PDS2023-MUP-23-013 Chabad of RSF Project Description Tech Report Cover Letter

- *Acreage: Some of the project's tech report's used the site's gross acreage, while others make reference to the net acreage. The site is 2.43 gross acres and 2.39 net acres.*
- *Existing Buildings: the square footages of the existing-to-remain buildings have been rounded in some of the tech reports (single family residential 1,701 to 1,700; office 582 to 600; candle shop/commercial space 3,395 to 4,000). the existing-to-remain 582 square feet structure is an office and is not an ADU*
- *New Building: the total sf of the proposed new building is 13,845; however, the ground floor (lot coverage) of the proposed new building is 11,550 sf.*
- *Parking Spaces: in a previous round the project had 62 parking spaces but lost 2 spaces due to tree wells. The project proposes 60 parking spaces where 47 are required.*

We have clarified all of these minor inconsistencies through the unifying Project Description below.

The project proposes a Major Use Permit for Chabad of Rancho Santa Fe (as defined by Zoning Ordinance Section 1348 – Civic, Fraternal or Religious Assembly and 1332 – Child Care Center) on 2 lots, totaling approximately 2.43 gross acres (2.39 net acres). The project proposes to redevelop the property to include the construction of one (1) new building, three (3) existing-to-remain buildings, the retention of existing covered areas and construction of new covered areas, all totaling approximately 19,898.66 square foot (sf) of lot coverage or 19.11%. The proposed new building is a Chabad religious assembly center and communal space proposed to be approximately 13,845 gross sf with 11,550 sf of ground floor lot coverage. Uses associated within the proposed new building's Religious Assembly will include administration offices, mikvah, religious education classes, kitchen, childcare, and meeting spaces. Outdoor spaces will include landscaped garden areas, courtyard, playground, and perimeter screening/fence. The project offers 60 parking spaces where 47 are required by the proposed uses. The project will consist of a single phase of construction which will consist of the Shul, parking, drive aisles, signage, right-of-way improvements, and landscaping.

Existing as-built structures include a candle shop/commercial space (approximately 3,395 gross sf), a single-family residence (approximately 1,701 gross sf), an office (approximately 582 gross sf), a stone shop, and various out-structures. Of these structures, the project proposes to retain the candle shop/commercial space, single-family residence, and office. The stone shop and various out-structures will be demolished/removed.

The Child Care Center use is requested for all buildings on site, with specific development details to be determined during the building permit phase. The residence and accessory structures are occasionally inhabited by the Rabbi, his family and guests of the organization. These structures are excluded from the in the Religious Assembly. The candle shop/commercial space will remain as a commercial use for the sale of religious and Chabad-related items. Childcare services are proposed for up to 50 children, aged six months to six years old, operating Monday through Friday,

from 6:00 AM to 6:00 PM. If the childcare program grows to serve 50 children, staffing requirements are estimated to include approximately 12 employees, depending on the ages of the children in compliance with state-mandated staffing ratios for early learning and care programs.

The Religious Assembly use would include typical Shabat weekly services held Friday evenings and Saturday mornings, as well as other holiday services, events, weddings and gatherings, such as but not limited to Rosh Hashanah, Passover, and Yom Kippur. Services may be attended by approximately 100 adults plus children. The project is designed to accommodate the growth of the population from approximately 20 to 30 adults (plus children) to approximately 100 adults (plus children) for an average service. Evening classes and gatherings will operate from Monday through Thursday with varying class times in the day. Administrative offices will operate from 8:00 AM to 5:00 PM. The Religious Assembly currently employs three (3) staff and would be anticipated to grow in accordance with the growth of the Chabad.

The project will include public road improvements along Via De La Valle. Fire would be served by the Rancho Santa Fe Fire Protection District. School Service is provided by Solana Beach (General Elementary) and San Dieguito Union (High School). Water service is provided by Santa Fe Irrigation. The project is currently not connected to a sewer district and will rely on septic. The project will require approximately 2,688 cubic yards of cut and 3,225 cubic yards of fill. A total of 537 cubic yards of imported material will be required. The project is subject to General Plan Regional Category Semi-Rural, the General Plan Land Use of SR-2 and Zoning Single Family (RS). The project is not subject to Special Area Regulations. The project is located at 14906 Via De La Valle, directly north of Villa De La Valle, approximately 1.9 miles east of Interstate 15, in the San Dieguito Community Planning Area, within unincorporated San Diego County (APNs 302-110-29 and 30).

DRAINAGE STUDY
Chabad RSF

14906 Via De La
Rancho Santa Fe, CA 92067

APN: 302-110-29 and 30

Prepared for:
Chabad Jewish Center of RSF
P.O. Box 8282
Rancho Santa Fe, California 92067
858-756-7571

Engineer:

SWS Engineering, Inc.
1635 Lake San Marcos Drive, Suite 200
San Marcos, California 92078
760-744-0011
PN: 21-257

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 PROFESSIONAL CODE, AND THAT THE DESIGN IN CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE COUNTY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR THE PROJECT DESIGN.

Prepared by: _____Date: _____
Michael D. Schweitzer RCE# 59658 Exp. 12-31-27

Date	Comments
9-14-23	Original
11-06-24	2nd
5-19-25	3rd
9-9-25	4TH

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1.0 PROJECT DESCRIPTION

The proposed project “Chabad of Rancho Santa Fe” is building a new Chabad Center on the property of approximately 2.77 ac of which 2.72 ac is the study area in the Rancho Santa Fe area in San Diego County, California. The project site located on Via De La Valle approximately 1.5 mile from Interstate 5. The Chabad Center will consist of religious assembly, administration offices, 2 religious school classrooms and meeting spaces for the congregation. The Synagogue and Social Hall will have a capacity of up to 75 people each with garden areas for exterior events. The grandfathered residential and commercial uses (house and candle gift shop) will stay in use and future phases could include a preschool and a residence for the Rabbi and his family. The proposed project will also consist of associated utilities and treatment basin. The site is located on Single Family Residential 2 (SR-2) per General Plan and zoning is Single Family (RS).

2.0 PURPOSE

The purpose of this study is to determine the peak runoff rates for the pre-development and post-development conditions. Comparisons will be made at the same discharge points for each drainage basin affecting the site and adjacent properties. The adequacy of existing and proposed conveyance facilities affected by the project will be determined.

3.0 METHODOLOGY

The Rational Method as outlined in the San Diego County Hydrology Manual, dated June 2003, was used to determine the runoff flow rate. The 100-year frequency storm event was analyzed to determine peak runoff rates discharging the site for both the existing and post-development condition.

Soil type was determined to be type “D” from the Soil Hydrologic Groups map, NRCS Web Soil Survey (see Appendix A). According to geologic maps of the area, the property is underlain by alluvium (Qal) and Delmar Formation (Td). The property gently to moderately slopes to the southeast. Per Geotechnical report (by Geocon Inc. dated June 14, 2023) the site groundwater table is expected to be greater than 50 feet. The runoff coefficient “C” was determined by using the closest matching land use category in Table 3-1 (Appendix A). The exhibits have been prepared for the Pre-Development and Post-Development conditions and are attached as Exhibits “A” and “B”.
Runoff coefficients, “C” is summarized below:

Onsite

- Pre-Development
  - Site Overall Weighted C = 0.66, 56% imperviousness
    Closest matching “C” was selected from the Table 3-1
- Post-Development
  - Site Overall Weighted C= 0.74, 70% impervious
    Closest matching “C” was selected from the Table 3-1

4.0 HYDROLOGY

4.1 Pre-Development Conditions

The property is located at 14906 Via de la Valle in the Rancho Santa Fe area in San Diego County, California. The project site of 2.77 ac (2.72 ac study area) currently consists of a few commercial and retail buildings, and some ancillary structures, along with accommodating pavement, utilities, flatwork and landscaping. The property gently to moderately slopes to the southeast with elevations ranging from about 100 feet to 70 feet above Mean Sea Level (MSL) from north to south, respectively. Major portion of the site runoff surface flow in southerly direction into onsite natural channel located at the south portion of the site where this channel conveys the runoff to the lowest point of the channel located on the southeast portion of the site. There is offsite run-on into project site from north and west side of the site where confluences with the onsite majority runoff toward the low point of the channel. All the runoff from the channel ultimately discharges offsite located on the east driveway via existing storm drain system. There is a small offsite area draining into site from northeast which will discharge offsite into low point of the site conferencing with rest of onsite and offsite runoff from the west. All the onsite and offsite discharge runoff ultimately drain into lined channel located on the southeast of the site (south of Via De Valle) and then into San Dieguito River.

A pre-development hydrology map delineating basin areas, flow paths, and concentration points has been prepared and is attached to this report as Exhibit “A”. Pre-development hydrology calculations can be found in Appendix “B”.

4.2 Post-Development Conditions

The proposed project “Chabad of Rancho Santa Fe” is building a new Chabad Center on the property of approximately 2.77 ac (2.72 ac study area) in the Rancho Santa Fe area in San Diego County, California. The Chabad Center will consist of religious assembly, administration offices, 2 religious school classrooms and meeting spaces for the congregation. The proposed project will also consist of associated utilities, driveways, landscape, parking lots (permeable paver), and treatment system/underground storage.

The runoff from basins-200-A along with offsite runoff from north (basin-100.2) discharge via proposed brow-ditch and storm drain systems into proposed inlet located at the southwest corner of the site where it will confluence with the rest of offsite runoff from west (basin-100-1) into the same inlet. The runoff from basin-B also drains into the same inlet. All these confluence runoffs will bypass the site via proposed onsite storm drain systems into discharge point located at the low point of the east driveway. The runoff from basins 200 (C, H) sheet flow in northerly direction into proposed inlets and then into bypass storm drain system that will confluence with the rest of conveyed runoffs already in the system. The runoff from basins 200 (D,E,F-G) will drain into first treatment system (MWS) and then into underground system (Storm Chamber) via proposed inlets and storm drain systems.

All the treated and detained runoff from basins (D, E, F, G) will discharge into the bypass storm drain system which will confluence with the rest of runoff in the system and finally discharge offsite located on the east driveway low point. The runoff from basins 200-I (existing undisturbed area) and basin-J (west driveway) will discharge into second MWS via inlets and storm drain systems for treatment prior to discharging into west driveway low point, the same as bypass runoff system does.

All the detained onsite and offsite discharge runoff ultimately drain into lined channel located on the southeast of the site (south of Via De Valle) and then into San Dieguito River.

The proposed project onsite runoff will increase by (1.5 cfs) compared to the existing condition because of time of concentration and site imperviousness. The proposed runoff will be reduced below the existing condition by installation of underground storage system (Chamber).

A post-development hydrology map delineating basin area, flow paths, concentration points, and proposed drainage facilities has been prepared and is attached to this report as Exhibit “B”. Post-development hydrology calculations can be found in Appendix C.

4.3 FEMA NFIP

Per FEMA-NFIP Map (Panel 1326 of 2375, Map Number 06073C-1326G), the site in located on Zone X. See appendix A for FEMA maps.

5.0 CONCLUSION

The proposed project will maintain the flow patterns and drainage areas as in the pre-developed condition. Development of the project site will increase the runoff from the pre-developed condition which a construction of proposed underground storage (chamber system) will reduce the excess runoff below the existing condition. Table 2 provides a summary of the pre- and post-development areas and flows. The proposed underground storage will provide storage capacity to satisfy the hydromodification volume requirement as well as the extra volume for the flood control requirement. See the attenuated analysis used EPA SWMM for the runoff from basins (D-G for Q=6.83 cfs)

Table 1 Offsite Area and Flow in both pre and post condition

Basins	Area (ac)	Q_{100} (cfs)
100 (offsite	9.63	12.9

Table 2 – Pre - Development Areas and Flows (Onsite)

Basins	Area (ac)	Q_{100} (cfs)
200 (onsite)	2.72	12.3

Table 3 – Post - Development Areas and Flows (Onsite

Basin-200	Area (ac)	Q_{100} (cfs)	Q_{100} (cfs)
A	0.156	0.81	
B	0.09	0.47	
C	0.11	0.57	
D	0.1	0.51	**6.83***
E	0.35	1.82	
F	0.18	0.94	
G	0.80	3.79	
H	0.21	1.09	
I	0.28	1.46	
J	044	2.27	
Total	**2.72**	**13.73**	

***Discharge into chamber system at the confluence point from Basins D-G for detention**

Table 4 –Pre and Post - Development Flow Comparison at POC-1

Basins	Pre Q_{100} (cfs)	Post Q_{100} (cfs)	Increased Q ± (cfs)	Attenuated Q (cfs)
Offsite & Offsite	18.2	19.7	+1.5	**18.0**

*Construction of underground storage will reduce the post runoff below the existing runoff **(0.2 cfs).** The discharge runoff from project site into San Dieguito River will be lower than the existing runoff and therefore will have no negative impact downstream systems.

REFERENCES

CivilDesign Corporation. *San Diego County Rational Method*. (Software Version 7.7)

County of San Diego Department of Public Works Flood Control Section. *San Diego County Hydrology Manual.* (2003)

County of San Diego Department of Public Works Flood Control Section. *San Diego County Drainage Design Manual.* (2005)

Appendix A

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

Off-Site

*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

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.

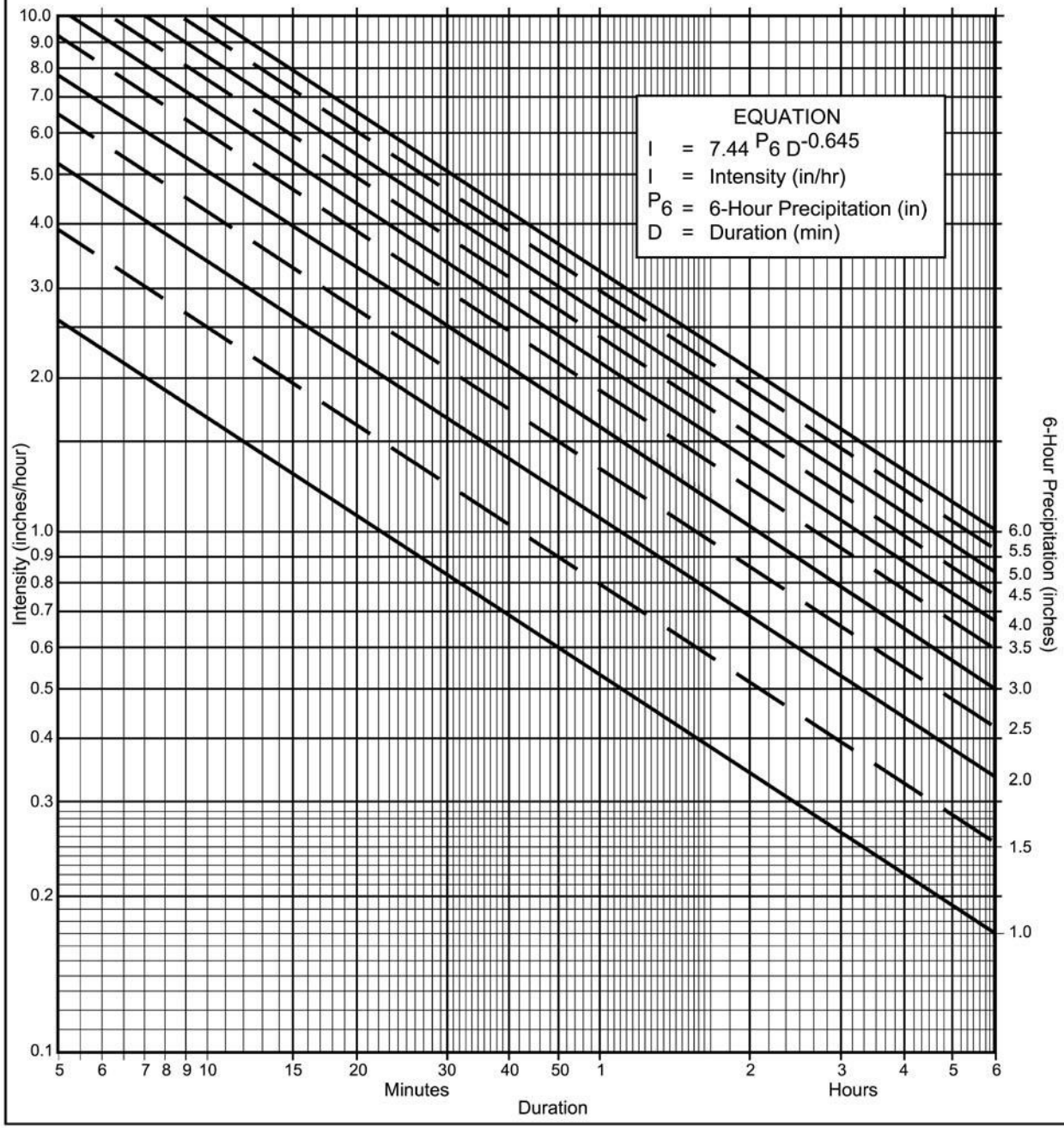
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved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



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 = 2.6 in., P_{24} = 4.2, $\frac{P_6}{P_{24}}$ = 62 %(2)

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

(d) t_x = _____ min.

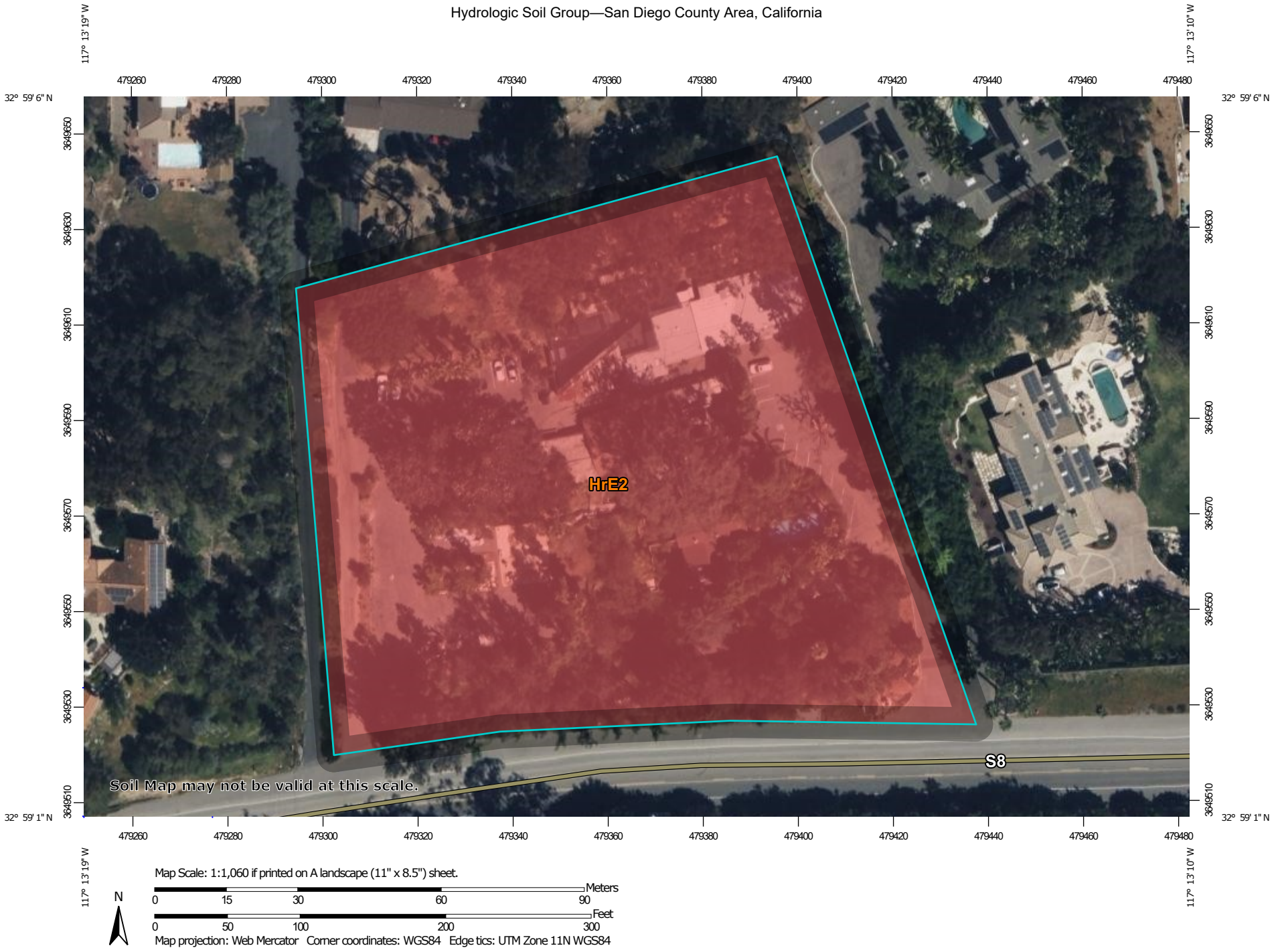
(e) I = _____ in./hr.

