1.36	Q V			
814	3+ 0	0.2132	1.36	Q V			
815	3+ 1	0.2151	1.38	Q V			
816	3+ 2	0.2171	1.40	Q V			
817	3+ 3	0.2190	1.42	Q V			
818	3+ 4	0.2210	1.44	Q V			
819	3+ 5	0.2230	1.46	Q V			
820	3+ 6	0.2251	1.48	Q V			
821	3+ 7	0.2272	1.51	Q V			
822	3+ 8	0.2293	1.53	Q V			
823	3+ 9	0.2314	1.55	Q V			
824	3+10	0.2336	1.57	Q V			
825	3+11	0.2357	1.59	Q V			
826	3+12	0.2379	1.61	Q V			
827	3+13	0.2402	1.63	Q V			
828	3+14	0.2425	1.65	Q V			





```
      5+33       0.8564      0.83  | Q       |         |         |        V |
      5+34       0.8576      0.83  | Q       |         |         |        V |
      5+35       0.8587      0.82  | Q       |         |         |        V |
      5+36       0.8598      0.82  | Q       |         |         |        V |
      5+37       0.8610      0.81  | Q       |         |         |        V |
      5+38       0.8621      0.80  | Q       |         |         |        V |
      5+39       0.8632      0.80  | Q       |         |         |        V |
      5+40       0.8643      0.79  | Q       |         |         |        V |
      5+41       0.8653      0.79  | Q       |         |         |        V |
      5+42       0.8664      0.78  | Q       |         |         |        V |
      5+43       0.8675      0.77  | Q       |         |         |        V |
      5+44       0.8685      0.77  | Q       |         |         |        V |
      5+45       0.8696      0.76  | Q       |         |         |        V |
      5+46       0.8706      0.76  | Q       |         |         |        V |
      5+47       0.8717      0.75  | Q       |         |         |        V |
      5+48       0.8727      0.75  | Q       |         |         |        V |
      5+49       0.8737      0.74  | Q       |         |         |        V |
      5+50       0.8747      0.74  | Q       |         |         |        V |
      5+51       0.8757      0.73  | Q       |         |         |        V |
      5+52       0.8767      0.73  | Q       |         |         |         V|
      5+53       0.8777      0.72  | Q       |         |         |         V|
      5+54       0.8787      0.72  | Q       |         |         |         V|
      5+55       0.8797      0.71  | Q       |         |         |         V|
      5+56       0.8807      0.71  | Q       |         |         |         V|
      5+57       0.8817      0.70  | Q       |         |         |         V|
      5+58       0.8826      0.70  | Q       |         |         |         V|
      5+59       0.8836      0.70  | Q       |         |         |         V|
      6+ 0       0.8845      0.69  | Q       |         |         |         V|
      6+ 1       0.8855      0.69  | Q       |         |         |         V|
      6+ 2       0.8864      0.68  |Q        |         |         |         V|
      6+ 3       0.8874      0.68  |Q        |         |         |         V|
      6+ 4       0.8883      0.68  |Q        |         |         |         V|
      6+ 5       0.8892      0.67  |Q        |         |         |         V|
      6+ 6       0.8901      0.67  |Q        |         |         |         V|
      6+ 7       0.8911      0.66  |Q        |         |         |         V|
      6+ 8       0.8920      0.66  |Q        |         |         |         V|
      6+ 9       0.8929      0.66  |Q        |         |         |         V|
      6+10       0.8938      0.65  |Q        |         |         |         V|
      6+11       0.8947      0.65  |Q        |         |         |         V|
      6+12       0.8956      0.65  |Q        |         |         |         V|
      6+13       0.8964      0.64  |Q        |         |         |         V|
      6+14       0.8973      0.64  |Q        |         |         |         V|
      6+15       0.8982      0.64  |Q        |         |         |          V
-------------------------------------------------------------------------------



 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 Process from Point/Station      306.000 to Point/Station      408.000
 **** PIPEFLOW TRAVEL TIME (User specified size) ****
 ------------------------------------------------------------------------
 Upstream point/station elevation =   757.560(Ft.)
 Downstream point/station elevation =   757.490(Ft.)
 Pipe length  =    15.05(Ft.) Slope =   0.0047  Manning's N = 0.013
 No. of pipes = 1  Required pipe flow  =    13.708(CFS)
 Given pipe size =     24.00(In.)
 Calculated individual pipe flow  =    13.708(CFS)
 Normal flow depth in pipe =   17.63(In.)
 Flow top width inside pipe =   21.20(In.)
 Critical Depth =   15.99(In.)
 Pipe flow velocity =      5.55(Ft/s)
 Travel time through pipe =    0.05 min.
 Time of concentration (TC) =    15.68 min.


 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station      408.000 to Point/Station      408.000
**** CONFLUENCE OF MINOR STREAMS ****

____________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      8.844(Ac.)
Runoff from this stream =     13.708(CFS)
Time of concentration =   15.68 min.
Rainfall intensity =     3.782(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****

____________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  828.000(Ft.)
Lowest elevation =  815.000(Ft.)
Elevation difference =   13.000(Ft.) Slope = 13.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  13.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.66 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(  13.000^(1/3)]=   5.66
Rainfall intensity (I) =      7.293(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.320(CFS)
Total initial stream area =        0.122(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

____________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.994(CFS)
Depth of flow =   0.235(Ft.), Average velocity =   3.602(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2             10.00              0.00
    3             20.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      1.994(CFS)
  '     '    flow top width =      4.706(Ft.)
  '     '    velocity=    3.602(Ft/s)
  '     '    area =      0.554(Sq.Ft)
  '     '    Froude number =     1.851

Upstream point elevation =   815.000(Ft.)
Downstream point elevation =   791.000(Ft.)
Flow length =   259.850(Ft.)
Travel time  =    1.20 min.
Time of concentration =    6.87 min.
Depth of flow =   0.235(Ft.)
Average velocity =   3.602(Ft/s)
Total irregular channel flow =     1.994(CFS)
```

```
Irregular channel normal depth above invert elev. =    0.235(Ft.)
Average velocity of channel(s) =    3.602(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      6.441(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                      ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.306
Rainfall intensity =      6.441(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.310  CA =      0.558
Subarea runoff =      3.272(CFS) for      1.679(Ac.)
Total runoff =      3.592(CFS)  Total area =       1.801(Ac.)
Depth of flow =   0.293(Ft.), Average velocity =   4.173(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      404.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
----------------------------------------------------------------------
Depth of flow =   0.716(Ft.), Average velocity =   7.001(Ft/s)
    ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2              1.00              0.00
    3              2.00              1.00
Manning's 'N' friction factor =   0.015
----------------------------------------------------------------
Sub-Channel flow  =      3.592(CFS)
  '     '    flow top width =      1.433(Ft.)
  '     '    velocity=    7.001(Ft/s)
  '     '    area =      0.513(Sq.Ft)
  '     '    Froude number =     2.061

Upstream point elevation =   791.000(Ft.)
Downstream point elevation =   781.500(Ft.)
Flow length =   304.820(Ft.)
Travel time  =    0.73 min.
Time of concentration =    7.59 min.
Depth of flow =   0.716(Ft.)
Average velocity =   7.001(Ft/s)
Total irregular channel flow =     3.592(CFS)
Irregular channel normal depth above invert elev. =   0.716(Ft.)
Average velocity of channel(s) =   7.001(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      405.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
----------------------------------------------------------------------
Upstream point/station elevation =   775.420(Ft.)
Downstream point/station elevation =   773.810(Ft.)
Pipe length  =   164.90(Ft.) Slope =   0.0098  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.592(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.592(CFS)
Normal flow depth in pipe =    7.31(In.)
Flow top width inside pipe =   17.68(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      5.34(Ft/s)
Travel time through pipe =    0.51 min.
Time of concentration (TC) =     8.11 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      406.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   773.610(Ft.)
Downstream point/station elevation =   772.150(Ft.)
Pipe length  =   150.00(Ft.) Slope =   0.0097  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.592(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.592(CFS)
Normal flow depth in pipe =    7.31(In.)
Flow top width inside pipe =   17.68(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      5.33(Ft/s)
Travel time through pipe =    0.47 min.
Time of concentration (TC) =     8.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      407.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   771.950(Ft.)
Downstream point/station elevation =   759.100(Ft.)
Pipe length  =   387.10(Ft.) Slope =   0.0332  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.592(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.592(CFS)
Normal flow depth in pipe =    5.29(In.)
Flow top width inside pipe =   16.40(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      8.31(Ft/s)
Travel time through pipe =    0.78 min.
Time of concentration (TC) =     9.35 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      407.000 to Point/Station      408.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   758.900(Ft.)
Downstream point/station elevation =   757.490(Ft.)
Pipe length  =   141.20(Ft.) Slope =   0.0100  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.592(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.592(CFS)
Normal flow depth in pipe =    7.26(In.)
Flow top width inside pipe =   17.66(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      5.38(Ft/s)
Travel time through pipe =    0.44 min.
Time of concentration (TC) =     9.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      408.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.801(Ac.)
Runoff from this stream =      3.592(CFS)
Time of concentration =    9.79 min.
Rainfall intensity =     5.124(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)

```

```
1243
1244        1       13.708     15.68             3.782
1245        2        3.592      9.79             5.124
1246        Qmax(1) =
1247               1.000 *    1.000 *    13.708) +
1248               0.738 *    1.000 *     3.592) + =      16.359
1249        Qmax(2) =
1250               1.000 *    0.624 *    13.708) +
1251               1.000 *    1.000 *     3.592) + =      12.152
1252
1253        Total of 2 streams to confluence:
1254        Flow rates before confluence point:
1255              13.708       3.592
1256        Maximum flow rates at confluence using above data:
1257               16.359       12.152
1258        Area of streams before confluence:
1259                8.844        1.801
1260        Results of confluence:
1261        Total flow rate =     16.359(CFS)
1262        Time of concentration =    15.679 min.
1263        Effective stream area after confluence =     10.645(Ac.)
1264
1265
1266        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1267        Process from Point/Station      408.000 to Point/Station      204.000
1268        **** PIPEFLOW TRAVEL TIME (User specified size) ****
1269        ______________________________________________________________________
1270        Upstream point/station elevation =   757.290(Ft.)
1271        Downstream point/station elevation =   757.150(Ft.)
1272        Pipe length  =    27.40(Ft.) Slope =   0.0051  Manning's N = 0.013
1273        No. of pipes = 1  Required pipe flow  =    16.359(CFS)
1274        Given pipe size =     24.00(In.)
1275        NOTE: Normal flow is pressure flow in user selected pipe size.
1276        The approximate hydraulic grade line above the pipe invert is
1277             0.635(Ft.)  at the headworks or inlet of the pipe(s)
1278         Pipe friction loss =      0.143(Ft.)
1279         Minor friction loss =      0.632(Ft.)  K-factor =   1.50
1280        Pipe flow velocity =      5.21(Ft/s)
1281        Travel time through pipe =    0.09 min.
1282        Time of concentration (TC) =    15.77 min.
1283
1284
1285        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1286        Process from Point/Station      204.000 to Point/Station      204.000
1287        **** CONFLUENCE OF MAIN STREAMS ****
1288        ______________________________________________________________________
1289        The following data inside Main Stream is listed:
1290        In Main Stream number: 2
1291        Stream flow area =     10.645(Ac.)
1292        Runoff from this stream =     16.359(CFS)
1293        Time of concentration =   15.77 min.
1294        Rainfall intensity =     3.768(In/Hr)
1295        Summary of stream data:
1296
1297        Stream   Flow rate      TC            Rainfall Intensity
1298         No.       (CFS)       (min)                  (In/Hr)
1299
1300
1301        1       10.825     18.09             3.449
1302        2       16.359     15.77             3.768
1303        Qmax(1) =
1304               1.000 *    1.000 *    10.825) +
1305               0.915 *    1.000 *    16.359) + =      25.798
1306        Qmax(2) =
1307               1.000 *    0.872 *    10.825) +
1308               1.000 *    1.000 *    16.359) + =      25.795
1309
1310        Total of 2 main streams to confluence:
1311        Flow rates before confluence point:
```

```
      10.825      16.359
Maximum flow rates at confluence using above data:
       25.798       25.795
Area of streams before confluence:
        9.433       10.645


Results of confluence:
Total flow rate =     25.798(CFS)
Time of concentration =    18.087 min.
Effective stream area after confluence  =     20.078(Ac.)
End of computations, total study area =          20.078 (Ac.)
```

```
            San Diego County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1

     Rational method hydrology  program based on
     San Diego County Flood Control Division 2003 hydrology manual
         Rational Hydrology Study        Date: 12/02/24
     ------------------------------------------------------------------------
     24021 CONWAY DRIVE
     POST-DEVELOPMENT
     Q50 YR
     POC-2
     ------------------------------------------------------------------------
      *********   Hydrology Study Control Information **********

     ------------------------------------------------------------------------


     Program License Serial Number 6332

     ------------------------------------------------------------------------
     Rational hydrology study storm event year is    50.0
     English (in-lb) input data Units used

     Map data precipitation entered:
     6 hour,  precipitation(inches) =  3.000
     24 hour precipitation(inches) =  6.500
     P6/P24 =    46.2%
     San Diego hydrology manual 'C' values used


     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
     Process from Point/Station      501.000 to Point/Station      502.000
     **** INITIAL AREA EVALUATION ****

     ________________________________________________________________________
     Decimal fraction soil group A = 0.000
     Decimal fraction soil group B = 0.000
     Decimal fraction soil group C = 1.000
     Decimal fraction soil group D = 0.000
     [LOW DENSITY RESIDENTIAL                    ]
     (2.9 DU/A or Less       )
     Impervious value, Ai = 0.250
     Sub-Area C Value = 0.450
     Initial subarea total flow distance  =   70.000(Ft.)
     Highest elevation =  784.000(Ft.)
     Lowest elevation =  783.300(Ft.)
     Elevation difference =    0.700(Ft.) Slope =  1.000 %
     INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
     The maximum overland flow distance is 70.00 (Ft)
     for the top area slope value of   1.00 %, in a development type of
      2.9 DU/A or Less
     In Accordance With Figure 3-3
     Initial Area Time of Concentration =   9.79 minutes
     TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
     TC = [1.8*(1.1-0.4500)*(  70.000^.5)/(   1.000^(1/3)]=   9.79
     Rainfall intensity (I) =      5.125(In/Hr) for a    50.0 year storm
     Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
     Subarea runoff =      0.334(CFS)
     Total initial stream area =        0.145(Ac.)


     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
     Process from Point/Station      502.000 to Point/Station      503.000
     **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

     ________________________________________________________________________
     Estimated mean flow rate at midpoint of channel =      0.944(CFS)
     Depth of flow =   0.208(Ft.), Average velocity =   2.365(Ft/s)
         ******* Irregular Channel Data ***********
```

```
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.69
    2             34.50              0.13
    3             36.00              0.00
    4             36.00              0.50
    5             41.50              0.58
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      0.944(CFS)
  '     '    flow top width =      6.277(Ft.)
  '     '    velocity=    2.365(Ft/s)
  '     '    area =      0.399(Sq.Ft)
  '     '    Froude number =     1.653

Upstream point elevation =   783.300(Ft.)
Downstream point elevation =   777.800(Ft.)
Flow length =   234.100(Ft.)
Travel time  =    1.65 min.
Time of concentration =   11.44 min.
Depth of flow =   0.208(Ft.)
Average velocity =   2.365(Ft/s)
Total irregular channel flow =     0.944(CFS)
Irregular channel normal depth above invert elev. =   0.208(Ft.)
Average velocity of channel(s) =   2.365(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.635(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.450
Rainfall intensity =      4.635(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.450  CA =      0.318
Subarea runoff =      1.140(CFS) for      0.562(Ac.)
Total runoff =      1.475(CFS)  Total area =       0.707(Ac.)
Depth of flow =   0.231(Ft.), Average velocity =   2.602(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      504.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   775.240(Ft.)
Downstream point/station elevation =   774.950(Ft.)
Pipe length  =    21.30(Ft.) Slope =   0.0136  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.475(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.475(CFS)
Normal flow depth in pipe =    4.94(In.)
Flow top width inside pipe =   11.81(In.)
Critical Depth =    6.18(In.)
Pipe flow velocity =      4.84(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    11.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      504.000
**** 6 HOUR HYDROGRAPH ****
______________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

```

Time of Concentration = 11.51
Basin Area = 0.71 Acres
6 Hour Rainfall = 3.000 Inches
Runoff Coefficient = 0.450
Peak Discharge = 1.47 CFS

Time (Min)	Discharge (CFS)
0	0.000
11	0.057
22	0.058
33	0.061
44	0.062
55	0.065
66	0.066
77	0.070
88	0.072
99	0.077
110	0.079
121	0.085
132	0.088
143	0.096
154	0.100
165	0.111
176	0.118
187	0.135
198	0.146
209	0.179
220	0.204
231	0.299
242	0.422
253	1.475
264	0.240
275	0.161
286	0.126
297	0.105
308	0.092
319	0.082
330	0.074
341	0.068
352	0.063
363	0.059

