

BEAR VALLEY PARKWAY  
Drainage Study

City of Escondido, CA

Prepared for

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# 1 Scope

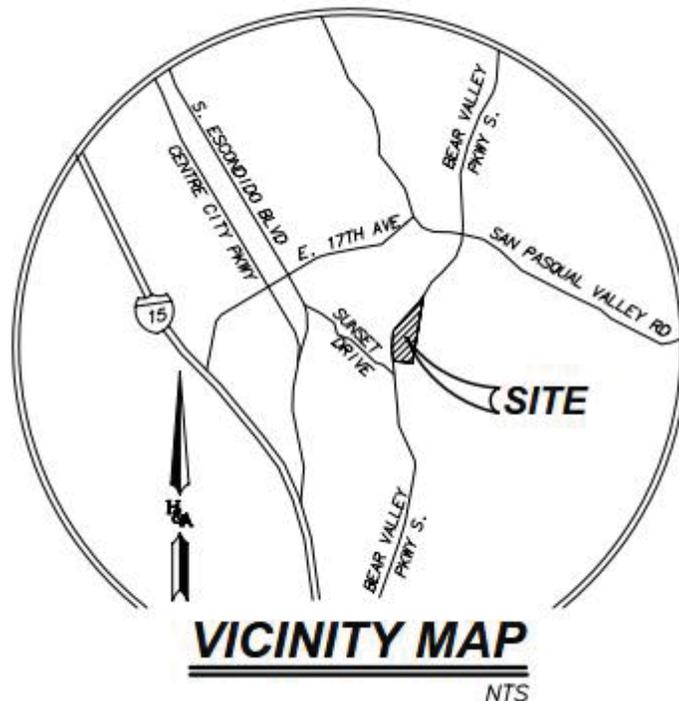
The purpose of this study is to provide flood control calculations in support of a proposed subdivision of land for creation of 55 residential lots in the City of Escondido, CA. This report will provide preliminary calculations for existing and proposed runoff for the 100-year frequency storm event.

# 2 Existing Conditions

Bear valley Parkway is a 41 acre site, located in the County of San Diego, California. Most of the site is made up of hillside and is sparsely vegetated by seasonal grass. The project site is bounded to the north, west and south by Bear Valley Parkway, and to the east by Choya Canyon Road. The hilltop at the central portion of the site has been graded to accommodate an existing single family residence. There is also a driveway connecting the existing residence to Bear Valley

Please see vicinity map below.

Site topography varies from 680 to 525 Mean Sea Level, with the higher elevations along the eastern portion of the site.



Three drainage courses run through the site, falling generally north to south. These collect runoff discharging from existing culverts under the roads previously mentioned.

- The westerly drainage course collects runoff near the westerly boundary of the project, from both Bear Valley Parkway and the project site. This drainage course also conveys runoff from a small offsite area west of Bear Valley Parkway that is discharged to the site via an existing 18-in CMP culvert.
- The central drainage course collects runoff from the central portion of the project hillside
- The eastern drainage course collects runoff from the easterly slopes of the project, as well as offsite hillsides with dispersed estate style single family residences.

All runoff ultimately leaves the site near the southerly boundary, draining to a small creek that leads to Lake Hodges.

### **Hydrologic and Geotechnical Characteristics;**

The entire site is tributary to Lake Hodges, and is identified as part of the San Dieguito Hydrologic Unit, Hodges Hydrologic Area (basin number 905.2).

The site is not mapped within any flood hazard areas.

According to the NRCS Web Soil Survey, the soils onsite are hydrologic soil type C.

## **3 Project Description**

The proposed development will create 55 single family residential lots. The project proposes to extend a private street from Bear Valley Parkway, through the site. The onsite road will generally follow existing terrain, bifurcating the site necessitating creating approximately 10' high cut or fill slopes.

Proposed frontage improvements to Bear Valley Parkway include widening in addition to replacing the existing paved shoulder and berm with a new curb, gutter and sidewalk. A new storm drain inlet will be added on Bear Valley Parkway, adjacent to the southerly property limits. Surface improvements will only be made to the easterly shoulder of Bear Valley Parkway, and drainage patterns on Bear Valley will remain unchanged, as the existing road is super elevated, which will remain unchanged.

### **Drainage Routing and Improvements;**

All onsite runoff is directed towards 2 bioretention areas designed to mitigate for water quality and hydromodification. The bioretention areas will be located near the westerly project boundary, adjacent to the areas they are designed to mitigate. Drainage patterns will remain generally unchanged, and all mitigated runoff will drain to the existing 60" culvert under Bear Valley Parkway.

## 4 Methodology

### 4.1 *Hydrology*

The Rational Method as described in the June 2003 San Diego County Hydrology Manual (SDCHM), Section 3, was used for the hydrologic calculations for this project. The Rational Method formula is expressed as follows:

$$Q = C I A$$

$$I = 7.44P_6T_c^{-0.645}$$

$$T_c = T_t + T_i$$

$$T_t = (11.9 * L^3 / \Delta E)^{0.385}$$

Where:

Q = Peak discharge, in cubic feet per second (cfs).

C = Runoff coefficient, proportion of the rainfall that runs off the surface. The C coefficient was obtained from Table 3-1 of the SDCHM. It has no units and is based on the soil group and the development type for the drainage sub-area.

A = Drainage area contributing to the design location (ac).

I = Average rainfall intensity (in/hr). The formula can be found on Figure 3-2 of the SDCHM.

P<sub>6</sub> = 6-hour precipitation (in). This value was taken from the 6-hour isopluvial maps found in Appendix B of the SDCHM.

T<sub>i</sub> = Initial time of concentration, from Table 3-2 of the SDCHM.

T<sub>t</sub> = Travel time (min), from Figure 3-4 of the SDCHM.

L = Longest flow path distance (mi).

ΔE = Change in elevation along flowpath (ft).

## 5 Results and Conclusions

The following tabulates the results for the project hydrology for the project.

Table 1 Rational Method Results

Existing Condition	
Area (ac)	100-Year Peak Flow (cfs)
80	156
Proposed Condition - Mitigated	
Area (ac)	100-Year Peak Flow (cfs)
80	109

As illustrated above, development of the Bear Valley Parkway project site attenuates runoff to levels below the 156cfs experienced in existing conditions, to an anticipated 109 cfs in developed conditions, a decrease of approximately 47 cfs.

### **Conclusions;**

Since the project does not increase runoff in the 100-year storm event, no negative impacts to downstream drainage facilities are expected.

Please see our separate Water Quality report that provides mitigation for all onsite stormwater quality impacts, as well as hydromodification management.