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



Map Scale: 1:1,060 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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 18, Sep 14, 2022

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

Date(s) aerial images were photographed: Mar 24, 2022—Apr 29, 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
HrE2	Huerhuero loam, 15 to 30 percent slopes, eroded	D	3.2	100.0%
Totals for Area of Interest			**3.2**	**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)

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

P_6 = 2.6 in

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
We Have San Diego Covered!

N W E S

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

P_{24} = 4.2 in

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
We Have San Diego Covered!

N W E S

3 0 3 Miles

NOTES TO USERS

ap is for use in administering the National Flood Insurance Program. It does cessarily identify all areas subject to flooding, particularly from local drainage s of small size. The **community map repository** should be consulted for e updated or additional flood hazard information.

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

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

aries of the **floodways** were computed at cross sections and interpolated n cross sections. The floodways were based on hydraulic considerations with to requirements of the National Flood Insurance Program. Floodway widths her pertinent floodway data are provided in the Flood Insurance Study report jurisdiction.

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

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

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

formation Services
NGS12
al Geodetic Survey
3, #9202
ast-West Highway
Spring, Maryland 20910-3282
13-3242

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

map information shown on this FIRM was provided in digital format by the National Agriculture Imagery Program (NAIP). this information was rammetrically compiled at a scale of 1:24,000 from aerial photography dated

ap reflects more detailed and up-to-date **stream channel configurations** ose shown on the previous FIRM for this jurisdiction. The floodplains and ays that were transferred from the previous FIRM may have been adjusted to n to these new stream channel configurations. As a result, the Flood Profiles oodway Data tables *in the Flood Insurance Study report (which contains ative hydraulic data)* may reflect stream channel distances that differ from shown on this map.

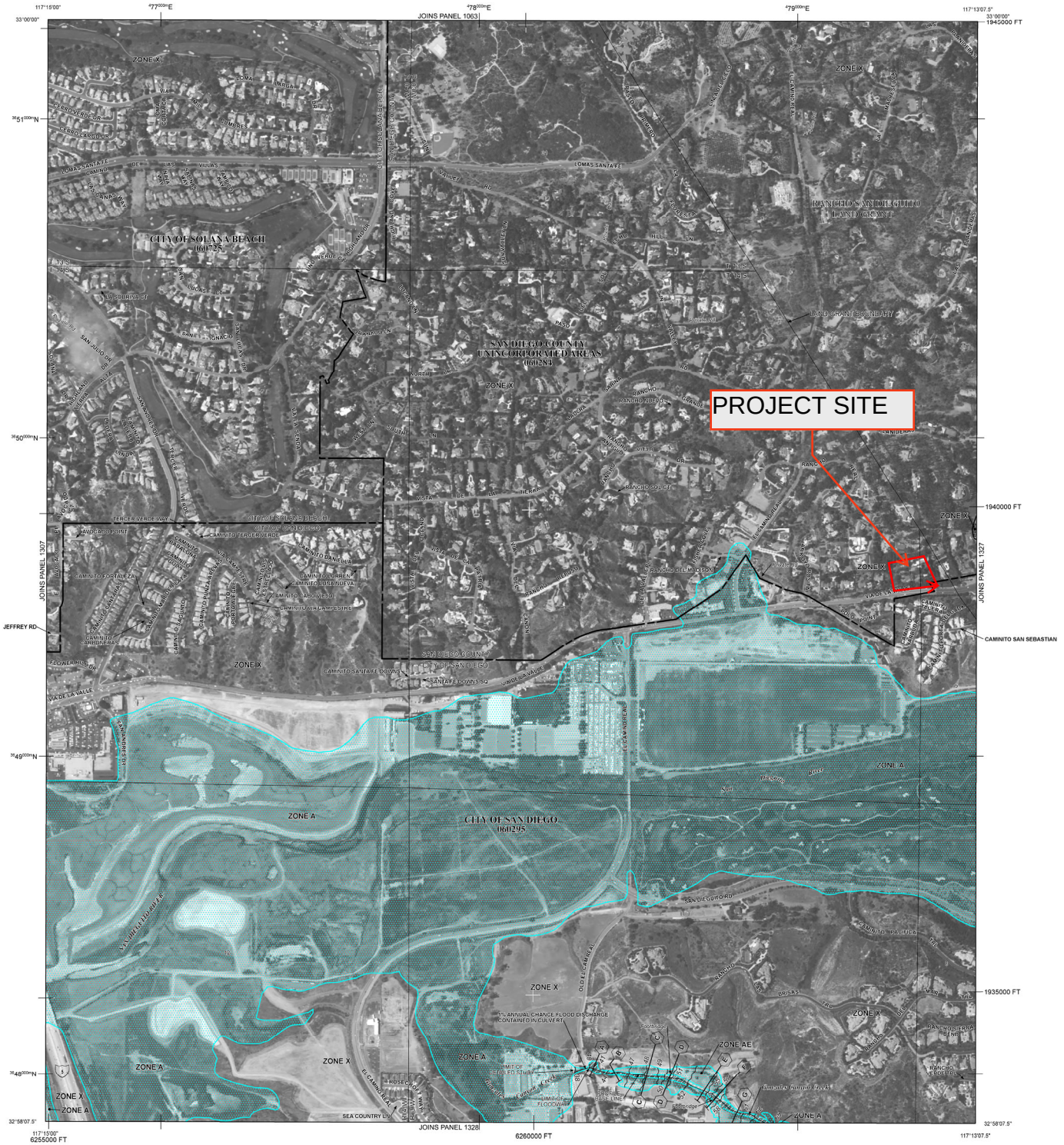
rate limits shown on this map are based on the best data available at the time ication. Because changes due to annexations or de-annexations may have d after this map was published, map users should contact appropriate nity officials to verify current corporate limit locations.

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

t the **FEMA Map Service Center** at 1-877-FEMA MAP (1-877-336-2627) for ation on available products associated with this FIRM. Available products may previously issued Letters of Map Change, a Flood Insurance Study report, digital versions of this map. The FEMA Map Service Center may also be d by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

have questions about this map or questions concerning the National Flood nce Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or e FEMA website at http://www.fema.gov/business/nfip/.

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



LEGEND

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

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

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513 (EL 987) Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A Cross section line
23 — 23 Transect line
97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4275000mE 1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 FT 5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 19, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
May 16, 2012 – to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to update map elevations to North American Vertical Datum of 1988.

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

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

MAP SCALE 1" = 500'

250 0 250 500 750 1,000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1326G

FIRM

FLOOD INSURANCE RATE

SAN DIEGO COUNT
CALIFORNIA
AND INCORPORATED AR

PANEL 1326 OF 2375

(SEE MAP INDEX FOR FIRM PANEL

CONTAINS:

COMMUNITY	NUMBER	PANEL
SAN DIEGO COUNTY	060284	1326
SAN DIEGO, CITY OF	060295	1326
SOLANA BEACH, CITY OF	060725	1326

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

MAP NU
06073C

MAP REV
MAY 16

Federal Emergency Management

National Flood Hazard Layer FIRMette

FEMA

117°13'34"W 32°59'18"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

117°12'57"W 32°58'48"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/12/2023 at 11:57 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX B - PRE-DEVELOPMENT HYDROLOGY CALCULATIONS

```
                San Diego County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2006 Version 7.7

     Rational method hydrology  program based on
     San Diego County Flood Control Division 2003 hydrology manual
          Rational Hydrology Study        Date: 09/09/25
     ------------------------------------------------------------------------
-----
     21-257 Pre-Deveopment- Chabad Rancho Santa Fe
     100-year Pre Development
     Basin 100-200
     Offsite + Onsite
     ------------------------------------------------------------------------
-----
      *********   Hydrology Study Control Information **********

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


     Program License Serial Number 6144

     ------------------------------------------------------------------------
-----
     Rational hydrology study storm event year is   100.0
     English (in-lb) input data Units used

     Map data precipitation entered:
     6 hour,  precipitation(inches) =  2.600
     24 hour precipitation(inches) =  4.200
     P6/P24 =    61.9%
     San Diego hydrology manual 'C' values used


     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
     Process from Point/Station      101.000 to Point/Station
102.000
     **** INITIAL AREA EVALUATION ****
     ________________________________________________________________________
___
     Decimal fraction soil group A = 0.000
     Decimal fraction soil group B = 0.000
     Decimal fraction soil group C = 0.000
     Decimal fraction soil group D = 1.000
     [LOW DENSITY RESIDENTIAL                    ]
     (1.0 DU/A or Less       )
     Impervious value, Ai = 0.100
     Sub-Area C Value = 0.410
     Initial subarea total flow distance  =  100.000(Ft.)
     Highest elevation =  190.000(Ft.)
     Lowest elevation =  184.000(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 =   6.83 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.4100)*( 100.000^.5)/(   6.000^(1/3)]=   6.83
      Rainfall intensity (I) =      5.599(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
      Subarea runoff =      1.102(CFS)
      Total initial stream area =        0.480(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      102.000 to Point/Station
103.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ____________________________________________________________________
___
      Estimated mean flow rate at midpoint of channel =      5.950(CFS)
      Depth of flow =   0.936(Ft.), Average velocity =   1.488(Ft/s)
            ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              1.50
            2              2.00              0.75
            3              3.00              0.00
            4              4.00              0.00
            5              5.00              0.00
            6              6.00              0.00
            7              7.00              0.75
            8              8.00              1.50
      Manning's 'N' friction factor =   0.250
      ------------------------------------------------------------------
      Sub-Channel flow  =      5.950(CFS)
        '     '   flow top width =      5.743(Ft.)
        '     '    velocity=    1.488(Ft/s)
        '     '   area =      3.998(Sq.Ft)
        '     '   Froude number =     0.314

      Upstream point elevation =   184.000(Ft.)
      Downstream point elevation =    95.000(Ft.)
      Flow length =   768.000(Ft.)
      Travel time  =    8.60 min.
      Time of concentration =   15.44 min.
      Depth of flow =   0.936(Ft.)
      Average velocity =   1.488(Ft/s)
      Total irregular channel flow =     5.950(CFS)
      Irregular channel normal depth above invert elev. =   0.936(Ft.)
      Average velocity of channel(s) =   1.488(Ft/s)
```

```
 Adding area flow to channel
Rainfall intensity (I) =      3.311(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 = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Rainfall intensity =      3.311(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.410  CA =      3.235
Subarea runoff =      9.608(CFS) for      7.410(Ac.)
Total runoff =     10.710(CFS)    Total area =       7.890(Ac.)
Depth of flow =   1.280(Ft.), Average velocity =   1.725(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
Process from Point/Station      103.000 to Point/Station
203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
___
Top of street segment elevation =    95.000(Ft.)
End of street segment elevation =    81.680(Ft.)
Length of street segment  =   293.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  12.000(Ft.)
Distance from crown to crossfall grade break  =  10.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.000(Ft.)
Gutter hike from flowline =  0.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.069(CFS)
Depth of flow =   0.274(Ft.), Average velocity =   5.982(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.000(Ft.)
Flow velocity =   5.98(Ft/s)
Travel time =    0.82 min.     TC =   16.25  min.
 Adding area flow to street
Rainfall intensity (I) =      3.203(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 = 0.000
Decimal fraction soil group D = 1.000
```

```
      [LOW DENSITY RESIDENTIAL                    ]
      (1.0 DU/A or Less       )
      Impervious value, Ai = 0.100
      Sub-Area C Value = 0.410
      Rainfall intensity =      3.203(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for total area
      (Q=KCIA) is C = 0.410  CA =      3.538
      Subarea runoff =      0.622(CFS) for      0.740(Ac.)
      Total runoff =     11.332(CFS)    Total area =       8.630(Ac.)
      Street flow at end of street =     11.332(CFS)
      Half street flow at end of street =     11.332(CFS)
      Depth of flow =   0.276(Ft.), Average velocity =   6.038(Ft/s)
      Note:  depth of flow exceeds top of street crown.
      Flow width (from curb towards crown)=  12.000(Ft.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      103.000 to Point/Station
203.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 1 in normal stream number 1
      Stream flow area =      8.630(Ac.)
      Runoff from this stream =     11.332(CFS)
      Time of concentration =   16.25 min.
      Rainfall intensity =     3.203(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      201.000 to Point/Station
202.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                   ]
      (24.0 DU/A or Less      )
      Impervious value, Ai = 0.650
      Sub-Area C Value = 0.660
      Initial subarea total flow distance  =   62.000(Ft.)
      Highest elevation =   97.390(Ft.)
      Lowest elevation =   88.700(Ft.)
      Elevation difference =    8.690(Ft.) Slope = 14.016 %
      Top of Initial Area Slope adjusted by User to 14.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of  14.00 %, in a development type of
       24.0 DU/A or Less
```

```
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   3.29 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.6600)*( 100.000^.5)/(  14.000^(1/3)]=   3.29
      Calculated TC of    3.286 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.660
      Subarea runoff =      1.356(CFS)
      Total initial stream area =        0.300(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 =      6.827(CFS)
      Depth of flow =   0.500(Ft.), Average velocity =   4.404(Ft/s)
            ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              0.90
            2              1.00              0.70
            3              2.00              0.50
            4              3.00              0.40
            5              4.00              0.20
            6              5.00              0.00
            7              6.00              0.00
            8              7.00              0.30
            9              8.00              0.70
            10              9.00              0.90
      Manning's 'N' friction factor =   0.025
      ------------------------------------------------------------------
      Sub-Channel flow  =      6.827(CFS)
        '     '   flow top width =      5.500(Ft.)
        '     '    velocity=    4.404(Ft/s)
        '     '   area =      1.550(Sq.Ft)
        '     '   Froude number =     1.462

      Upstream point elevation =    88.510(Ft.)
      Downstream point elevation =    81.680(Ft.)
      Flow length =   223.000(Ft.)
      Travel time  =    0.84 min.
      Time of concentration =    4.13 min.
      Depth of flow =   0.500(Ft.)
      Average velocity =   4.404(Ft/s)
      Total irregular channel flow =     6.827(CFS)
      Irregular channel normal depth above invert elev. =   0.500(Ft.)
      Average velocity of channel(s) =   4.404(Ft/s)
       Adding area flow to channel
```

```
      Calculated TC of    4.130 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      User specified 'C' value of 0.660 given for subarea
      Rainfall intensity =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for total area
      (Q=KCIA) is C = 0.660  CA =      1.795
      Subarea runoff =     10.941(CFS) for      2.420(Ac.)
      Total runoff =     12.298(CFS)    Total area =       2.720(Ac.)
      Depth of flow =   0.635(Ft.), Average velocity =   5.203(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 =      2.720(Ac.)
      Runoff from this stream =     12.298(CFS)
      Time of concentration =    4.13 min.
      Rainfall intensity =     6.850(In/Hr)
      Summary of stream data:

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


      1       11.332     16.25             3.203
      2       12.298      4.13             6.850
      Qmax(1) =
              1.000 *    1.000 *    11.332) +
              0.468 *    1.000 *    12.298) + =      17.081
      Qmax(2) =
              1.000 *    0.254 *    11.332) +
              1.000 *    1.000 *    12.298) + =      15.177

      Total of 2 streams to confluence:
      Flow rates before confluence point:
            11.332      12.298
      Maximum flow rates at confluence using above data:
             17.081       15.177
      Area of streams before confluence:
              8.630        2.720
      Results of confluence:
      Total flow rate =     17.081(CFS)
      Time of concentration =    16.252 min.
      Effective stream area after confluence =     11.350(Ac.)


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

```
      Process from Point/Station      203.000 to Point/Station
204.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ____________________________________________________________________
___
      Depth of flow =   2.540(Ft.), Average velocity =   1.388(Ft/s)
            ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              3.00
            2              1.00              0.00
            3              5.00              0.00
            4              6.00              3.00
      Manning's 'N' friction factor =   0.250
      ------------------------------------------------------------------
      Sub-Channel flow  =     17.081(CFS)
        '     '    flow top width =      5.693(Ft.)
        '     '     velocity=    1.388(Ft/s)
        '     '    area =     12.308(Sq.Ft)
        '     '    Froude number =     0.166

      Upstream point elevation =    81.680(Ft.)
      Downstream point elevation =    69.960(Ft.)
      Flow length =   310.000(Ft.)
      Travel time  =    3.72 min.
      Time of concentration =   19.98 min.
      Depth of flow =   2.540(Ft.)
      Average velocity =   1.388(Ft/s)
      Total irregular channel flow =    17.081(CFS)
      Irregular channel normal depth above invert elev. =   2.540(Ft.)
      Average velocity of channel(s) =   1.388(Ft/s)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      204.000 to Point/Station
205.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    69.440(Ft.)
      Downstream point/station elevation =    69.000(Ft.)
      Pipe length  =   105.00(Ft.) Slope =   0.0042  Manning's N = 0.015
      No. of pipes = 1  Required pipe flow  =    17.081(CFS)
      Nearest computed pipe diameter  =     27.00(In.)
      Calculated individual pipe flow  =    17.081(CFS)
      Normal flow depth in pipe =   21.75(In.)
      Flow top width inside pipe =   21.37(In.)
      Critical Depth =   17.32(In.)
      Pipe flow velocity =      4.98(Ft/s)
      Travel time through pipe =    0.35 min.
      Time of concentration (TC) =    20.33 min.
```

```
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      204.000 to Point/Station
205.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 1 in normal stream number 1
      Stream flow area =     11.350(Ac.)
      Runoff from this stream =     17.081(CFS)
      Time of concentration =   20.33 min.
      Rainfall intensity =     2.772(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      104.000 to Point/Station
105.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [LOW DENSITY RESIDENTIAL                    ]
      (1.0 DU/A or Less       )
      Impervious value, Ai = 0.100
      Sub-Area C Value = 0.410
      Initial subarea total flow distance  =  100.000(Ft.)
      Highest elevation =  180.000(Ft.)
      Lowest elevation =  150.000(Ft.)
      Elevation difference =   30.000(Ft.) Slope = 30.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of  30.00 %, in a development type of
       1.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   4.00 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.4100)*( 100.000^.5)/(  30.000^(1/3)]=   4.00
      Calculated TC of    3.997 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
      Subarea runoff =      0.140(CFS)
      Total initial stream area =        0.050(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      104.000 to Point/Station
205.000
```

```
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_____

___
Estimated mean flow rate at midpoint of channel =      0.866(CFS)
Depth of flow =   0.276(Ft.), Average velocity =   0.932(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.50
      2              2.00              0.75
      3              3.00              0.00
      4              4.00              0.00
      5              5.00              0.00
      6              6.00              0.00
      7              7.00              0.75
      8              8.00              1.50
Manning's 'N' friction factor =   0.250
-----------------------------------------------------------------
Sub-Channel flow  =      0.866(CFS)
  '     '   flow top width =      3.736(Ft.)
  '     '    velocity=    0.932(Ft/s)
  '     '   area =      0.929(Sq.Ft)
  '     '   Froude number =     0.329

Upstream point elevation =   150.000(Ft.)
Downstream point elevation =    71.260(Ft.)
Flow length =   470.000(Ft.)
Travel time  =    8.41 min.
Time of concentration =   12.40 min.
Depth of flow =   0.276(Ft.)
Average velocity =   0.932(Ft/s)
Total irregular channel flow =     0.866(CFS)
Irregular channel normal depth above invert elev. =   0.276(Ft.)
Average velocity of channel(s) =   0.932(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      3.812(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 = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Rainfall intensity =      3.812(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.410  CA =      0.402
Subarea runoff =      1.391(CFS) for      0.930(Ac.)
Total runoff =      1.532(CFS)    Total area =       0.980(Ac.)
Depth of flow =   0.386(Ft.), Average velocity =   1.130(Ft/s)
```

```
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+++
 Process from Point/Station      205.000 to Point/Station
205.000
 **** CONFLUENCE OF MINOR STREAMS ****
 ____________________________________________________________________
___
 Along Main Stream number: 1 in normal stream number 2
 Stream flow area =      0.980(Ac.)
 Runoff from this stream =      1.532(CFS)
 Time of concentration =   12.40 min.
 Rainfall intensity =     3.812(In/Hr)
 Summary of stream data:

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


 1       17.081     20.33             2.772
 2        1.532     12.40             3.812
 Qmax(1) =
          1.000 *    1.000 *    17.081) +
          0.727 *    1.000 *     1.532) + =      18.195
 Qmax(2) =
          1.000 *    0.610 *    17.081) +
          1.000 *    1.000 *     1.532) + =      11.956

 Total of 2 streams to confluence:
 Flow rates before confluence point:
       17.081       1.532
 Maximum flow rates at confluence using above data:
        18.195       11.956
 Area of streams before confluence:
        11.350        0.980
 Results of confluence:
 Total flow rate =     18.195(CFS)
 Time of concentration =    20.326 min.
 Effective stream area after confluence =     12.330(Ac.)
 End of computations, total study area =          12.330 (Ac.)
```

APPENDIX C - POST-DEVELOPMENT HYDROLOGY CALCULATIONS

BEFORE DETENTION

```
                San Diego County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2006 Version 7.7

      Rational method hydrology  program based on
      San Diego County Flood Control Division 2003 hydrology manual
            Rational Hydrology Study        Date: 09/04/25
      ------------------------------------------------------------------------
-----
      21-257 Post Development Condition
      100-Year Post Development
      Basin 100-200
      Offsite + onsite
      ------------------------------------------------------------------------
-----
       *********   Hydrology Study Control Information **********

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


      Program License Serial Number 6144

      ------------------------------------------------------------------------
-----
      Rational hydrology study storm event year is   100.0
      English (in-lb) input data Units used

      Map data precipitation entered:
      6 hour,  precipitation(inches) =  2.600
      24 hour precipitation(inches) =  4.200
      P6/P24 =    61.9%
      San Diego hydrology manual 'C' values used


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+++
      Process from Point/Station      101.000 to Point/Station
102.000
      **** INITIAL AREA EVALUATION ****
      ________________________________________________________________________
___
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [LOW DENSITY RESIDENTIAL                    ]
      (1.0 DU/A or Less       )
      Impervious value, Ai = 0.100
      Sub-Area C Value = 0.410
      Initial subarea total flow distance  =  100.000(Ft.)
      Highest elevation =  190.000(Ft.)
      Lowest elevation =  184.000(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 =   6.83 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.4100)*( 100.000^.5)/(   6.000^(1/3)]=   6.83
      Rainfall intensity (I) =      5.599(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
      Subarea runoff =      1.102(CFS)
      Total initial stream area =        0.480(Ac.)