++

6 - H O U R S T O R M
R u n o f f H y d r o g r a p h

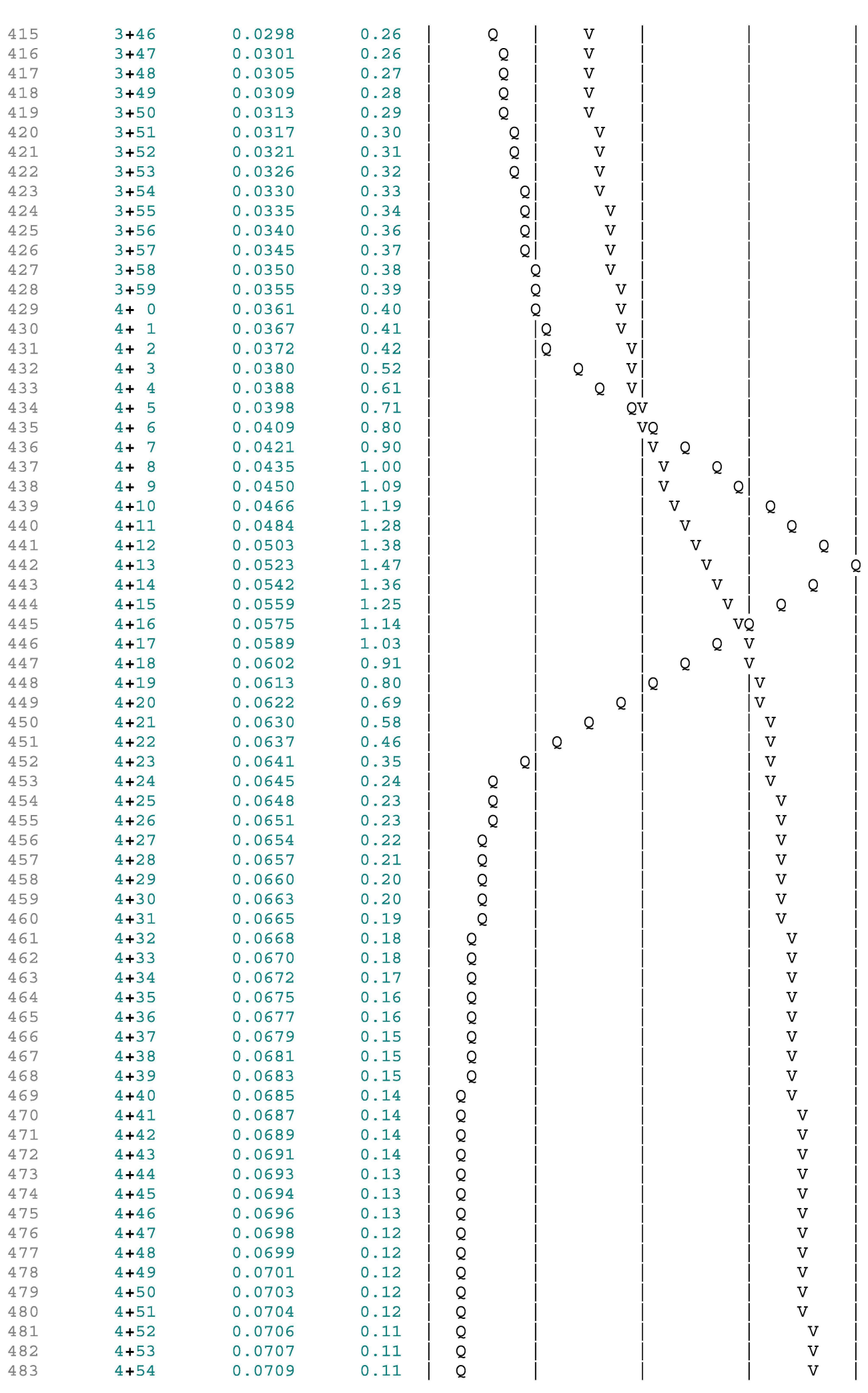
Hydrograph in 1 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	0.4	0.7	1.1	1.5
0+ 0	0.0000	0.00	Q				
0+ 1	0.0000	0.01	Q				
0+ 2	0.0000	0.01	Q				
0+ 3	0.0000	0.02	Q				
0+ 4	0.0001	0.02	Q				
0+ 5	0.0001	0.03	Q				
0+ 6	0.0001	0.03	Q				
0+ 7	0.0002	0.04	Q				
0+ 8	0.0003	0.04	VQ				
0+ 9	0.0003	0.05	VQ				
0+10	0.0004	0.05	VQ				
0+11	0.0005	0.06	VQ				
0+12	0.0005	0.06	VQ				
0+13	0.0006	0.06	VQ				
0+14	0.0007	0.06	VQ				
0+15	0.0008	0.06	VQ				
0+16	0.0009	0.06	VQ				
0+17	0.0009	0.06	VQ				
0+18	0.0010	0.06	VQ				

208	0+19	0.0011	0.06	VQ				
209	0+20	0.0012	0.06	VQ				
210	0+21	0.0013	0.06	VQ				
211	0+22	0.0013	0.06	VQ				
212	0+23	0.0014	0.06	VQ				
213	0+24	0.0015	0.06	VQ				
214	0+25	0.0016	0.06	VQ				
215	0+26	0.0017	0.06	VQ				
216	0+27	0.0017	0.06	VQ				
217	0+28	0.0018	0.06	VQ				
218	0+29	0.0019	0.06	VQ				
219	0+30	0.0020	0.06	|Q				
220	0+31	0.0021	0.06	|Q				
221	0+32	0.0022	0.06	|Q				
222	0+33	0.0022	0.06	|Q				
223	0+34	0.0023	0.06	|Q				
224	0+35	0.0024	0.06	|Q				
225	0+36	0.0025	0.06	|Q				
226	0+37	0.0026	0.06	|Q				
227	0+38	0.0027	0.06	|Q				
228	0+39	0.0027	0.06	|Q				
229	0+40	0.0028	0.06	|Q				
230	0+41	0.0029	0.06	|Q				
231	0+42	0.0030	0.06	|Q				
232	0+43	0.0031	0.06	|Q				
233	0+44	0.0032	0.06	|Q				
234	0+45	0.0033	0.06	|Q				
235	0+46	0.0033	0.06	|Q				
236	0+47	0.0034	0.06	|Q				
237	0+48	0.0035	0.06	|Q				
238	0+49	0.0036	0.06	|Q				
239	0+50	0.0037	0.06	|Q				
240	0+51	0.0038	0.06	|Q				
241	0+52	0.0039	0.06	|Q				
242	0+53	0.0040	0.06	|QV				
243	0+54	0.0040	0.06	|QV				
244	0+55	0.0041	0.06	|QV				
245	0+56	0.0042	0.06	|QV				
246	0+57	0.0043	0.07	|QV				
247	0+58	0.0044	0.07	|QV				
248	0+59	0.0045	0.07	|QV				
249	1+ 0	0.0046	0.07	|QV				
250	1+ 1	0.0047	0.07	|QV				
251	1+ 2	0.0048	0.07	|QV				
252	1+ 3	0.0049	0.07	|QV				
253	1+ 4	0.0049	0.07	|QV				
254	1+ 5	0.0050	0.07	|QV				
255	1+ 6	0.0051	0.07	|QV				
256	1+ 7	0.0052	0.07	|QV				
257	1+ 8	0.0053	0.07	|QV				
258	1+ 9	0.0054	0.07	|QV				
259	1+10	0.0055	0.07	|QV				
260	1+11	0.0056	0.07	|QV				
261	1+12	0.0057	0.07	|QV				
262	1+13	0.0058	0.07	|QV				
263	1+14	0.0059	0.07	|Q V				
264	1+15	0.0060	0.07	|Q V				
265	1+16	0.0061	0.07	|Q V				
266	1+17	0.0062	0.07	|Q V				
267	1+18	0.0063	0.07	|Q V				
268	1+19	0.0064	0.07	|Q V				
269	1+20	0.0065	0.07	|Q V				
270	1+21	0.0066	0.07	|Q V				
271	1+22	0.0066	0.07	|Q V				
272	1+23	0.0067	0.07	|Q V				
273	1+24	0.0068	0.07	|Q V				
274	1+25	0.0069	0.07	|Q V				
275	1+26	0.0070	0.07	|Q V				
276	1+27	0.0071	0.07	|Q V				

277	1+28	0.0072	0.07	Q V				
278	1+29	0.0073	0.07	Q V				
279	1+30	0.0074	0.07	Q V				
280	1+31	0.0075	0.07	Q V				
281	1+32	0.0076	0.07	Q V				
282	1+33	0.0077	0.07	QV				
283	1+34	0.0078	0.07	Q V				
284	1+35	0.0080	0.07	Q V				
285	1+36	0.0081	0.08	Q V				
286	1+37	0.0082	0.08	Q V				
287	1+38	0.0083	0.08	Q V				
288	1+39	0.0084	0.08	Q V				
289	1+40	0.0085	0.08	Q V				
290	1+41	0.0086	0.08	Q V				
291	1+42	0.0087	0.08	Q V				
292	1+43	0.0088	0.08	Q V				
293	1+44	0.0089	0.08	Q V				
294	1+45	0.0090	0.08	Q V				
295	1+46	0.0091	0.08	Q V				
296	1+47	0.0092	0.08	Q V				
297	1+48	0.0093	0.08	Q V				
298	1+49	0.0094	0.08	Q V				
299	1+50	0.0096	0.08	Q V				
300	1+51	0.0097	0.08	Q V				
301	1+52	0.0098	0.08	Q V				
302	1+53	0.0099	0.08	Q V				
303	1+54	0.0100	0.08	Q V				
304	1+55	0.0101	0.08	Q V				
305	1+56	0.0102	0.08	Q V				
306	1+57	0.0103	0.08	Q V				
307	1+58	0.0104	0.08	Q V				
308	1+59	0.0106	0.08	Q V				
309	2+ 0	0.0107	0.08	Q V				
310	2+ 1	0.0108	0.08	Q V				
311	2+ 2	0.0109	0.09	Q V				
312	2+ 3	0.0110	0.09	Q V				
313	2+ 4	0.0111	0.09	Q V				
314	2+ 5	0.0113	0.09	Q V				
315	2+ 6	0.0114	0.09	Q V				
316	2+ 7	0.0115	0.09	Q V				
317	2+ 8	0.0116	0.09	Q V				
318	2+ 9	0.0117	0.09	Q V				
319	2+10	0.0119	0.09	Q V				
320	2+11	0.0120	0.09	Q V				
321	2+12	0.0121	0.09	Q V				
322	2+13	0.0122	0.09	Q V				
323	2+14	0.0124	0.09	Q V				
324	2+15	0.0125	0.09	Q V				
325	2+16	0.0126	0.09	Q V				
326	2+17	0.0127	0.09	Q V				
327	2+18	0.0129	0.09	Q V				
328	2+19	0.0130	0.09	Q V				
329	2+20	0.0131	0.09	Q V				
330	2+21	0.0132	0.09	Q V				
331	2+22	0.0134	0.09	Q V				
332	2+23	0.0135	0.10	Q V				
333	2+24	0.0136	0.10	Q V				
334	2+25	0.0138	0.10	Q V				
335	2+26	0.0139	0.10	Q V				
336	2+27	0.0140	0.10	Q V				
337	2+28	0.0142	0.10	Q V				
338	2+29	0.0143	0.10	Q V				
339	2+30	0.0144	0.10	Q V				
340	2+31	0.0146	0.10	Q V				
341	2+32	0.0147	0.10	Q V				
342	2+33	0.0149	0.10	Q V				
343	2+34	0.0150	0.10	Q V				
344	2+35	0.0151	0.10	Q V				
345	2+36	0.0153	0.10	Q V				

346	2+37	0.0154	0.10	Q V			
347	2+38	0.0156	0.10	Q V			
348	2+39	0.0157	0.11	Q V			
349	2+40	0.0158	0.11	Q V			
350	2+41	0.0160	0.11	Q V			
351	2+42	0.0161	0.11	Q V			
352	2+43	0.0163	0.11	Q V			
353	2+44	0.0164	0.11	Q V			
354	2+45	0.0166	0.11	Q V			
355	2+46	0.0168	0.11	Q V			
356	2+47	0.0169	0.11	Q V			
357	2+48	0.0171	0.11	Q V			
358	2+49	0.0172	0.11	Q V			
359	2+50	0.0174	0.11	Q V			
360	2+51	0.0175	0.11	Q V			
361	2+52	0.0177	0.12	Q V			
362	2+53	0.0179	0.12	Q V			
363	2+54	0.0180	0.12	Q V			
364	2+55	0.0182	0.12	Q V			
365	2+56	0.0183	0.12	Q V			
366	2+57	0.0185	0.12	Q V			
367	2+58	0.0187	0.12	Q V			
368	2+59	0.0188	0.12	Q V			
369	3+ 0	0.0190	0.12	Q V			
370	3+ 1	0.0192	0.13	Q V			
371	3+ 2	0.0194	0.13	Q V			
372	3+ 3	0.0195	0.13	Q V			
373	3+ 4	0.0197	0.13	Q V			
374	3+ 5	0.0199	0.13	Q V			
375	3+ 6	0.0201	0.13	Q V			
376	3+ 7	0.0203	0.14	Q V			
377	3+ 8	0.0205	0.14	Q V			
378	3+ 9	0.0206	0.14	Q V			
379	3+10	0.0208	0.14	Q V			
380	3+11	0.0210	0.14	Q V			
381	3+12	0.0212	0.14	Q V			
382	3+13	0.0214	0.14	Q V			
383	3+14	0.0216	0.14	Q V			
384	3+15	0.0218	0.14	Q V			
385	3+16	0.0220	0.14	Q V			
386	3+17	0.0222	0.15	Q V			
387	3+18	0.0224	0.15	Q V			
388	3+19	0.0226	0.15	Q V			
389	3+20	0.0228	0.15	Q V			
390	3+21	0.0230	0.16	Q V			
391	3+22	0.0233	0.16	Q V			
392	3+23	0.0235	0.16	Q V			
393	3+24	0.0237	0.16	Q V			
394	3+25	0.0239	0.17	Q V			
395	3+26	0.0242	0.17	Q V			
396	3+27	0.0244	0.17	Q V			
397	3+28	0.0247	0.18	Q V			
398	3+29	0.0249	0.18	Q V			
399	3+30	0.0251	0.18	Q V			
400	3+31	0.0254	0.18	Q V			
401	3+32	0.0257	0.19	Q V			
402	3+33	0.0259	0.19	Q V			
403	3+34	0.0262	0.19	Q V			
404	3+35	0.0264	0.19	Q V			
405	3+36	0.0267	0.19	Q V			
406	3+37	0.0270	0.20	Q V			
407	3+38	0.0273	0.20	Q V			
408	3+39	0.0275	0.20	Q V			
409	3+40	0.0278	0.20	Q V			
410	3+41	0.0281	0.21	Q V			
411	3+42	0.0284	0.22	Q V			
412	3+43	0.0287	0.23	Q V			
413	3+44	0.0291	0.24	Q V			
414	3+45	0.0294	0.25	Q V			