## 6 Watershed Information

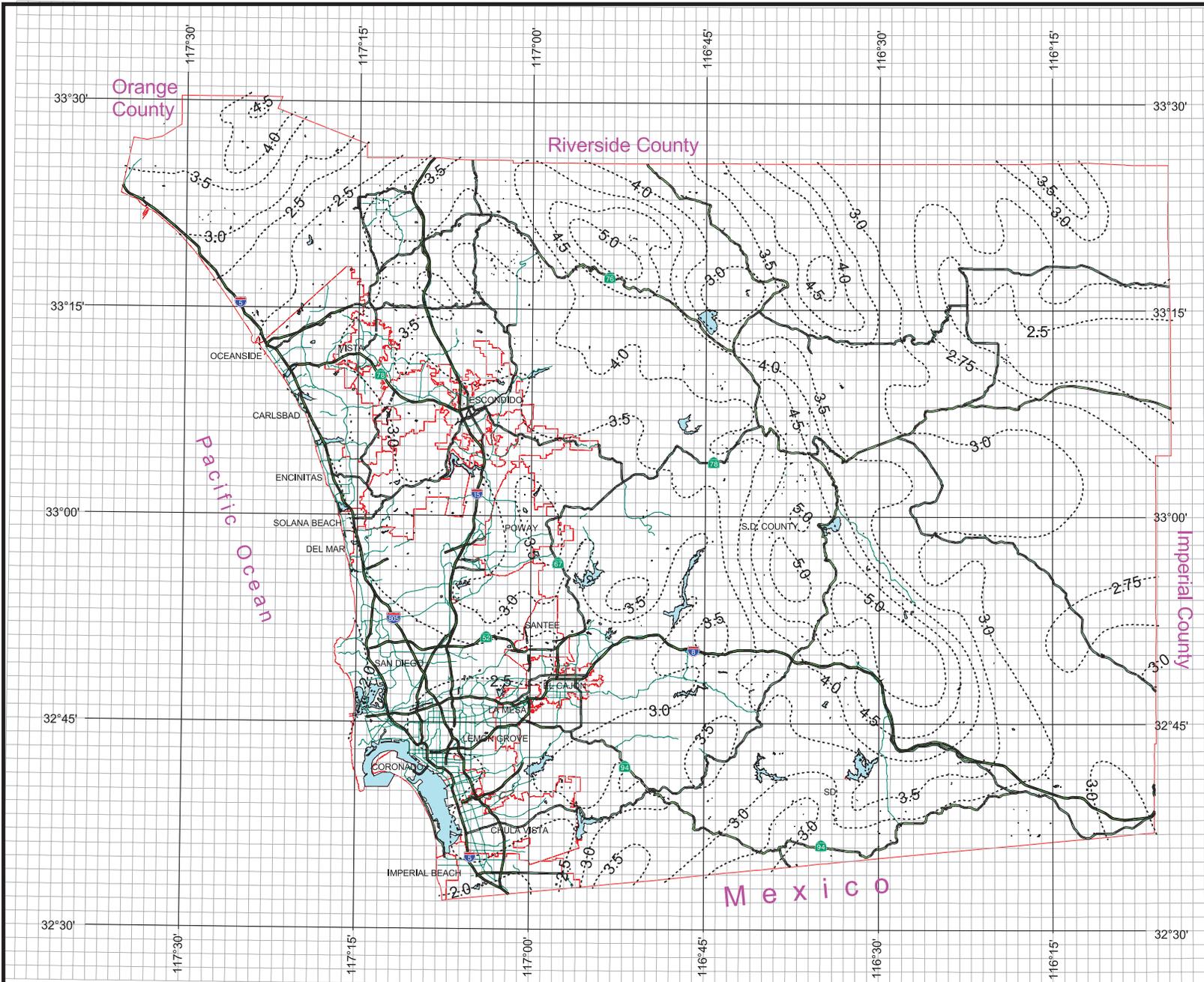
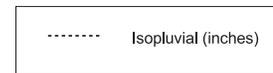
- Isopluvial Map

# County of San Diego Hydrology Manual



## Rainfall Isopluvials

### 100 Year Rainfall Event - 6 Hours



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## 7 Appendices

## **Appendix 1 - Soils Information**

Hydrologic Soil Group—San Diego County Area, California  
(Bear Valley Parkway)



Map Scale: 1:9,150 if printed on B portrait (11" x 17") sheet.  
 0 100 200 400 600 Meters  
 0 400 800 1600 2400 Feet  
 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: <http://websoilsurvey.nrcs.usda.gov>  
 Coordinate System: Web Mercator (EPSG:3857)

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

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

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

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

Date(s) aerial images were photographed: May 2, 2010—Jun 7, 2012

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

## Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CIG2	Cieneba coarse sandy loam, 30 to 65 percent slopes, eroded	D	4.1	0.6%
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	C	39.5	5.3%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	C	105.4	14.2%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	253.2	34.0%
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes	C	43.6	5.9%
FvE	Fallbrook-Vista sandy loams, 15 to 30 percent slopes	C	29.9	4.0%
RaB	Ramona sandy loam, 2 to 5 percent slopes	C	186.8	25.1%
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	C	46.7	6.3%
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	C	19.5	2.6%
StG	Steep gullied land		7.4	1.0%
VvG	Vista rocky coarse sandy loam, 30 to 65 percent slopes	B	8.0	1.1%
<b>Totals for Area of Interest</b>			<b>744.1</b>	<b>100.0%</b>

## 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

## **Appendix 2 - Hydrology Calculations and Exhibits**

## EXISTING CONDITION

\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT  
2003,1985,1981 HYDROLOGY MANUAL  
(c) Copyright 1982-2013 Advanced Engineering Software (aes)  
Ver. 20.0 Release Date: 06/01/2013 License ID 1239

Analysis prepared by:

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* BEAR VALLEY PARKWAY EXISTING 100-YEAR ANALYSIS \*  
\* \* \* \* \*

FILE NAME: H:\AES2010\1161\EX\EX-Q100.DAT  
TIME/DATE OF STUDY: 14:18 01/06/2015

-----  
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:  
-----

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
6-HOUR DURATION PRECIPITATION (INCHES) = 3.300  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95  
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD  
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS  
\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*  
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING  
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR  
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)  
=====

NO.	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / SIDE/ WAY	PARK- HEIGHT (FT)	WIDTH (FT)	LIP (FT)	HIKE (FT)	FACTORS (n)
1	13.0	6.5	0.020/0.020	0.020	0.50	1.50	0.0313	0.125	0.0160
2	15.0	7.5	0.020/0.020	0.020	0.50	1.50	0.0313	0.125	0.0130

=====

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.50 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 5.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 100.00 TO NODE 102.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
=====

NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 88  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 130.00  
UPSTREAM ELEVATION(FEET) = 710.00  
DOWNSTREAM ELEVATION(FEET) = 700.00  
ELEVATION DIFFERENCE(FEET) = 10.00  
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.839

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN  
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00  
(Reference: Table 3-1b of Hydrology Manual)  
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.104  
SUBAREA RUNOFF(CFS) = 0.75  
TOTAL AREA(ACRES) = 0.30 TOTAL RUNOFF(CFS) = 0.75

\*\*\*\*\*  
FLOW PROCESS FROM NODE 102.00 TO NODE 104.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 630.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 685.00 CHANNEL SLOPE = 0.1022  
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION  
NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION  
CHANNEL FLOW THRU SUBAREA(CFS) = 0.75  
FLOW VELOCITY(FEET/SEC) = 4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 2.41 Tc(MIN.) = 9.25  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 815.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 102.00 TO NODE 104.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.848  
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 88  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500  
SUBAREA AREA(ACRES) = 3.50 SUBAREA RUNOFF(CFS) = 7.16  
TOTAL AREA(ACRES) = 3.8 TOTAL RUNOFF(CFS) = 7.78  
TC(MIN.) = 9.25

\*\*\*\*\*  
FLOW PROCESS FROM NODE 104.00 TO NODE 104.00 IS CODE = 1  
-----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
=====

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 9.25  
RAINFALL INTENSITY(INCH/HR) = 5.85  
TOTAL STREAM AREA(ACRES) = 3.80  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.78

\*\*\*\*\*  
FLOW PROCESS FROM NODE 106.00 TO NODE 108.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
=====

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 82  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00  
UPSTREAM ELEVATION(FEET) = 710.00  
DOWNSTREAM ELEVATION(FEET) = 700.00  
ELEVATION DIFFERENCE(FEET) = 10.00  
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.765  
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.932  
SUBAREA RUNOFF(CFS) = 0.65  
TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 0.65

\*\*\*\*\*  
FLOW PROCESS FROM NODE 108.00 TO NODE 104.00 IS CODE = 52

-----  
>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 630.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 700.00 CHANNEL SLOPE = 0.1000  
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION  
CHANNEL FLOW THRU SUBAREA(CFS) = 0.65  
FLOW VELOCITY(FEET/SEC) = 4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 8.22  
LONGEST FLOWPATH FROM NODE 106.00 TO NODE 104.00 = 800.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 108.00 TO NODE 104.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.307  
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 82  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100  
SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 17.33  
TOTAL AREA(ACRES) = 6.9 TOTAL RUNOFF(CFS) = 17.84  
TC(MIN.) = 8.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 104.00 TO NODE 104.00 IS CODE = 1