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      Process from Point/Station      102.000 to Point/Station
105.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ____________________________________________________________________
___
      Estimated mean flow rate at midpoint of channel =      5.950(CFS)
      Depth of flow =   0.936(Ft.), Average velocity =   1.488(Ft/s)
            ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              1.50
            2              2.00              0.75
            3              3.00              0.00
            4              4.00              0.00
            5              5.00              0.00
            6              6.00              0.00
            7              7.00              0.75
            8              8.00              1.50
      Manning's 'N' friction factor =   0.250
      ------------------------------------------------------------------
      Sub-Channel flow  =      5.950(CFS)
        '     '   flow top width =      5.743(Ft.)
        '     '    velocity=    1.488(Ft/s)
        '     '   area =      3.998(Sq.Ft)
        '     '   Froude number =     0.314

      Upstream point elevation =   184.000(Ft.)
      Downstream point elevation =    95.000(Ft.)
      Flow length =   768.000(Ft.)
      Travel time  =    8.60 min.
      Time of concentration =   15.44 min.
      Depth of flow =   0.936(Ft.)
      Average velocity =   1.488(Ft/s)
      Total irregular channel flow =     5.950(CFS)
      Irregular channel normal depth above invert elev. =   0.936(Ft.)
      Average velocity of channel(s) =   1.488(Ft/s)
```

```
 Adding area flow to channel
Rainfall intensity (I) =      3.311(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 = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Rainfall intensity =      3.311(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.410  CA =      3.235
Subarea runoff =      9.608(CFS) for      7.410(Ac.)
Total runoff =     10.710(CFS)    Total area =       7.890(Ac.)
Depth of flow =   1.280(Ft.), Average velocity =   1.725(Ft/s)


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Process from Point/Station      105.000 to Point/Station
205.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
___
Top of street segment elevation =    95.000(Ft.)
End of street segment elevation =    83.400(Ft.)
Length of street segment  =   140.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  12.000(Ft.)
Distance from crown to crossfall grade break  =  10.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.173(CFS)
Depth of flow =   0.378(Ft.), Average velocity =   7.163(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.000(Ft.)
Flow velocity =   7.16(Ft/s)
Travel time =    0.33 min.     TC =   15.76  min.
 Adding area flow to street
Rainfall intensity (I) =      3.267(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 = 0.000
Decimal fraction soil group D = 1.000
```

```
      [LOW DENSITY RESIDENTIAL                    ]
      (1.0 DU/A or Less       )
      Impervious value, Ai = 0.100
      Sub-Area C Value = 0.410
      Rainfall intensity =      3.267(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for total area
      (Q=KCIA) is C = 0.410  CA =      3.538
      Subarea runoff =      0.848(CFS) for      0.740(Ac.)
      Total runoff =     11.558(CFS)    Total area =       8.630(Ac.)
      Street flow at end of street =     11.558(CFS)
      Half street flow at end of street =     11.558(CFS)
      Depth of flow =   0.381(Ft.), Average velocity =   7.260(Ft/s)
      Note:  depth of flow exceeds top of street crown.
      Flow width (from curb towards crown)=  12.000(Ft.)


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      Process from Point/Station      105.000 to Point/Station
205.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 1
      Stream flow area =      8.630(Ac.)
      Runoff from this stream =     11.558(CFS)
      Time of concentration =   15.76 min.
      Rainfall intensity =     3.267(In/Hr)
      Program is now starting with Main Stream No. 2


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      103.000 to Point/Station
104.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [LOW DENSITY RESIDENTIAL                    ]
      (1.0 DU/A or Less       )
      Impervious value, Ai = 0.100
      Sub-Area C Value = 0.410
      Initial subarea total flow distance  =  100.000(Ft.)
      Highest elevation =  180.000(Ft.)
      Lowest elevation =  150.000(Ft.)
      Elevation difference =   30.000(Ft.) Slope = 30.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of  30.00 %, in a development type of
```

```
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.00 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4100)*( 100.000^.5)/(  30.000^(1/3)]=   4.00
Calculated TC of    3.997 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff =      0.140(CFS)
Total initial stream area =        0.050(Ac.)


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Process from Point/Station      104.000 to Point/Station
202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
____________________________________________________________________________
___
Estimated mean flow rate at midpoint of channel =      1.056(CFS)
Depth of flow =   0.303(Ft.), Average velocity =   1.024(Ft/s)
      ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.50
      2              2.00              0.75
      3              3.00              0.00
      4              4.00              0.00
      5              5.00              0.00
      6              6.00              0.00
      7              7.00              0.75
      8              8.00              1.50
Manning's 'N' friction factor =   0.250
-------------------------------------------------------------------
Sub-Channel flow  =      1.056(CFS)
  '     '   flow top width =      3.808(Ft.)
  '     '    velocity=    1.024(Ft/s)
  '     '   area =      1.031(Sq.Ft)
  '     '   Froude number =     0.347

Upstream point elevation =   150.000(Ft.)
Downstream point elevation =    95.570(Ft.)
Flow length =   300.000(Ft.)
Travel time  =    4.88 min.
Time of concentration =    8.88 min.
Depth of flow =   0.303(Ft.)
Average velocity =   1.024(Ft/s)
Total irregular channel flow =     1.056(CFS)
Irregular channel normal depth above invert elev. =   0.303(Ft.)
Average velocity of channel(s) =   1.024(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.729(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 = 0.000
      Decimal fraction soil group D = 1.000
      [LOW DENSITY RESIDENTIAL                    ]
      (1.0 DU/A or Less       )
      Impervious value, Ai = 0.100
      Sub-Area C Value = 0.410
      Rainfall intensity =      4.729(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for total area
      (Q=KCIA) is C = 0.410  CA =      0.402
      Subarea runoff =      1.760(CFS) for      0.930(Ac.)
      Total runoff =      1.900(CFS)    Total area =       0.980(Ac.)
      Depth of flow =   0.427(Ft.), Average velocity =   1.245(Ft/s)


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      Process from Point/Station      104.000 to Point/Station
202.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 1
      Stream flow area =      0.980(Ac.)
      Runoff from this stream =      1.900(CFS)
      Time of concentration =    8.88 min.
      Rainfall intensity =     4.729(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      201.000 to Point/Station
202.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                   ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   25.000(Ft.)
      Highest elevation =  104.780(Ft.)
      Lowest elevation =   95.570(Ft.)
      Elevation difference =    9.210(Ft.) Slope = 36.840 %
      Top of Initial Area Slope adjusted by User to 30.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of  30.00 %, in a development type of
       43.0 DU/A or Less
```

```
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   1.97 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*( 100.000^.5)/(  30.000^(1/3)]=   1.97
      Calculated TC of    1.970 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.812(CFS)
      Total initial stream area =        0.156(Ac.)


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      Process from Point/Station      202.000 to Point/Station
202.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 2
      Stream flow area =      0.156(Ac.)
      Runoff from this stream =      0.812(CFS)
      Time of concentration =    1.97 min.
      Rainfall intensity =     6.850(In/Hr)
      Summary of stream data:

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


      1        1.900      8.88             4.729
      2        0.812      1.97             6.850
      Qmax(1) =
               1.000 *    1.000 *     1.900) +
               0.690 *    1.000 *     0.812) + =       2.461
      Qmax(2) =
               1.000 *    0.222 *     1.900) +
               1.000 *    1.000 *     0.812) + =       1.234

      Total of 2 streams to confluence:
      Flow rates before confluence point:
             1.900       0.812
      Maximum flow rates at confluence using above data:
              2.461        1.234
      Area of streams before confluence:
              0.980        0.156
      Results of confluence:
      Total flow rate =      2.461(CFS)
      Time of concentration =     8.881 min.
      Effective stream area after confluence =      1.136(Ac.)


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

```
      Process from Point/Station      202.000 to Point/Station
203.000
      **** IMPROVED CHANNEL TRAVEL TIME ****
      ____________________________________________________________________
___
      Upstream point elevation =    95.570(Ft.)
      Downstream point elevation =    91.830(Ft.)
      Channel length thru subarea  =   120.000(Ft.)
      Channel base width     =    0.500(Ft.)
      Slope or 'Z' of left channel bank =   4.000
      Slope or 'Z' of right channel bank =   4.000
      Manning's 'N'    = 0.015
      Maximum depth of channel  =    1.000(Ft.)
      Flow(q) thru subarea =      2.461(CFS)
      Depth of flow =   0.286(Ft.), Average velocity =   5.246(Ft/s)
      Channel flow top width =    2.785(Ft.)
      Flow Velocity =    5.25(Ft/s)
      Travel time  =    0.38 min.
      Time of concentration =    9.26 min.
      Critical depth =      0.414(Ft.)


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      Process from Point/Station      203.000 to Point/Station
205.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    90.000(Ft.)
      Downstream point/station elevation =    82.000(Ft.)
      Pipe length  =   230.00(Ft.) Slope =   0.0348  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     2.461(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     2.461(CFS)
      Normal flow depth in pipe =    6.08(In.)
      Flow top width inside pipe =    8.43(In.)
      Critical Depth =    8.28(In.)
      Pipe flow velocity =      7.75(Ft/s)
      Travel time through pipe =    0.49 min.
      Time of concentration (TC) =     9.76 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      203.000 to Point/Station
205.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 2
      Stream flow area =      1.136(Ac.)
      Runoff from this stream =      2.461(CFS)
```

```
      Time of concentration =    9.76 min.
      Rainfall intensity =     4.451(In/Hr)
      Program is now starting with Main Stream No. 3


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      204.000 to Point/Station
205.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   75.000(Ft.)
      Highest elevation =   84.430(Ft.)
      Lowest elevation =   83.400(Ft.)
      Elevation difference =    1.030(Ft.) Slope =  1.373 %
      Top of Initial Area Slope adjusted by User to  2.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 75.00 (Ft)
      for the top area slope value of   2.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   4.21 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*(  75.000^.5)/(   2.000^(1/3)]=   4.21
      Calculated TC of    4.207 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.469(CFS)
      Total initial stream area =        0.090(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      205.000 to Point/Station
205.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 3
      Stream flow area =      0.090(Ac.)
      Runoff from this stream =      0.469(CFS)
      Time of concentration =    4.21 min.
      Rainfall intensity =     6.850(In/Hr)
```

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	11.558	15.76	3.267
2	2.461	9.76	4.451
3	0.469	4.21	6.850

```
Qmax(1) =
         1.000 *    1.000 *    11.558) +
         0.734 *    1.000 *     2.461) +
         0.477 *    1.000 *     0.469) + =      13.588
Qmax(2) =
         1.000 *    0.619 *    11.558) +
         1.000 *    1.000 *     2.461) +
         0.650 *    1.000 *     0.469) + =       9.920
Qmax(3) =
         1.000 *    0.267 *    11.558) +
         1.000 *    0.431 *     2.461) +
         1.000 *    1.000 *     0.469) + =       4.614
```

Total of 3 main streams to confluence:
Flow rates before confluence point:
11.558 2.461 0.469
Maximum flow rates at confluence using above data:
13.588 9.920 4.614
Area of streams before confluence:
8.630 1.136 0.090

Results of confluence:
Total flow rate = 13.588(CFS)
Time of concentration = 15.762 min.
Effective stream area after confluence = 9.856(Ac.)

++
+++
Process from Point/Station 205.000 to Point/Station
207.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
___
Upstream point/station elevation = 82.000(Ft.)
Downstream point/station elevation = 81.700(Ft.)
Pipe length = 110.00(Ft.) Slope = 0.0027 Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 13.588(CFS)
Nearest computed pipe diameter = 27.00(In.)
Calculated individual pipe flow = 13.588(CFS)
Normal flow depth in pipe = 18.94(In.)
Flow top width inside pipe = 24.71(In.)
Critical Depth = 15.38(In.)
Pipe flow velocity = 4.56(Ft/s)

```
      Travel time through pipe =    0.40 min.
      Time of concentration (TC) =    16.16 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      205.000 to Point/Station
207.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 1 in normal stream number 1
      Stream flow area =      9.856(Ac.)
      Runoff from this stream =     13.588(CFS)
      Time of concentration =   16.16 min.
      Rainfall intensity =     3.214(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      206.000 to Point/Station
207.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   28.000(Ft.)
      Highest elevation =   88.370(Ft.)
      Lowest elevation =   83.530(Ft.)
      Elevation difference =    4.840(Ft.) Slope = 17.286 %
      Top of Initial Area Slope adjusted by User to 30.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of  30.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   1.97 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*( 100.000^.5)/(  30.000^(1/3)]=   1.97
      Calculated TC of    1.970 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.573(CFS)
      Total initial stream area =        0.110(Ac.)
```

```
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      207.000 to Point/Station
207.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 1 in normal stream number 2
      Stream flow area =      0.110(Ac.)
      Runoff from this stream =      0.573(CFS)
      Time of concentration =    1.97 min.
      Rainfall intensity =     6.850(In/Hr)
      Summary of stream data:

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


      1       13.588     16.16              3.214
      2        0.573      1.97              6.850
      Qmax(1) =
               1.000 *    1.000 *    13.588) +
               0.469 *    1.000 *     0.573) + =      13.856
      Qmax(2) =
               1.000 *    0.122 *    13.588) +
               1.000 *    1.000 *     0.573) + =       2.228

      Total of 2 streams to confluence:
      Flow rates before confluence point:
            13.588       0.573
      Maximum flow rates at confluence using above data:
             13.856        2.228
      Area of streams before confluence:
              9.856        0.110
      Results of confluence:
      Total flow rate =     13.856(CFS)
      Time of concentration =    16.164 min.
      Effective stream area after confluence =      9.966(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      207.000 to Point/Station
219.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    74.090(Ft.)
      Downstream point/station elevation =    70.030(Ft.)
      Pipe length  =    85.00(Ft.) Slope =   0.0478  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    13.856(CFS)
      Nearest computed pipe diameter  =     15.00(In.)
      Calculated individual pipe flow  =    13.856(CFS)
      Normal flow depth in pipe =   12.05(In.)
```

```
      Flow top width inside pipe =   11.93(In.)
      Critical depth could not be calculated.
      Pipe flow velocity =     13.11(Ft/s)
      Travel time through pipe =    0.11 min.
      Time of concentration (TC) =    16.27 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      207.000 to Point/Station
219.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 1
      Stream flow area =      9.966(Ac.)
      Runoff from this stream =     13.856(CFS)
      Time of concentration =   16.27 min.
      Rainfall intensity =     3.200(In/Hr)
      Program is now starting with Main Stream No. 2


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      208.000 to Point/Station
209.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =  100.000(Ft.)
      Highest elevation =   94.780(Ft.)
      Lowest elevation =   84.940(Ft.)
      Elevation difference =    9.840(Ft.) Slope =  9.840 %
      Top of Initial Area Slope adjusted by User to  9.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of   9.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   2.94 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*( 100.000^.5)/(   9.000^(1/3)]=   2.94
      Calculated TC of    2.942 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
```

```
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.208(CFS)
      Total initial stream area =        0.040(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      209.000 to Point/Station
210.000
      **** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
      ____________________________________________________________________
___
      Top of street segment elevation =    84.940(Ft.)
      End of street segment elevation =    83.530(Ft.)
      Length of street segment  =   120.000(Ft.)
      Height of curb above gutter flowline  =    6.0(In.)
      Width of half street (curb to crown)  =  12.000(Ft.)
      Distance from crown to crossfall grade break  =  10.500(Ft.)
      Slope from gutter to grade break (v/hz) =   0.020
      Slope from grade break to crown (v/hz)  =   0.020
      Street flow is on [1] side(s) of the street
      Distance from curb to property line  =  10.000(Ft.)
      Slope from curb to property line (v/hz) =   0.020
      Gutter width =   1.500(Ft.)
      Gutter hike from flowline =  2.000(In.)
       Manning's N in gutter =  0.0150
       Manning's N from gutter to grade break =  0.0150
       Manning's N from grade break to crown =  0.0150
      Estimated mean flow rate at midpoint of street =      0.324(CFS)
      Depth of flow =   0.198(Ft.), Average velocity =   1.646(Ft/s)
      Streetflow hydraulics at midpoint of street travel:
      Halfstreet flow width =   3.070(Ft.)
      Flow velocity =   1.65(Ft/s)
      Travel time =    1.21 min.     TC =    4.16  min.
       Adding area flow to street
      Calculated TC of    4.157 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      User specified 'C' value of 0.740 given for subarea
      Rainfall intensity =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for total area
      (Q=KCIA) is C = 0.748  CA =      0.075
      Subarea runoff =      0.304(CFS) for      0.060(Ac.)
      Total runoff =      0.512(CFS)    Total area =       0.100(Ac.)
      Street flow at end of street =      0.512(CFS)
      Half street flow at end of street =      0.512(CFS)
      Depth of flow =   0.225(Ft.), Average velocity =   1.718(Ft/s)
      Flow width (from curb towards crown)=   4.424(Ft.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      210.000 to Point/Station
212.000
```

```
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    82.500(Ft.)
      Downstream point/station elevation =    81.000(Ft.)
      Pipe length  =   235.00(Ft.) Slope =   0.0064  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.512(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     0.512(CFS)
      Normal flow depth in pipe =    3.89(In.)
      Flow top width inside pipe =    8.92(In.)
      Critical Depth =    3.88(In.)
      Pipe flow velocity =      2.80(Ft/s)
      Travel time through pipe =    1.40 min.
      Time of concentration (TC) =     5.55 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      210.000 to Point/Station
212.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 1
      Stream flow area =      0.100(Ac.)
      Runoff from this stream =      0.512(CFS)
      Time of concentration =    5.55 min.
      Rainfall intensity =     6.401(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      211.000 to Point/Station
212.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   73.000(Ft.)
      Highest elevation =   86.760(Ft.)
      Lowest elevation =   83.430(Ft.)
      Elevation difference =    3.330(Ft.) Slope =  4.562 %
      Top of Initial Area Slope adjusted by User to 10.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of  10.00 %, in a development type of
```

```
 43.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.84 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7600)*( 100.000^.5)/(  10.000^(1/3)]=   2.84
Calculated TC of    2.841 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
Subarea runoff =      1.822(CFS)
Total initial stream area =        0.350(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
Process from Point/Station      212.000 to Point/Station
212.000
**** CONFLUENCE OF MINOR STREAMS ****
__________________________________________________________________________
___
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.350(Ac.)
Runoff from this stream =      1.822(CFS)
Time of concentration =    2.84 min.
Rainfall intensity =     6.850(In/Hr)
Summary of stream data:

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


1        0.512      5.55             6.401
2        1.822      2.84             6.850
Qmax(1) =
         1.000 *    1.000 *     0.512) +
         0.934 *    1.000 *     1.822) + =       2.215
Qmax(2) =
         1.000 *    0.511 *     0.512) +
         1.000 *    1.000 *     1.822) + =       2.084

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.512       1.822
Maximum flow rates at confluence using above data:
        2.215        2.084
Area of streams before confluence:
        0.100        0.350
Results of confluence:
Total flow rate =      2.215(CFS)
Time of concentration =     5.555 min.
Effective stream area after confluence =      0.450(Ac.)
```

```
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      212.000 to Point/Station
217.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    81.000(Ft.)
      Downstream point/station elevation =    80.200(Ft.)
      Pipe length  =   117.00(Ft.) Slope =   0.0068  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     2.215(CFS)
      Nearest computed pipe diameter  =     12.00(In.)
      Calculated individual pipe flow  =     2.215(CFS)
      Normal flow depth in pipe =    7.77(In.)
      Flow top width inside pipe =   11.47(In.)
      Critical Depth =    7.64(In.)
      Pipe flow velocity =      4.12(Ft/s)
      Travel time through pipe =    0.47 min.
      Time of concentration (TC) =     6.03 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      212.000 to Point/Station
217.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 1
      Stream flow area =      0.450(Ac.)
      Runoff from this stream =      2.215(CFS)
      Time of concentration =    6.03 min.
      Rainfall intensity =     6.072(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      213.000 to Point/Station
214.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =  105.000(Ft.)
      Highest elevation =   84.000(Ft.)
      Lowest elevation =   76.580(Ft.)
      Elevation difference =    7.420(Ft.) Slope =  7.067 %
```

```
      Top of Initial Area Slope adjusted by User to 13.000 %
      Bottom of Initial Area Slope adjusted by User to 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
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   2.60 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*( 100.000^.5)/(  13.000^(1/3)]=   2.60
      The initial area total distance of  105.00 (Ft.) entered leaves a
      remaining distance of    5.00 (Ft.)
      Using Figure 3-4, the travel time for this distance is   0.06
minutes
      for a distance of   5.00 (Ft.) and a slope of 13.00 %
      with an elevation difference of   0.65(Ft.) from the end of the top
area
      Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
       =    0.059 Minutes
      Tt=[(11.9*0.0009^3)/(  0.65)]^.385=  0.06
      Total initial area Ti =   2.60 minutes from Figure 3-3 formula plus
        0.06 minutes from the Figure 3-4 formula =   2.66 minutes
      Calculated TC of    2.662 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.937(CFS)
      Total initial stream area =        0.180(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      214.000 to Point/Station
217.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------
---
      Upstream point/station elevation =    80.350(Ft.)
      Downstream point/station elevation =    80.200(Ft.)
      Pipe length  =    30.00(Ft.) Slope =   0.0050  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.937(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     0.937(CFS)
      Normal flow depth in pipe =    6.09(In.)
      Flow top width inside pipe =    8.42(In.)
      Critical Depth =    5.32(In.)
      Pipe flow velocity =      2.94(Ft/s)
      Travel time through pipe =    0.17 min.
      Time of concentration (TC) =     2.83 min.


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