484	4+55	0.0710	0.11	Q			V	
485	4+56	0.0712	0.11	Q			V	
486	4+57	0.0713	0.11	Q			V	
487	4+58	0.0715	0.10	Q			V	
488	4+59	0.0716	0.10	Q			V	
489	5+ 0	0.0718	0.10	Q			V	
490	5+ 1	0.0719	0.10	Q			V	
491	5+ 2	0.0720	0.10	Q			V	
492	5+ 3	0.0722	0.10	Q			V	
493	5+ 4	0.0723	0.10	Q			V	
494	5+ 5	0.0724	0.10	Q			V	
495	5+ 6	0.0726	0.09	Q			V	
496	5+ 7	0.0727	0.09	Q			V	
497	5+ 8	0.0728	0.09	Q			V	
498	5+ 9	0.0729	0.09	Q			V	
499	5+10	0.0731	0.09	Q			V	
500	5+11	0.0732	0.09	Q			V	
501	5+12	0.0733	0.09	Q			V	
502	5+13	0.0734	0.09	Q			V	
503	5+14	0.0736	0.09	Q			V	
504	5+15	0.0737	0.09	Q			V	
505	5+16	0.0738	0.08	Q			V	
506	5+17	0.0739	0.08	Q			V	
507	5+18	0.0740	0.08	Q			V	
508	5+19	0.0741	0.08	Q			V	
509	5+20	0.0742	0.08	Q			V	
510	5+21	0.0744	0.08	Q			V	
511	5+22	0.0745	0.08	Q			V	
512	5+23	0.0746	0.08	Q			V	
513	5+24	0.0747	0.08	Q			V	
514	5+25	0.0748	0.08	Q			V	
515	5+26	0.0749	0.08	Q			V	
516	5+27	0.0750	0.08	Q			V	
517	5+28	0.0751	0.08	Q			V	
518	5+29	0.0752	0.07	Q			V	
519	5+30	0.0753	0.07	Q			V	
520	5+31	0.0754	0.07	Q			V	
521	5+32	0.0755	0.07	Q			V	
522	5+33	0.0756	0.07	Q			V	
523	5+34	0.0757	0.07	Q			V	
524	5+35	0.0758	0.07	Q			V	
525	5+36	0.0759	0.07	Q			V	
526	5+37	0.0760	0.07	Q			V	
527	5+38	0.0761	0.07	Q			V	
528	5+39	0.0762	0.07	Q			V	
529	5+40	0.0763	0.07	Q			V	
530	5+41	0.0764	0.07	Q			V	
531	5+42	0.0765	0.07	Q			V	
532	5+43	0.0766	0.07	Q			V	
533	5+44	0.0767	0.07	Q			V	
534	5+45	0.0768	0.07	Q			V	
535	5+46	0.0768	0.07	Q			V	
536	5+47	0.0769	0.07	Q			V	
537	5+48	0.0770	0.07	Q			V	
538	5+49	0.0771	0.06	Q			V	
539	5+50	0.0772	0.06	Q			V	
540	5+51	0.0773	0.06	Q			V	
541	5+52	0.0774	0.06	Q			V	
542	5+53	0.0775	0.06	Q			V	
543	5+54	0.0775	0.06	Q			V	
544	5+55	0.0776	0.06	Q			V	
545	5+56	0.0777	0.06	Q			V	
546	5+57	0.0778	0.06	Q			V	
547	5+58	0.0779	0.06	Q			V	
548	5+59	0.0780	0.06	Q			V	
549	6+ 0	0.0781	0.06	Q			V	
550	6+ 1	0.0781	0.06	Q			V	
551	6+ 2	0.0782	0.06	Q			V	
552	6+ 3	0.0783	0.06	Q			V	

```
 ----------------------------------------------------------------------
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 Process from Point/Station      504.000 to Point/Station      505.000
 **** PIPEFLOW TRAVEL TIME (User specified size) ****
 ______________________________________________________________________
 Upstream point/station elevation =   772.700(Ft.)
 Downstream point/station elevation =   772.600(Ft.)
 Pipe length  =    12.00(Ft.) Slope =   0.0083  Manning's N = 0.013
 No. of pipes = 1  Required pipe flow  =     1.475(CFS)
 Given pipe size =     12.00(In.)
 Calculated individual pipe flow  =     1.475(CFS)
 Normal flow depth in pipe =    5.67(In.)
 Flow top width inside pipe =   11.98(In.)
 Critical Depth =    6.18(In.)
 Pipe flow velocity =      4.04(Ft/s)
 Travel time through pipe =    0.05 min.
 Time of concentration (TC) =    11.56 min.


 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 Process from Point/Station      505.000 to Point/Station      506.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
 ______________________________________________________________________
 Depth of flow =   0.352(Ft.), Average velocity =   3.426(Ft/s)
 !!Warning: Water is above left or right bank elevations
     ******* Irregular Channel Data ***********
 ----------------------------------------------------------------
 Information entered for subchannel number 1 :
 Point number      'X' coordinate     'Y' coordinate
     1              0.00              0.13
     2              1.50              0.00
     3              1.50              0.50
     4              2.00              0.51
 Manning's 'N' friction factor =   0.015
 ----------------------------------------------------------------
 Sub-Channel flow  =      1.475(CFS)
   '     '    flow top width =      1.500(Ft.)
   '     '    velocity=    3.426(Ft/s)
   '     '    area =      0.430(Sq.Ft)
   '     '    Froude number =     1.127

 Upstream point elevation =   772.600(Ft.)
 Downstream point elevation =   772.000(Ft.)
 Flow length =    71.400(Ft.)
 Travel time  =    0.35 min.
 Time of concentration =   11.91 min.
 Depth of flow =   0.352(Ft.)
 Average velocity =   3.426(Ft/s)
 Total irregular channel flow =     1.475(CFS)
 Irregular channel normal depth above invert elev. =   0.352(Ft.)
 Average velocity of channel(s) =   3.426(Ft/s)
 !!Warning: Water is above left or right bank elevations


 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 Process from Point/Station      506.000 to Point/Station      506.000
 **** SUBAREA FLOW ADDITION ****
 ______________________________________________________________________
 Rainfall intensity (I) =      4.516(In/Hr) for a    50.0 year storm
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 1.000
 Decimal fraction soil group D = 0.000
```

```
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.450
Time of concentration =    11.91 min.
Rainfall intensity =      4.516(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.450  CA =      0.463
Subarea runoff =      0.617(CFS) for      0.322(Ac.)
Total runoff =      2.091(CFS)  Total area =       1.029(Ac.)
End of computations, total study area =           1.029 (Ac.)
```

ATTACHMENT F

100 Year Pre Development Calculations and Map

Steps Taken To Analyze This Condition

The Rational Method as outlined in section 3 of the June 2003 San Diego County Hydrology Manual is followed here. The software that we are using is the *"Rational Hydrology Method, San Diego County (2003 Manual)"* module of the CIVILCADD/CIVIL DESIGN Engineering software version 7.9.

Please see the subsequent pages for the calculations. These calculations are for the Q100. The results are outlined/summarized in Section 8.

NORTH AVE

CONWAY DRIVE

CLEVELAND AVE

(766.00) FL
101

L=535.6'
6.9757 ACRES

L=100'
0.0757 ACRES

(240.00) EG
101
201

(836.00) EG
102

L=100'
0.1838 ACRES

202

(834.00) EG

0.6205 ACRES
L=695'

820

810

800

790

785

780

775

770

765

L=1225.4'
12.1605 ACRES

(762.00) FL
104

L=400'

203
Q50 = 23.97 CFS
Q100 = 29.11 CFS

POC-1
(759.50) FL

(783.00) EG
301

L=85'
0.2533 ACRES

(780.50) EG
302

L=184'
0.8615 ACRES

303
Q50 = 1.96 CFS
Q100 = 2.36 CFS

POC-2
(772.00) FL

SCALE 1":80'
0 80 160

LEGEND

- 304 NODE #
- POC (POINT OF CONFLUENCE)
- DIRECTION OF FLOW
- BASIN BOUNDARY
- FLOW PATH

CONWAY DRIVE
HYDROLOGY PRE DEVELOPMENT EXHIBIT
ONSITE CONDITION

```
1
2                San Diego County Rational Hydrology Program
3
4       CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1
5
6       Rational method hydrology  program based on
7       San Diego County Flood Control Division 2003 hydrology manual
8           Rational Hydrology Study        Date: 11/26/24
9       ------------------------------------------------------------------------
10      24021 CONWAY DRIVE
11      PRE-DEVELOPMENT
12      Q100 YEAR
13      POC-1
14      ------------------------------------------------------------------------
15       *********   Hydrology Study Control Information **********
16
17      ------------------------------------------------------------------------
18
19
20      Program License Serial Number 6332
21
22      ------------------------------------------------------------------------
23      Rational hydrology study storm event year is   100.0
24      English (in-lb) input data Units used
25
26      Map data precipitation entered:
27      6 hour,  precipitation(inches) =  3.500
28      24 hour precipitation(inches) =  8.000
29      P6/P24 =    43.8%
30      Adjusted 6 hour precipitation (inches) =  3.600
31      Adjusted P6/P24 =    45.0%
32      San Diego hydrology manual 'C' values used
33
34
35      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
36      Process from Point/Station      101.000 to Point/Station      102.000
37      **** INITIAL AREA EVALUATION ****
38      ________________________________________________________________________
39      Decimal fraction soil group A = 0.000
40      Decimal fraction soil group B = 0.000
41      Decimal fraction soil group C = 1.000
42      Decimal fraction soil group D = 0.000
43      [LOW DENSITY RESIDENTIAL                    ]
44      (1.0 DU/A or Less       )
45      Impervious value, Ai = 0.100
46      Sub-Area C Value = 0.360
47      Initial subarea total flow distance  =  100.000(Ft.)
48      Highest elevation =  840.000(Ft.)
49      Lowest elevation =  836.000(Ft.)
50      Elevation difference =    4.000(Ft.) Slope =  4.000 %
51      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
52      The maximum overland flow distance is 100.00 (Ft)
53      for the top area slope value of   4.00 %, in a development type of
54       1.0 DU/A or Less
55      In Accordance With Figure 3-3
56      Initial Area Time of Concentration =   8.39 minutes
57      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
58      TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   4.000^(1/3)]=   8.39
59      Rainfall intensity (I) =      6.792(In/Hr) for a   100.0 year storm
60      Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
61      Subarea runoff =      0.186(CFS)
62      Total initial stream area =        0.076(Ac.)
63
64
65      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
66      Process from Point/Station      102.000 to Point/Station      103.000
67      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
68      ________________________________________________________________________
69      Estimated mean flow rate at midpoint of channel =      6.518(CFS)
```

```
Depth of flow =   0.244(Ft.), Average velocity =   4.397(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              2.00
    2             50.00              0.00
    3            100.00              2.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      6.518(CFS)
  '     '    flow top width =     12.176(Ft.)
  '     '    velocity=    4.397(Ft/s)
  '     '    area =      1.482(Sq.Ft)
  '     '    Froude number =     2.220

Upstream point elevation =   836.000(Ft.)
Downstream point elevation =   766.000(Ft.)
Flow length =   535.600(Ft.)
Travel time  =    2.03 min.
Time of concentration =   10.42 min.
Depth of flow =   0.244(Ft.)
Average velocity =   4.397(Ft/s)
Total irregular channel flow =     6.518(CFS)
Irregular channel normal depth above invert elev. =   0.244(Ft.)
Average velocity of channel(s) =   4.397(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.906(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.306
Rainfall intensity =      5.906(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.307  CA =      2.162
Subarea runoff =     12.584(CFS) for      6.976(Ac.)
Total runoff =     12.769(CFS)  Total area =       7.052(Ac.)
Depth of flow =   0.313(Ft.), Average velocity =   5.202(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
!!Warning: Water is above left or right bank elevations
!!Warning: Water is above left or right bank elevations
!!Warning: Water is above left or right bank elevations
!!Warning: Water is above left or right bank elevations
!!Warning: Water is above left or right bank elevations
Estimated mean flow rate at midpoint of channel =     12.805(CFS)
Depth of flow =   0.532(Ft.), Average velocity =   2.694(Ft/s)
!!Warning: Water is above left or right bank elevations
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.52
    2             19.50              0.13
    3             21.00              0.00
    4             21.00              0.50
    5             31.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =     12.805(CFS)
  '     '    flow top width =     21.646(Ft.)
```

```
'     '    velocity=    2.694(Ft/s)
'     '    area =      4.754(Sq.Ft)
'     '    Froude number =     1.013

Upstream point elevation =   766.000(Ft.)
Downstream point elevation =   762.000(Ft.)
Flow length =   695.000(Ft.)
Travel time  =    4.30 min.
Time of concentration =   14.72 min.
Depth of flow =   0.532(Ft.)
Average velocity =   2.694(Ft/s)
Total irregular channel flow =    12.805(CFS)
Irregular channel normal depth above invert elev. =   0.532(Ft.)
Average velocity of channel(s) =   2.694(Ft/s)
!!Warning: Water is above left or right bank elevations
 Adding area flow to channel
Rainfall intensity (I) =      4.727(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.750
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.250
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.292
The area added to the existing stream causes a
a lower flow rate of Q =     11.077(CFS)
therefore the upstream flow rate of Q =     12.769(CFS) is being used
Rainfall intensity =      4.727(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.305  CA =      2.344
Subarea runoff =      0.000(CFS) for      0.621(Ac.)
Total runoff =     12.769(CFS)  Total area =       7.673(Ac.)
Depth of flow =   0.532(Ft.), Average velocity =   2.691(Ft/s)
!!Warning: Water is above left or right bank elevations


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Depth of flow =   0.526(Ft.), Average velocity =   2.764(Ft/s)
!!Warning: Water is above left or right bank elevations
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.52
    2             19.50              0.13
    3             21.00              0.00
    4             21.00              0.50
    5             31.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =     12.770(CFS)
  '     '    flow top width =     21.522(Ft.)
  '     '    velocity=    2.764(Ft/s)
  '     '    area =      4.620(Sq.Ft)
  '     '    Froude number =     1.051

Upstream point elevation =   762.000(Ft.)
Downstream point elevation =   759.500(Ft.)
Flow length =   400.000(Ft.)
Travel time  =    2.41 min.
Time of concentration =   17.13 min.
Depth of flow =   0.526(Ft.)
Average velocity =   2.764(Ft/s)
Total irregular channel flow =    12.769(CFS)
Irregular channel normal depth above invert elev. =   0.526(Ft.)
```

```
Average velocity of channel(s) =   2.764(Ft/s)
!!Warning: Water is above left or right bank elevations


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      203.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.673(Ac.)
Runoff from this stream =     12.769(CFS)
Time of concentration =   17.13 min.
Rainfall intensity =     4.286(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  840.000(Ft.)
Lowest elevation =  834.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  6.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.33 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   6.000^(1/3)]=   7.33
Rainfall intensity (I) =      7.411(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.491(CFS)
Total initial stream area =        0.184(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =     10.039(CFS)
Depth of flow =   0.331(Ft.), Average velocity =   3.676(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              2.00
    2             50.00              0.00
    3            100.00              2.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =     10.039(CFS)
  '     '    flow top width =     16.526(Ft.)
  '     '    velocity=    3.676(Ft/s)
  '     '    area =      2.731(Sq.Ft)
  '     '    Froude number =     1.594

Upstream point elevation =   834.000(Ft.)
Downstream point elevation =   759.500(Ft.)
Flow length =  1225.400(Ft.)
```

```
Travel time  =    5.56 min.
Time of concentration =   12.89 min.
Depth of flow =   0.331(Ft.)
Average velocity =   3.676(Ft/s)
Total irregular channel flow =    10.039(CFS)
Irregular channel normal depth above invert elev. =   0.331(Ft.)
Average velocity of channel(s) =   3.676(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.150(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.306
Rainfall intensity =      5.150(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.307  CA =      3.788
Subarea runoff =     19.016(CFS) for     12.161(Ac.)
Total runoff =     19.507(CFS)  Total area =      12.345(Ac.)
Depth of flow =   0.424(Ft.), Average velocity =   4.340(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      203.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     12.345(Ac.)
Runoff from this stream =     19.507(CFS)
Time of concentration =   12.89 min.
Rainfall intensity =     5.150(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1       12.769     17.13             4.286
2       19.507     12.89             5.150
Qmax(1) =
       1.000 *    1.000 *    12.769) +
       0.832 *    1.000 *    19.507) + =      29.002
Qmax(2) =
       1.000 *    0.752 *    12.769) +
       1.000 *    1.000 *    19.507) + =      29.111

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.769      19.507
Maximum flow rates at confluence using above data:
       29.002       29.111
Area of streams before confluence:
        7.673       12.345
Results of confluence:
Total flow rate =     29.111(CFS)
Time of concentration =    12.886 min.
Effective stream area after confluence =     20.018(Ac.)
End of computations, total study area =          20.018 (Ac.)
```

```
1
2                San Diego County Rational Hydrology Program
3
4       CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1
5
6       Rational method hydrology  program based on
7       San Diego County Flood Control Division 2003 hydrology manual
8           Rational Hydrology Study        Date: 11/26/24
9       ------------------------------------------------------------------------
10      24021 CONWAY DRIVE
11      PRE-DEVELOPMENT
12      Q100 YEAR
13      POC-2
14      ------------------------------------------------------------------------
15       *********   Hydrology Study Control Information **********
16
17      ------------------------------------------------------------------------
18
19
20      Program License Serial Number 6332
21
22      ------------------------------------------------------------------------
23      Rational hydrology study storm event year is   100.0
24      English (in-lb) input data Units used
25
26      Map data precipitation entered:
27      6 hour,  precipitation(inches) =  3.500
28      24 hour precipitation(inches) =  8.000
29      P6/P24 =    43.8%
30      Adjusted 6 hour precipitation (inches) =  3.600
31      Adjusted P6/P24 =    45.0%
32      San Diego hydrology manual 'C' values used
33
34
35      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
36      Process from Point/Station      301.000 to Point/Station      302.000
37      **** INITIAL AREA EVALUATION ****
38      ________________________________________________________________________
39      Decimal fraction soil group A = 0.000
40      Decimal fraction soil group B = 0.000
41      Decimal fraction soil group C = 1.000
42      Decimal fraction soil group D = 0.000
43      [LOW DENSITY RESIDENTIAL                    ]
44      (1.0 DU/A or Less       )
45      Impervious value, Ai = 0.100
46      Sub-Area C Value = 0.360
47      Initial subarea total flow distance  =   85.000(Ft.)
48      Highest elevation =  783.000(Ft.)
49      Lowest elevation =  780.500(Ft.)
50      Elevation difference =    2.500(Ft.) Slope =  2.941 %
51      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
52      The maximum overland flow distance is 100.00 (Ft)
53      for the top area slope value of   2.94 %, in a development type of
54       1.0 DU/A or Less
55      In Accordance With Figure 3-3
56      Initial Area Time of Concentration =   9.30 minutes
57      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
58      TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   2.941^(1/3)]=   9.30
59      Rainfall intensity (I) =      6.358(In/Hr) for a   100.0 year storm
60      Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
61      Subarea runoff =      0.579(CFS)
62      Total initial stream area =        0.253(Ac.)
63
64
65      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
66      Process from Point/Station      302.000 to Point/Station      303.000
67      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
68      ________________________________________________________________________
69      Estimated mean flow rate at midpoint of channel =      1.518(CFS)
```

```
Depth of flow =   0.242(Ft.), Average velocity =   2.595(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2             10.00              0.00
    3             20.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      1.518(CFS)
  '     '    flow top width =      4.838(Ft.)
  '     '    velocity=    2.595(Ft/s)
  '     '    area =      0.585(Sq.Ft)
  '     '    Froude number =     1.315

Upstream point elevation =   780.500(Ft.)
Downstream point elevation =   772.000(Ft.)
Flow length =   184.000(Ft.)
Travel time  =    1.18 min.
Time of concentration =   10.48 min.
Depth of flow =   0.242(Ft.)
Average velocity =   2.595(Ft/s)
Total irregular channel flow =     1.518(CFS)
Irregular channel normal depth above invert elev. =   0.242(Ft.)
Average velocity of channel(s) =   2.595(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.885(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Rainfall intensity =      5.885(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.360  CA =      0.401
Subarea runoff =      1.783(CFS) for      0.862(Ac.)
Total runoff =      2.362(CFS)  Total area =       1.115(Ac.)
Depth of flow =   0.285(Ft.), Average velocity =   2.898(Ft/s)
End of computations, total study area =          1.115 (Ac.)
```

ATTACHMENT G
100 Year POST DEVELOPED Q CALCULATIONS

Steps Taken To Analyze This Condition
The Rational Method as outlined in section 3 of the June 2003 San Diego County Hydrology Manual is followed here. The software that we are using is the *"Rational Hydrology Method, San Diego County (2003 Manual)"* module of the CIVILCADD/CIVIL DESIGN Engineering software version 7.9.