-----  
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<  
-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
TIME OF CONCENTRATION(MIN.) = 8.22  
RAINFALL INTENSITY(INCH/HR) = 6.31  
TOTAL STREAM AREA(ACRES) = 6.90  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.84

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	7.78	9.25	5.848	3.80
2	17.84	8.22	6.307	6.90

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	24.76	8.22	6.307
2	24.32	9.25	5.848

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 24.76 Tc(MIN.) = 8.22  
TOTAL AREA(ACRES) = 10.7

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 815.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 104.00 TO NODE 110.00 IS CODE = 52

-----  
>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 630.00 DOWNSTREAM(FEET) = 600.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 790.00 CHANNEL SLOPE = 0.0380  
CHANNEL FLOW THRU SUBAREA(CFS) = 24.76  
FLOW VELOCITY(FEET/SEC) = 6.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 2.13 Tc(MIN.) = 10.35  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 110.00 = 1605.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 104.00 TO NODE 110.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.437  
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 82  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3970  
SUBAREA AREA(ACRES) = 6.80 SUBAREA RUNOFF(CFS) = 15.16  
TOTAL AREA(ACRES) = 17.5 TOTAL RUNOFF(CFS) = 37.77  
TC(MIN.) = 10.35

\*\*\*\*\*  
FLOW PROCESS FROM NODE 110.00 TO NODE 112.00 IS CODE = 52

-----  
>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 600.00 DOWNSTREAM(FEET) = 560.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 770.00 CHANNEL SLOPE = 0.0519  
CHANNEL FLOW THRU SUBAREA(CFS) = 37.77  
FLOW VELOCITY(FEET/SEC) = 8.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 1.58 Tc(MIN.) = 11.93  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 112.00 = 2375.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 110.00 TO NODE 112.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.962  
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 82  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4011  
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 16.28  
TOTAL AREA(ACRES) = 25.5 TOTAL RUNOFF(CFS) = 50.75  
TC(MIN.) = 11.93

\*\*\*\*\*  
FLOW PROCESS FROM NODE 112.00 TO NODE 114.00 IS CODE = 52

-----  
>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 540.00 DOWNSTREAM(FEET) = 525.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 780.00 CHANNEL SLOPE = 0.0192  
CHANNEL FLOW THRU SUBAREA(CFS) = 50.75  
FLOW VELOCITY(FEET/SEC) = 5.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 2.41 Tc(MIN.) = 14.34  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 114.00 = 3155.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 112.00 TO NODE 114.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.407
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4041
SUBAREA AREA(ACRES) = 12.90 SUBAREA RUNOFF(CFS) = 23.31
TOTAL AREA(ACRES) = 38.4 TOTAL RUNOFF(CFS) = 68.37
TC(MIN.) = 14.34

-----  
END 100 AREA  
BEGIN 200 AREA  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 200.00 TO NODE 202.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
=====

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 82
INITIAL SUBAREA FLOW-LENGTH(FEET) = 110.00
UPSTREAM ELEVATION(FEET) = 690.00
DOWNSTREAM ELEVATION(FEET) = 680.00
ELEVATION DIFFERENCE(FEET) = 10.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.951

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN  
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00  
(Reference: Table 3-1B of Hydrology Manual)  
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.771
SUBAREA RUNOFF(CFS) = 1.59
TOTAL AREA(ACRES) = 0.50 TOTAL RUNOFF(CFS) = 1.59

\*\*\*\*\*  
FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 680.00 DOWNSTREAM(FEET) = 560.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1100.00 CHANNEL SLOPE = 0.1091
NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) = 1.59
FLOW VELOCITY(FEET/SEC) = 5.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 3.53 Tc(MIN.) = 9.48
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 204.00 = 1210.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 81  
-----

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.755
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 48.60
TOTAL AREA(ACRES) = 21.1 TOTAL RUNOFF(CFS) = 49.78
TC(MIN.) = 9.48

\*\*\*\*\*  
FLOW PROCESS FROM NODE 204.00 TO NODE 206.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 560.00 DOWNSTREAM(FEET) = 520.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 900.00 CHANNEL SLOPE = 0.0444
CHANNEL FLOW THRU SUBAREA(CFS) = 49.78
FLOW VELOCITY(FEET/SEC) = 8.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 1.84 Tc(MIN.) = 11.32
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 2110.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 204.00 TO NODE 206.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.132
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 20.50 SUBAREA RUNOFF(CFS) = 43.14
TOTAL AREA(ACRES) = 41.6 TOTAL RUNOFF(CFS) = 87.54
TC(MIN.) = 11.32

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 41.6 TC(MIN.) = 11.32
PEAK FLOW RATE(CFS) = 87.54

=====

END OF RATIONAL METHOD ANALYSIS

## **PROPOSED CONDITION**

\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT  
2003,1985,1981 HYDROLOGY MANUAL  
(c) Copyright 1982-2013 Advanced Engineering Software (aes)  
Ver. 20.0 Release Date: 06/01/2013 License ID 1239

Analysis prepared by:

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* BEAR VALLEY PARKWAY PROPOSED 100-YEAR HYDROLOGY \*  
\* \* \* \* \*

FILE NAME: H:\AES2010\1161\PR\PR-Q100.DAT  
TIME/DATE OF STUDY: 11:11 05/27/2015

-----  
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:  
-----

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
6-HOUR DURATION PRECIPITATION (INCHES) = 3.300  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95  
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD  
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS  
\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*  
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING  
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR  
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (n)  
=====

NO.	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / SIDE/ WAY	HEIGHT (FT)	WIDTH (FT)	LIP (FT)	HIKE (FT)	FACTOR (n)
1	16.0	8.0	0.020/0.020	0.020	0.50	1.50	0.0313	0.125	0.0150
2	12.0	6.0	0.020/0.020	0.020	0.50	1.50	0.0313	0.125	0.0150

=====

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 0.50 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 5.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*\*\*\*\*  
FLOW PROCESS FROM NODE 100.00 TO NODE 102.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
-----  
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 88  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 130.00  
UPSTREAM ELEVATION(FEET) = 710.00  
DOWNSTREAM ELEVATION(FEET) = 700.00  
ELEVATION DIFFERENCE(FEET) = 10.00  
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.839

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN  
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00  
(Reference: Table 3-1b of Hydrology Manual)  
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.104  
SUBAREA RUNOFF(CFS) = 0.75  
TOTAL AREA(ACRES) = 0.30 TOTAL RUNOFF(CFS) = 0.75

\*\*\*\*\*  
FLOW PROCESS FROM NODE 102.00 TO NODE 104.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 630.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 700.00 CHANNEL SLOPE = 0.1000  
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION  
CHANNEL FLOW THRU SUBAREA(CFS) = 0.75  
FLOW VELOCITY(FEET/SEC) = 4.74 (PER LACFCD/RCPC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 9.30  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 830.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 102.00 TO NODE 104.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.827  
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 88  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500  
SUBAREA AREA(ACRES) = 3.50 SUBAREA RUNOFF(CFS) = 7.14  
TOTAL AREA(ACRES) = 3.8 TOTAL RUNOFF(CFS) = 7.75  
TC(MIN.) = 9.30