```
      Process from Point/Station      214.000 to Point/Station
217.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 2
      Stream flow area =      0.180(Ac.)
      Runoff from this stream =      0.937(CFS)
      Time of concentration =    2.83 min.
      Rainfall intensity =     6.850(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      215.000 to Point/Station
216.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =  110.000(Ft.)
      Highest elevation =   84.500(Ft.)
      Lowest elevation =   84.300(Ft.)
      Elevation difference =    0.200(Ft.) Slope =  0.182 %
      Top of Initial Area Slope adjusted by User to  1.000 %
      Bottom of Initial Area Slope adjusted by User to  1.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 65.00 (Ft)
      for the top area slope value of   1.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   4.93 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*(  65.000^.5)/(   1.000^(1/3)]=   4.93
      The initial area total distance of  110.00 (Ft.) entered leaves a
      remaining distance of   45.00 (Ft.)
      Using Figure 3-4, the travel time for this distance is   0.86
minutes
      for a distance of  45.00 (Ft.) and a slope of  1.00 %
      with an elevation difference of   0.45(Ft.) from the end of the top
area
      Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
       =    0.862 Minutes
      Tt=[(11.9*0.0085^3)/(  0.45)]^.385=  0.86
      Total initial area Ti =   4.93 minutes from Figure 3-3 formula plus
        0.86 minutes from the Figure 3-4 formula =   5.80 minutes
      Rainfall intensity (I) =      6.228(In/Hr) for a   100.0 year storm
```

```
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      3.786(CFS)
      Total initial stream area =        0.800(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      216.000 to Point/Station
217.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    80.510(Ft.)
      Downstream point/station elevation =    80.200(Ft.)
      Pipe length  =    61.00(Ft.) Slope =   0.0051  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     3.786(CFS)
      Nearest computed pipe diameter  =     15.00(In.)
      Calculated individual pipe flow  =     3.786(CFS)
      Normal flow depth in pipe =   10.36(In.)
      Flow top width inside pipe =   13.87(In.)
      Critical Depth =    9.43(In.)
      Pipe flow velocity =      4.19(Ft/s)
      Travel time through pipe =    0.24 min.
      Time of concentration (TC) =     6.04 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      217.000 to Point/Station
217.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 3
      Stream flow area =      0.800(Ac.)
      Runoff from this stream =      3.786(CFS)
      Time of concentration =    6.04 min.
      Rainfall intensity =     6.065(In/Hr)
      Summary of stream data:

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


      1        2.215      6.03             6.072
      2        0.937      2.83             6.850
      3        3.786      6.04             6.065
      Qmax(1) =
               1.000 *    1.000 *     2.215) +
               0.886 *    1.000 *     0.937) +
               1.000 *    0.998 *     3.786) + =       6.825
      Qmax(2) =
               1.000 *    0.470 *     2.215) +
               1.000 *    1.000 *     0.937) +
```

```
         1.000 *    0.469 *     3.786) + =       3.753
     Qmax(3) =
         0.999 *    1.000 *     2.215) +
         0.885 *    1.000 *     0.937) +
         1.000 *    1.000 *     3.786) + =       6.829

     Total of 3 streams to confluence:
     Flow rates before confluence point:
           2.215       0.937       3.786
     Maximum flow rates at confluence using above data:
         6.825        3.753        6.829
     Area of streams before confluence:
         0.450        0.180        0.800
     Results of confluence:
     Total flow rate =      6.829(CFS)
     Time of concentration =     6.039 min.
     Effective stream area after confluence =      1.430(Ac.)


     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
     Process from Point/Station      217.000 to Point/Station
219.000
     **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
     ______________________________________________________________________
___
     Upstream point/station elevation =    80.200(Ft.)
     Downstream point/station elevation =    70.030(Ft.)
     Pipe length  =   110.00(Ft.) Slope =   0.0925  Manning's N = 0.013
     No. of pipes = 1  Required pipe flow  =     6.829(CFS)
     Nearest computed pipe diameter  =     12.00(In.)
     Calculated individual pipe flow  =     6.829(CFS)
     Normal flow depth in pipe =    6.91(In.)
     Flow top width inside pipe =   11.86(In.)
     Critical depth could not be calculated.
     Pipe flow velocity =     14.59(Ft/s)
     Travel time through pipe =    0.13 min.
     Time of concentration (TC) =     6.16 min.


     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
     Process from Point/Station      219.000 to Point/Station
219.000
     **** CONFLUENCE OF MAIN STREAMS ****
     ______________________________________________________________________
___
     The following data inside Main Stream is listed:
     In Main Stream number: 2
     Stream flow area =      1.430(Ac.)
     Runoff from this stream =      6.829(CFS)
     Time of concentration =    6.16 min.
     Rainfall intensity =     5.985(In/Hr)
     Summary of stream data:
```

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


      1       13.856     16.27             3.200
      2        6.829      6.16             5.985
      Qmax(1) =
               1.000 *    1.000 *    13.856) +
               0.535 *    1.000 *     6.829) + =      17.508
      Qmax(2) =
               1.000 *    0.379 *    13.856) +
               1.000 *    1.000 *     6.829) + =      12.078

      Total of 2 main streams to confluence:
      Flow rates before confluence point:
            13.856       6.829
      Maximum flow rates at confluence using above data:
             17.508       12.078
      Area of streams before confluence:
              9.966        1.430


      Results of confluence:
      Total flow rate =     17.508(CFS)
      Time of concentration =    16.272 min.
      Effective stream area after confluence  =     11.396(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      219.000 to Point/Station
220.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    70.030(Ft.)
      Downstream point/station elevation =    69.440(Ft.)
      Pipe length  =   117.00(Ft.) Slope =   0.0050  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    17.508(CFS)
      Nearest computed pipe diameter  =     27.00(In.)
      Calculated individual pipe flow  =    17.508(CFS)
      Normal flow depth in pipe =   18.21(In.)
      Flow top width inside pipe =   25.30(In.)
      Critical Depth =   17.53(In.)
      Pipe flow velocity =      6.14(Ft/s)
      Travel time through pipe =    0.32 min.
      Time of concentration (TC) =    16.59 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      219.000 to Point/Station
220.000
```

```
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 1 in normal stream number 1
      Stream flow area =     11.396(Ac.)
      Runoff from this stream =     17.508(CFS)
      Time of concentration =   16.59 min.
      Rainfall intensity =     3.160(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      218.000 to Point/Station
220.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   33.000(Ft.)
      Highest elevation =   84.760(Ft.)
      Lowest elevation =   71.720(Ft.)
      Elevation difference =   13.040(Ft.) Slope = 39.515 %
      Top of Initial Area Slope adjusted by User to 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
       43.0 DU/A or Less
      In Accordance With Table 3-2
      Initial Area Time of Concentration =   2.70 minutes
       (for slope value of  10.00 %)
      Calculated TC of    2.700 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      1.093(CFS)
      Total initial stream area =        0.210(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      220.000 to Point/Station
220.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 1 in normal stream number 2
      Stream flow area =      0.210(Ac.)
```

```
      Runoff from this stream =      1.093(CFS)
      Time of concentration =    2.70 min.
      Rainfall intensity =     6.850(In/Hr)
      Summary of stream data:

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


      1       17.508     16.59             3.160
      2        1.093      2.70             6.850
      Qmax(1) =
               1.000 *    1.000 *    17.508) +
               0.461 *    1.000 *     1.093) + =      18.012
      Qmax(2) =
               1.000 *    0.163 *    17.508) +
               1.000 *    1.000 *     1.093) + =       3.943

      Total of 2 streams to confluence:
      Flow rates before confluence point:
            17.508       1.093
      Maximum flow rates at confluence using above data:
             18.012        3.943
      Area of streams before confluence:
             11.396        0.210
      Results of confluence:
      Total flow rate =     18.012(CFS)
      Time of concentration =    16.590 min.
      Effective stream area after confluence =     11.606(Ac.)


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+++
      Process from Point/Station      220.000 to Point/Station
226.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    69.440(Ft.)
      Downstream point/station elevation =    69.000(Ft.)
      Pipe length  =    88.00(Ft.) Slope =   0.0050  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    18.012(CFS)
      Nearest computed pipe diameter  =     27.00(In.)
      Calculated individual pipe flow  =    18.012(CFS)
      Normal flow depth in pipe =   18.66(In.)
      Flow top width inside pipe =   24.95(In.)
      Critical Depth =   17.80(In.)
      Pipe flow velocity =      6.15(Ft/s)
      Travel time through pipe =    0.24 min.
      Time of concentration (TC) =    16.83 min.


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```

```
      Process from Point/Station      220.000 to Point/Station
226.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 1
      Stream flow area =     11.606(Ac.)
      Runoff from this stream =     18.012(CFS)
      Time of concentration =   16.83 min.
      Rainfall intensity =     3.132(In/Hr)
      Program is now starting with Main Stream No. 2


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      221.000 to Point/Station
222.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =  125.000(Ft.)
      Highest elevation =   77.000(Ft.)
      Lowest elevation =   69.540(Ft.)
      Elevation difference =    7.460(Ft.) Slope =  5.968 %
      Top of Initial Area Slope adjusted by User to  5.000 %
      Bottom of Initial Area Slope adjusted by User to  5.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 95.00 (Ft)
      for the top area slope value of   5.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   3.49 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*(  95.000^.5)/(   5.000^(1/3)]=   3.49
      The initial area total distance of  125.00 (Ft.) entered leaves a
      remaining distance of   30.00 (Ft.)
      Using Figure 3-4, the travel time for this distance is   0.34
minutes
      for a distance of  30.00 (Ft.) and a slope of  5.00 %
      with an elevation difference of   1.50(Ft.) from the end of the top
area
      Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
       =    0.340 Minutes
      Tt=[(11.9*0.0057^3)/(  1.50)]^.385=  0.34
      Total initial area Ti =   3.49 minutes from Figure 3-3 formula plus
```

```
       0.34 minutes from the Figure 3-4 formula =   3.83 minutes
     Calculated TC of    3.828 minutes is less than 5 minutes,
      resetting TC to 5.0 minutes for rainfall intensity calculations
     Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
     Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
     Subarea runoff =      1.458(CFS)
     Total initial stream area =        0.280(Ac.)


     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
     Process from Point/Station      222.000 to Point/Station
225.000
     **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
     ______________________________________________________________________
___
     Upstream point/station elevation =    69.800(Ft.)
     Downstream point/station elevation =    69.500(Ft.)
     Pipe length  =    50.00(Ft.) Slope =   0.0060  Manning's N = 0.013
     No. of pipes = 1  Required pipe flow  =     1.458(CFS)
     Nearest computed pipe diameter  =     12.00(In.)
     Calculated individual pipe flow  =     1.458(CFS)
     Normal flow depth in pipe =    6.20(In.)
     Flow top width inside pipe =   11.99(In.)
     Critical Depth =    6.14(In.)
     Pipe flow velocity =      3.56(Ft/s)
     Travel time through pipe =    0.23 min.
     Time of concentration (TC) =     4.06 min.


     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
     Process from Point/Station      222.000 to Point/Station
225.000
     **** CONFLUENCE OF MINOR STREAMS ****
     ______________________________________________________________________
___
     Along Main Stream number: 2 in normal stream number 1
     Stream flow area =      0.280(Ac.)
     Runoff from this stream =      1.458(CFS)
     Time of concentration =    4.06 min.
     Rainfall intensity =     6.850(In/Hr)


     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
     Process from Point/Station      223.000 to Point/Station
224.000
     **** INITIAL AREA EVALUATION ****
     ______________________________________________________________________
___
     Decimal fraction soil group A = 1.000
     Decimal fraction soil group B = 0.000
     Decimal fraction soil group C = 0.000
```

```
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   87.000(Ft.)
      Highest elevation =   86.330(Ft.)
      Lowest elevation =   83.670(Ft.)
      Elevation difference =    2.660(Ft.) Slope =  3.057 %
      Top of Initial Area Slope adjusted by User to  3.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 85.00 (Ft)
      for the top area slope value of   3.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   3.91 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*(  85.000^.5)/(   3.000^(1/3)]=   3.91
      Calculated TC of    3.912 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.677(CFS)
      Total initial stream area =        0.130(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      224.000 to Point/Station
225.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ____________________________________________________________________
___
      Estimated mean flow rate at midpoint of channel =      1.494(CFS)
      Depth of flow =   0.164(Ft.), Average velocity =   5.982(Ft/s)
            ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              0.50
            2              1.00              0.40
            3              2.00              0.30
            4              3.00              0.10
            5              4.00              0.00
            6              5.00              0.10
            7              6.00              0.30
            8              7.00              0.40
      Manning's 'N' friction factor =   0.015
      ------------------------------------------------------------------
      Sub-Channel flow  =      1.494(CFS)
        '     '   flow top width =      2.645(Ft.)
        '     '    velocity=    5.982(Ft/s)
        '     '   area =      0.250(Sq.Ft)
        '     '   Froude number =     3.430
```

```
      Upstream point elevation =    83.670(Ft.)
      Downstream point elevation =    71.580(Ft.)
      Flow length =   141.000(Ft.)
      Travel time  =    0.39 min.
      Time of concentration =    4.31 min.
      Depth of flow =   0.164(Ft.)
      Average velocity =   5.982(Ft/s)
      Total irregular channel flow =     1.494(CFS)
      Irregular channel normal depth above invert elev. =   0.164(Ft.)
      Average velocity of channel(s) =   5.982(Ft/s)
       Adding area flow to channel
      Calculated TC of    4.305 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      User specified 'C' value of 0.740 given for subarea
      Rainfall intensity =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for total area
      (Q=KCIA) is C = 0.746  CA =      0.331
      Subarea runoff =      1.592(CFS) for      0.314(Ac.)
      Total runoff =      2.269(CFS)    Total area =       0.444(Ac.)
      Depth of flow =   0.195(Ft.), Average velocity =   6.763(Ft/s)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      225.000 to Point/Station
225.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 2
      Stream flow area =      0.444(Ac.)
      Runoff from this stream =      2.269(CFS)
      Time of concentration =    4.31 min.
      Rainfall intensity =     6.850(In/Hr)
      Summary of stream data:

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


      1        1.458      4.06             6.850
      2        2.269      4.31             6.850
      Qmax(1) =
              1.000 *    1.000 *     1.458) +
              1.000 *    0.944 *     2.269) + =       3.598
      Qmax(2) =
              1.000 *    1.000 *     1.458) +
              1.000 *    1.000 *     2.269) + =       3.726

      Total of 2 streams to confluence:
      Flow rates before confluence point:
             1.458       2.269
```

```
      Maximum flow rates at confluence using above data:
              3.598        3.726
      Area of streams before confluence:
              0.280        0.444
      Results of confluence:
      Total flow rate =      3.726(CFS)
      Time of concentration =     4.305 min.
      Effective stream area after confluence =      0.724(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      225.000 to Point/Station
226.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ______________________________________________________________________
___
      Upstream point/station elevation =    69.500(Ft.)
      Downstream point/station elevation =    69.000(Ft.)
      Pipe length  =    60.00(Ft.) Slope =   0.0083  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     3.726(CFS)
      Nearest computed pipe diameter  =     15.00(In.)
      Calculated individual pipe flow  =     3.726(CFS)
      Normal flow depth in pipe =    8.65(In.)
      Flow top width inside pipe =   14.82(In.)
      Critical Depth =    9.36(In.)
      Pipe flow velocity =      5.08(Ft/s)
      Travel time through pipe =    0.20 min.
      Time of concentration (TC) =     4.50 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      226.000 to Point/Station
226.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ______________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 2
      Stream flow area =      0.724(Ac.)
      Runoff from this stream =      3.726(CFS)
      Time of concentration =    4.50 min.
      Rainfall intensity =     6.850(In/Hr)
      Summary of stream data:

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


      1       18.012     16.83             3.132
      2        3.726      4.50             6.850
      Qmax(1) =
               1.000 *    1.000 *    18.012) +
```

```
         0.457 *    1.000 *     3.726) + =      19.715
Qmax(2) =
         1.000 *    0.268 *    18.012) +
         1.000 *    1.000 *     3.726) + =       8.545

Total of 2 main streams to confluence:
Flow rates before confluence point:
      18.012       3.726
Maximum flow rates at confluence using above data:
       19.715        8.545
Area of streams before confluence:
       11.606        0.724


Results of confluence:
Total flow rate =     19.715(CFS)
Time of concentration =    16.828 min.
Effective stream area after confluence  =     12.330(Ac.)
End of computations, total study area =          12.330 (Ac.)
```

AFTER DETENTION

```
                San Diego County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2006 Version 7.7

      Rational method hydrology  program based on
      San Diego County Flood Control Division 2003 hydrology manual
            Rational Hydrology Study        Date: 09/08/25
      ------------------------------------------------------------------------
-----
      21-257 Post Development Condition
      100-Year Post Development
      Basin 100-200
      Offsite + onsite
      ------------------------------------------------------------------------
-----
       *********   Hydrology Study Control Information **********

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


      Program License Serial Number 6144

      ------------------------------------------------------------------------
-----
      Rational hydrology study storm event year is   100.0
      English (in-lb) input data Units used

      Map data precipitation entered:
      6 hour,  precipitation(inches) =  2.600
      24 hour precipitation(inches) =  4.200
      P6/P24 =    61.9%
      San Diego hydrology manual 'C' values used