Please see the subsequent pages for the calculations. These calculations are for the Q100. The results are outlined/summarized in Section 8.

```
1
2                San Diego County Rational Hydrology Program
3
4       CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1
5
6       Rational method hydrology  program based on
7       San Diego County Flood Control Division 2003 hydrology manual
8           Rational Hydrology Study        Date: 11/27/24
9       ------------------------------------------------------------------------
10      24021 CONWAY DRIVE
11      POST-DEVELOPMENT
12      Q100 YR
13      POC-1
14      ------------------------------------------------------------------------
15       *********   Hydrology Study Control Information **********
16
17      ------------------------------------------------------------------------
18
19
20      Program License Serial Number 6332
21
22      ------------------------------------------------------------------------
23      Rational hydrology study storm event year is   100.0
24      English (in-lb) input data Units used
25
26      Map data precipitation entered:
27      6 hour,  precipitation(inches) =  3.500
28      24 hour precipitation(inches) =  8.000
29      P6/P24 =    43.8%
30      Adjusted 6 hour precipitation (inches) =  3.600
31      Adjusted P6/P24 =    45.0%
32      San Diego hydrology manual 'C' values used
33
34
35      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
36      Process from Point/Station      101.000 to Point/Station      102.000
37      **** INITIAL AREA EVALUATION ****
38      ________________________________________________________________________
39      Decimal fraction soil group A = 0.000
40      Decimal fraction soil group B = 0.000
41      Decimal fraction soil group C = 1.000
42      Decimal fraction soil group D = 0.000
43      [LOW DENSITY RESIDENTIAL                    ]
44      (1.0 DU/A or Less       )
45      Impervious value, Ai = 0.100
46      Sub-Area C Value = 0.360
47      Initial subarea total flow distance  =  100.000(Ft.)
48      Highest elevation =  840.000(Ft.)
49      Lowest elevation =  836.000(Ft.)
50      Elevation difference =    4.000(Ft.) Slope =  4.000 %
51      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
52      The maximum overland flow distance is 100.00 (Ft)
53      for the top area slope value of   4.00 %, in a development type of
54       1.0 DU/A or Less
55      In Accordance With Figure 3-3
56      Initial Area Time of Concentration =   8.39 minutes
57      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
58      TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   4.000^(1/3)]=   8.39
59      Rainfall intensity (I) =      6.792(In/Hr) for a   100.0 year storm
60      Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
61      Subarea runoff =      0.186(CFS)
62      Total initial stream area =        0.076(Ac.)
63
64
65      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
66      Process from Point/Station      102.000 to Point/Station      103.000
67      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
68      ________________________________________________________________________
69      Estimated mean flow rate at midpoint of channel =      4.434(CFS)
```

```
Depth of flow =   0.211(Ft.), Average velocity =   3.993(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              2.00
    2             50.00              0.00
    3            100.00              2.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      4.434(CFS)
  '     '    flow top width =     10.538(Ft.)
  '     '    velocity=    3.993(Ft/s)
  '     '    area =      1.110(Sq.Ft)
  '     '    Froude number =     2.168

Upstream point elevation =   836.000(Ft.)
Downstream point elevation =   766.000(Ft.)
Flow length =   535.600(Ft.)
Travel time  =    2.24 min.
Time of concentration =   10.63 min.
Depth of flow =   0.211(Ft.)
Average velocity =   3.993(Ft/s)
Total irregular channel flow =     4.434(CFS)
Irregular channel normal depth above invert elev. =   0.211(Ft.)
Average velocity of channel(s) =   3.993(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.832(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.306
Rainfall intensity =      5.832(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.307  CA =      1.479
Subarea runoff =      8.439(CFS) for      4.743(Ac.)
Total runoff =      8.624(CFS)  Total area =       4.819(Ac.)
Depth of flow =   0.270(Ft.), Average velocity =   4.715(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel =      8.653(CFS)
Depth of flow =   0.472(Ft.), Average velocity =   2.442(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.52
    2             19.50              0.13
    3             21.00              0.00
    4             21.00              0.50
    5             31.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      8.653(CFS)
  '     '    flow top width =     18.624(Ft.)
  '     '    velocity=    2.442(Ft/s)
  '     '    area =      3.543(Sq.Ft)
  '     '    Froude number =     0.987

Upstream point elevation =   766.000(Ft.)
Downstream point elevation =   762.910(Ft.)
```

```
Flow length =   537.900(Ft.)
Travel time  =    3.67 min.
Time of concentration =   14.30 min.
Depth of flow =   0.472(Ft.)
Average velocity =   2.442(Ft/s)
Total irregular channel flow =     8.653(CFS)
Irregular channel normal depth above invert elev. =   0.472(Ft.)
Average velocity of channel(s) =   2.442(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.816(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.900
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.279
The area added to the existing stream causes a
a lower flow rate of Q =      7.807(CFS)
therefore the upstream flow rate of Q =      8.624(CFS) is being used
Rainfall intensity =      4.816(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.304  CA =      1.621
Subarea runoff =      0.000(CFS) for      0.510(Ac.)
Total runoff =      8.624(CFS)  Total area =       5.329(Ac.)
Depth of flow =   0.472(Ft.), Average velocity =   2.440(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****

____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.329(Ac.)
Runoff from this stream =      8.624(CFS)
Time of concentration =   14.30 min.
Rainfall intensity =     4.816(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****

____________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  840.000(Ft.)
Lowest elevation =  834.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  6.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.33 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   6.000^(1/3)]=   7.33
Rainfall intensity (I) =      7.411(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.491(CFS)
Total initial stream area =        0.184(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      3.138(CFS)
Depth of flow =   0.180(Ft.), Average velocity =   3.861(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              2.00
    2             50.00              0.00
    3            100.00              2.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------------
Sub-Channel flow  =      3.138(CFS)
  '     '    flow top width =      9.015(Ft.)
  '     '    velocity=    3.861(Ft/s)
  '     '    area =      0.813(Sq.Ft)
  '     '    Froude number =     2.266

Upstream point elevation =   834.000(Ft.)
Downstream point elevation =   790.370(Ft.)
Flow length =   289.900(Ft.)
Travel time  =    1.25 min.
Time of concentration =    8.58 min.
Depth of flow =   0.180(Ft.)
Average velocity =   3.861(Ft/s)
Total irregular channel flow =     3.138(CFS)
Irregular channel normal depth above invert elev. =   0.180(Ft.)
Average velocity of channel(s) =   3.861(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      6.695(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.800
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.288
Rainfall intensity =      6.695(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.293  CA =      0.854
Subarea runoff =      5.224(CFS) for      2.734(Ac.)
Total runoff =      5.715(CFS)  Total area =       2.918(Ac.)
Depth of flow =   0.226(Ft.), Average velocity =   4.486(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Depth of flow =   0.799(Ft.), Average velocity =   8.962(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2              1.00              0.00
    3              2.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------------
Sub-Channel flow  =      5.715(CFS)
  '     '    flow top width =      1.597(Ft.)
  '     '    velocity=    8.962(Ft/s)
  '     '    area =      0.638(Sq.Ft)
  '     '    Froude number =     2.499
```

```
277
278       Upstream point elevation =   790.370(Ft.)
279       Downstream point elevation =   762.910(Ft.)
280       Flow length =   621.500(Ft.)
281       Travel time  =    1.16 min.
282       Time of concentration =    9.74 min.
283       Depth of flow =   0.799(Ft.)
284       Average velocity =   8.962(Ft/s)
285       Total irregular channel flow =     5.715(CFS)
286       Irregular channel normal depth above invert elev. =   0.799(Ft.)
287       Average velocity of channel(s) =   8.962(Ft/s)
288
289
290       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
291       Process from Point/Station      104.000 to Point/Station      104.000
292       **** CONFLUENCE OF MINOR STREAMS ****
293
294       ----------------------------------------------------------------------
295       Along Main Stream number: 1 in normal stream number 2
296       Stream flow area =      2.918(Ac.)
297       Runoff from this stream =      5.715(CFS)
298       Time of concentration =    9.74 min.
299       Rainfall intensity =     6.171(In/Hr)
300       Summary of stream data:
301
302       Stream    Flow rate      TC            Rainfall Intensity
303        No.        (CFS)       (min)                 (In/Hr)
304
305       1         8.624     14.30             4.816
306       2         5.715      9.74             6.171
307       Qmax(1) =
308             1.000 *    1.000 *     8.624) +
309             0.781 *    1.000 *     5.715) + =      13.085
310       Qmax(2) =
311             1.000 *    0.681 *     8.624) +
312             1.000 *    1.000 *     5.715) + =      11.588
313
314       Total of 2 streams to confluence:
315       Flow rates before confluence point:
316             8.624       5.715
317       Maximum flow rates at confluence using above data:
318             13.085       11.588
319       Area of streams before confluence:
320              5.329        2.918
321       Results of confluence:
322       Total flow rate =     13.085(CFS)
323       Time of concentration =    14.298 min.
324       Effective stream area after confluence =      8.247(Ac.)
325
326
327       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
328       Process from Point/Station      104.000 to Point/Station      204.000
329       **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
330
331       ----------------------------------------------------------------------
332       !!Warning: Water is above left or right bank elevations
333       !!Warning: Water is above left or right bank elevations
334       !!Warning: Water is above left or right bank elevations
335       !!Warning: Water is above left or right bank elevations
336       !!Warning: Water is above left or right bank elevations
337       !!Warning: Water is above left or right bank elevations
338       Estimated mean flow rate at midpoint of channel =     13.114(CFS)
339       Depth of flow =   0.531(Ft.), Average velocity =   2.771(Ft/s)
340       !!Warning: Water is above left or right bank elevations
341           ******* Irregular Channel Data ***********
342       ----------------------------------------------------------------
343       Information entered for subchannel number 1 :
344       Point number      'X' coordinate     'Y' coordinate
345           1              0.00              0.52
          2             19.50              0.13
```

```
        3             21.00              0.00
        4             21.00              0.50
        5             31.00              1.00
    Manning's 'N' friction factor =   0.015
    -----------------------------------------------------------------
    Sub-Channel flow  =     13.115(CFS)
      '     '    flow top width =     21.627(Ft.)
      '     '    velocity=    2.771(Ft/s)
      '     '    area =      4.733(Sq.Ft)
      '     '    Froude number =     1.044

    Upstream point elevation =   762.910(Ft.)
    Downstream point elevation =   759.500(Ft.)
    Flow length =   557.300(Ft.)
    Travel time  =    3.35 min.
    Time of concentration =   17.65 min.
    Depth of flow =   0.531(Ft.)
    Average velocity =   2.771(Ft/s)
    Total irregular channel flow =    13.114(CFS)
    Irregular channel normal depth above invert elev. =   0.531(Ft.)
    Average velocity of channel(s) =   2.771(Ft/s)
    !!Warning: Water is above left or right bank elevations
     Adding area flow to channel
    Rainfall intensity (I) =      4.205(In/Hr) for a   100.0 year storm
    Decimal fraction soil group A = 0.400
    Decimal fraction soil group B = 0.000
    Decimal fraction soil group C = 0.600
    Decimal fraction soil group D = 0.000
    [LOW DENSITY RESIDENTIAL                    ]
    (2.9 DU/A or Less       )
    Impervious value, Ai = 0.250
    Sub-Area C Value = 0.422
    The area added to the existing stream causes a
    a lower flow rate of Q =     12.509(CFS)
    therefore the upstream flow rate of Q =     13.085(CFS) is being used
    Rainfall intensity =      4.205(In/Hr) for a   100.0 year storm
    Effective runoff coefficient used for total area
    (Q=KCIA) is C = 0.315  CA =      2.975
    Subarea runoff =      0.000(CFS) for      1.186(Ac.)
    Total runoff =     13.085(CFS)  Total area =       9.433(Ac.)
    Depth of flow =   0.531(Ft.), Average velocity =   2.769(Ft/s)
    !!Warning: Water is above left or right bank elevations


    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    Process from Point/Station      204.000 to Point/Station      204.000
    **** CONFLUENCE OF MAIN STREAMS ****
    ______________________________________________________________________
    The following data inside Main Stream is listed:
    In Main Stream number: 1
    Stream flow area =      9.433(Ac.)
    Runoff from this stream =     13.085(CFS)
    Time of concentration =   17.65 min.
    Rainfall intensity =     4.205(In/Hr)
    Program is now starting with Main Stream No. 2


    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    Process from Point/Station      301.000 to Point/Station      302.000
    **** INITIAL AREA EVALUATION ****
    ______________________________________________________________________
    Decimal fraction soil group A = 0.000
    Decimal fraction soil group B = 0.000
    Decimal fraction soil group C = 1.000
    Decimal fraction soil group D = 0.000
    [LOW DENSITY RESIDENTIAL                    ]
    (2.9 DU/A or Less       )
    Impervious value, Ai = 0.250
    Sub-Area C Value = 0.450
```

```
Initial subarea total flow distance  =   70.000(Ft.)
Highest elevation =  784.000(Ft.)
Lowest elevation =  783.300(Ft.)
Elevation difference =    0.700(Ft.) Slope =  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 2.9 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   9.79 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  70.000^.5)/(   1.000^(1/3)]=   9.79
Rainfall intensity (I) =      6.150(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.401(CFS)
Total initial stream area =        0.145(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      3.180(CFS)
Depth of flow =   0.269(Ft.), Average velocity =   2.885(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.33
    2             16.50              0.13
    3             18.00              0.00
    4             18.00              0.50
    5             23.50              0.58
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------------
Sub-Channel flow  =      3.180(CFS)
  '     '    flow top width =     12.962(Ft.)
  '     '    velocity=    2.885(Ft/s)
  '     '    area =      1.102(Sq.Ft)
  '     '    Froude number =     1.743

Upstream point elevation =   783.300(Ft.)
Downstream point elevation =   764.900(Ft.)
Flow length =   788.900(Ft.)
Travel time  =    4.56 min.
Time of concentration =   14.35 min.
Depth of flow =   0.269(Ft.)
Average velocity =   2.885(Ft/s)
Total irregular channel flow =     3.180(CFS)
Irregular channel normal depth above invert elev. =   0.269(Ft.)
Average velocity of channel(s) =   2.885(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.806(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.700
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.401
Rainfall intensity =      4.806(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.403  CA =      1.221
Subarea runoff =      5.464(CFS) for      2.881(Ac.)
Total runoff =      5.866(CFS)  Total area =       3.026(Ac.)
Depth of flow =   0.313(Ft.), Average velocity =   3.340(Ft/s)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------------
Upstream point/station elevation =   762.220(Ft.)
Downstream point/station elevation =   762.040(Ft.)
Pipe length  =    36.00(Ft.) Slope =   0.0050  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.866(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     5.866(CFS)
Normal flow depth in pipe =   12.07(In.)
Flow top width inside pipe =   16.92(In.)
Critical Depth =   11.22(In.)
Pipe flow velocity =      4.66(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    14.48 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      304.000
**** SUBAREA FLOW ADDITION ****

------------------------------------------------------------------------------
Rainfall intensity (I) =      4.778(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.422
Time of concentration =    14.48 min.
Rainfall intensity =      4.778(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.410  CA =      1.929
Subarea runoff =      3.354(CFS) for      1.680(Ac.)
Total runoff =      9.220(CFS)  Total area =       4.706(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      305.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------------
Upstream point/station elevation =   761.840(Ft.)