\*\*\*\*\*  
FLOW PROCESS FROM NODE 104.00 TO NODE 106.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 625.00 DOWNSTREAM(FEET) = 620.00  
FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.33  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 7.75  
PIPE TRAVEL TIME(MIN.) = 0.50 Tc(MIN.) = 9.80  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 1080.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 1  
-----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 9.80  
RAINFALL INTENSITY(INCH/HR) = 5.63  
TOTAL STREAM AREA(ACRES) = 3.80  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.75

```

*****
FLOW PROCESS FROM NODE 108.00 TO NODE 110.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
-----
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 82
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 710.00
DOWNSTREAM ELEVATION(FEET) = 700.00
ELEVATION DIFFERENCE(FEET) = 10.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.765
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.932
SUBAREA RUNOFF(CFS) = 0.65
TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 0.65

```

```

*****
FLOW PROCESS FROM NODE 110.00 TO NODE 112.00 IS CODE = 52
-----
>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 655.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 410.00 CHANNEL SLOPE = 0.1098
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) = 0.65
FLOW VELOCITY(FEET/SEC) = 4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 1.44 Tc(MIN.) = 7.21
LONGEST FLOWPATH FROM NODE 108.00 TO NODE 112.00 = 510.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 110.00 TO NODE 112.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.869
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
SUBAREA AREA(ACRES) = 4.60 SUBAREA RUNOFF(CFS) = 12.95
TOTAL AREA(ACRES) = 4.8 TOTAL RUNOFF(CFS) = 13.52
TC(MIN.) = 7.21

```

```

*****
FLOW PROCESS FROM NODE 112.00 TO NODE 106.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 650.00 DOWNSTREAM(FEET) = 620.00
FLOW LENGTH(FEET) = 570.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.76
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.52
PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 7.90
LONGEST FLOWPATH FROM NODE 108.00 TO NODE 106.00 = 1080.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.90
RAINFALL INTENSITY(INCH/HR) = 6.48
TOTAL STREAM AREA(ACRES) = 4.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.52

```

```

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 7.75 9.80 5.634 3.80
2 13.52 7.90 6.475 4.80

```

```

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

```

```

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 19.76 7.90 6.475
2 19.51 9.80 5.634

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 19.76 Tc(MIN.) = 7.90
TOTAL AREA(ACRES) = 8.6
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 1080.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 106.00 TO NODE 114.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 620.00 DOWNSTREAM(FEET) = 610.00
FLOW LENGTH(FEET) = 300.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.69
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.76
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 8.29
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 114.00 = 1380.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
-----

```

```

*****
FLOW PROCESS FROM NODE 116.00 TO NODE 118.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
-----
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
S.C.S. CURVE NUMBER (AMC II) = 82

```

INITIAL SUBAREA FLOW-LENGTH(FEET) = 160.00  
UPSTREAM ELEVATION(FEET) = 658.00  
DOWNSTREAM ELEVATION(FEET) = 656.00  
ELEVATION DIFFERENCE(FEET) = 2.00  
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.766  
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN  
THE MAXIMUM OVERLAND FLOW LENGTH = 67.50  
(Reference: Table 3-1B of Hydrology Manual)  
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.931  
SUBAREA RUNOFF(CFS) = 1.62  
TOTAL AREA(ACRES) = 0.30 TOTAL RUNOFF(CFS) = 1.62

\*\*\*\*\*  
FLOW PROCESS FROM NODE 118.00 TO NODE 120.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

-----  
UPSTREAM ELEVATION(FEET) = 656.00 DOWNSTREAM ELEVATION(FEET) = 626.00  
STREET LENGTH(FEET) = 810.00 CURB HEIGHT(INCHES) = 6.0  
STREET HALFWIDTH(FEET) = 12.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 6.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curb) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0130

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.60  
\*\*\*STREET FLOWING FULL\*\*\*  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.38  
HALFSTREET FLOOD WIDTH(FEET) = 12.00  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.97  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.87  
STREET FLOW TRAVEL TIME(MIN.) = 2.71 Tc(MIN.) = 8.48  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.184

\*USER SPECIFIED(SUBAREA):  
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800  
S.C.S. CURVE NUMBER (AMC II) = 82  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.680  
SUBAREA AREA(ACRES) = 7.00 SUBAREA RUNOFF(CFS) = 29.44  
TOTAL AREA(ACRES) = 7.3 PEAK FLOW RATE(CFS) = 30.70

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 12.00  
FLOW VELOCITY(FEET/SEC.) = 6.36 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.78  
LONGEST FLOWPATH FROM NODE 116.00 TO NODE 120.00 = 970.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 120.00 TO NODE 122.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 623.00 DOWNSTREAM(FEET) = 620.00  
FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.78

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 30.70  
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 8.49  
LONGEST FLOWPATH FROM NODE 116.00 TO NODE 122.00 = 990.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1  
-----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 8.49  
RAINFALL INTENSITY(INCH/HR) = 6.18  
TOTAL STREAM AREA(ACRES) = 7.30  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 30.70

\*\*\*\*\*  
FLOW PROCESS FROM NODE 124.00 TO NODE 126.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

-----  
\*USER SPECIFIED(SUBAREA):  
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800  
S.C.S. CURVE NUMBER (AMC II) = 82  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 170.00  
UPSTREAM ELEVATION(FEET) = 650.00  
DOWNSTREAM ELEVATION(FEET) = 640.00  
ELEVATION DIFFERENCE(FEET) = 10.00  
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.101  
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN  
THE MAXIMUM OVERLAND FLOW LENGTH = 95.88  
(Reference: Table 3-1B of Hydrology Manual)  
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695  
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.  
SUBAREA RUNOFF(CFS) = 1.18  
TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 1.18

\*\*\*\*\*  
FLOW PROCESS FROM NODE 126.00 TO NODE 122.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 640.00 DOWNSTREAM(FEET) = 620.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 760.00 CHANNEL SLOPE = 0.0263  
CHANNEL FLOW THRU SUBAREA(CFS) = 1.18  
FLOW VELOCITY(FEET/SEC) = 2.51 (PER LACFCD/RCPC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 5.04 Tc(MIN.) = 9.14  
LONGEST FLOWPATH FROM NODE 124.00 TO NODE 122.00 = 930.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 126.00 TO NODE 122.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.891  
\*USER SPECIFIED(SUBAREA):  
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800  
S.C.S. CURVE NUMBER (AMC II) = 82  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6800  
SUBAREA AREA(ACRES) = 2.50 SUBAREA RUNOFF(CFS) = 10.01

TOTAL AREA(ACRES) = 2.7 TOTAL RUNOFF(CFS) = 10.82  
TC(MIN.) = 9.14

\*\*\*\*\*  
FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
TIME OF CONCENTRATION(MIN.) = 9.14  
RAINFALL INTENSITY(INCH/HR) = 5.89  
TOTAL STREAM AREA(ACRES) = 2.70  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.82

\*\* CONFLUENCE DATA \*\*  
STREAM RUNOFF Tc INTENSITY AREA  
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)  
1 30.70 8.49 6.178 7.30  
2 10.82 9.14 5.891 2.70

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

\*\* PEAK FLOW RATE TABLE \*\*  
STREAM RUNOFF Tc INTENSITY  
NUMBER (CFS) (MIN.) (INCH/HOUR)  
1 40.74 8.49 6.178  
2 40.09 9.14 5.891

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 40.74 Tc(MIN.) = 8.49  
TOTAL AREA(ACRES) = 10.0  
LONGEST FLOWPATH FROM NODE 116.00 TO NODE 122.00 = 990.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

-----  
USER-SPECIFIED VALUES ARE AS FOLLOWS:  
TC(MIN) = 9.00 RAIN INTENSITY(INCH/HOUR) = 5.95  
TOTAL AREA(ACRES) = 10.00 TOTAL RUNOFF(CFS) = 3.50

\*\*\*\*\*  
FLOW PROCESS FROM NODE 122.00 TO NODE 114.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 620.00 DOWNSTREAM(FEET) = 610.00  
FLOW LENGTH(FEET) = 110.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.59  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 3.50  
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 9.16  
LONGEST FLOWPATH FROM NODE 116.00 TO NODE 114.00 = 1100.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 11