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+++
      Process from Point/Station      101.000 to Point/Station
102.000
      **** INITIAL AREA EVALUATION ****
      ________________________________________________________________________
___
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [LOW DENSITY RESIDENTIAL                    ]
      (1.0 DU/A or Less       )
      Impervious value, Ai = 0.100
      Sub-Area C Value = 0.410
      Initial subarea total flow distance  =  100.000(Ft.)
      Highest elevation =  190.000(Ft.)
      Lowest elevation =  184.000(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 =   6.83 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.4100)*( 100.000^.5)/(   6.000^(1/3)]=   6.83
      Rainfall intensity (I) =      5.599(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
      Subarea runoff =      1.102(CFS)
      Total initial stream area =        0.480(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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      Process from Point/Station      102.000 to Point/Station
105.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ____________________________________________________________________
___
      Estimated mean flow rate at midpoint of channel =      5.950(CFS)
      Depth of flow =   0.936(Ft.), Average velocity =   1.488(Ft/s)
            ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              1.50
            2              2.00              0.75
            3              3.00              0.00
            4              4.00              0.00
            5              5.00              0.00
            6              6.00              0.00
            7              7.00              0.75
            8              8.00              1.50
      Manning's 'N' friction factor =   0.250
      ------------------------------------------------------------------
      Sub-Channel flow  =      5.950(CFS)
        '     '   flow top width =      5.743(Ft.)
        '     '    velocity=    1.488(Ft/s)
        '     '   area =      3.998(Sq.Ft)
        '     '   Froude number =     0.314

      Upstream point elevation =   184.000(Ft.)
      Downstream point elevation =    95.000(Ft.)
      Flow length =   768.000(Ft.)
      Travel time  =    8.60 min.
      Time of concentration =   15.44 min.
      Depth of flow =   0.936(Ft.)
      Average velocity =   1.488(Ft/s)
      Total irregular channel flow =     5.950(CFS)
      Irregular channel normal depth above invert elev. =   0.936(Ft.)
      Average velocity of channel(s) =   1.488(Ft/s)
```

```
 Adding area flow to channel
Rainfall intensity (I) =      3.311(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 = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Rainfall intensity =      3.311(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.410  CA =      3.235
Subarea runoff =      9.608(CFS) for      7.410(Ac.)
Total runoff =     10.710(CFS)    Total area =       7.890(Ac.)
Depth of flow =   1.280(Ft.), Average velocity =   1.725(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
Process from Point/Station      105.000 to Point/Station
205.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
___
Top of street segment elevation =    95.000(Ft.)
End of street segment elevation =    83.400(Ft.)
Length of street segment  =   140.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  12.000(Ft.)
Distance from crown to crossfall grade break  =  10.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.173(CFS)
Depth of flow =   0.378(Ft.), Average velocity =   7.163(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.000(Ft.)
Flow velocity =   7.16(Ft/s)
Travel time =    0.33 min.     TC =   15.76  min.
 Adding area flow to street
Rainfall intensity (I) =      3.267(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 = 0.000
Decimal fraction soil group D = 1.000
```

```
      [LOW DENSITY RESIDENTIAL                    ]
      (1.0 DU/A or Less       )
      Impervious value, Ai = 0.100
      Sub-Area C Value = 0.410
      Rainfall intensity =      3.267(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for total area
      (Q=KCIA) is C = 0.410  CA =      3.538
      Subarea runoff =      0.848(CFS) for      0.740(Ac.)
      Total runoff =     11.558(CFS)    Total area =       8.630(Ac.)
      Street flow at end of street =     11.558(CFS)
      Half street flow at end of street =     11.558(CFS)
      Depth of flow =   0.381(Ft.), Average velocity =   7.260(Ft/s)
      Note:  depth of flow exceeds top of street crown.
      Flow width (from curb towards crown)=  12.000(Ft.)


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+++
      Process from Point/Station      105.000 to Point/Station
205.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 1
      Stream flow area =      8.630(Ac.)
      Runoff from this stream =     11.558(CFS)
      Time of concentration =   15.76 min.
      Rainfall intensity =     3.267(In/Hr)
      Program is now starting with Main Stream No. 2


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+++
      Process from Point/Station      103.000 to Point/Station
104.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [LOW DENSITY RESIDENTIAL                    ]
      (1.0 DU/A or Less       )
      Impervious value, Ai = 0.100
      Sub-Area C Value = 0.410
      Initial subarea total flow distance  =  100.000(Ft.)
      Highest elevation =  180.000(Ft.)
      Lowest elevation =  150.000(Ft.)
      Elevation difference =   30.000(Ft.) Slope = 30.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of  30.00 %, in a development type of
```

```
 1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.00 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4100)*( 100.000^.5)/(  30.000^(1/3)]=   4.00
Calculated TC of    3.997 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff =      0.140(CFS)
Total initial stream area =        0.050(Ac.)


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+++
Process from Point/Station      104.000 to Point/Station
202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
____________________________________________________________________________
___
Estimated mean flow rate at midpoint of channel =      1.056(CFS)
Depth of flow =   0.303(Ft.), Average velocity =   1.024(Ft/s)
      ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.50
      2              2.00              0.75
      3              3.00              0.00
      4              4.00              0.00
      5              5.00              0.00
      6              6.00              0.00
      7              7.00              0.75
      8              8.00              1.50
Manning's 'N' friction factor =   0.250
-------------------------------------------------------------------
Sub-Channel flow  =      1.056(CFS)
  '     '   flow top width =      3.808(Ft.)
  '     '    velocity=    1.024(Ft/s)
  '     '   area =      1.031(Sq.Ft)
  '     '   Froude number =     0.347

Upstream point elevation =   150.000(Ft.)
Downstream point elevation =    95.570(Ft.)
Flow length =   300.000(Ft.)
Travel time  =    4.88 min.
Time of concentration =    8.88 min.
Depth of flow =   0.303(Ft.)
Average velocity =   1.024(Ft/s)
Total irregular channel flow =     1.056(CFS)
Irregular channel normal depth above invert elev. =   0.303(Ft.)
Average velocity of channel(s) =   1.024(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.729(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 = 0.000
      Decimal fraction soil group D = 1.000
      [LOW DENSITY RESIDENTIAL                    ]
      (1.0 DU/A or Less       )
      Impervious value, Ai = 0.100
      Sub-Area C Value = 0.410
      Rainfall intensity =      4.729(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for total area
      (Q=KCIA) is C = 0.410  CA =      0.402
      Subarea runoff =      1.760(CFS) for      0.930(Ac.)
      Total runoff =      1.900(CFS)    Total area =       0.980(Ac.)
      Depth of flow =   0.427(Ft.), Average velocity =   1.245(Ft/s)


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+++
      Process from Point/Station      104.000 to Point/Station
202.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 1
      Stream flow area =      0.980(Ac.)
      Runoff from this stream =      1.900(CFS)
      Time of concentration =    8.88 min.
      Rainfall intensity =     4.729(In/Hr)


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+++
      Process from Point/Station      201.000 to Point/Station
202.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                   ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   25.000(Ft.)
      Highest elevation =  104.780(Ft.)
      Lowest elevation =   95.570(Ft.)
      Elevation difference =    9.210(Ft.) Slope = 36.840 %
      Top of Initial Area Slope adjusted by User to 30.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of  30.00 %, in a development type of
       43.0 DU/A or Less
```

```
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   1.97 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*( 100.000^.5)/(  30.000^(1/3)]=   1.97
      Calculated TC of    1.970 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.812(CFS)
      Total initial stream area =        0.156(Ac.)


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      Process from Point/Station      202.000 to Point/Station
202.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 2
      Stream flow area =      0.156(Ac.)
      Runoff from this stream =      0.812(CFS)
      Time of concentration =    1.97 min.
      Rainfall intensity =     6.850(In/Hr)
      Summary of stream data:

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


      1        1.900      8.88             4.729
      2        0.812      1.97             6.850
      Qmax(1) =
               1.000 *    1.000 *     1.900) +
               0.690 *    1.000 *     0.812) + =       2.461
      Qmax(2) =
               1.000 *    0.222 *     1.900) +
               1.000 *    1.000 *     0.812) + =       1.234

      Total of 2 streams to confluence:
      Flow rates before confluence point:
             1.900       0.812
      Maximum flow rates at confluence using above data:
              2.461        1.234
      Area of streams before confluence:
              0.980        0.156
      Results of confluence:
      Total flow rate =      2.461(CFS)
      Time of concentration =     8.881 min.
      Effective stream area after confluence =      1.136(Ac.)


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

```
      Process from Point/Station      202.000 to Point/Station
203.000
      **** IMPROVED CHANNEL TRAVEL TIME ****
      ____________________________________________________________________
___
      Upstream point elevation =    95.570(Ft.)
      Downstream point elevation =    91.830(Ft.)
      Channel length thru subarea  =   120.000(Ft.)
      Channel base width     =    0.500(Ft.)
      Slope or 'Z' of left channel bank =   4.000
      Slope or 'Z' of right channel bank =   4.000
      Manning's 'N'    = 0.015
      Maximum depth of channel  =    1.000(Ft.)
      Flow(q) thru subarea =      2.461(CFS)
      Depth of flow =   0.286(Ft.), Average velocity =   5.246(Ft/s)
      Channel flow top width =    2.785(Ft.)
      Flow Velocity =    5.25(Ft/s)
      Travel time  =    0.38 min.
      Time of concentration =    9.26 min.
      Critical depth =      0.414(Ft.)


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+++
      Process from Point/Station      203.000 to Point/Station
205.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    90.000(Ft.)
      Downstream point/station elevation =    82.000(Ft.)
      Pipe length  =   230.00(Ft.) Slope =   0.0348  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     2.461(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     2.461(CFS)
      Normal flow depth in pipe =    6.08(In.)
      Flow top width inside pipe =    8.43(In.)
      Critical Depth =    8.28(In.)
      Pipe flow velocity =      7.75(Ft/s)
      Travel time through pipe =    0.49 min.
      Time of concentration (TC) =     9.76 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      203.000 to Point/Station
205.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 2
      Stream flow area =      1.136(Ac.)
      Runoff from this stream =      2.461(CFS)
```

```
      Time of concentration =    9.76 min.
      Rainfall intensity =     4.451(In/Hr)
      Program is now starting with Main Stream No. 3


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      204.000 to Point/Station
205.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   75.000(Ft.)
      Highest elevation =   84.430(Ft.)
      Lowest elevation =   83.400(Ft.)
      Elevation difference =    1.030(Ft.) Slope =  1.373 %
      Top of Initial Area Slope adjusted by User to  2.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 75.00 (Ft)
      for the top area slope value of   2.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   4.21 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*(  75.000^.5)/(   2.000^(1/3)]=   4.21
      Calculated TC of    4.207 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.469(CFS)
      Total initial stream area =        0.090(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      205.000 to Point/Station
205.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 3
      Stream flow area =      0.090(Ac.)
      Runoff from this stream =      0.469(CFS)
      Time of concentration =    4.21 min.
      Rainfall intensity =     6.850(In/Hr)
```

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	11.558	15.76	3.267
2	2.461	9.76	4.451
3	0.469	4.21	6.850

```
Qmax(1) =
         1.000 *    1.000 *    11.558) +
         0.734 *    1.000 *     2.461) +
         0.477 *    1.000 *     0.469) + =      13.588
Qmax(2) =
         1.000 *    0.619 *    11.558) +
         1.000 *    1.000 *     2.461) +
         0.650 *    1.000 *     0.469) + =       9.920
Qmax(3) =
         1.000 *    0.267 *    11.558) +
         1.000 *    0.431 *     2.461) +
         1.000 *    1.000 *     0.469) + =       4.614
```

Total of 3 main streams to confluence:
Flow rates before confluence point:
11.558 2.461 0.469
Maximum flow rates at confluence using above data:
13.588 9.920 4.614
Area of streams before confluence:
8.630 1.136 0.090

Results of confluence:
Total flow rate = 13.588(CFS)
Time of concentration = 15.762 min.
Effective stream area after confluence = 9.856(Ac.)

++
+++
Process from Point/Station 205.000 to Point/Station
207.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
___
Upstream point/station elevation = 82.000(Ft.)
Downstream point/station elevation = 81.700(Ft.)
Pipe length = 110.00(Ft.) Slope = 0.0027 Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 13.588(CFS)
Nearest computed pipe diameter = 27.00(In.)
Calculated individual pipe flow = 13.588(CFS)
Normal flow depth in pipe = 18.94(In.)
Flow top width inside pipe = 24.71(In.)
Critical Depth = 15.38(In.)
Pipe flow velocity = 4.56(Ft/s)

```
      Travel time through pipe =    0.40 min.
      Time of concentration (TC) =    16.16 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      205.000 to Point/Station
207.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 1 in normal stream number 1
      Stream flow area =      9.856(Ac.)
      Runoff from this stream =     13.588(CFS)
      Time of concentration =   16.16 min.
      Rainfall intensity =     3.214(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      206.000 to Point/Station
207.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   28.000(Ft.)
      Highest elevation =   88.370(Ft.)
      Lowest elevation =   83.530(Ft.)
      Elevation difference =    4.840(Ft.) Slope = 17.286 %
      Top of Initial Area Slope adjusted by User to 30.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of  30.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   1.97 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*( 100.000^.5)/(  30.000^(1/3)]=   1.97
      Calculated TC of    1.970 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.573(CFS)
      Total initial stream area =        0.110(Ac.)
```

```
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      207.000 to Point/Station
207.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 1 in normal stream number 2
      Stream flow area =      0.110(Ac.)
      Runoff from this stream =      0.573(CFS)
      Time of concentration =    1.97 min.
      Rainfall intensity =     6.850(In/Hr)
      Summary of stream data:

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


      1       13.588     16.16              3.214
      2        0.573      1.97              6.850
      Qmax(1) =
               1.000 *    1.000 *    13.588) +
               0.469 *    1.000 *     0.573) + =      13.856
      Qmax(2) =
               1.000 *    0.122 *    13.588) +
               1.000 *    1.000 *     0.573) + =       2.228

      Total of 2 streams to confluence:
      Flow rates before confluence point:
            13.588       0.573
      Maximum flow rates at confluence using above data:
             13.856        2.228
      Area of streams before confluence:
              9.856        0.110
      Results of confluence:
      Total flow rate =     13.856(CFS)
      Time of concentration =    16.164 min.
      Effective stream area after confluence =      9.966(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      207.000 to Point/Station
219.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    74.090(Ft.)
      Downstream point/station elevation =    70.030(Ft.)
      Pipe length  =    85.00(Ft.) Slope =   0.0478  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    13.856(CFS)
      Nearest computed pipe diameter  =     15.00(In.)
      Calculated individual pipe flow  =    13.856(CFS)
      Normal flow depth in pipe =   12.05(In.)
```

```
      Flow top width inside pipe =   11.93(In.)
      Critical depth could not be calculated.
      Pipe flow velocity =     13.11(Ft/s)
      Travel time through pipe =    0.11 min.
      Time of concentration (TC) =    16.27 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      207.000 to Point/Station
219.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 1
      Stream flow area =      9.966(Ac.)
      Runoff from this stream =     13.856(CFS)
      Time of concentration =   16.27 min.
      Rainfall intensity =     3.200(In/Hr)
      Program is now starting with Main Stream No. 2


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      208.000 to Point/Station
209.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =  100.000(Ft.)
      Highest elevation =   94.780(Ft.)
      Lowest elevation =   84.940(Ft.)
      Elevation difference =    9.840(Ft.) Slope =  9.840 %
      Top of Initial Area Slope adjusted by User to  9.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of   9.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   2.94 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*( 100.000^.5)/(   9.000^(1/3)]=   2.94
      Calculated TC of    2.942 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
```

```
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.208(CFS)
      Total initial stream area =        0.040(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      209.000 to Point/Station
210.000
      **** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
      ____________________________________________________________________
___
      Top of street segment elevation =    84.940(Ft.)
      End of street segment elevation =    83.530(Ft.)
      Length of street segment  =   120.000(Ft.)
      Height of curb above gutter flowline  =    6.0(In.)
      Width of half street (curb to crown)  =  12.000(Ft.)
      Distance from crown to crossfall grade break  =  10.500(Ft.)
      Slope from gutter to grade break (v/hz) =   0.020
      Slope from grade break to crown (v/hz)  =   0.020
      Street flow is on [1] side(s) of the street
      Distance from curb to property line  =  10.000(Ft.)
      Slope from curb to property line (v/hz) =   0.020
      Gutter width =   1.500(Ft.)
      Gutter hike from flowline =  2.000(In.)
       Manning's N in gutter =  0.0150
       Manning's N from gutter to grade break =  0.0150
       Manning's N from grade break to crown =  0.0150
      Estimated mean flow rate at midpoint of street =      0.324(CFS)
      Depth of flow =   0.198(Ft.), Average velocity =   1.646(Ft/s)
      Streetflow hydraulics at midpoint of street travel:
      Halfstreet flow width =   3.070(Ft.)
      Flow velocity =   1.65(Ft/s)
      Travel time =    1.21 min.     TC =    4.16  min.
       Adding area flow to street
      Calculated TC of    4.157 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      User specified 'C' value of 0.740 given for subarea
      Rainfall intensity =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for total area
      (Q=KCIA) is C = 0.748  CA =      0.075
      Subarea runoff =      0.304(CFS) for      0.060(Ac.)
      Total runoff =      0.512(CFS)    Total area =       0.100(Ac.)
      Street flow at end of street =      0.512(CFS)
      Half street flow at end of street =      0.512(CFS)
      Depth of flow =   0.225(Ft.), Average velocity =   1.718(Ft/s)
      Flow width (from curb towards crown)=   4.424(Ft.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      210.000 to Point/Station
212.000
```

```
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    82.500(Ft.)
      Downstream point/station elevation =    81.000(Ft.)
      Pipe length  =   235.00(Ft.) Slope =   0.0064  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.512(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     0.512(CFS)
      Normal flow depth in pipe =    3.89(In.)
      Flow top width inside pipe =    8.92(In.)
      Critical Depth =    3.88(In.)
      Pipe flow velocity =      2.80(Ft/s)
      Travel time through pipe =    1.40 min.
      Time of concentration (TC) =     5.55 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      210.000 to Point/Station
212.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 1
      Stream flow area =      0.100(Ac.)
      Runoff from this stream =      0.512(CFS)
      Time of concentration =    5.55 min.
      Rainfall intensity =     6.401(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      211.000 to Point/Station
212.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   73.000(Ft.)
      Highest elevation =   86.760(Ft.)
      Lowest elevation =   83.430(Ft.)
      Elevation difference =    3.330(Ft.) Slope =  4.562 %
      Top of Initial Area Slope adjusted by User to 10.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 100.00 (Ft)
      for the top area slope value of  10.00 %, in a development type of
```

```
 43.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.84 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7600)*( 100.000^.5)/(  10.000^(1/3)]=   2.84
Calculated TC of    2.841 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
Subarea runoff =      1.822(CFS)
Total initial stream area =        0.350(Ac.)


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Process from Point/Station      212.000 to Point/Station
212.000
**** CONFLUENCE OF MINOR STREAMS ****
__________________________________________________________________________
___
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.350(Ac.)
Runoff from this stream =      1.822(CFS)
Time of concentration =    2.84 min.
Rainfall intensity =     6.850(In/Hr)
Summary of stream data:

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


1        0.512      5.55             6.401
2        1.822      2.84             6.850
Qmax(1) =
         1.000 *    1.000 *     0.512) +
         0.934 *    1.000 *     1.822) + =       2.215
Qmax(2) =
         1.000 *    0.511 *     0.512) +
         1.000 *    1.000 *     1.822) + =       2.084

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.512       1.822
Maximum flow rates at confluence using above data:
        2.215        2.084
Area of streams before confluence:
        0.100        0.350
Results of confluence:
Total flow rate =      2.215(CFS)
Time of concentration =     5.555 min.
Effective stream area after confluence =      0.450(Ac.)
```

```
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      212.000 to Point/Station
217.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    81.000(Ft.)
      Downstream point/station elevation =    80.200(Ft.)
      Pipe length  =   117.00(Ft.) Slope =   0.0068  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     2.215(CFS)
      Nearest computed pipe diameter  =     12.00(In.)
      Calculated individual pipe flow  =     2.215(CFS)
      Normal flow depth in pipe =    7.77(In.)
      Flow top width inside pipe =   11.47(In.)
      Critical Depth =    7.64(In.)
      Pipe flow velocity =      4.12(Ft/s)
      Travel time through pipe =    0.47 min.
      Time of concentration (TC) =     6.03 min.


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      Process from Point/Station      212.000 to Point/Station
217.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 1
      Stream flow area =      0.450(Ac.)
      Runoff from this stream =      2.215(CFS)
      Time of concentration =    6.03 min.
      Rainfall intensity =     6.072(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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      Process from Point/Station      213.000 to Point/Station
214.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =  105.000(Ft.)
      Highest elevation =   84.000(Ft.)
      Lowest elevation =   76.580(Ft.)
      Elevation difference =    7.420(Ft.) Slope =  7.067 %
```

```
      Top of Initial Area Slope adjusted by User to 13.000 %
      Bottom of Initial Area Slope adjusted by User to 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
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   2.60 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*( 100.000^.5)/(  13.000^(1/3)]=   2.60
      The initial area total distance of  105.00 (Ft.) entered leaves a
      remaining distance of    5.00 (Ft.)
      Using Figure 3-4, the travel time for this distance is   0.06
minutes
      for a distance of   5.00 (Ft.) and a slope of 13.00 %
      with an elevation difference of   0.65(Ft.) from the end of the top
area
      Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
       =    0.059 Minutes
      Tt=[(11.9*0.0009^3)/(  0.65)]^.385=  0.06
      Total initial area Ti =   2.60 minutes from Figure 3-3 formula plus
        0.06 minutes from the Figure 3-4 formula =   2.66 minutes
      Calculated TC of    2.662 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.937(CFS)
      Total initial stream area =        0.180(Ac.)


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+++
      Process from Point/Station      214.000 to Point/Station
217.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------
---
      Upstream point/station elevation =    80.350(Ft.)
      Downstream point/station elevation =    80.200(Ft.)
      Pipe length  =    30.00(Ft.) Slope =   0.0050  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.937(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     0.937(CFS)
      Normal flow depth in pipe =    6.09(In.)
      Flow top width inside pipe =    8.42(In.)
      Critical Depth =    5.32(In.)
      Pipe flow velocity =      2.94(Ft/s)
      Travel time through pipe =    0.17 min.
      Time of concentration (TC) =     2.83 min.


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      Process from Point/Station      214.000 to Point/Station
217.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 2
      Stream flow area =      0.180(Ac.)
      Runoff from this stream =      0.937(CFS)
      Time of concentration =    2.83 min.
      Rainfall intensity =     6.850(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      215.000 to Point/Station
216.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =  110.000(Ft.)
      Highest elevation =   84.500(Ft.)
      Lowest elevation =   84.300(Ft.)
      Elevation difference =    0.200(Ft.) Slope =  0.182 %
      Top of Initial Area Slope adjusted by User to  1.000 %
      Bottom of Initial Area Slope adjusted by User to  1.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 65.00 (Ft)
      for the top area slope value of   1.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   4.93 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*(  65.000^.5)/(   1.000^(1/3)]=   4.93
      The initial area total distance of  110.00 (Ft.) entered leaves a
      remaining distance of   45.00 (Ft.)
      Using Figure 3-4, the travel time for this distance is   0.86
minutes
      for a distance of  45.00 (Ft.) and a slope of  1.00 %
      with an elevation difference of   0.45(Ft.) from the end of the top
area
      Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
       =    0.862 Minutes
      Tt=[(11.9*0.0085^3)/(  0.45)]^.385=  0.86
      Total initial area Ti =   4.93 minutes from Figure 3-3 formula plus
        0.86 minutes from the Figure 3-4 formula =   5.80 minutes
      Rainfall intensity (I) =      6.228(In/Hr) for a   100.0 year storm
```

```
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      3.786(CFS)
      Total initial stream area =        0.800(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      216.000 to Point/Station
217.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    80.510(Ft.)
      Downstream point/station elevation =    80.200(Ft.)
      Pipe length  =    61.00(Ft.) Slope =   0.0051  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     3.786(CFS)
      Nearest computed pipe diameter  =     15.00(In.)
      Calculated individual pipe flow  =     3.786(CFS)
      Normal flow depth in pipe =   10.36(In.)
      Flow top width inside pipe =   13.87(In.)
      Critical Depth =    9.43(In.)
      Pipe flow velocity =      4.19(Ft/s)
      Travel time through pipe =    0.24 min.
      Time of concentration (TC) =     6.04 min.


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+++
      Process from Point/Station      217.000 to Point/Station
217.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 3
      Stream flow area =      0.800(Ac.)
      Runoff from this stream =      3.786(CFS)
      Time of concentration =    6.04 min.
      Rainfall intensity =     6.065(In/Hr)
      Summary of stream data:

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


      1        2.215      6.03             6.072
      2        0.937      2.83             6.850
      3        3.786      6.04             6.065
      Qmax(1) =
               1.000 *    1.000 *     2.215) +
               0.886 *    1.000 *     0.937) +
               1.000 *    0.998 *     3.786) + =       6.825
      Qmax(2) =
               1.000 *    0.470 *     2.215) +
               1.000 *    1.000 *     0.937) +
```

```
          1.000 *    0.469 *     3.786) + =       3.753
     Qmax(3) =
          0.999 *    1.000 *     2.215) +
          0.885 *    1.000 *     0.937) +
          1.000 *    1.000 *     3.786) + =       6.829

     Total of 3 streams to confluence:
     Flow rates before confluence point:
          2.215       0.937       3.786
     Maximum flow rates at confluence using above data:
          6.825       3.753       6.829
     Area of streams before confluence:
          0.450       0.180       0.800
     Results of confluence:
     Total flow rate =      6.829(CFS)
     Time of concentration =     6.039 min.
     Effective stream area after confluence =      1.430(Ac.)


     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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     Process from Point/Station      217.000 to Point/Station
219.000
     **** USER DEFINED FLOW INFORMATION AT A POINT ****
     ____________________________________________________________________
___
     User specified 'C' value of 0.760 given for subarea
     Rainfall intensity (I) =      6.090(In/Hr) for a   100.0 year storm
     User specified values are as follows:
     TC =   6.00 min.  Rain intensity =       6.09(In/Hr)
     Total area =        1.430(Ac.)  Total runoff =     3.720(CFS)


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+++
     Process from Point/Station      217.000 to Point/Station
219.000
     **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
     ____________________________________________________________________
___
     Upstream point/station elevation =    80.200(Ft.)
     Downstream point/station elevation =    70.030(Ft.)
     Pipe length  =   110.00(Ft.) Slope =   0.0925  Manning's N = 0.013
     No. of pipes = 1  Required pipe flow  =     3.720(CFS)
     Nearest computed pipe diameter  =      9.00(In.)
     Calculated individual pipe flow  =     3.720(CFS)
     Normal flow depth in pipe =    5.76(In.)
     Flow top width inside pipe =    8.64(In.)
     Critical depth could not be calculated.
     Pipe flow velocity =     12.46(Ft/s)
     Travel time through pipe =    0.15 min.
     Time of concentration (TC) =     6.15 min.
```