Downstream point/station elevation =   761.300(Ft.)
Pipe length  =   107.10(Ft.) Slope =   0.0050  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.220(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     9.220(CFS)
Normal flow depth in pipe =   13.03(In.)
Flow top width inside pipe =   23.91(In.)
Critical Depth =   13.01(In.)
Pipe flow velocity =      5.29(Ft/s)
Travel time through pipe =    0.34 min.
Time of concentration (TC) =    14.81 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      306.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------------
Depth of flow =   1.405(Ft.), Average velocity =   5.093(Ft/s)
!!Warning: Water is above left or right bank elevations
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2              1.00              0.00
```

```
    3              2.00              1.00
Manning's 'N' friction factor =   0.015
-----------------------------------------------------------------
Sub-Channel flow  =      9.220(CFS)
  '     '    flow top width =      2.000(Ft.)
  '     '    velocity=    5.093(Ft/s)
  '     '    area =      1.810(Sq.Ft)
  '     '    Froude number =     0.943

Upstream point elevation =   761.300(Ft.)
Downstream point elevation =   760.500(Ft.)
Flow length =   167.000(Ft.)
Travel time  =    0.55 min.
Time of concentration =   15.36 min.
Depth of flow =   1.405(Ft.)
Average velocity =   5.093(Ft/s)
Total irregular channel flow =     9.220(CFS)
Irregular channel normal depth above invert elev. =   1.405(Ft.)
Average velocity of channel(s) =   5.093(Ft/s)
!!Warning: Water is above left or right bank elevations


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      306.000
**** SUBAREA FLOW ADDITION ****

------------------------------------------------------------------------
Rainfall intensity (I) =      4.599(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.408
Time of concentration =    15.36 min.
Rainfall intensity =      4.599(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.409  CA =      3.618
Subarea runoff =      7.419(CFS) for      4.138(Ac.)
Total runoff =     16.638(CFS)  Total area =       8.844(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      408.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------
Upstream point/station elevation =   757.560(Ft.)
Downstream point/station elevation =   757.490(Ft.)
Pipe length  =    15.05(Ft.) Slope =   0.0047  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.638(CFS)
Given pipe size =     24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     0.665(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      0.081(Ft.)
 Minor friction loss =      0.653(Ft.)  K-factor =   1.50
Pipe flow velocity =      5.30(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    15.41 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      408.000
**** CONFLUENCE OF MINOR STREAMS ****

------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      8.844(Ac.)
Runoff from this stream =     16.638(CFS)
```

```
Time of concentration =   15.41 min.
Rainfall intensity =     4.590(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****

------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                      ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  828.000(Ft.)
Lowest elevation =  815.000(Ft.)
Elevation difference =   13.000(Ft.) Slope = 13.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  13.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.66 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(  13.000^(1/3)]=   5.66
Rainfall intensity (I) =      8.751(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.384(CFS)
Total initial stream area =        0.122(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      2.404(CFS)
Depth of flow =   0.252(Ft.), Average velocity =   3.774(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2             10.00              0.00
    3             20.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      2.404(CFS)
  '     '    flow top width =      5.047(Ft.)
  '     '    velocity=    3.774(Ft/s)
  '     '    area =      0.637(Sq.Ft)
  '     '    Froude number =     1.873

Upstream point elevation =   815.000(Ft.)
Downstream point elevation =   791.000(Ft.)
Flow length =   259.850(Ft.)
Travel time  =    1.15 min.
Time of concentration =    6.81 min.
Depth of flow =   0.252(Ft.)
Average velocity =   3.774(Ft/s)
Total irregular channel flow =     2.404(CFS)
Irregular channel normal depth above invert elev. =   0.252(Ft.)
Average velocity of channel(s) =   3.774(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      7.770(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
```

```
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.306
Rainfall intensity =      7.770(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.310  CA =      0.558
Subarea runoff =      3.949(CFS) for      1.679(Ac.)
Total runoff =      4.333(CFS)  Total area =       1.801(Ac.)
Depth of flow =   0.315(Ft.), Average velocity =   4.374(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      404.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Depth of flow =   0.769(Ft.), Average velocity =   7.337(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2              1.00              0.00
    3              2.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      4.333(CFS)
  '     '    flow top width =      1.537(Ft.)
  '     '    velocity=    7.337(Ft/s)
  '     '    area =      0.591(Sq.Ft)
  '     '    Froude number =     2.086

Upstream point elevation =   791.000(Ft.)
Downstream point elevation =   781.500(Ft.)
Flow length =   304.820(Ft.)
Travel time  =    0.69 min.
Time of concentration =    7.50 min.
Depth of flow =   0.769(Ft.)
Average velocity =   7.337(Ft/s)
Total irregular channel flow =     4.333(CFS)
Irregular channel normal depth above invert elev. =   0.769(Ft.)
Average velocity of channel(s) =   7.337(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      405.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------
Upstream point/station elevation =   775.420(Ft.)
Downstream point/station elevation =   773.810(Ft.)
Pipe length  =   164.90(Ft.) Slope =   0.0098  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.333(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     4.333(CFS)
Normal flow depth in pipe =    8.11(In.)
Flow top width inside pipe =   17.91(In.)
Critical Depth =    9.58(In.)
Pipe flow velocity =      5.61(Ft/s)
Travel time through pipe =    0.49 min.
Time of concentration (TC) =     7.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      406.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------
Upstream point/station elevation =   773.610(Ft.)
```

```
Downstream point/station elevation =   772.150(Ft.)
Pipe length  =   150.00(Ft.) Slope =   0.0097  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.333(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     4.333(CFS)
Normal flow depth in pipe =    8.12(In.)
Flow top width inside pipe =   17.91(In.)
Critical Depth =    9.58(In.)
Pipe flow velocity =      5.60(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =     8.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      407.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------------
Upstream point/station elevation =   771.950(Ft.)
Downstream point/station elevation =   759.100(Ft.)
Pipe length  =   387.10(Ft.) Slope =   0.0332  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.333(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     4.333(CFS)
Normal flow depth in pipe =    5.82(In.)
Flow top width inside pipe =   16.84(In.)
Critical Depth =    9.58(In.)
Pipe flow velocity =      8.76(Ft/s)
Travel time through pipe =    0.74 min.
Time of concentration (TC) =     9.18 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      407.000 to Point/Station      408.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------------
Upstream point/station elevation =   758.900(Ft.)
Downstream point/station elevation =   757.490(Ft.)
Pipe length  =   141.20(Ft.) Slope =   0.0100  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.333(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     4.333(CFS)
Normal flow depth in pipe =    8.06(In.)
Flow top width inside pipe =   17.90(In.)
Critical Depth =    9.58(In.)
Pipe flow velocity =      5.66(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =     9.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      408.000
**** CONFLUENCE OF MINOR STREAMS ****

------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.801(Ac.)
Runoff from this stream =      4.333(CFS)
Time of concentration =    9.59 min.
Rainfall intensity =     6.230(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       16.638     15.41             4.590
2        4.333      9.59             6.230
Qmax(1) =
       1.000 *    1.000 *    16.638) +
       0.737 *    1.000 *     4.333) + =      19.830
```

```
Qmax(2) =
       1.000 *    0.623 *    16.638) +
       1.000 *    1.000 *     4.333) + =      14.693

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.638       4.333
Maximum flow rates at confluence using above data:
       19.830       14.693
Area of streams before confluence:
        8.844        1.801
Results of confluence:
Total flow rate =     19.830(CFS)
Time of concentration =    15.407 min.
Effective stream area after confluence =     10.645(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   757.290(Ft.)
Downstream point/station elevation =   757.150(Ft.)
Pipe length  =    27.40(Ft.) Slope =   0.0051  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.830(CFS)
Given pipe size =     24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     0.999(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      0.210(Ft.)
 Minor friction loss =      0.928(Ft.)  K-factor =   1.50
Pipe flow velocity =      6.31(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    15.48 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     10.645(Ac.)
Runoff from this stream =     19.830(CFS)
Time of concentration =   15.48 min.
Rainfall intensity =     4.576(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       13.085     17.65             4.205
2       19.830     15.48             4.576
Qmax(1) =
       1.000 *    1.000 *    13.085) +
       0.919 *    1.000 *    19.830) + =      31.306
Qmax(2) =
       1.000 *    0.877 *    13.085) +
       1.000 *    1.000 *    19.830) + =      31.306

Total of 2 main streams to confluence:
Flow rates before confluence point:
      13.085      19.830
Maximum flow rates at confluence using above data:
       31.306       31.306
Area of streams before confluence:
        9.433       10.645
```

```
898
899       Results of confluence:
900       Total flow rate =     31.306(CFS)
901       Time of concentration =    15.479 min.
902       Effective stream area after confluence  =     20.078(Ac.)
903       End of computations, total study area =          20.078 (Ac.)
904
905
906
```

```
1
2               San Diego County Rational Hydrology Program
3
4       CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1
5
6       Rational method hydrology  program based on
7       San Diego County Flood Control Division 2003 hydrology manual
8           Rational Hydrology Study        Date: 12/02/24
9       ------------------------------------------------------------------------
10      24021 CONWAY DRIVE
11      POST-DEVELOPMENT
12      Q100 YR
13      POC-2
14      ------------------------------------------------------------------------
15       *********   Hydrology Study Control Information **********
16
17      ------------------------------------------------------------------------
18
19
20      Program License Serial Number 6332
21
22      ------------------------------------------------------------------------
23      Rational hydrology study storm event year is   100.0
24      English (in-lb) input data Units used
25
26      Map data precipitation entered:
27      6 hour,  precipitation(inches) =  3.500
28      24 hour precipitation(inches) =  8.000
29      P6/P24 =    43.8%
30      Adjusted 6 hour precipitation (inches) =  3.600
31      Adjusted P6/P24 =    45.0%
32      San Diego hydrology manual 'C' values used
33
34
35      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
36      Process from Point/Station      501.000 to Point/Station      502.000
37      **** INITIAL AREA EVALUATION ****
38      ________________________________________________________________________
39      Decimal fraction soil group A = 0.000
40      Decimal fraction soil group B = 0.000
41      Decimal fraction soil group C = 1.000
42      Decimal fraction soil group D = 0.000
43      [LOW DENSITY RESIDENTIAL                    ]
44      (2.9 DU/A or Less       )
45      Impervious value, Ai = 0.250
46      Sub-Area C Value = 0.450
47      Initial subarea total flow distance  =   70.000(Ft.)
48      Highest elevation =  784.000(Ft.)
49      Lowest elevation =  783.300(Ft.)
50      Elevation difference =    0.700(Ft.) Slope =  1.000 %
51      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
52      The maximum overland flow distance is 70.00 (Ft)
53      for the top area slope value of   1.00 %, in a development type of
54       2.9 DU/A or Less
55      In Accordance With Figure 3-3
56      Initial Area Time of Concentration =   9.79 minutes
57      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
58      TC = [1.8*(1.1-0.4500)*(  70.000^.5)/(   1.000^(1/3)]=   9.79
59      Rainfall intensity (I) =      6.150(In/Hr) for a   100.0 year storm
60      Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
61      Subarea runoff =      0.401(CFS)
62      Total initial stream area =        0.145(Ac.)
63
64
65      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
66      Process from Point/Station      502.000 to Point/Station      503.000
67      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
68      ________________________________________________________________________
69      Estimated mean flow rate at midpoint of channel =      1.134(CFS)
```

```
Depth of flow =   0.217(Ft.), Average velocity =   2.458(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.69
    2             34.50              0.13
    3             36.00              0.00
    4             36.00              0.50
    5             41.50              0.58
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      1.134(CFS)
  '     '    flow top width =      6.862(Ft.)
  '     '    velocity=    2.458(Ft/s)
  '     '    area =      0.461(Sq.Ft)
  '     '    Froude number =     1.670

Upstream point elevation =   783.300(Ft.)
Downstream point elevation =   777.800(Ft.)
Flow length =   234.100(Ft.)
Travel time  =    1.59 min.
Time of concentration =   11.38 min.
Depth of flow =   0.217(Ft.)
Average velocity =   2.458(Ft/s)
Total irregular channel flow =     1.134(CFS)
Irregular channel normal depth above invert elev. =   0.217(Ft.)
Average velocity of channel(s) =   2.458(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.582(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.450
Rainfall intensity =      5.582(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.450  CA =      0.318
Subarea runoff =      1.374(CFS) for      0.562(Ac.)
Total runoff =      1.776(CFS)  Total area =       0.707(Ac.)
Depth of flow =   0.242(Ft.), Average velocity =   2.713(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      504.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------
Upstream point/station elevation =   775.240(Ft.)
Downstream point/station elevation =   774.950(Ft.)
Pipe length  =    21.30(Ft.) Slope =   0.0136  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.776(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.776(CFS)
Normal flow depth in pipe =    5.48(In.)
Flow top width inside pipe =   11.95(In.)
Critical Depth =    6.81(In.)
Pipe flow velocity =      5.09(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    11.45 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      505.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------
Upstream point/station elevation =   772.700(Ft.)
```

```
Downstream point/station elevation =   772.600(Ft.)
Pipe length  =    12.00(Ft.) Slope =   0.0083  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.776(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.776(CFS)
Normal flow depth in pipe =    6.32(In.)
Flow top width inside pipe =   11.98(In.)
Critical Depth =    6.81(In.)
Pipe flow velocity =      4.23(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    11.49 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      505.000 to Point/Station      506.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Depth of flow =   0.388(Ft.), Average velocity =   3.662(Ft/s)
!!Warning: Water is above left or right bank elevations
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.13
    2              1.50              0.00
    3              1.50              0.50
    4              2.00              0.51
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      1.776(CFS)
  '     '    flow top width =      1.500(Ft.)
  '     '    velocity=    3.662(Ft/s)
  '     '    area =      0.485(Sq.Ft)
  '     '    Froude number =     1.135

Upstream point elevation =   772.600(Ft.)
Downstream point elevation =   772.000(Ft.)
Flow length =    71.400(Ft.)
Travel time  =    0.32 min.
Time of concentration =   11.82 min.
Depth of flow =   0.388(Ft.)
Average velocity =   3.662(Ft/s)
Total irregular channel flow =     1.776(CFS)
Irregular channel normal depth above invert elev. =   0.388(Ft.)
Average velocity of channel(s) =   3.662(Ft/s)
!!Warning: Water is above left or right bank elevations


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      506.000 to Point/Station      506.000
**** SUBAREA FLOW ADDITION ****

------------------------------------------------------------------------
Rainfall intensity (I) =      5.446(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.450
Time of concentration =    11.82 min.
Rainfall intensity =      5.446(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.450  CA =      0.463
Subarea runoff =      0.746(CFS) for      0.322(Ac.)
Total runoff =      2.522(CFS)  Total area =       1.029(Ac.)
End of computations, total study area =          1.029 (Ac.)
```