-----  
>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

\*\*\*\*\*  
\*\* MAIN STREAM CONFLUENCE DATA \*\*

STREAM RUNOFF Tc INTENSITY AREA  
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)  
1 3.50 9.16 5.885 10.00  
LONGEST FLOWPATH FROM NODE 116.00 TO NODE 114.00 = 1100.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*

STREAM RUNOFF Tc INTENSITY AREA  
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)  
1 19.76 8.29 6.275 8.60  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 114.00 = 1380.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM RUNOFF Tc INTENSITY  
NUMBER (CFS) (MIN.) (INCH/HOUR)  
1 22.93 8.29 6.275  
2 22.03 9.16 5.885

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 22.93 Tc(MIN.) = 8.29  
TOTAL AREA(ACRES) = 18.6

\*\*\*\*\*  
FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

\*\*\*\*\*  
FLOW PROCESS FROM NODE 114.00 TO NODE 128.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 610.00 DOWNSTREAM(FEET) = 560.00  
FLOW LENGTH(FEET) = 1000.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.36  
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 22.93  
PIPE TRAVEL TIME(MIN.) = 1.09 Tc(MIN.) = 9.38  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 128.00 = 2380.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 128.00 TO NODE 156.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 560.00 DOWNSTREAM(FEET) = 555.00  
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.36  
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 22.93  
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 9.48  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 156.00 = 2480.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 156.00 TO NODE 156.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 130.00 TO NODE 132.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

\*USER SPECIFIED(SUBAREA):  
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800  
S.C.S. CURVE NUMBER (AMC II) = 82  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00  
UPSTREAM ELEVATION(FEET) = 603.00  
DOWNSTREAM ELEVATION(FEET) = 601.00  
ELEVATION DIFFERENCE(FEET) = 2.00  
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.197  
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN  
THE MAXIMUM OVERLAND FLOW LENGTH = 75.00  
(Reference: Table 3-1B of Hydrology Manual)  
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.481  
SUBAREA RUNOFF(CFS) = 2.88  
TOTAL AREA(ACRES) = 0.50 TOTAL RUNOFF(CFS) = 2.88

FLOW PROCESS FROM NODE 132.00 TO NODE 134.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 601.00 DOWNSTREAM ELEVATION(FEET) = 595.00  
STREET LENGTH(FEET) = 310.00 CURB HEIGHT(INCHES) = 6.0  
STREET HALFWIDTH(FEET) = 12.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 6.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0130

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.51  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.36  
HALFSTREET FLOOD WIDTH(FEET) = 11.86  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.45  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.25  
STREET FLOW TRAVEL TIME(MIN.) = 1.50 Tc(MIN.) = 6.69  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.202

\*USER SPECIFIED(SUBAREA):  
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800  
S.C.S. CURVE NUMBER (AMC II) = 82  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.680  
SUBAREA AREA(ACRES) = 3.10 SUBAREA RUNOFF(CFS) = 15.18  
TOTAL AREA(ACRES) = 3.6 PEAK FLOW RATE(CFS) = 17.63

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 12.00  
FLOW VELOCITY(FEET/SEC.) = 4.21 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.73

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 134.00 = 410.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 134.00 TO NODE 136.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 591.00 DOWNSTREAM(FEET) = 589.00  
FLOW LENGTH(FEET) = 370.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.19  
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 17.63  
PIPE TRAVEL TIME(MIN.) = 1.00 Tc(MIN.) = 7.69  
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 136.00 = 780.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 136.00 TO NODE 136.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 7.69  
RAINFALL INTENSITY(INCH/HR) = 6.59  
TOTAL STREAM AREA(ACRES) = 3.60  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.63

\*\*\*\*\*  
FLOW PROCESS FROM NODE 138.00 TO NODE 140.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

\*USER SPECIFIED(SUBAREA):  
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800  
S.C.S. CURVE NUMBER (AMC II) = 82  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 190.00  
UPSTREAM ELEVATION(FEET) = 600.00  
DOWNSTREAM ELEVATION(FEET) = 598.00  
ELEVATION DIFFERENCE(FEET) = 2.00  
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.016  
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN  
THE MAXIMUM OVERLAND FLOW LENGTH = 65.53  
(Reference: Table 3-1B of Hydrology Manual)  
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.717  
SUBAREA RUNOFF(CFS) = 3.15  
TOTAL AREA(ACRES) = 0.60 TOTAL RUNOFF(CFS) = 3.15

\*\*\*\*\*  
FLOW PROCESS FROM NODE 140.00 TO NODE 136.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 598.00 DOWNSTREAM ELEVATION(FEET) = 593.00  
STREET LENGTH(FEET) = 510.00 CURB HEIGHT(INCHES) = 6.0  
STREET HALFWIDTH(FEET) = 12.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 6.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0130

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.38  
 \*\*\*STREET FLOWING FULL\*\*\*  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.45  
 HALFSTREET FLOOD WIDTH(FEET) = 12.00  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.41  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.53  
 STREET FLOW TRAVEL TIME(MIN.) = 2.49 Tc(MIN.) = 8.51  
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.171  
 \*USER SPECIFIED(SUBAREA):  
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800  
 S.C.S. CURVE NUMBER (AMC II) = 82  
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.680  
 SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 28.12  
 TOTAL AREA(ACRES) = 7.3 PEAK FLOW RATE(CFS) = 30.63

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 13.77  
 FLOW VELOCITY(FEET/SEC.) = 4.23 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.27  
 \*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
 AND L = 510.0 FT WITH ELEVATION-DROP = 5.0 FT, IS 34.8 CFS,  
 WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 136.00  
 LONGEST FLOWPATH FROM NODE 138.00 TO NODE 136.00 = 700.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 136.00 TO NODE 136.00 IS CODE = 1  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<<<<<<

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 8.51  
 RAINFALL INTENSITY(INCH/HR) = 6.17  
 TOTAL STREAM AREA(ACRES) = 7.30  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 30.63

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	17.63	7.69	6.586	3.60
2	30.63	8.51	6.171	7.30

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	45.33	7.69	6.586
2	47.16	8.51	6.171

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 47.16 Tc(MIN.) = 8.51  
 TOTAL AREA(ACRES) = 10.9  
 LONGEST FLOWPATH FROM NODE 130.00 TO NODE 136.00 = 780.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 136.00 TO NODE 142.00 IS CODE = 31  
 -----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 589.00 DOWNSTREAM(FEET) = 588.00  
 FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.84  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 47.16  
 PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 8.68  
 LONGEST FLOWPATH FROM NODE 130.00 TO NODE 142.00 = 880.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 142.00 TO NODE 142.00 IS CODE = 1  
 -----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 8.68  
 RAINFALL INTENSITY(INCH/HR) = 6.09  
 TOTAL STREAM AREA(ACRES) = 10.90  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 47.16

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 144.00 TO NODE 146.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

\*USER SPECIFIED(SUBAREA):  
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800  
 S.C.S. CURVE NUMBER (AMC II) = 82  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 120.00  
 UPSTREAM ELEVATION(FEET) = 658.00  
 DOWNSTREAM ELEVATION(FEET) = 656.00  
 ELEVATION DIFFERENCE(FEET) = 2.00  
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.398  
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN  
 THE MAXIMUM OVERLAND FLOW LENGTH = 71.67  
 (Reference: Table 3-1B of Hydrology Manual)  
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!  
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.275  
 SUBAREA RUNOFF(CFS) = 1.69  
 TOTAL AREA(ACRES) = 0.30 TOTAL RUNOFF(CFS) = 1.69