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      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      219.000 to Point/Station
219.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 2
      Stream flow area =      1.430(Ac.)
      Runoff from this stream =      3.720(CFS)
      Time of concentration =    6.15 min.
      Rainfall intensity =     5.996(In/Hr)
      Summary of stream data:

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


      1       13.856     16.27             3.200
      2        3.720      6.15             5.996
      Qmax(1) =
               1.000 *    1.000 *    13.856) +
               0.534 *    1.000 *     3.720) + =      15.842
      Qmax(2) =
               1.000 *    0.378 *    13.856) +
               1.000 *    1.000 *     3.720) + =       8.955

      Total of 2 main streams to confluence:
      Flow rates before confluence point:
            13.856       3.720
      Maximum flow rates at confluence using above data:
             15.842        8.955
      Area of streams before confluence:
              9.966        1.430


      Results of confluence:
      Total flow rate =     15.842(CFS)
      Time of concentration =    16.272 min.
      Effective stream area after confluence  =     11.396(Ac.)


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+++
      Process from Point/Station      219.000 to Point/Station
220.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    70.030(Ft.)
      Downstream point/station elevation =    69.440(Ft.)
      Pipe length  =   117.00(Ft.) Slope =   0.0050  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    15.842(CFS)
```

```
      Nearest computed pipe diameter  =     24.00(In.)
      Calculated individual pipe flow  =    15.842(CFS)
      Normal flow depth in pipe =   19.36(In.)
      Flow top width inside pipe =   18.96(In.)
      Critical Depth =   17.23(In.)
      Pipe flow velocity =      5.83(Ft/s)
      Travel time through pipe =    0.33 min.
      Time of concentration (TC) =    16.61 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      219.000 to Point/Station
220.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 1 in normal stream number 1
      Stream flow area =     11.396(Ac.)
      Runoff from this stream =     15.842(CFS)
      Time of concentration =   16.61 min.
      Rainfall intensity =     3.158(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      218.000 to Point/Station
220.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   33.000(Ft.)
      Highest elevation =   84.760(Ft.)
      Lowest elevation =   71.720(Ft.)
      Elevation difference =   13.040(Ft.) Slope = 39.515 %
      Top of Initial Area Slope adjusted by User to 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
       43.0 DU/A or Less
      In Accordance With Table 3-2
      Initial Area Time of Concentration =   2.70 minutes
       (for slope value of  10.00 %)
      Calculated TC of    2.700 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
```

```
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      1.093(CFS)
      Total initial stream area =        0.210(Ac.)


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      Process from Point/Station      220.000 to Point/Station
220.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 1 in normal stream number 2
      Stream flow area =      0.210(Ac.)
      Runoff from this stream =      1.093(CFS)
      Time of concentration =    2.70 min.
      Rainfall intensity =     6.850(In/Hr)
      Summary of stream data:

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


      1       15.842     16.61              3.158
      2        1.093      2.70              6.850
      Qmax(1) =
               1.000 *    1.000 *    15.842) +
               0.461 *    1.000 *     1.093) + =      16.346
      Qmax(2) =
               1.000 *    0.163 *    15.842) +
               1.000 *    1.000 *     1.093) + =       3.669

      Total of 2 streams to confluence:
      Flow rates before confluence point:
            15.842       1.093
      Maximum flow rates at confluence using above data:
             16.346        3.669
      Area of streams before confluence:
             11.396        0.210
      Results of confluence:
      Total flow rate =     16.346(CFS)
      Time of concentration =    16.607 min.
      Effective stream area after confluence =     11.606(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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      Process from Point/Station      220.000 to Point/Station
226.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    69.440(Ft.)
      Downstream point/station elevation =    69.000(Ft.)
```

```
      Pipe length  =    88.00(Ft.) Slope =   0.0050  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    16.346(CFS)
      Nearest computed pipe diameter  =     27.00(In.)
      Calculated individual pipe flow  =    16.346(CFS)
      Normal flow depth in pipe =   17.39(In.)
      Flow top width inside pipe =   25.85(In.)
      Critical Depth =   16.94(In.)
      Pipe flow velocity =      6.04(Ft/s)
      Travel time through pipe =    0.24 min.
      Time of concentration (TC) =    16.85 min.


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+++
      Process from Point/Station      220.000 to Point/Station
226.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ____________________________________________________________________
___
      The following data inside Main Stream is listed:
      In Main Stream number: 1
      Stream flow area =     11.606(Ac.)
      Runoff from this stream =     16.346(CFS)
      Time of concentration =   16.85 min.
      Rainfall intensity =     3.129(In/Hr)
      Program is now starting with Main Stream No. 2


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      221.000 to Point/Station
222.000
      **** INITIAL AREA EVALUATION ****
      ____________________________________________________________________
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =  125.000(Ft.)
      Highest elevation =   77.000(Ft.)
      Lowest elevation =   69.540(Ft.)
      Elevation difference =    7.460(Ft.) Slope =  5.968 %
      Top of Initial Area Slope adjusted by User to  5.000 %
      Bottom of Initial Area Slope adjusted by User to  5.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 95.00 (Ft)
      for the top area slope value of   5.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
```

```
      Initial Area Time of Concentration =   3.49 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*(  95.000^.5)/(   5.000^(1/3)]=   3.49
      The initial area total distance of  125.00 (Ft.) entered leaves a
      remaining distance of   30.00 (Ft.)
      Using Figure 3-4, the travel time for this distance is   0.34
minutes
      for a distance of  30.00 (Ft.) and a slope of  5.00 %
      with an elevation difference of   1.50(Ft.) from the end of the top
area
      Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
       =    0.340 Minutes
      Tt=[(11.9*0.0057^3)/(  1.50)]^.385=  0.34
      Total initial area Ti =   3.49 minutes from Figure 3-3 formula plus
        0.34 minutes from the Figure 3-4 formula =   3.83 minutes
      Calculated TC of    3.828 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      1.458(CFS)
      Total initial stream area =        0.280(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      222.000 to Point/Station
225.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ____________________________________________________________________
___
      Upstream point/station elevation =    69.800(Ft.)
      Downstream point/station elevation =    69.500(Ft.)
      Pipe length  =    50.00(Ft.) Slope =   0.0060  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     1.458(CFS)
      Nearest computed pipe diameter  =     12.00(In.)
      Calculated individual pipe flow  =     1.458(CFS)
      Normal flow depth in pipe =    6.20(In.)
      Flow top width inside pipe =   11.99(In.)
      Critical Depth =    6.14(In.)
      Pipe flow velocity =      3.56(Ft/s)
      Travel time through pipe =    0.23 min.
      Time of concentration (TC) =     4.06 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      222.000 to Point/Station
225.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 1
      Stream flow area =      0.280(Ac.)
      Runoff from this stream =      1.458(CFS)
```

```
      Time of concentration =    4.06 min.
      Rainfall intensity =     6.850(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      223.000 to Point/Station
224.000
      **** INITIAL AREA EVALUATION ****
      ------------------------------------------------------------------------
___
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      [HIGH DENSITY RESIDENTIAL                    ]
      (43.0 DU/A or Less      )
      Impervious value, Ai = 0.800
      Sub-Area C Value = 0.760
      Initial subarea total flow distance  =   87.000(Ft.)
      Highest elevation =   86.330(Ft.)
      Lowest elevation =   83.670(Ft.)
      Elevation difference =    2.660(Ft.) Slope =  3.057 %
      Top of Initial Area Slope adjusted by User to  3.000 %
      INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
      The maximum overland flow distance is 85.00 (Ft)
      for the top area slope value of   3.00 %, in a development type of
       43.0 DU/A or Less
      In Accordance With Figure 3-3
      Initial Area Time of Concentration =   3.91 minutes
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7600)*(  85.000^.5)/(   3.000^(1/3)]=   3.91
      Calculated TC of    3.912 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
      Subarea runoff =      0.677(CFS)
      Total initial stream area =        0.130(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      224.000 to Point/Station
225.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ------------------------------------------------------------------------
___
      Estimated mean flow rate at midpoint of channel =      1.494(CFS)
      Depth of flow =   0.164(Ft.), Average velocity =   5.982(Ft/s)
            ******* Irregular Channel Data ***********
      ---------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              0.50
```

```
        2              1.00              0.40
        3              2.00              0.30
        4              3.00              0.10
        5              4.00              0.00
        6              5.00              0.10
        7              6.00              0.30
        8              7.00              0.40
      Manning's 'N' friction factor =   0.015
      -----------------------------------------------------------------
      Sub-Channel flow  =      1.494(CFS)
        '     '    flow top width =      2.645(Ft.)
        '     '     velocity=    5.982(Ft/s)
        '     '    area =      0.250(Sq.Ft)
        '     '    Froude number =     3.430

      Upstream point elevation =    83.670(Ft.)
      Downstream point elevation =    71.580(Ft.)
      Flow length =   141.000(Ft.)
      Travel time  =    0.39 min.
      Time of concentration =    4.31 min.
      Depth of flow =   0.164(Ft.)
      Average velocity =   5.982(Ft/s)
      Total irregular channel flow =     1.494(CFS)
      Irregular channel normal depth above invert elev. =   0.164(Ft.)
      Average velocity of channel(s) =   5.982(Ft/s)
       Adding area flow to channel
      Calculated TC of    4.305 minutes is less than 5 minutes,
       resetting TC to 5.0 minutes for rainfall intensity calculations
      Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
      User specified 'C' value of 0.740 given for subarea
      Rainfall intensity =      6.850(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for total area
      (Q=KCIA) is C = 0.746  CA =      0.331
      Subarea runoff =      1.592(CFS) for      0.314(Ac.)
      Total runoff =      2.269(CFS)    Total area =       0.444(Ac.)
      Depth of flow =   0.195(Ft.), Average velocity =   6.763(Ft/s)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      225.000 to Point/Station
225.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ____________________________________________________________________
___
      Along Main Stream number: 2 in normal stream number 2
      Stream flow area =      0.444(Ac.)
      Runoff from this stream =      2.269(CFS)
      Time of concentration =    4.31 min.
      Rainfall intensity =     6.850(In/Hr)
      Summary of stream data:

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

```
      1        1.458      4.06              6.850
      2        2.269      4.31              6.850
      Qmax(1) =
                1.000 *    1.000 *     1.458) +
                1.000 *    0.944 *     2.269) + =       3.598
      Qmax(2) =
                1.000 *    1.000 *     1.458) +
                1.000 *    1.000 *     2.269) + =       3.726

      Total of 2 streams to confluence:
      Flow rates before confluence point:
             1.458       2.269
      Maximum flow rates at confluence using above data:
              3.598        3.726
      Area of streams before confluence:
              0.280        0.444
      Results of confluence:
      Total flow rate =      3.726(CFS)
      Time of concentration =     4.305 min.
      Effective stream area after confluence =      0.724(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      225.000 to Point/Station
226.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
---
      Upstream point/station elevation =    69.500(Ft.)
      Downstream point/station elevation =    69.000(Ft.)
      Pipe length  =    60.00(Ft.) Slope =   0.0083  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     3.726(CFS)
      Nearest computed pipe diameter  =     15.00(In.)
      Calculated individual pipe flow  =     3.726(CFS)
      Normal flow depth in pipe =    8.65(In.)
      Flow top width inside pipe =   14.82(In.)
      Critical Depth =    9.36(In.)
      Pipe flow velocity =      5.08(Ft/s)
      Travel time through pipe =    0.20 min.
      Time of concentration (TC) =     4.50 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++
      Process from Point/Station      226.000 to Point/Station
226.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ------------------------------------------------------------------------
---
      The following data inside Main Stream is listed:
      In Main Stream number: 2
```

```
Stream flow area =      0.724(Ac.)
Runoff from this stream =      3.726(CFS)
Time of concentration =    4.50 min.
Rainfall intensity =     6.850(In/Hr)
Summary of stream data:

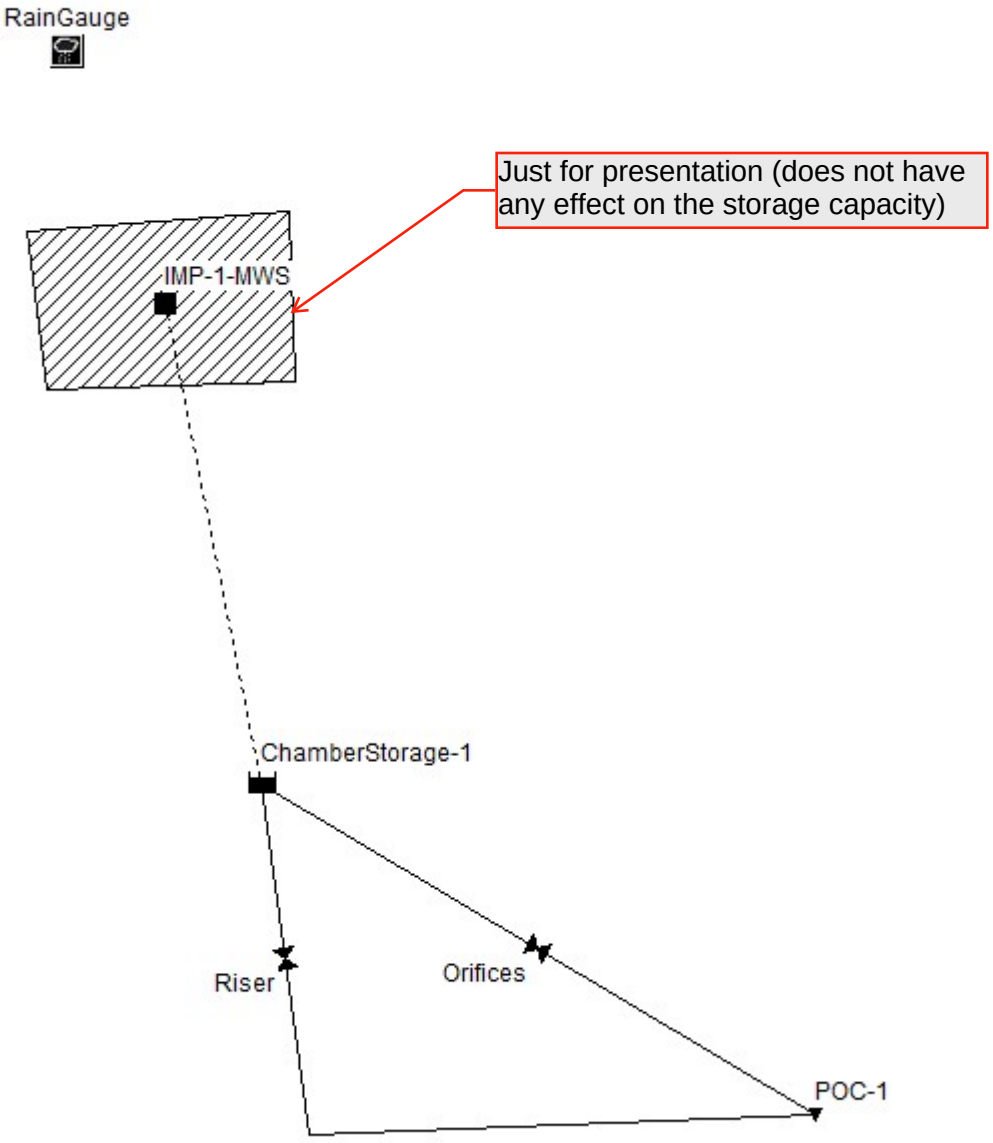
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       16.346     16.85             3.129
2        3.726      4.50             6.850
Qmax(1) =
         1.000 *    1.000 *    16.346) +
         0.457 *    1.000 *     3.726) + =      18.048
Qmax(2) =
         1.000 *    0.267 *    16.346) +
         1.000 *    1.000 *     3.726) + =       8.094

Total of 2 main streams to confluence:
Flow rates before confluence point:
      16.346       3.726
Maximum flow rates at confluence using above data:
       18.048        8.094
Area of streams before confluence:
       11.606        0.724


Results of confluence:
Total flow rate =     18.048(CFS)
Time of concentration =    16.849 min.
Effective stream area after confluence  =     12.330(Ac.)
End of computations, total study area =          12.330 (Ac.)
```