ATTACHMENT H
50 Year POST DEVELOPED Q CALCULATIONS

Steps Taken To Analyze This Condition
The Rational Method as outlined in section 3 of the June 2003 San Diego County Hydrology Manual is followed here. The software that we are using is the *"Rational Hydrology Method, San Diego County (2003 Manual)"* module of the CIVILCADD/CIVIL DESIGN Engineering software version 7.9.

Please see the subsequent pages for the calculations. These calculations are for the Q50. The results are outlined/summarized in Section 8.

```
1
2                San Diego County Rational Hydrology Program
3
4       CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1
5
6       Rational method hydrology  program based on
7       San Diego County Flood Control Division 2003 hydrology manual
8           Rational Hydrology Study        Date: 11/18/25
9       ------------------------------------------------------------------------
10      24021 CONWAY DRIVE
11      POST-DEVELOPMENT MITIGATED
12      Q50 YR
13      POC-1
14      ------------------------------------------------------------------------
15       *********   Hydrology Study Control Information **********
16
17      ------------------------------------------------------------------------
18
19
20      Program License Serial Number 6332
21
22      ------------------------------------------------------------------------
23      Rational hydrology study storm event year is    50.0
24      English (in-lb) input data Units used
25
26      Map data precipitation entered:
27      6 hour,  precipitation(inches) =  3.000
28      24 hour precipitation(inches) =  6.500
29      P6/P24 =    46.2%
30      San Diego hydrology manual 'C' values used
31
32
33      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
34      Process from Point/Station      101.000 to Point/Station      102.000
35      **** INITIAL AREA EVALUATION ****
36
37      Decimal fraction soil group A = 0.000
38      Decimal fraction soil group B = 0.000
39      Decimal fraction soil group C = 1.000
40      Decimal fraction soil group D = 0.000
41      [LOW DENSITY RESIDENTIAL                    ]
42      (1.0 DU/A or Less       )
43      Impervious value, Ai = 0.100
44      Sub-Area C Value = 0.360
45      Initial subarea total flow distance  =  100.000(Ft.)
46      Highest elevation =  840.000(Ft.)
47      Lowest elevation =  836.000(Ft.)
48      Elevation difference =    4.000(Ft.) Slope =  4.000 %
49      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
50      The maximum overland flow distance is 100.00 (Ft)
51      for the top area slope value of   4.00 %, in a development type of
52       1.0 DU/A or Less
53      In Accordance With Figure 3-3
54      Initial Area Time of Concentration =   8.39 minutes
55      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
56      TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   4.000^(1/3)]=   8.39
57      Rainfall intensity (I) =      5.660(In/Hr) for a    50.0 year storm
58      Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
59      Subarea runoff =      0.155(CFS)
60      Total initial stream area =        0.076(Ac.)
61
62
63      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
64      Process from Point/Station      102.000 to Point/Station      103.000
65      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
66
67      Estimated mean flow rate at midpoint of channel =      3.696(CFS)
68      Depth of flow =   0.197(Ft.), Average velocity =   3.815(Ft/s)
69          ******* Irregular Channel Data ***********
```

```
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              2.00
    2             50.00              0.00
    3            100.00              2.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      3.696(CFS)
   '     '    flow top width =      9.842(Ft.)
   '     '    velocity=    3.815(Ft/s)
   '     '    area =      0.969(Sq.Ft)
   '     '    Froude number =     2.143

Upstream point elevation =   836.000(Ft.)
Downstream point elevation =   766.000(Ft.)
Flow length =   535.600(Ft.)
Travel time  =    2.34 min.
Time of concentration =   10.73 min.
Depth of flow =   0.197(Ft.)
Average velocity =   3.815(Ft/s)
Total irregular channel flow =     3.696(CFS)
Irregular channel normal depth above invert elev. =   0.197(Ft.)
Average velocity of channel(s) =   3.815(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.830(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.306
Rainfall intensity =      4.830(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.307  CA =      1.479
Subarea runoff =      6.987(CFS) for      4.743(Ac.)
Total runoff =      7.142(CFS)  Total area =       4.819(Ac.)
Depth of flow =   0.252(Ft.), Average velocity =   4.498(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      7.189(CFS)
Depth of flow =   0.447(Ft.), Average velocity =   2.333(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.52
    2             19.50              0.13
    3             21.00              0.00
    4             21.00              0.50
    5             31.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      7.189(CFS)
   '     '    flow top width =     17.340(Ft.)
   '     '    velocity=    2.333(Ft/s)
   '     '    area =      3.082(Sq.Ft)
   '     '    Froude number =     0.975

Upstream point elevation =   766.000(Ft.)
Downstream point elevation =   762.910(Ft.)
Flow length =   537.900(Ft.)
Travel time  =    3.84 min.
```

```
Time of concentration =   14.57 min.
Depth of flow =   0.447(Ft.)
Average velocity =   2.333(Ft/s)
Total irregular channel flow =     7.189(CFS)
Irregular channel normal depth above invert elev. =   0.447(Ft.)
Average velocity of channel(s) =   2.333(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      3.965(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.900
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.279
The area added to the existing stream causes a
a lower flow rate of Q =      6.426(CFS)
therefore the upstream flow rate of Q =      7.142(CFS) is being used
Rainfall intensity =      3.965(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.304  CA =      1.621
Subarea runoff =      0.000(CFS) for      0.510(Ac.)
Total runoff =      7.142(CFS)  Total area =       5.329(Ac.)
Depth of flow =   0.446(Ft.), Average velocity =   2.329(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.329(Ac.)
Runoff from this stream =      7.142(CFS)
Time of concentration =   14.57 min.
Rainfall intensity =     3.965(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  840.000(Ft.)
Lowest elevation =  834.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  6.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.33 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(   6.000^(1/3)]=   7.33
Rainfall intensity (I) =      6.176(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.409(CFS)
Total initial stream area =        0.184(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station      202.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      2.605(CFS)
Depth of flow =   0.168(Ft.), Average velocity =   3.686(Ft/s)
    ******* Irregular Channel Data ***********
-------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              2.00
    2             50.00              0.00
    3            100.00              2.00
Manning's 'N' friction factor =   0.030
-------------------------------------------------------------
Sub-Channel flow  =      2.605(CFS)
  '     '    flow top width =      8.407(Ft.)
  '     '    velocity=    3.686(Ft/s)
  '     '    area =      0.707(Sq.Ft)
  '     '    Froude number =     2.240

Upstream point elevation =   834.000(Ft.)
Downstream point elevation =   790.370(Ft.)
Flow length =   289.900(Ft.)
Travel time  =    1.31 min.
Time of concentration =    8.64 min.
Depth of flow =   0.168(Ft.)
Average velocity =   3.686(Ft/s)
Total irregular channel flow =     2.605(CFS)
Irregular channel normal depth above invert elev. =   0.168(Ft.)
Average velocity of channel(s) =   3.686(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.554(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.800
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.288
Rainfall intensity =      5.554(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.293  CA =      0.854
Subarea runoff =      4.332(CFS) for      2.734(Ac.)
Total runoff =      4.741(CFS)  Total area =       2.918(Ac.)
Depth of flow =   0.210(Ft.), Average velocity =   4.281(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Depth of flow =   0.745(Ft.), Average velocity =   8.553(Ft/s)
    ******* Irregular Channel Data ***********
-------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2              1.00              0.00
    3              2.00              1.00
Manning's 'N' friction factor =   0.015
-------------------------------------------------------------
Sub-Channel flow  =      4.741(CFS)
  '     '    flow top width =      1.489(Ft.)
  '     '    velocity=    8.553(Ft/s)
  '     '    area =      0.554(Sq.Ft)
  '     '    Froude number =     2.470

Upstream point elevation =   790.370(Ft.)
```

```
Downstream point elevation =   762.910(Ft.)
Flow length =   621.500(Ft.)
Travel time  =    1.21 min.
Time of concentration =    9.85 min.
Depth of flow =   0.745(Ft.)
Average velocity =   8.553(Ft/s)
Total irregular channel flow =     4.741(CFS)
Irregular channel normal depth above invert elev. =   0.745(Ft.)
Average velocity of channel(s) =   8.553(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.918(Ac.)
Runoff from this stream =      4.741(CFS)
Time of concentration =    9.85 min.
Rainfall intensity =     5.103(In/Hr)
Summary of stream data:

Stream    Flow rate      TC            Rainfall Intensity
 No.        (CFS)       (min)                 (In/Hr)


1         7.142     14.57             3.965
2         4.741      9.85             5.103
Qmax(1) =
       1.000 *    1.000 *     7.142) +
       0.777 *    1.000 *     4.741) + =      10.825
Qmax(2) =
       1.000 *    0.676 *     7.142) +
       1.000 *    1.000 *     4.741) + =       9.569

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.142       4.741
Maximum flow rates at confluence using above data:
       10.825        9.569
Area of streams before confluence:
        5.329        2.918
Results of confluence:
Total flow rate =     10.825(CFS)
Time of concentration =    14.574 min.
Effective stream area after confluence =      8.247(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      204.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =     10.874(CFS)
Depth of flow =   0.502(Ft.), Average velocity =   2.644(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              0.52
    2             19.50              0.13
    3             21.00              0.00
    4             21.00              0.50
    5             31.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =     10.874(CFS)
  '     '    flow top width =     20.133(Ft.)
  '     '    velocity=    2.644(Ft/s)
  '     '    area =      4.113(Sq.Ft)
```

```
'     '    Froude number =     1.031

Upstream point elevation =   762.910(Ft.)
Downstream point elevation =   759.500(Ft.)
Flow length =   557.300(Ft.)
Travel time  =    3.51 min.
Time of concentration =   18.09 min.
Depth of flow =   0.502(Ft.)
Average velocity =   2.644(Ft/s)
Total irregular channel flow =    10.874(CFS)
Irregular channel normal depth above invert elev. =   0.502(Ft.)
Average velocity of channel(s) =   2.644(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      3.449(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.422
The area added to the existing stream causes a
a lower flow rate of Q =     10.261(CFS)
therefore the upstream flow rate of Q =     10.825(CFS) is being used
Rainfall intensity =      3.449(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.315  CA =      2.975
Subarea runoff =      0.000(CFS) for      1.186(Ac.)
Total runoff =     10.825(CFS)  Total area =       9.433(Ac.)
Depth of flow =   0.501(Ft.), Average velocity =   2.642(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** CONFLUENCE OF MAIN STREAMS ****

------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.433(Ac.)
Runoff from this stream =     10.825(CFS)
Time of concentration =   18.09 min.
Rainfall intensity =     3.449(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      306.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

------------------------------------------------------------------------
User specified 'C' value of 0.364 given for subarea
Rainfall intensity (I) =      3.168(In/Hr) for a    50.0 year storm
User specified values are as follows:
TC =  20.63 min.  Rain intensity =       3.17(In/Hr)
Total area =        8.843(Ac.)  Total runoff =    10.210(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      408.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------
Upstream point/station elevation =   757.560(Ft.)
Downstream point/station elevation =   757.490(Ft.)
Pipe length  =    15.05(Ft.) Slope =   0.0047  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.210(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    10.210(CFS)
Normal flow depth in pipe =   14.25(In.)
Flow top width inside pipe =   23.57(In.)
```

```
Critical Depth =   13.73(In.)
Pipe flow velocity =      5.25(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    20.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      408.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      8.843(Ac.)
Runoff from this stream =     10.210(CFS)
Time of concentration =   20.68 min.
Rainfall intensity =     3.164(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  828.000(Ft.)
Lowest elevation =  815.000(Ft.)
Elevation difference =   13.000(Ft.) Slope = 13.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  13.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.66 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3600)*( 100.000^.5)/(  13.000^(1/3)]=   5.66
Rainfall intensity (I) =      7.293(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.320(CFS)
Total initial stream area =        0.122(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      1.994(CFS)
Depth of flow =   0.235(Ft.), Average velocity =   3.602(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2             10.00              0.00
    3             20.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      1.994(CFS)
  '     '    flow top width =      4.706(Ft.)
  '     '    velocity=    3.602(Ft/s)
  '     '    area =      0.554(Sq.Ft)
  '     '    Froude number =     1.851

Upstream point elevation =   815.000(Ft.)
```

```
Downstream point elevation =   791.000(Ft.)
Flow length =   259.850(Ft.)
Travel time  =    1.20 min.
Time of concentration =    6.87 min.
Depth of flow =   0.235(Ft.)
Average velocity =   3.602(Ft/s)
Total irregular channel flow =     1.994(CFS)
Irregular channel normal depth above invert elev. =   0.235(Ft.)
Average velocity of channel(s) =   3.602(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      6.441(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.306
Rainfall intensity =      6.441(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.310  CA =      0.558
Subarea runoff =      3.272(CFS) for      1.679(Ac.)
Total runoff =      3.592(CFS)  Total area =       1.801(Ac.)
Depth of flow =   0.293(Ft.), Average velocity =   4.173(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      404.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

------------------------------------------------------------------------
Depth of flow =   0.716(Ft.), Average velocity =   7.001(Ft/s)
    ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1              0.00              1.00
    2              1.00              0.00
    3              2.00              1.00
Manning's 'N' friction factor =   0.015
-----------------------------------------------------------------
Sub-Channel flow  =      3.592(CFS)
  '     '    flow top width =      1.433(Ft.)
  '     '    velocity=    7.001(Ft/s)
  '     '    area =      0.513(Sq.Ft)
  '     '    Froude number =     2.061

Upstream point elevation =   791.000(Ft.)
Downstream point elevation =   781.500(Ft.)
Flow length =   304.820(Ft.)
Travel time  =    0.73 min.
Time of concentration =    7.59 min.
Depth of flow =   0.716(Ft.)
Average velocity =   7.001(Ft/s)
Total irregular channel flow =     3.592(CFS)
Irregular channel normal depth above invert elev. =   0.716(Ft.)
Average velocity of channel(s) =   7.001(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      405.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------
Upstream point/station elevation =   775.420(Ft.)
Downstream point/station elevation =   773.810(Ft.)
Pipe length  =   164.90(Ft.) Slope =   0.0098  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.592(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.592(CFS)
```

```
Normal flow depth in pipe =    7.31(In.)
Flow top width inside pipe =   17.68(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      5.34(Ft/s)
Travel time through pipe =    0.51 min.
Time of concentration (TC) =     8.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      406.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   773.610(Ft.)
Downstream point/station elevation =   772.150(Ft.)
Pipe length  =   150.00(Ft.) Slope =   0.0097  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.592(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.592(CFS)
Normal flow depth in pipe =    7.31(In.)
Flow top width inside pipe =   17.68(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      5.33(Ft/s)
Travel time through pipe =    0.47 min.
Time of concentration (TC) =     8.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      407.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   771.950(Ft.)
Downstream point/station elevation =   759.100(Ft.)
Pipe length  =   387.10(Ft.) Slope =   0.0332  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.592(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.592(CFS)
Normal flow depth in pipe =    5.29(In.)
Flow top width inside pipe =   16.40(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      8.31(Ft/s)
Travel time through pipe =    0.78 min.
Time of concentration (TC) =     9.35 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      407.000 to Point/Station      408.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   758.900(Ft.)
Downstream point/station elevation =   757.490(Ft.)
Pipe length  =   141.20(Ft.) Slope =   0.0100  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.592(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.592(CFS)
Normal flow depth in pipe =    7.26(In.)
Flow top width inside pipe =   17.66(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      5.38(Ft/s)
Travel time through pipe =    0.44 min.
Time of concentration (TC) =     9.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      408.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.801(Ac.)
Runoff from this stream =      3.592(CFS)
```

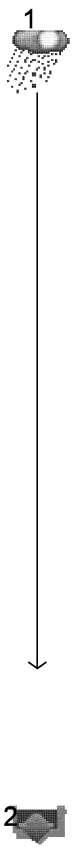
```
Time of concentration =    9.79 min.
Rainfall intensity =     5.124(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       10.210     20.68             3.164
2        3.592      9.79             5.124
Qmax(1) =
       1.000 *    1.000 *    10.210) +
       0.617 *    1.000 *     3.592) + =      12.428
Qmax(2) =
       1.000 *    0.473 *    10.210) +
       1.000 *    1.000 *     3.592) + =       8.427

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.210       3.592
Maximum flow rates at confluence using above data:
       12.428        8.427
Area of streams before confluence:
        8.843        1.801
Results of confluence:
Total flow rate =     12.428(CFS)
Time of concentration =    20.678 min.
Effective stream area after confluence =     10.644(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   757.290(Ft.)
Downstream point/station elevation =   757.150(Ft.)
Pipe length  =    27.40(Ft.) Slope =   0.0051  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.428(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    12.428(CFS)
Normal flow depth in pipe =   15.77(In.)
Flow top width inside pipe =   22.78(In.)
Critical Depth =   15.21(In.)
Pipe flow velocity =      5.68(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    20.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     10.644(Ac.)
Runoff from this stream =     12.428(CFS)
Time of concentration =   20.76 min.
Rainfall intensity =     3.156(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       10.825     18.09             3.449
2       12.428     20.76             3.156
Qmax(1) =
       1.000 *    1.000 *    10.825) +
       1.000 *    0.871 *    12.428) + =      21.654
```

```
      Qmax(2) =
             0.915 *    1.000 *    10.825) +
             1.000 *    1.000 *    12.428) + =      22.333

      Total of 2 main streams to confluence:
      Flow rates before confluence point:
            10.825      12.428
      Maximum flow rates at confluence using above data:
             21.654       22.333
      Area of streams before confluence:
              9.433       10.644


      Results of confluence:
      Total flow rate =     22.333(CFS)
      Time of concentration =    20.758 min.
      Effective stream area after confluence  =     20.077(Ac.)
      End of computations, total study area =          20.077 (Ac.)
```

```
1
2                San Diego County Rational Hydrology Program
3
4       CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1
5
6       Rational method hydrology  program based on
7       San Diego County Flood Control Division 2003 hydrology manual
8           Rational Hydrology Study        Date: 11/18/25
9       ------------------------------------------------------------------------
10      24021 CONWAY DRIVE
11      POST-DEVELOPMENT MITIGATED
12      Q50 YR
13      POC-2
14      ------------------------------------------------------------------------
15       *********   Hydrology Study Control Information **********
16
17      ------------------------------------------------------------------------
18
19
20      Program License Serial Number 6332
21
22      ------------------------------------------------------------------------
23      Rational hydrology study storm event year is    50.0
24      English (in-lb) input data Units used
25
26      Map data precipitation entered:
27      6 hour,  precipitation(inches) =  3.000
28      24 hour precipitation(inches) =  6.500
29      P6/P24 =    46.2%
30      San Diego hydrology manual 'C' values used
31
32
33      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
34      Process from Point/Station      504.000 to Point/Station      505.000
35      **** PIPEFLOW TRAVEL TIME (User specified size) ****
36
37      ________________________________________________________________________
38      Upstream point/station elevation =   772.700(Ft.)
39      Downstream point/station elevation =   772.600(Ft.)
40      Pipe length  =    12.00(Ft.) Slope =   0.0083  Manning's N = 0.013
41      No. of pipes = 1  Required pipe flow  =     0.000(CFS)
42      Given pipe size =     12.00(In.)
43      Calculated individual pipe flow  =     0.000(CFS)
44      Normal flow depth in pipe =    0.08(In.)
45      Flow top width inside pipe =    1.89(In.)
46      Critical depth could not be calculated.
47      Pipe flow velocity =      0.27(Ft/s)
48      Travel time through pipe =    0.74 min.
49      Time of concentration (TC) =     0.74 min.
50
51      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
52      Process from Point/Station      504.000 to Point/Station      504.000
53      **** USER DEFINED FLOW INFORMATION AT A POINT ****
54
55      ________________________________________________________________________
56      User specified 'C' value of 0.441 given for subarea
57      Rainfall intensity (I) =      4.163(In/Hr) for a    50.0 year storm
58      User specified values are as follows:
59      TC =  13.51 min.  Rain intensity =       4.16(In/Hr)
60      Total area =        0.707(Ac.)  Total runoff =     1.299(CFS)
61
62
63      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
64      Process from Point/Station      505.000 to Point/Station      506.000
65      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
66
67      ________________________________________________________________________
68      Depth of flow =   0.330(Ft.), Average velocity =   3.272(Ft/s)
69      !!Warning: Water is above left or right bank elevations
            ******* Irregular Channel Data ***********
        ------------------------------------------------------------------
```