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 146.00 TO NODE 148.00 IS CODE = 62  
 -----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>(STREET TABLE SECTION # 2 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 656.00 DOWNSTREAM ELEVATION(FEET) = 632.00  
 STREET LENGTH(FEET) = 670.00 CURB HEIGHT(INCHES) = 6.0  
 STREET HALFWIDTH(FEET) = 12.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 6.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0130

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.80  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.31  
HALFSTREET FLOOD WIDTH(FEET) = 9.14  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.09  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.26  
STREET FLOW TRAVEL TIME(MIN.) = 2.73 Tc(MIN.) = 8.13  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.355  
\*USER SPECIFIED(SUBAREA):  
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800  
S.C.S. CURVE NUMBER (AMC II) = 82  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.680  
SUBAREA AREA(ACRES) = 2.80 SUBAREA RUNOFF(CFS) = 12.10  
TOTAL AREA(ACRES) = 3.1 PEAK FLOW RATE(CFS) = 13.40

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 11.58  
FLOW VELOCITY(FEET/SEC.) = 4.59 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.64  
LONGEST FLOWPATH FROM NODE 144.00 TO NODE 148.00 = 790.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 148.00 TO NODE 142.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 627.00 DOWNSTREAM(FEET) = 588.00  
FLOW LENGTH(FEET) = 500.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.92  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 13.40  
PIPE TRAVEL TIME(MIN.) = 0.52 Tc(MIN.) = 8.65  
LONGEST FLOWPATH FROM NODE 144.00 TO NODE 142.00 = 1290.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 142.00 TO NODE 142.00 IS CODE = 1  
-----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
TIME OF CONCENTRATION(MIN.) = 8.65  
RAINFALL INTENSITY(INCH/HR) = 6.10  
TOTAL STREAM AREA(ACRES) = 3.10  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.40

\*\* CONFLUENCE DATA \*\*  
STREAM RUNOFF Tc INTENSITY AREA  
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)  
1 47.16 8.68 6.093 10.90  
2 13.40 8.65 6.104 3.10

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	60.47	8.65	6.104
2	60.53	8.68	6.093

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 60.53 Tc(MIN.) = 8.68  
TOTAL AREA(ACRES) = 14.0  
LONGEST FLOWPATH FROM NODE 144.00 TO NODE 142.00 = 1290.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 142.00 TO NODE 150.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

-----  
ELEVATION DATA: UPSTREAM(FEET) = 588.00 DOWNSTREAM(FEET) = 578.00  
FLOW LENGTH(FEET) = 300.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.62  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 60.53  
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 8.98  
LONGEST FLOWPATH FROM NODE 144.00 TO NODE 150.00 = 1590.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 150.00 TO NODE 150.00 IS CODE = 1  
-----

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 8.98  
RAINFALL INTENSITY(INCH/HR) = 5.96  
TOTAL STREAM AREA(ACRES) = 14.00  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 60.53

\*\*\*\*\*  
FLOW PROCESS FROM NODE 152.00 TO NODE 154.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

-----  
\*USER SPECIFIED(SUBAREA):  
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800  
S.C.S. CURVE NUMBER (AMC II) = 82  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 120.00  
UPSTREAM ELEVATION(FEET) = 626.00  
DOWNSTREAM ELEVATION(FEET) = 624.00  
ELEVATION DIFFERENCE(FEET) = 2.00  
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.398  
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN  
THE MAXIMUM OVERLAND FLOW LENGTH = 71.67  
(Reference: Table 3-1b of Hydrology Manual)  
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.275  
SUBAREA RUNOFF(CFS) = 0.56  
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.56

\*\*\*\*\*  
FLOW PROCESS FROM NODE 154.00 TO NODE 150.00 IS CODE = 62  
-----

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

=====
UPSTREAM ELEVATION(FEET) = 624.00 DOWNSTREAM ELEVATION(FEET) = 570.00
STREET LENGTH(FEET) = 1100.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 12.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 6.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0130

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.94
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 9.52
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.85
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.54
STREET FLOW TRAVEL TIME(MIN.) = 3.78 Tc(MIN.) = 9.18
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.878
\*USER SPECIFIED(SUBAREA):
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
S.C.S. CURVE NUMBER (AMC II) = 82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.680
SUBAREA AREA(ACRES) = 4.60 SUBAREA RUNOFF(CFS) = 18.38
TOTAL AREA(ACRES) = 4.7 PEAK FLOW RATE(CFS) = 18.78

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 12.00
FLOW VELOCITY(FEET/SEC.) = 5.73 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.14
LONGEST FLOWPATH FROM NODE 152.00 TO NODE 150.00 = 1220.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 150.00 TO NODE 150.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.18
RAINFALL INTENSITY(INCH/HR) = 5.88
TOTAL STREAM AREA(ACRES) = 4.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.78

\*\* CONFLUENCE DATA \*\*
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 60.53 8.98 5.961 14.00
2 18.78 9.18 5.878 4.70

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

\*\* PEAK FLOW RATE TABLE \*\*
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 78.91 8.98 5.961
2 78.47 9.18 5.878

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 78.91 Tc(MIN.) = 8.98
TOTAL AREA(ACRES) = 18.7
LONGEST FLOWPATH FROM NODE 144.00 TO NODE 150.00 = 1590.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 150.00 TO NODE 150.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====
USER-SPECIFIED VALUES ARE AS FOLLOWS:
Tc(MIN) = 9.00 RAIN INTENSITY(INCH/HOUR) = 5.95
TOTAL AREA(ACRES) = 18.70 TOTAL RUNOFF(CFS) = 0.30

\*\*\*\*\*
FLOW PROCESS FROM NODE 150.00 TO NODE 156.00 IS CODE = 52

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 570.00 DOWNSTREAM(FEET) = 540.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 330.00 CHANNEL SLOPE = 0.0909
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) = 0.30
FLOW VELOCITY(FEET/SEC) = 4.52 (PER LACFCD/RFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 1.22 Tc(MIN.) = 10.22
LONGEST FLOWPATH FROM NODE 144.00 TO NODE 156.00 = 1920.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 150.00 TO NODE 156.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.484
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 88
AREA-AVERAGE RUNOFF COEFFICIENT = 0.0253
SUBAREA AREA(ACRES) = 1.30 SUBAREA RUNOFF(CFS) = 2.50
TOTAL AREA(ACRES) = 20.0 TOTAL RUNOFF(CFS) = 2.77
Tc(MIN.) = 10.22

\*\*\*\*\*
FLOW PROCESS FROM NODE 156.00 TO NODE 156.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

\*\* MAIN STREAM CONFLUENCE DATA \*\*
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 2.77 10.22 5.484 20.00
LONGEST FLOWPATH FROM NODE 144.00 TO NODE 156.00 = 1920.00 FEET.