APPENDIX D
ATTENUATION/HYDRAULIC ANALYSIS


RainGauge
Just for presentation (does not have any effect on the storage capacity)
IMP-1-MWS
ChamberStorage-1
Riser
Orifices
POC-1

Subcatchment IMP-1-MWS

Property	Value
Name	IMP-1-MWS
X-Coordinate	234.317
Y-Coordinate	-35.157
Description	
Tag	
Rain Gage	RainGauge
Outlet	ChamberStorage-1
Area	0.001
Width	10
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.15
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Storage Unit ChamberStorage-1

Property	Value
Name	ChamberStorage-1
X-Coordinate	254.858
Y-Coordinate	-137.861
Description	
Tag	
Inflows	YES
Treatment	NO
Invert El.	92
Max. Depth	5.5
Initial Depth	0
Surcharge Depth	0
Evap. Factor	0
Seepage Loss	NO
Storage Curve	TABULAR
Functional Curve	
Coefficient	1000
Exponent	0
Constant	0
Tabular Curve	
Curve Name	SurfaceStorage-1

Storage Curve Editor

Curve Name: SurfaceStorage-1

Description: Chamber

	Depth (ft)	Area (ft2)
1	0.00	840.00
2	0.08	840.00
3	0.17	840.00
4	0.25	840.00
5	0.33	840.00
6	0.42	840.00
7	0.50	840.00
8	0.58	840.00
9	0.67	840.00
10	0.75	840.00
11	0.83	1875.17

View... Load... Save... OK Cancel Help

Weir Riser

Property	Value
Name	Riser
Inlet Node	ChamberStorage-1
Outlet Node	POC-1
Description	
Tag	
Type	TRANSVERSE
Height	0.1
Length	8
Side Slope	0
Inlet Offset	0.1
Discharge Coeff.	3.33
Flap Gate	NO
End Contractions	0
End Coeff.	0
Can Surcharge	YES
Coeff. Curve	
Roadway Weir	
Road Width	0
Road Surface	PAVED

Outlet Orifices

Property	Value
Name	Orifices
Inlet Node	ChamberStorage-1
Outlet Node	POC-1
Description	
Tag	
Inlet Offset	0
Flap Gate	NO
Rating Curve	TABULAR/HEAD
Functional Curve	
Coefficient	10.0
Exponent	0.5
Tabular Curve	
Curve Name	RatingCurve

Rating Curve Editor

Curve Name: RatingCurve

Description: Orifices

	Head (ft)	Outflow (CFS)
1	0	0
2	0.0833	0.0016
3	0.1667	0.0025
4	0.2500	0.0031
5	0.3333	0.0037
6	0.4167	0.0041
7	0.5000	0.0045
8	0.5833	0.0049
9	0.6667	0.0053
10	0.7500	0.0056
11	0.8333	0.0059

View... Load... Save... OK Cancel Help

Outfall POC-1

Property	Value
Name	POC-1
X-Coordinate	373.122
Y-Coordinate	-208.197
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Route To	
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

INPUT

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           01/01/2000
START_TIME           00:00:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:00:00
END_DATE             01/02/2000
END_TIME             23:59:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:00:15
WET_STEP             00:00:15
DRY_STEP             00:00:15
ROUTING_STEP         0:00:10
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.566
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              4

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11
   .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
```

```
;;-------------- --------- ------ ------ ----------
RainGauge        VOLUME    0:05     1.0      TIMESERIES 6hr-Time

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width
%Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- --------
-------- -------- ----------------
IMP-1-MWS        RainGauge        ChamberStorage-1 0.001    0        10       0
   0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
IMP-1-MWS        0.012      0.15       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
IMP-1-MWS        1.5        0.3        0.33       7          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POC-1            0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
    N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ----------- ----------
---------------------------- -------- --------          -------- --------
ChamberStorage-1 92       5.5        0          TABULAR    SurfaceStorage-1
    0        0

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff
  Gated    EndCon   EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ----------
---------- -------- -------- ---------- ---------- ---------- ----------
----------------
Riser            ChamberStorage-1 POC-1            TRANSVERSE   0.1        3.33
  NO       0        0          YES

[OUTLETS]
;;Name           From Node        To Node          Offset     Type
QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- ---------------
---------------- ---------- --------
```

```
Orifices         ChamberStorage-1 POC-1            0          TABULAR/HEAD
RatingCurve                 NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ----------
---------- ----------
Riser            RECT_OPEN    0.1              8          0          0

[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor
Baseline Pattern
;;-------------- ---------------- ---------------- -------- -------- --------
-------- --------
ChamberStorage-1 FLOW             6hr-100Time      FLOW     1.0      1.0


[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
;Orifices
RatingCurve      Rating     0          0
RatingCurve                 0.0833     0.0016
RatingCurve                 0.1667     0.0025
RatingCurve                 0.2500     0.0031
RatingCurve                 0.3333     0.0037
RatingCurve                 0.4167     0.0041
RatingCurve                 0.5000     0.0045
RatingCurve                 0.5833     0.0049
RatingCurve                 0.6667     0.0053
RatingCurve                 0.7500     0.0056
RatingCurve                 0.8333     0.0059
RatingCurve                 0.9167     0.0062
RatingCurve                 1.0000     0.0065
RatingCurve                 1.0833     0.0068
RatingCurve                 1.1667     0.0070
RatingCurve                 1.2500     0.0073
RatingCurve                 1.3333     0.0075
RatingCurve                 1.4167     0.0078
RatingCurve                 1.5000     0.0080
RatingCurve                 1.5833     0.0082
RatingCurve                 1.6667     0.0084
RatingCurve                 1.7500     0.0086
RatingCurve                 1.8333     0.0088
RatingCurve                 1.9167     0.0090
RatingCurve                 2.0000     0.0092
RatingCurve                 2.0833     0.0094
RatingCurve                 2.1667     0.0096
RatingCurve                 2.2500     0.0098
```

```
RatingCurve                 2.3333     0.0100
RatingCurve                 2.4167     0.0102
RatingCurve                 2.5000     0.0103
RatingCurve                 2.5833     0.0105
RatingCurve                 2.6667     0.0107
RatingCurve                 2.7500     0.0108
RatingCurve                 2.8333     0.0110
RatingCurve                 2.9167     0.0112
RatingCurve                 3.0000     0.0113
RatingCurve                 3.0833     0.3518
RatingCurve                 3.1667     0.5315
RatingCurve                 3.2500     0.6635
RatingCurve                 3.3333     0.7730
RatingCurve                 3.4167     0.8686
RatingCurve                 3.5000     0.9546
RatingCurve                 3.5833     1.0334
RatingCurve                 3.6667     1.1066
RatingCurve                 3.7500     1.1752
RatingCurve                 3.8333     1.2400
RatingCurve                 3.9167     1.3015
RatingCurve                 4.0000     1.3602
RatingCurve                 4.0833     1.3803
RatingCurve                 4.1667     1.4292
RatingCurve                 4.2500     1.4766
RatingCurve                 4.3333     1.5224
RatingCurve                 4.4167     1.5669
RatingCurve                 4.5000     1.6101
RatingCurve                 4.5833     1.6523
RatingCurve                 4.6667     1.6933
RatingCurve                 4.7500     1.7334
RatingCurve                 4.8333     1.7726
RatingCurve                 4.9167     1.8110
RatingCurve                 5.0000     1.8485
RatingCurve                 5.0833     1.8853
RatingCurve                 5.1667     1.9214
RatingCurve                 5.2500     1.9568
RatingCurve                 5.3333     1.9916
RatingCurve                 5.4167     2.0257
RatingCurve                 5.5000     2.0594
;
;Chamber
SurfaceStorage-1 Storage    0.00       840.00
SurfaceStorage-1            0.08       840.00
SurfaceStorage-1            0.17       840.00
SurfaceStorage-1            0.25       840.00
SurfaceStorage-1            0.33       840.00
SurfaceStorage-1            0.42       840.00
SurfaceStorage-1            0.50       840.00
SurfaceStorage-1            0.58       840.00
SurfaceStorage-1            0.67       840.00
```

SurfaceStorage-1	0.75	840.00
SurfaceStorage-1	0.83	1875.17
SurfaceStorage-1	0.92	1865.85
SurfaceStorage-1	1.00	1859.55
SurfaceStorage-1	1.08	1853.33
SurfaceStorage-1	1.17	1846.57
SurfaceStorage-1	1.25	1839.92
SurfaceStorage-1	1.33	1832.72
SurfaceStorage-1	1.42	1825.33
SurfaceStorage-1	1.50	1817.45
SurfaceStorage-1	1.58	1809.11
SurfaceStorage-1	1.67	1800.42
SurfaceStorage-1	1.75	1791.30
SurfaceStorage-1	1.83	1781.77
SurfaceStorage-1	1.92	1771.62
SurfaceStorage-1	2.00	1761.08
SurfaceStorage-1	2.08	1750.18
SurfaceStorage-1	2.17	1737.90
SurfaceStorage-1	2.25	1725.67
SurfaceStorage-1	2.33	1712.94
SurfaceStorage-1	2.42	1699.26
SurfaceStorage-1	2.50	1684.73
SurfaceStorage-1	2.58	1669.58
SurfaceStorage-1	2.67	1653.68
SurfaceStorage-1	2.75	1636.94
SurfaceStorage-1	2.83	1619.39
SurfaceStorage-1	2.92	1600.87
SurfaceStorage-1	3.00	1581.41
SurfaceStorage-1	3.08	1560.92
SurfaceStorage-1	3.17	1538.91
SurfaceStorage-1	3.25	1515.83
SurfaceStorage-1	3.33	1491.40
SurfaceStorage-1	3.42	1464.94
SurfaceStorage-1	3.50	1437.19
SurfaceStorage-1	3.58	1406.74
SurfaceStorage-1	3.67	1374.46
SurfaceStorage-1	3.75	1338.69
SurfaceStorage-1	3.83	1299.30
SurfaceStorage-1	3.92	1255.06
SurfaceStorage-1	4.00	1204.49
SurfaceStorage-1	4.08	1139.96
SurfaceStorage-1	4.17	1040.83
SurfaceStorage-1	4.25	958.48
SurfaceStorage-1	4.33	926.28
SurfaceStorage-1	4.42	896.93
SurfaceStorage-1	4.50	856.73
SurfaceStorage-1	4.58	840.00
SurfaceStorage-1	4.67	840.00
SurfaceStorage-1	4.75	840.00
SurfaceStorage-1	4.83	840.00

```
SurfaceStorage-1            4.92       840.00
SurfaceStorage-1            5.00       840.00
SurfaceStorage-1            5.08       840.00
SurfaceStorage-1            5.17       840.00
SurfaceStorage-1            5.25       840.00
SurfaceStorage-1            5.33       840.00
SurfaceStorage-1            5.42       840.00
SurfaceStorage-1            5.50       840.00

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
6hr-Time                    0:00       0.00
6hr-Time                    0:06       0.17
6hr-Time                    0:12       0.17
6hr-Time                    0:18       0.17
6hr-Time                    0:24       0.18
6hr-Time                    0:30       0.18
6hr-Time                    0:36       0.18
6hr-Time                    0:42       0.19
6hr-Time                    0:48       0.19
6hr-Time                    0:54       0.19
6hr-Time                    1:00       0.20
6hr-Time                    1:06       0.20
6hr-Time                    1:12       0.21
6hr-Time                    1:18       0.21
6hr-Time                    1:24       0.22
6hr-Time                    1:30       0.22
6hr-Time                    1:36       0.23
6hr-Time                    1:42       0.24
6hr-Time                    1:48       0.24
6hr-Time                    1:54       0.25
6hr-Time                    2:00       0.25
6hr-Time                    2:06       0.26
6hr-Time                    2:12       0.27
6hr-Time                    2:18       0.28
6hr-Time                    2:24       0.29
6hr-Time                    2:30       0.31
6hr-Time                    2:36       0.32
6hr-Time                    2:42       0.33
6hr-Time                    2:48       0.35
6hr-Time                    2:54       0.37
6hr-Time                    3:00       0.39
6hr-Time                    3:06       0.42
6hr-Time                    3:12       0.44
6hr-Time                    3:18       0.49
6hr-Time                    3:24       0.52
6hr-Time                    3:30       0.59
6hr-Time                    3:36       0.64
6hr-Time                    3:42       0.78
```

```
6hr-Time                    3:48       0.89
6hr-Time                    3:54       1.31
6hr-Time                    4:00       1.85
6hr-Time                    4:06       6.83
6hr-Time                    4:12       1.05
6hr-Time                    4:18       0.70
6hr-Time                    4:24       0.55
6hr-Time                    4:30       0.46
6hr-Time                    4:36       0.40
6hr-Time                    4:42       0.36
6hr-Time                    4:48       0.32
6hr-Time                    4:54       0.30
6hr-Time                    5:00       0.28
6hr-Time                    5:06       0.26
6hr-Time                    5:12       0.24
6hr-Time                    5:18       0.23
6hr-Time                    5:24       0.22
6hr-Time                    5:30       0.21
6hr-Time                    5:36       0.20
6hr-Time                    5:42       0.19
6hr-Time                    5:48       0.18
6hr-Time                    5:54       0.18
6hr-Time                    6:00       0.17
;
6hr-100Time                 0:00       0.00
6hr-100Time                 0:06       0.17
6hr-100Time                 0:12       0.17
6hr-100Time                 0:18       0.17
6hr-100Time                 0:24       0.18
6hr-100Time                 0:30       0.18
6hr-100Time                 0:36       0.18
6hr-100Time                 0:42       0.19
6hr-100Time                 0:48       0.19
6hr-100Time                 0:54       0.19
6hr-100Time                 1:00       0.20
6hr-100Time                 1:06       0.20
6hr-100Time                 1:12       0.21
6hr-100Time                 1:18       0.21
6hr-100Time                 1:24       0.22
6hr-100Time                 1:30       0.22
6hr-100Time                 1:36       0.23
6hr-100Time                 1:42       0.24
6hr-100Time                 1:48       0.24
6hr-100Time                 1:54       0.25
6hr-100Time                 2:00       0.25
6hr-100Time                 2:06       0.26
6hr-100Time                 2:12       0.27
6hr-100Time                 2:18       0.28
6hr-100Time                 2:24       0.29
6hr-100Time                 2:30       0.31
```

```
6hr-100Time                2:36       0.32
6hr-100Time                2:42       0.33
6hr-100Time                2:48       0.35
6hr-100Time                2:54       0.37
6hr-100Time                3:00       0.39
6hr-100Time                3:06       0.42
6hr-100Time                3:12       0.44
6hr-100Time                3:18       0.49
6hr-100Time                3:24       0.52
6hr-100Time                3:30       0.59
6hr-100Time                3:36       0.64
6hr-100Time                3:42       0.78
6hr-100Time                3:48       0.89
6hr-100Time                3:54       1.31
6hr-100Time                4:00       1.85
6hr-100Time                4:06       6.83
6hr-100Time                4:12       1.05
6hr-100Time                4:18       0.70
6hr-100Time                4:24       0.55
6hr-100Time                4:30       0.46
6hr-100Time                4:36       0.40
6hr-100Time                4:42       0.36
6hr-100Time                4:48       0.32
6hr-100Time                4:54       0.30
6hr-100Time                5:00       0.28
6hr-100Time                5:06       0.26
6hr-100Time                5:12       0.24
6hr-100Time                5:18       0.23
6hr-100Time                5:24       0.22
6hr-100Time                5:30       0.21
6hr-100Time                5:36       0.20
6hr-100Time                5:42       0.19
6hr-100Time                5:48       0.18
6hr-100Time                5:54       0.18
6hr-100Time                6:00       0.17

[REPORT]
;;Reporting Options
INPUT      YES
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -129.191 -319.762 933.945 189.693
Units      Feet

[COORDINATES]
```

```
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            373.122            -208.197
ChamberStorage-1 254.858            -137.861

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Riser            265.178            -212.385

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
IMP-1-MWS        260.988            -15.424
IMP-1-MWS        262.222            -51.807
IMP-1-MWS        209.188            -53.657
IMP-1-MWS        204.871            -19.740

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
RainGauge        208.576            70.011
```

OUTPUT

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
  ---------------------------------------------------------------

  WARNING 09: time series interval greater than recording interval for Rain Gage
RainGauge

  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 1
  Number of nodes ........... 2
  Number of links ........... 2
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************
                                                    Data       Recording
  Name                 Data Source                  Type       Interval
  ------------------------------------------------------------------------
  RainGauge            6hr-Time                     VOLUME       5 min.


  ********************
  Subcatchment Summary
  ********************
  Name                        Area     Width   %Imperv    %Slope Rain Gage
 Outlet

-------------------------------------------------------------------------------
------------------------
  IMP-1-MWS                   0.00     10.00      0.00    0.0000 RainGauge
 ChamberStorage-1


  ************
  Node Summary
  ************
                                          Invert      Max.    Ponded    External
  Name                 Type                 Elev.     Depth      Area    Inflow
  ------------------------------------------------------------------------------
  POC-1                OUTFALL              0.00      0.00       0.0
  ChamberStorage-1     STORAGE             92.00      5.50       0.0    Yes


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

```
  Link Summary
  ************
  Name              From Node         To Node           Type             Length
%Slope Roughness

-------------------------------------------------------------------------------
----------
  Riser             ChamberStorage-1 POC-1             WEIR
  Orifices          ChamberStorage-1 POC-1             OUTLET


  *********************
  Cross Section Summary
  *********************
                                          Full      Full      Hyd.      Max.    No. of
 Full
  Conduit           Shape                 Depth     Area      Rad.     Width   Barrels
 Flow