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
    1               0.00               0.13
    2               1.50               0.00
    3               1.50               0.50
    4               2.00               0.51
Manning's 'N' friction factor =   0.015
-----------------------------------------------------------------
Sub-Channel flow  =      1.299(CFS)
   '      '    flow top width =      1.500(Ft.)
   '      '    velocity=    3.272(Ft/s)
   '      '    area =      0.397(Sq.Ft)
   '      '    Froude number =     1.121

Upstream point elevation =   772.600(Ft.)
Downstream point elevation =   772.000(Ft.)
Flow length =    71.400(Ft.)
Travel time  =    0.36 min.
Time of concentration =   13.87 min.
Depth of flow =   0.330(Ft.)
Average velocity =   3.272(Ft/s)
Total irregular channel flow =     1.299(CFS)
Irregular channel normal depth above invert elev. =   0.330(Ft.)
Average velocity of channel(s) =   3.272(Ft/s)
!!Warning: Water is above left or right bank elevations


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      506.000 to Point/Station      506.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Rainfall intensity (I) =      4.092(In/Hr) for a    50.0 year storm
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.450
Time of concentration =    13.87 min.
Rainfall intensity =      4.092(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.444  CA =      0.457
Subarea runoff =      0.570(CFS) for      0.322(Ac.)
Total runoff =      1.869(CFS)  Total area =       1.029(Ac.)
End of computations, total study area =          1.029 (Ac.)
```

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Manual	Node 306 Hydrograph Inflow
2	Reservoir	Node 306 Outflow

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Manual	------	-------	-------	-------	-------	-------	-------	13.71	-------	Node 306 Hydrograph Inflow
2	Reservoir	1	-------	-------	-------	-------	-------	-------	10.21	-------	Node 306 Outflow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

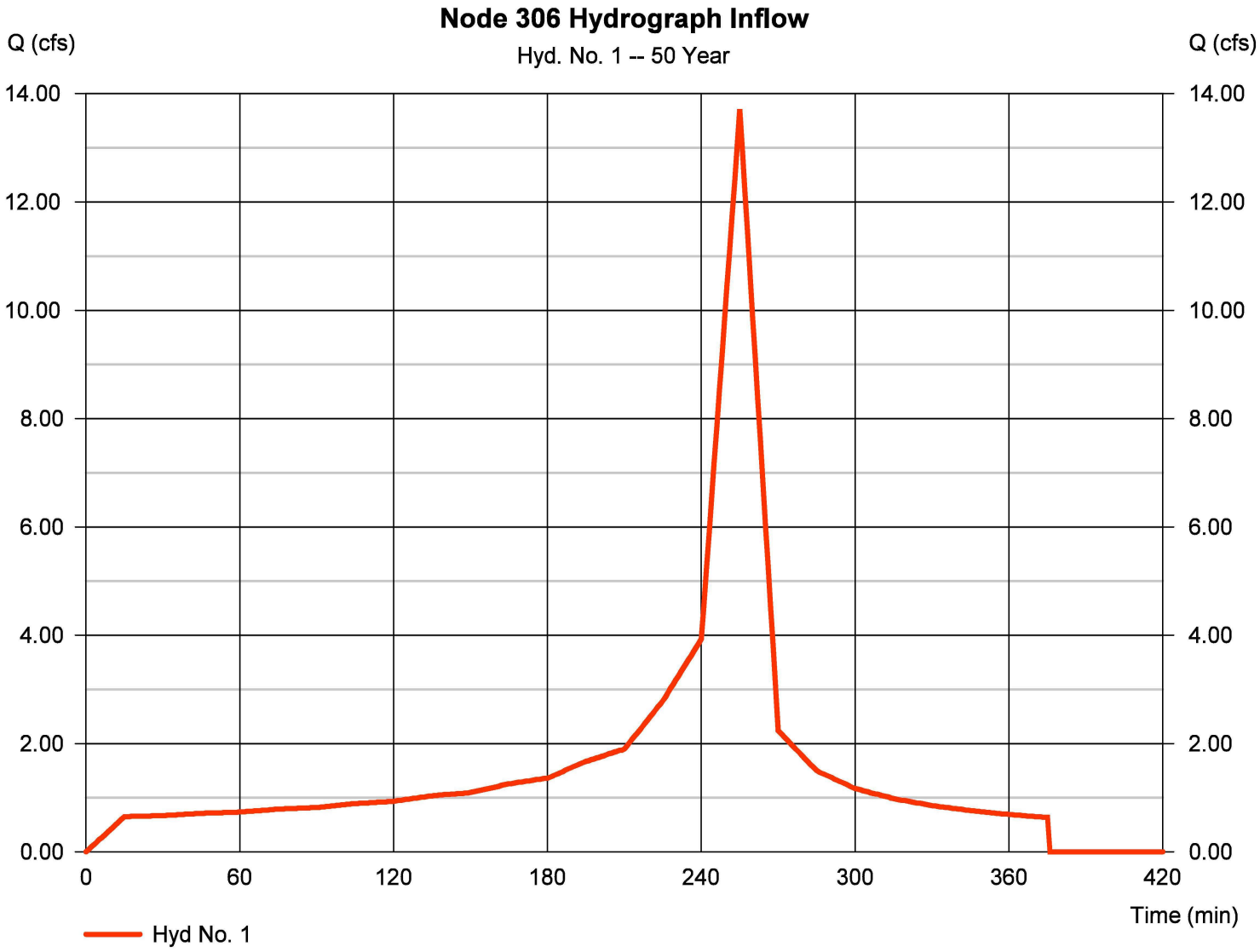
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	13.71	1	255	39,122	------	------	------	Node 306 Hydrograph Inflow
2	Reservoir	10.21	1	260	39,121	1	761.97	5,838	Node 306 Outflow

Hydrograph Report

Hyd. No. 1

Node 306 Hydrograph Inflow

Hydrograph type	= Manual	Peak discharge	= 13.71 cfs
Storm frequency	= 50 yrs	Time to peak	= 255 min
Time interval	= 1 min	Hyd. volume	= 39,122 cuft



Hydrograph Report

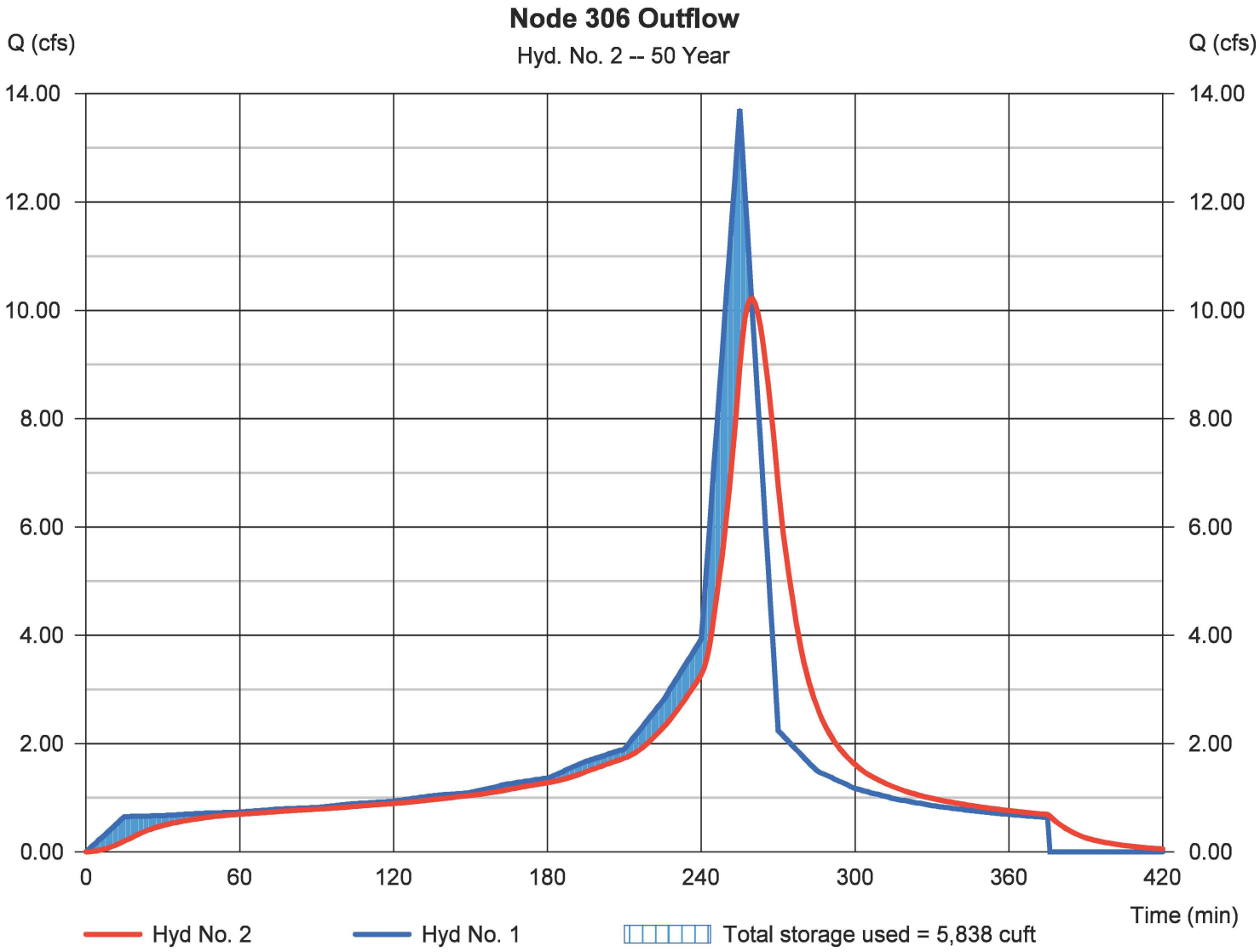
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 11 / 18 / 2025

Hyd. No. 2

Node 306 Outflow

Hydrograph type	=	Reservoir	Peak discharge	=	10.21 cfs
Storm frequency	=	50 yrs	Time to peak	=	260 min
Time interval	=	1 min	Hyd. volume	=	39,121 cuft
Inflow hyd. No.	=	1 - Node 306 Hydrograph Inflow	Max. Elevation	=	761.97 ft
Reservoir name	=	Detention Basin POC-1	Max. Storage	=	5,838 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 — Tuesday, 11 / 18 / 2025

Pond No. 1 - Detention Basin POC-1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 761.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	761.50	12,004	0	0