\*\* MEMORY BANK # 2 CONFLUENCE DATA \*\*
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 22.93 9.48 5.753 18.60
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 156.00 = 2480.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 25.50 9.48 5.753

2 24.63 10.22 5.484  
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE(CFS) = 25.50 Tc(MIN.) = 9.48  
TOTAL AREA(ACRES) = 38.6

\*\*\*\*\*  
FLOW PROCESS FROM NODE 156.00 TO NODE 156.00 IS CODE = 12  
-----

>>>>CLEAR MEMORY BANK # 2 <<<<<<  
-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 156.00 TO NODE 158.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 540.00 DOWNSTREAM(FEET) = 525.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 810.00 CHANNEL SLOPE = 0.0185  
CHANNEL FLOW THRU SUBAREA(CFS) = 25.50  
FLOW VELOCITY(FEET/SEC) = 4.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 3.10 Tc(MIN.) = 12.58  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 158.00 = 3290.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 156.00 TO NODE 158.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
-----

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.794  
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 82  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.1581  
SUBAREA AREA(ACRES) = 6.80 SUBAREA RUNOFF(CFS) = 13.37  
TOTAL AREA(ACRES) = 45.4 TOTAL RUNOFF(CFS) = 34.42  
TC(MIN.) = 12.58

-----+-----  
| END 100 AREA |  
| BEGIN 200 AREA |  
-----+-----

\*\*\*\*\*  
FLOW PROCESS FROM NODE 200.00 TO NODE 202.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
-----

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 82  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 110.00  
UPSTREAM ELEVATION(FEET) = 690.00  
DOWNSTREAM ELEVATION(FEET) = 680.00  
ELEVATION DIFFERENCE(FEET) = 10.00  
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.951  
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN  
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00  
(Reference: Table 3-1B of Hydrology Manual)  
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.771

SUBAREA RUNOFF(CFS) = 1.59  
TOTAL AREA(ACRES) = 0.50 TOTAL RUNOFF(CFS) = 1.59

\*\*\*\*\*  
FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<<  
-----

ELEVATION DATA: UPSTREAM(FEET) = 680.00 DOWNSTREAM(FEET) = 560.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 1100.00 CHANNEL SLOPE = 0.1091  
NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION  
CHANNEL FLOW THRU SUBAREA(CFS) = 1.59  
FLOW VELOCITY(FEET/SEC) = 5.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 3.53 Tc(MIN.) = 9.48  
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 204.00 = 1210.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
-----

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.755  
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 82  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100  
SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 37.28  
TOTAL AREA(ACRES) = 16.3 TOTAL RUNOFF(CFS) = 38.46  
TC(MIN.) = 9.48

\*\*\*\*\*  
FLOW PROCESS FROM NODE 204.00 TO NODE 206.00 IS CODE = 52  
-----

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<<  
>>>>TRAVELTIME THRU SUBAREA<<<<<<  
-----

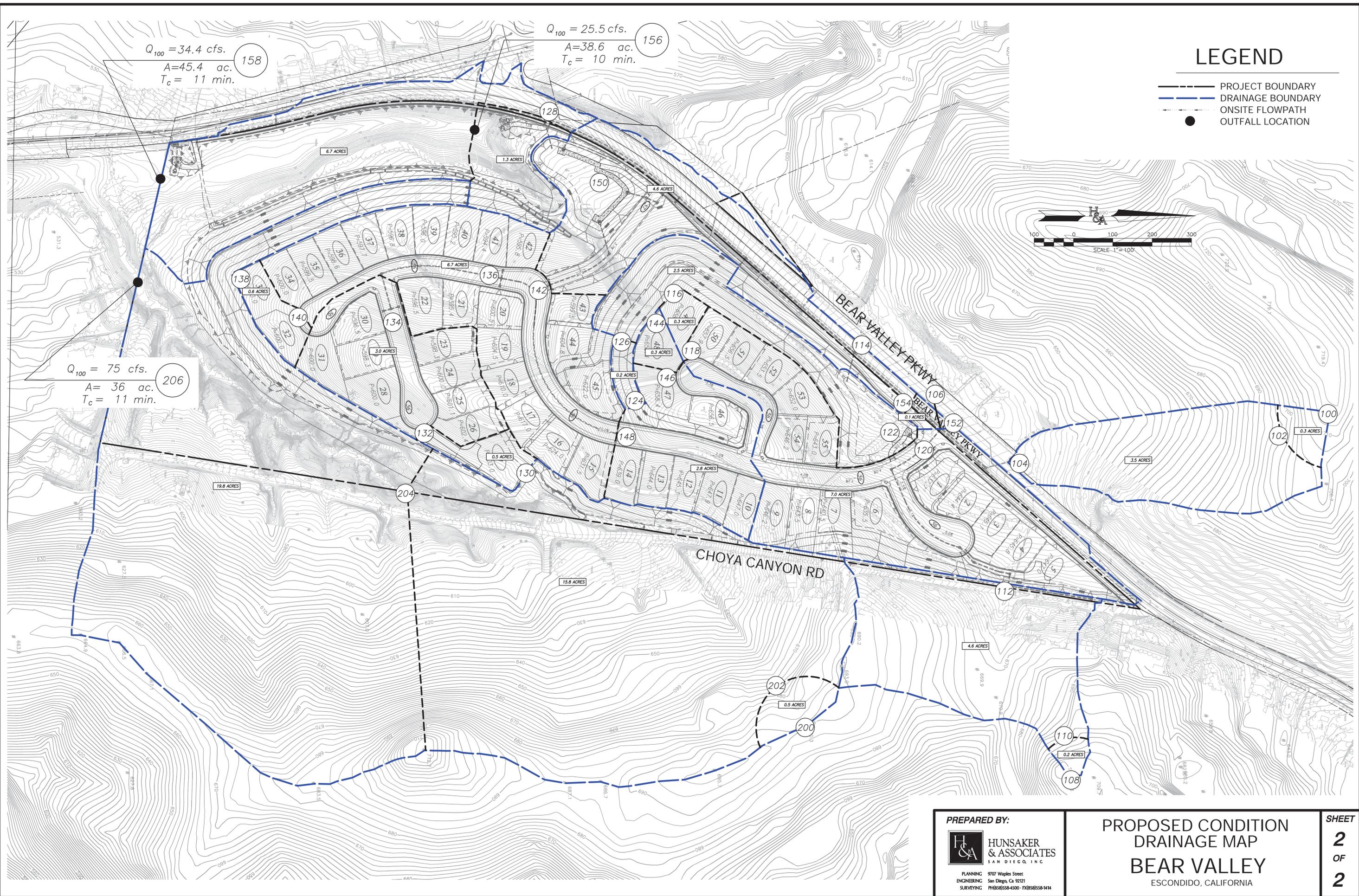
ELEVATION DATA: UPSTREAM(FEET) = 560.00 DOWNSTREAM(FEET) = 520.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 900.00 CHANNEL SLOPE = 0.0444  
CHANNEL FLOW THRU SUBAREA(CFS) = 38.46  
FLOW VELOCITY(FEET/SEC) = 7.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
TRAVEL TIME(MIN.) = 1.98 Tc(MIN.) = 11.46  
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 2110.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 204.00 TO NODE 206.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<  
-----

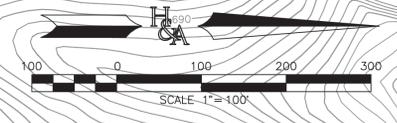
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.092  
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100  
SOIL CLASSIFICATION IS "D"  
S.C.S. CURVE NUMBER (AMC II) = 82  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100  
SUBAREA AREA(ACRES) = 19.80 SUBAREA RUNOFF(CFS) = 41.33  
TOTAL AREA(ACRES) = 36.1 TOTAL RUNOFF(CFS) = 75.36  
TC(MIN.) = 11.46

-----+-----  
END OF STUDY SUMMARY:  
TOTAL AREA(ACRES) = 36.1 TC(MIN.) = 11.46  
PEAK FLOW RATE(CFS) = 75.36  
-----+-----



# LEGEND

- PROJECT BOUNDARY
- DRAINAGE BOUNDARY
- ONSITE FLOWPATH
- OUTFALL LOCATION



$Q_{100} = 34.4 \text{ cfs.}$   
 $A = 45.4 \text{ ac.}$   
 $T_c = 11 \text{ min.}$   
 158

$Q_{100} = 25.5 \text{ cfs.}$   
 $A = 38.6 \text{ ac.}$   
 $T_c = 10 \text{ min.}$   
 156

$Q_{100} = 75 \text{ cfs.}$   
 $A = 36 \text{ ac.}$   
 $T_c = 11 \text{ min.}$   
 206

**PREPARED BY:**  
**HUNSAKER & ASSOCIATES**  
 SAN DIEGO, INC.  
 PLANNING: 9707 Waples Street  
 ENGINEERING: San Diego, Ca 92121  
 SURVEYING: PH(619)558-4500 - FX(619)558-1414