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


  ***********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  ***********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... CFS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... GREEN_AMPT
  Flow Routing Method ...... KINWAVE
  Starting Date ............ 01/01/2000 00:00:00
  Ending Date .............. 01/02/2000 23:59:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:00:15
  Wet Time Step ............ 00:00:15
  Dry Time Step ............ 00:00:15
```

Routing Time Step .... 10.00 sec

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Total Precipitation	0.002	28.520
Evaporation Loss	0.000	0.120
Infiltration Loss	0.002	22.798
Surface Runoff	0.000	0.000
Final Storage	0.000	5.602
Continuity Error (%)	0.000	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.235	0.077
External Outflow	0.235	0.077
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.015	

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****

Minimum Time Step	:	9.00 sec
Average Time Step	:	10.00 sec
Maximum Time Step	:	10.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.00
Percent Not Converging	:	0.00

****
Subcatchment Runoff Summary

  ****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff 10^6 gal	Total Peak Runoff CFS	Runoff Coeff
IMP-1-MWS	28.52	0.00	0.12	22.80	0.00	0.00	0.00	0.00	0.000

  ****
  Node Depth Summary
  ****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
POC-1	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
ChamberStorage-1	STORAGE	0.05	1.12	93.12	0 04:09	1.12

  ****
  Node Inflow Summary
  ****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
POC-1	OUTFALL	0.00	3.72	0 04:09	0		

0.0766 0.000
ChamberStorage-1 STORAGE 6.83 6.83 0 04:06 0.0766
0.0766 -0.015

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
ChamberStorage-1	0.041	1	0	0	1.281	18	0 04:09	3.72

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
POC-1	29.80	0.20	3.72	0.077
System	29.80	0.20	3.72	0.077

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
Riser	WEIR	3.71	0	04:09			0.00
Orifices	DUMMY	0.01	0	04:09			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Sep 8 12:10:01 2025
Analysis ended on: Mon Sep 8 12:10:01 2025
Total elapsed time: < 1 sec

APPENDIX E
HYDRAULIC CALCULATIONS

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Sunday, Aug 24 2025

Bypass Pipe

Circular

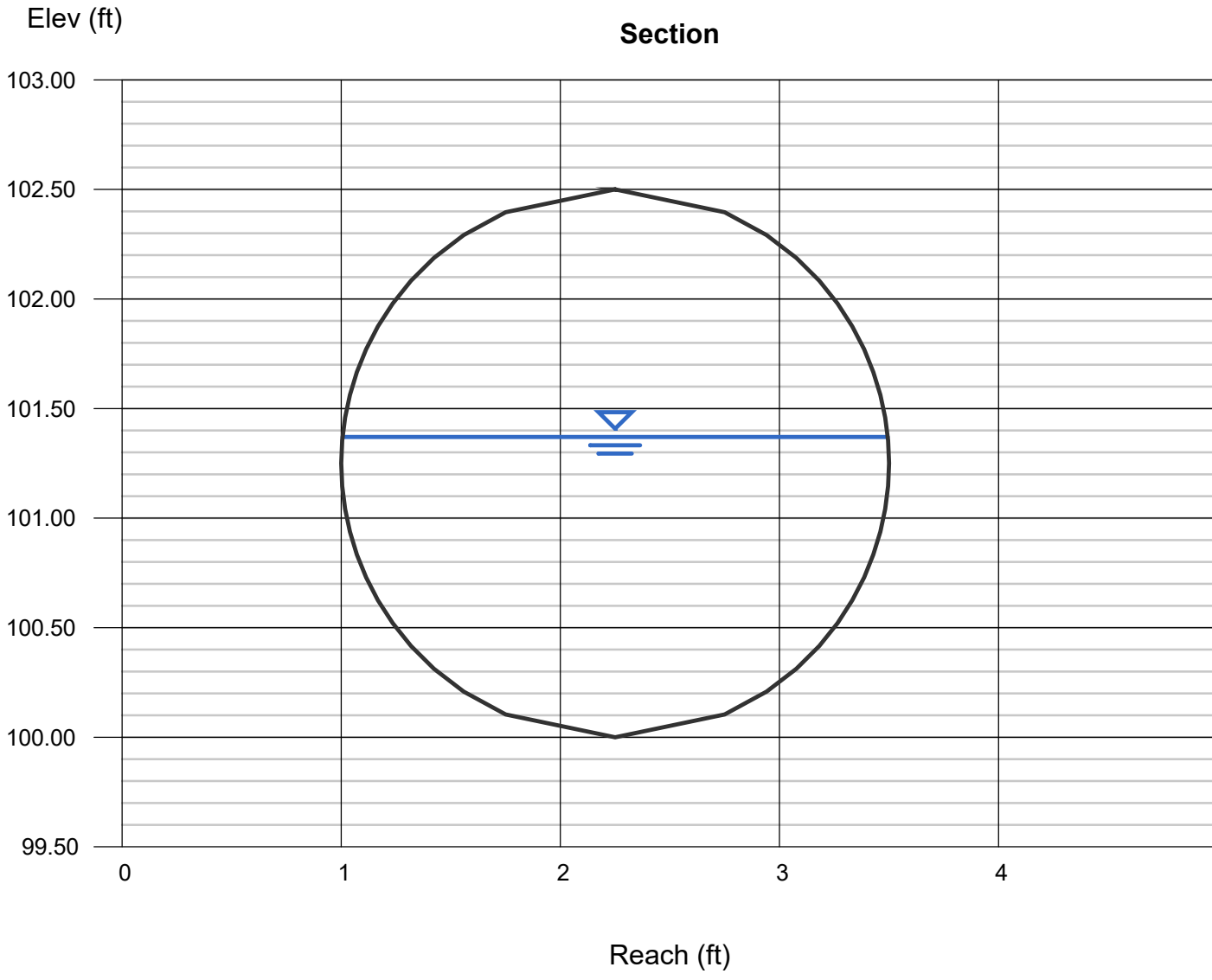
Diameter (ft)	= 2.50
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 18.13

Highlighted

Depth (ft)	= 1.37
Q (cfs)	= 18.13
Area (sqft)	= 2.76
Velocity (ft/s)	= 6.56
Wetted Perim (ft)	= 4.17
Crit Depth, Yc (ft)	= 1.45
Top Width (ft)	= 2.49
EGL (ft)	= 2.04



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Sunday, Aug 24 2025

Brow-Ditch

Circular

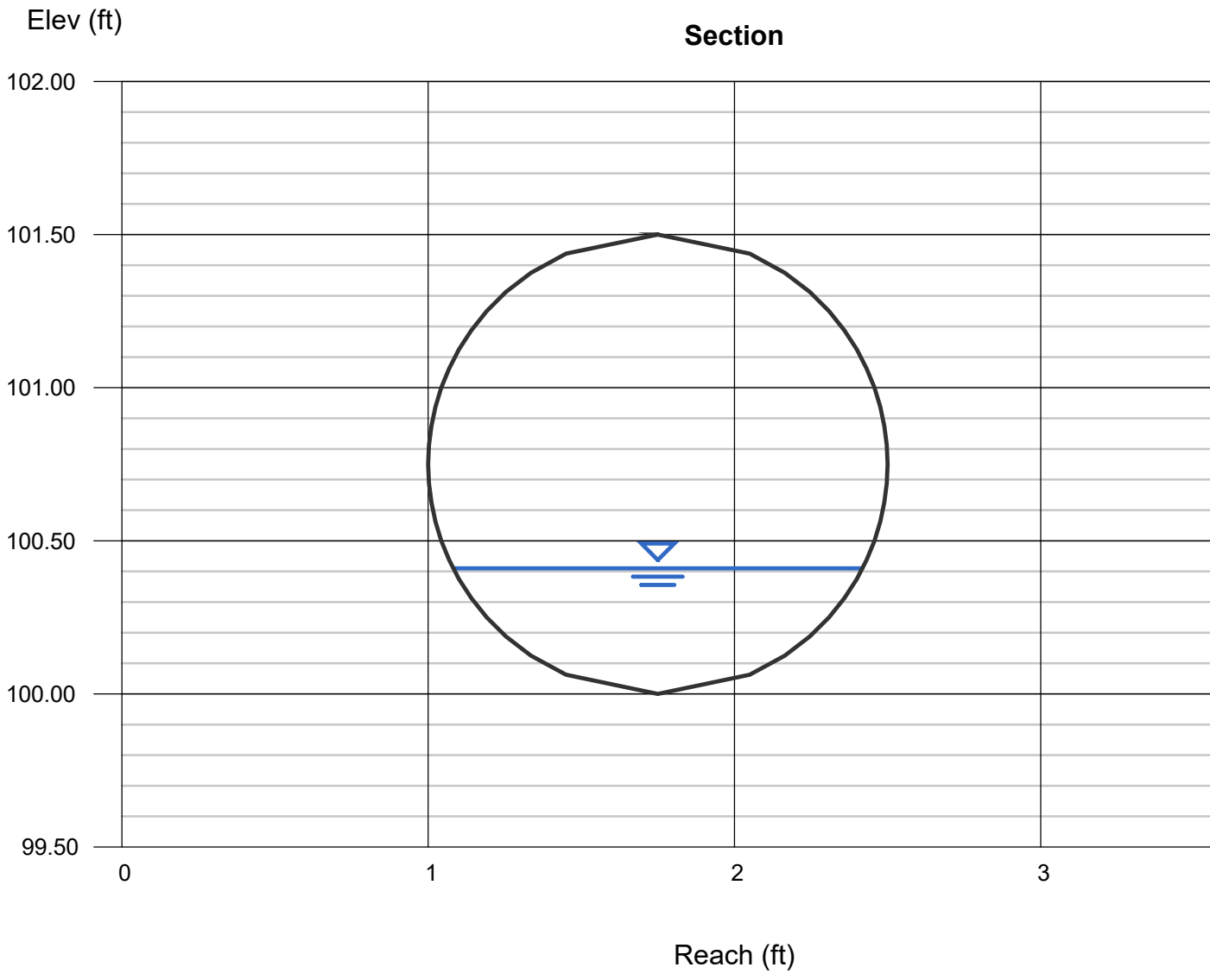
Diameter (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 3.00
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.50

Highlighted

Depth (ft)	= 0.41
Q (cfs)	= 2.500
Area (sqft)	= 0.40
Velocity (ft/s)	= 6.32
Wetted Perim (ft)	= 1.66
Crit Depth, Yc (ft)	= 0.60
Top Width (ft)	= 1.34
EGL (ft)	= 1.03



Inlet Report

Street Curb Inlet to MWS

Curb Inlet

Location	=	On grade
Curb Length (ft)	=	9.00
Throat Height (in)	=	6.00
Grate Area (sqft)	=	-0-
Grate Width (ft)	=	-0-
Grate Length (ft)	=	-0-

Gutter

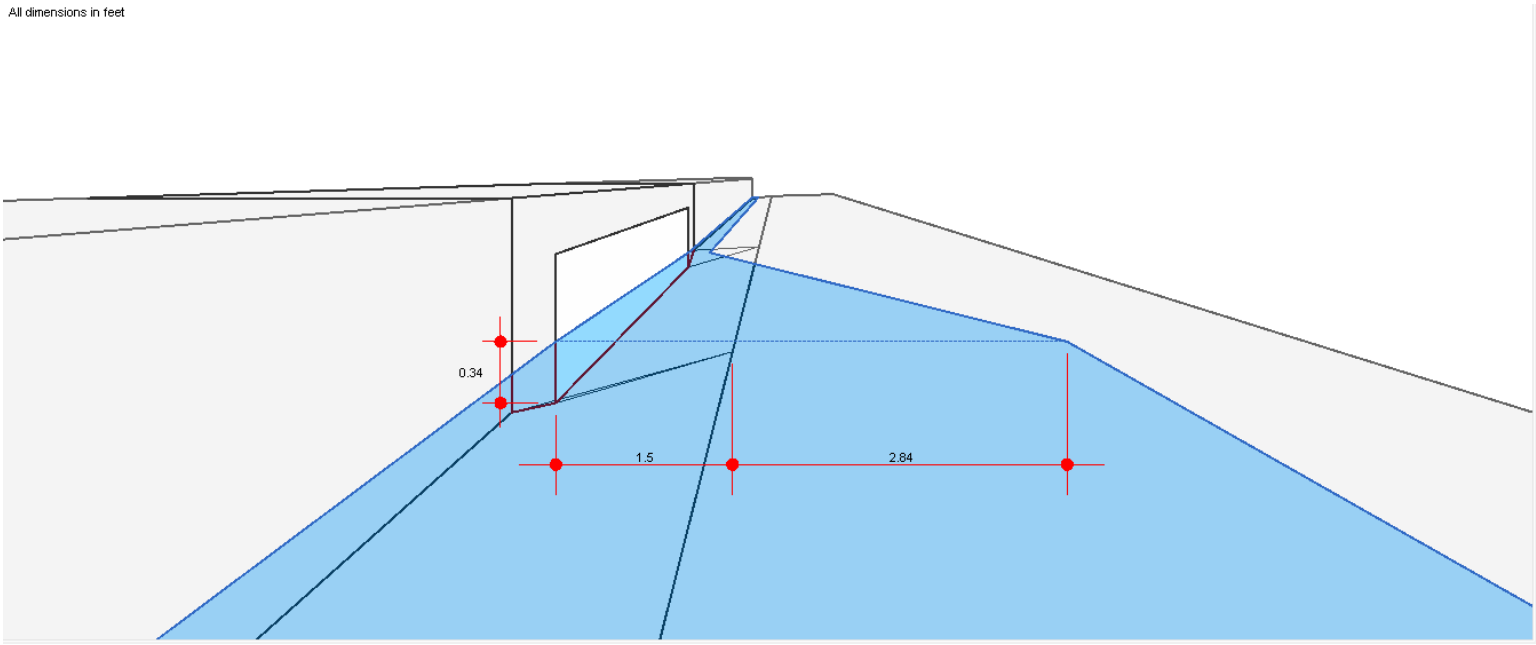
Slope, Sw (ft/ft)	=	0.080
Slope, Sx (ft/ft)	=	0.020
Local Depr (in)	=	2.00
Gutter Width (ft)	=	1.50
Gutter Slope (%)	=	5.20
Gutter n-value	=	0.015

Calculations

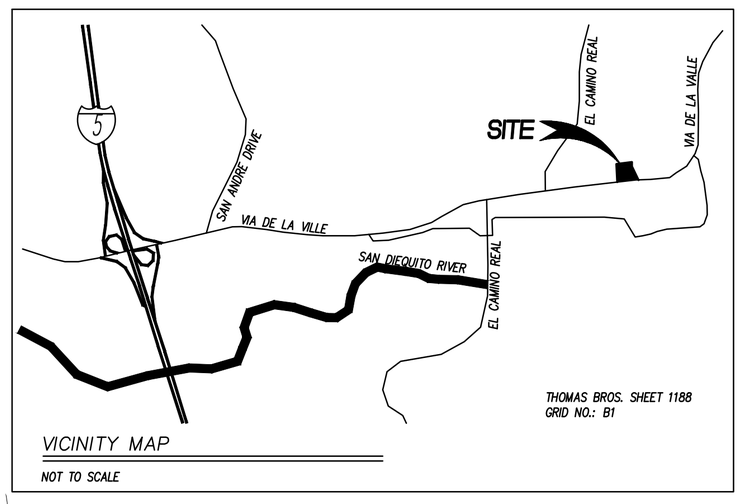
Compute by:		Known Q
Q (cfs)	=	1.20

Highlighted

Q Total (cfs)	=	1.20
Q Capt (cfs)	=	1.18
Q Bypass (cfs)	=	0.02
Depth at Inlet (in)	=	4.12
Efficiency (%)	=	99
Gutter Spread (ft)	=	4.34
Gutter Vel (ft/s)	=	4.69
Bypass Spread (ft)	=	0.45
Bypass Depth (in)	=	0.44



EXHIBITS



VICINITY MAP

NOT TO SCALE

SWS

N

40 20 0 40 80 120

SCALE IN FEET
GRAPHIC SCALE

HATCH

LANDSCAPE AREA

BRICK

BRICK

CONCRETE

WOOD DECK

AP

ROOF

CONTAINER

OFFSITE-BASIN-100.1
A = 8.63 AC

OFFSITE-BASIN-100.2
A = 0.98 AC

THIS BASIN WILL ULTIMATELY DISCHARGE TO OFFSITE (POC–1) VIA ONSITE EAST PARKING LOT, SOUTH VEGETATED CHANNEL AND WEST DRIVEWAY

BASIN-200
A=2.72 ac
Q=12.1 cfs

CONFLUENCE POINT OF MAJORE OFFSITE FLOW WITH ONSITE FLOW

POC–1

100+200
Q_{100}= 18.2
Tc = 20.3
A = 12.33

V_{100}=5.0 F/S

VIA DE LA VALLE

LEGEND

PROPERTY BOUNDARY (2.77 AC)

MAJOR BASIN BOUNDARY

SUBBASIN BOUNDARY

FLOW PATH

SOIL TYPE "D"

GROUNDWATER TABLE > 50'

100
Q_{100}= XXX
Tc = N/A
A = N/A

100–YEAR FREQUENCY DISCHARGE (CFS)
TIME OF CONCENTRATION (MIN)
AREA (AC)

NODE (100)

TABULAR SUMMARY

BASIN #	AREA (AC)	PERVIOUS AREA (AC)	IMPERVIOUS AREA (AC)	WEIGHTED "C"	% IMP	HSG
200	2.72	1.21	1.51	0.66	56	D

PRE DRAINAGE MAP

FOR

CHABAD RANCHO SANTA FE

SWS ENGINEERING, INC.
Civil Engineering • Land Planning • Surveying
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011
SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

DATE:9/9/2025 2:15:56 PM BY:MASSY,FATIN
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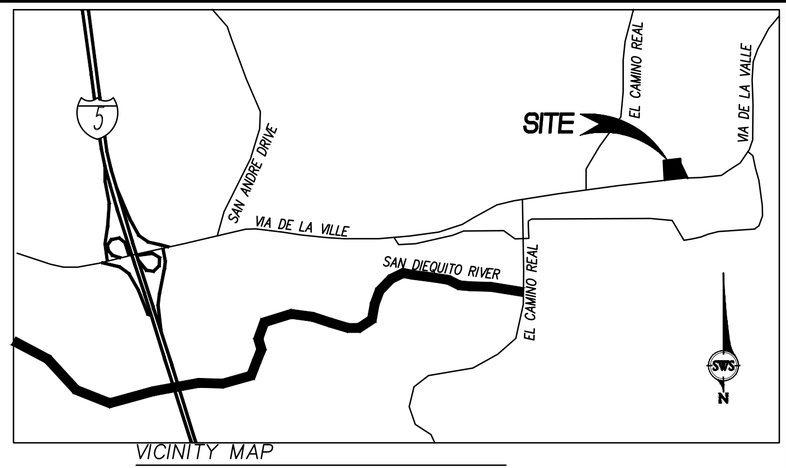
24" x 36"



VICINITY MAP

NO SCALE

SWS
N

40 20 0 40 80 120

SCALE IN FEET
GRAPHIC SCALE

OFFSITE-BASIN-100.1
A = 8.63 AC

OFFSITE-BASIN-100.2
A = 0.98 AC

THIS BASIN WILL ULTIMATELY DISCHARGE TO OFFSITE (POC-1) VIA BROW-DITCH, BYPASS PIPE

OFFSITE DISCHARGE POINT

POC-1

100+200
Q_{100}= 19.7
Tc = 16.8
A = 12.3

ATTENUATED
Q=18.0 CFS
V = 5.1 F/S

Q_{100} (INTO STORAGE) = 6.83 CFS
Q_{100} (OUT OF STORAGE = 4.82 CFS
TO BYPASS PIPE)

VIA DE LA VALLE

LEGEND

NODE	(100)
100-YEAR FREQUENCY DISCHARGE (CFS)	100 / Q_{100} = XXX
TIME OF CONCENTRATION (MIN)	Tc = N/A
AREA (AC)	A = N/A
OFFSITE MAJOR BASIN BOUNDARY	
ONSITE MAJOR BASIN BOUNDARY	
SUBBASIN BOUNDARY	
FLOW PATH	
PROPOSED STORM DRAIN	SD
SOIL TYPE	"D"
GROUNDWATER TABLE	> 50'
BOUNDARY TO REMAIN UNDISTURBED	
PROPOSED MULCH	
PROPOSED ROCK	
PROPOSED GRAVEL	
PROPOSED LANDSCAPE	
PROPOSED PERMEABLE PAVER	
PROPOSED LIME STONE	
PROPOSED CONCRETE PAVING	
PROPOSED CONCRETE	
PROPOSED BLDG	
PROPOSED ASH	
EXISTING BRICK	
EXISTING BRICK	
EXITING CONCRETE	
EXITING CONCRETE WOOD DECK	
EXITING ROOF	
EXISTING AP	
EXISTING LANDSCAPE	

TABULAR SUMMARY

BASIN #	AREA (AC)	PERVIOUS AREA (AC)	IMPERVIOUS AREA (AC)	WEIGHTED "C"	% IMP	HSG
200	2.72	0.81	1.91	0.74	0.70	D

POST DRAINAGE MAP

FOR

CHABAD RANCHO SANTA FE

SWS ENGINEERING, INC.
Civil Engineering • Land Planning • Surveying
1635 Lake San Marcos Drive, Suite 200
San Marcos, CA 92078
P: 760-744-0011
SAN DIEGO - NASHVILLE - PHOENIX - ORLANDO

DATE:9/9/2025 9:56:06 AM BY:MASSY,FATINI
FILE:Z:\Projects\2021\21-257\PROD\Reports\Hydrology
FILE NAME:21-257_Post Drainage.dwg

24" x 36"