0.25	761.75	12,352	3,044	3,044
0.50	762.00	12,705	3,132	6,176
0.75	762.25	13,061	3,220	9,396
1.00	762.50	13,301	3,295	12,691

Culvert / Orifice Structures

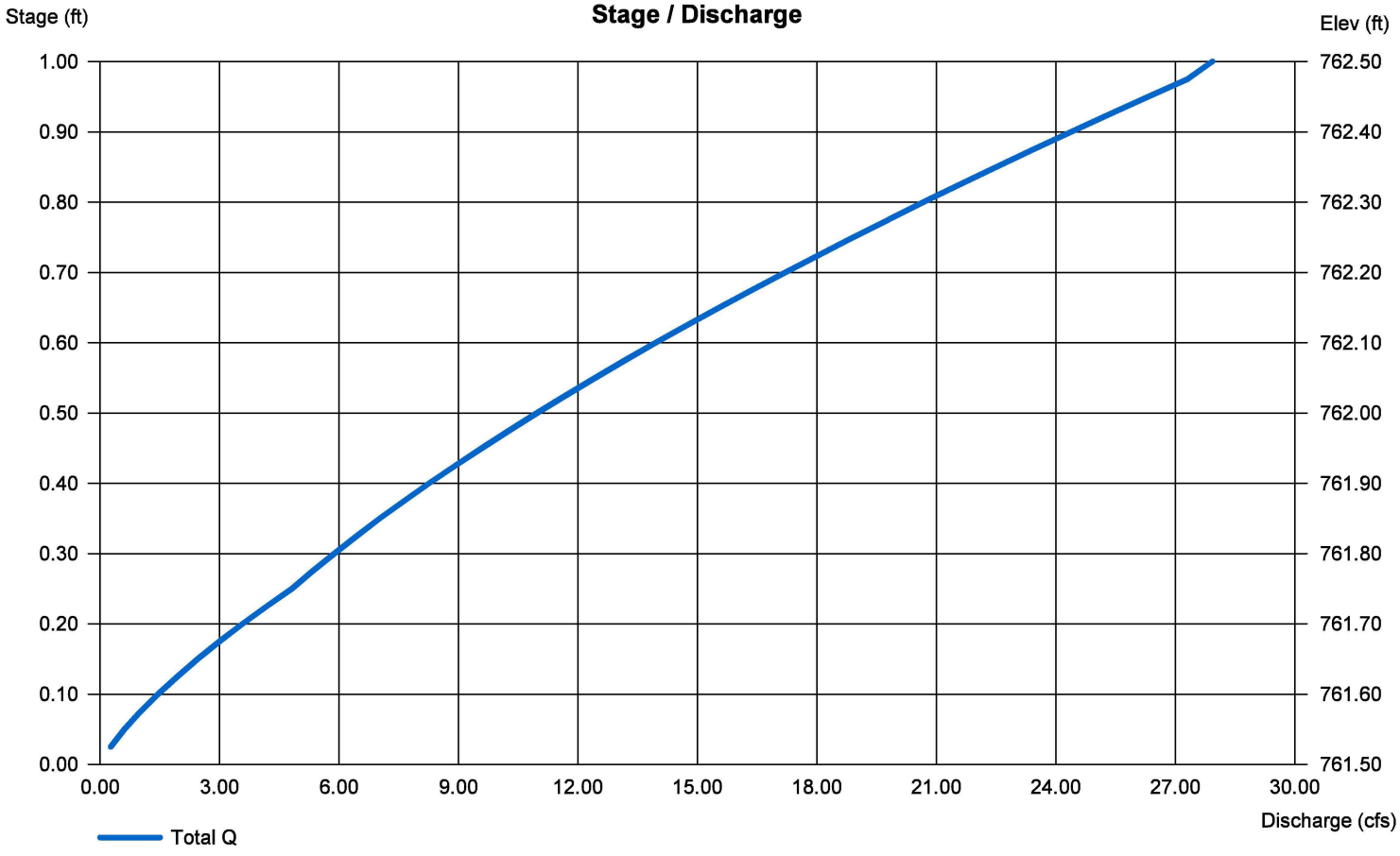
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	Inactive	0.00
Span (in)	= 24.00	2.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 757.56	758.00	0.00	0.00
Length (ft)	= 15.05	0.04	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 8.00	0.00	0.00	0.00
Crest El. (ft)	= 761.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr)	= 5.000 (by Contour)
TW Elev. (ft)	= 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

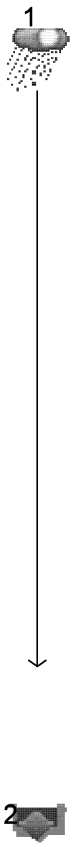
Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.20	0.00	3.30	4.25	5.77	6.80	7.95
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Manual	Node 504 inflow
2	Reservoir	Node 504 Outflow

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Manual	------	-------	-------	-------	-------	-------	-------	1.470	-------	Node 504 inflow
2	Reservoir	1	-------	-------	-------	-------	-------	-------	1.299	-------	Node 504 Outflow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

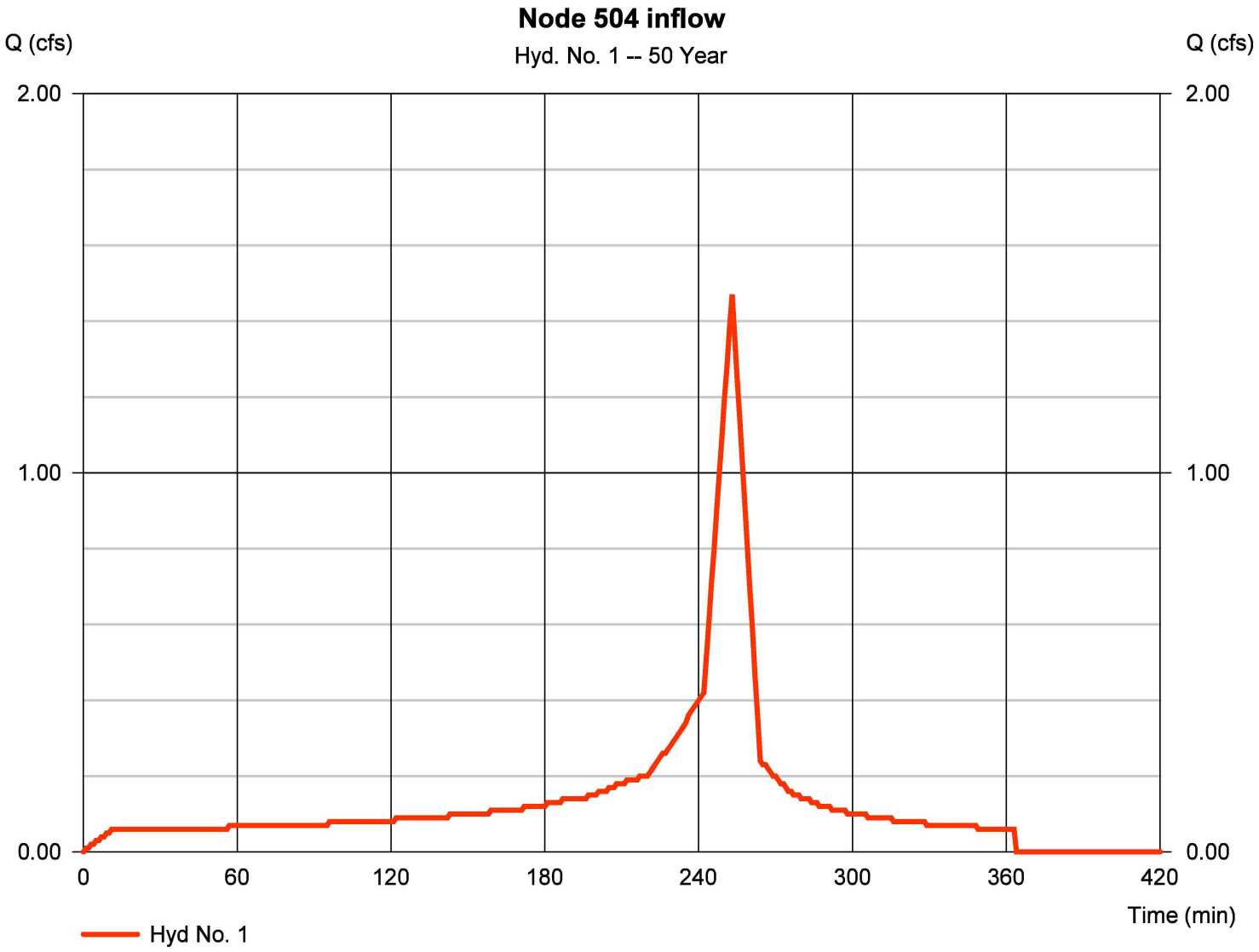
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	1.470	1	253	3,414	------	------	------	Node 504 inflow
2	Reservoir	1.299	1	255	3,414	1	776.08	272	Node 504 Outflow

Hydrograph Report

Hyd. No. 1

Node 504 inflow

Hydrograph type	= Manual	Peak discharge	= 1.470 cfs
Storm frequency	= 50 yrs	Time to peak	= 253 min
Time interval	= 1 min	Hyd. volume	= 3,414 cuft



Hydrograph Report

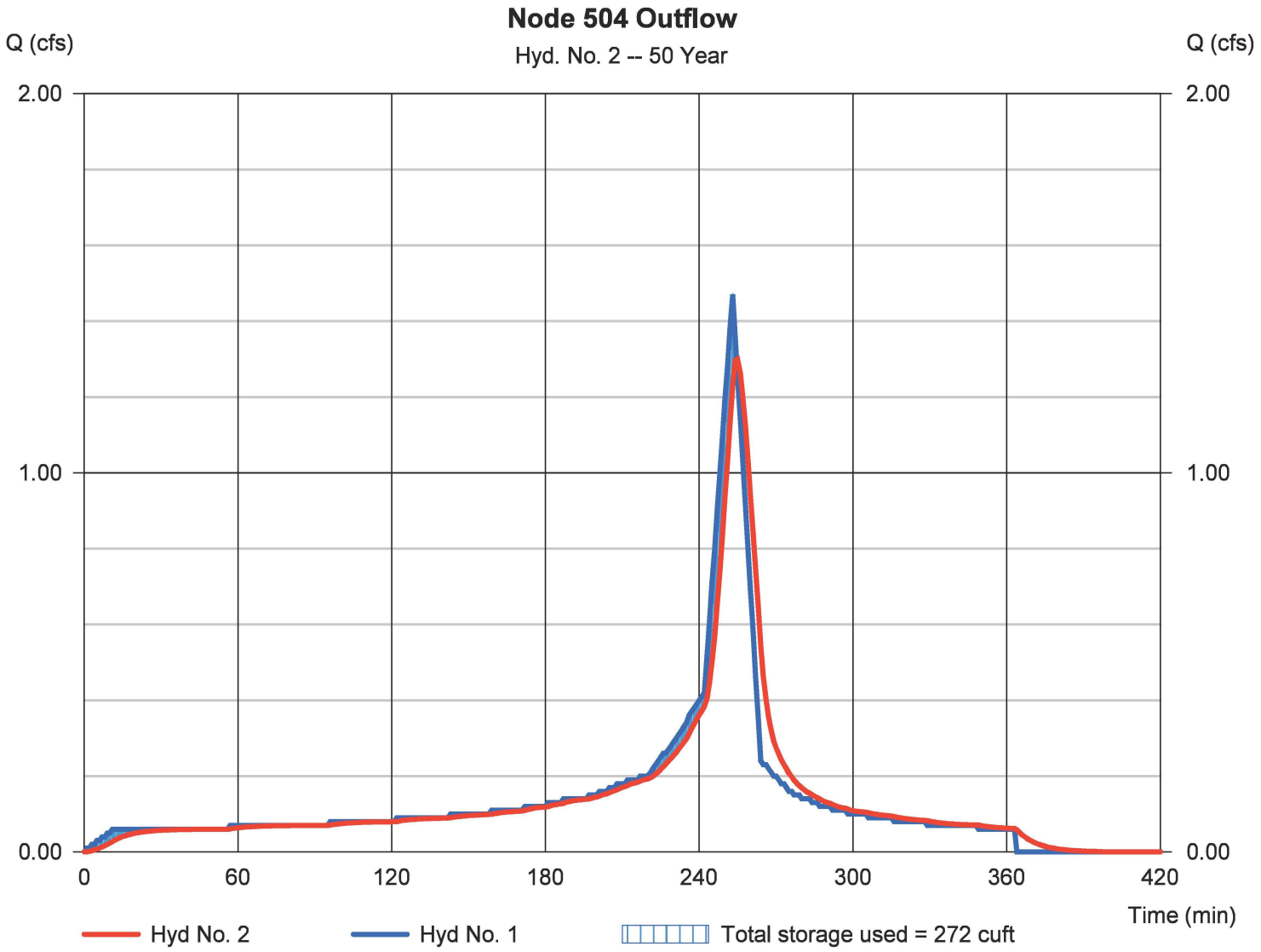
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 11 / 18 / 2025

Hyd. No. 2

Node 504 Outflow

Hydrograph type	=	Reservoir	Peak discharge	=	1.299 cfs
Storm frequency	=	50 yrs	Time to peak	=	255 min
Time interval	=	1 min	Hyd. volume	=	3,414 cuft
Inflow hyd. No.	=	1 - Node 504 inflow	Max. Elevation	=	776.08 ft
Reservoir name	=	Detention Basin Node 504	Max. Storage	=	272 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Detention Basin Node 504

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 775.95 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	775.95	1,960	0	0
0.25	776.20	2,133	511	511
0.50	776.45	2,310	555	1,067
0.75	776.70	2,492	600	1,667
1.00	776.95	2,615	638	2,305

Culvert / Orifice Structures

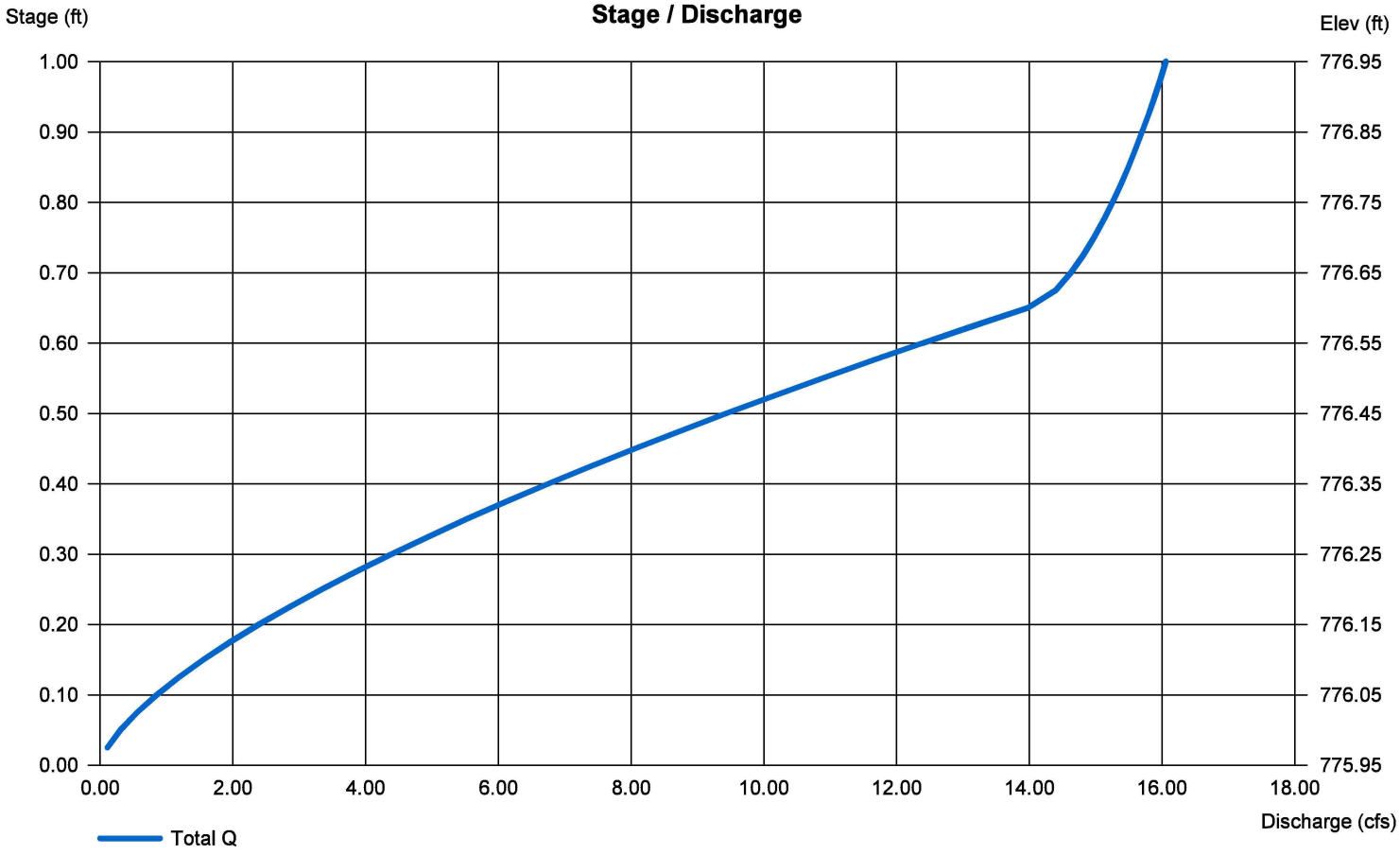
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	0.75	Inactive	0.00
Span (in)	= 18.00	0.75	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 772.45	772.45	0.00	0.00
Length (ft)	= 12.00	0.04	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 8.00	0.00	0.00	0.00
Crest El. (ft)	= 775.95	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr)	= 0.000 (by Contour)
TW Elev. (ft)	= 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydraflow Rainfall Report

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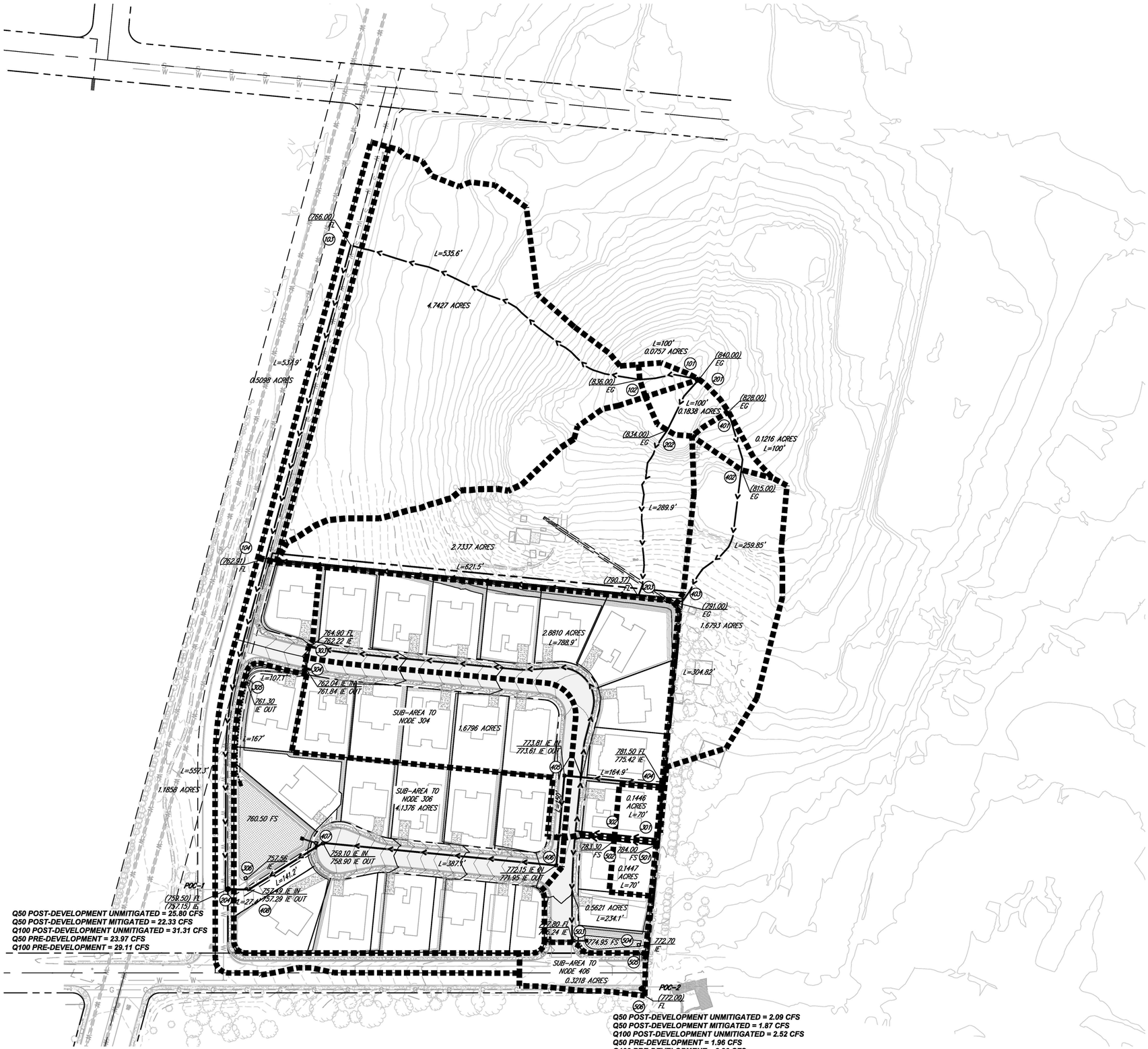
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

ATTACHMENT I
POST DEVELOPED HYDROLOGY MAP



CONWAY DRIVE
HYDROLOGY POST DEVELOPMENT EXHIBIT
ONSITE CONDITION