**PROPOSED CONDITION  
 DRAINAGE MAP  
 BEAR VALLEY**  
 ESCONDIDO, CALIFORNIA

**SHEET  
 2  
 OF  
 2**

RUN DATE 5/26/2015  
HYDROGRAPH FILE NAME Text1  
TIME OF CONCENTRATION 9 MIN.  
6 HOUR RAINFALL 3.3 INCHES  
BASIN AREA 10 ACRES  
RUNOFF COEFFICIENT 0.68  
PEAK DISCHARGE 40.7 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 9	DISCHARGE (CFS) = 0
TIME (MIN) = 18	DISCHARGE (CFS) = 1.4
TIME (MIN) = 27	DISCHARGE (CFS) = 1.4
TIME (MIN) = 36	DISCHARGE (CFS) = 1.4
TIME (MIN) = 45	DISCHARGE (CFS) = 1.5
TIME (MIN) = 54	DISCHARGE (CFS) = 1.5
TIME (MIN) = 63	DISCHARGE (CFS) = 1.6
TIME (MIN) = 72	DISCHARGE (CFS) = 1.6
TIME (MIN) = 81	DISCHARGE (CFS) = 1.7
TIME (MIN) = 90	DISCHARGE (CFS) = 1.7
TIME (MIN) = 99	DISCHARGE (CFS) = 1.8
TIME (MIN) = 108	DISCHARGE (CFS) = 1.9
TIME (MIN) = 117	DISCHARGE (CFS) = 1.9
TIME (MIN) = 126	DISCHARGE (CFS) = 2
TIME (MIN) = 135	DISCHARGE (CFS) = 2.1
TIME (MIN) = 144	DISCHARGE (CFS) = 2.3
TIME (MIN) = 153	DISCHARGE (CFS) = 2.4
TIME (MIN) = 162	DISCHARGE (CFS) = 2.6
TIME (MIN) = 171	DISCHARGE (CFS) = 2.7
TIME (MIN) = 180	DISCHARGE (CFS) = 3
TIME (MIN) = 189	DISCHARGE (CFS) = 3.2
TIME (MIN) = 198	DISCHARGE (CFS) = 3.6
TIME (MIN) = 207	DISCHARGE (CFS) = 3.9
TIME (MIN) = 216	DISCHARGE (CFS) = 4.8
TIME (MIN) = 225	DISCHARGE (CFS) = 5.5
TIME (MIN) = 234	DISCHARGE (CFS) = 8
TIME (MIN) = 243	DISCHARGE (CFS) = 11.1
TIME (MIN) = 252	DISCHARGE (CFS) = 40.7
TIME (MIN) = 261	DISCHARGE (CFS) = 6.4
TIME (MIN) = 270	DISCHARGE (CFS) = 4.3
TIME (MIN) = 279	DISCHARGE (CFS) = 3.4
TIME (MIN) = 288	DISCHARGE (CFS) = 2.8
TIME (MIN) = 297	DISCHARGE (CFS) = 2.5
TIME (MIN) = 306	DISCHARGE (CFS) = 2.2
TIME (MIN) = 315	DISCHARGE (CFS) = 2
TIME (MIN) = 324	DISCHARGE (CFS) = 1.8
TIME (MIN) = 333	DISCHARGE (CFS) = 1.7
TIME (MIN) = 342	DISCHARGE (CFS) = 1.6
TIME (MIN) = 351	DISCHARGE (CFS) = 1.5
TIME (MIN) = 360	DISCHARGE (CFS) = 1.4
TIME (MIN) = 369	DISCHARGE (CFS) = 0

# Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

1



2

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

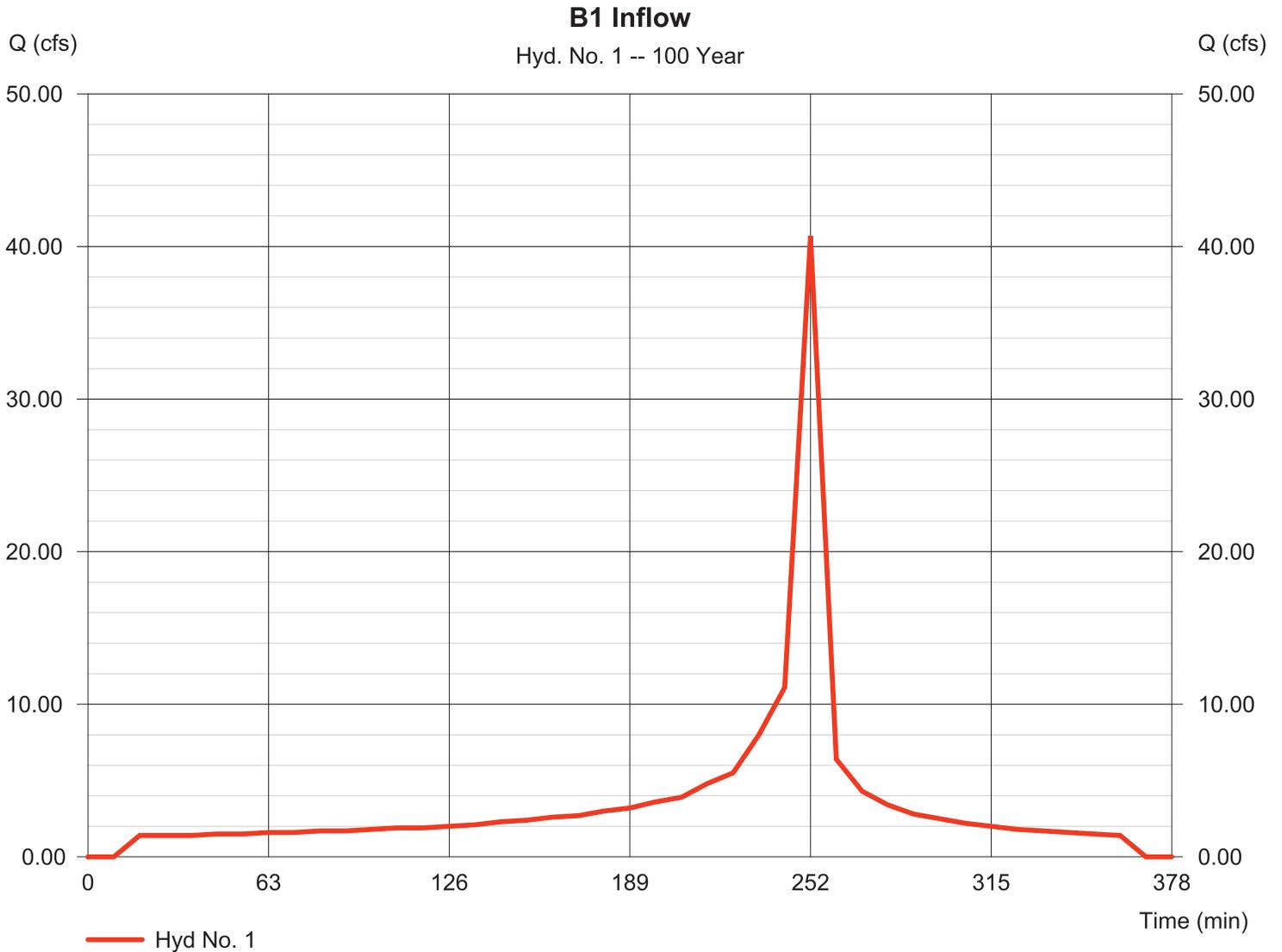
Wednesday, 05 / 27 / 2015

## Hyd. No. 1

B1 Inflow

Hydrograph type = Manual  
Storm frequency = 100 yrs  
Time interval = 9 min

Peak discharge = 40.70 cfs  
Time to peak = 252 min  
Hyd. volume = 80,406 cuft



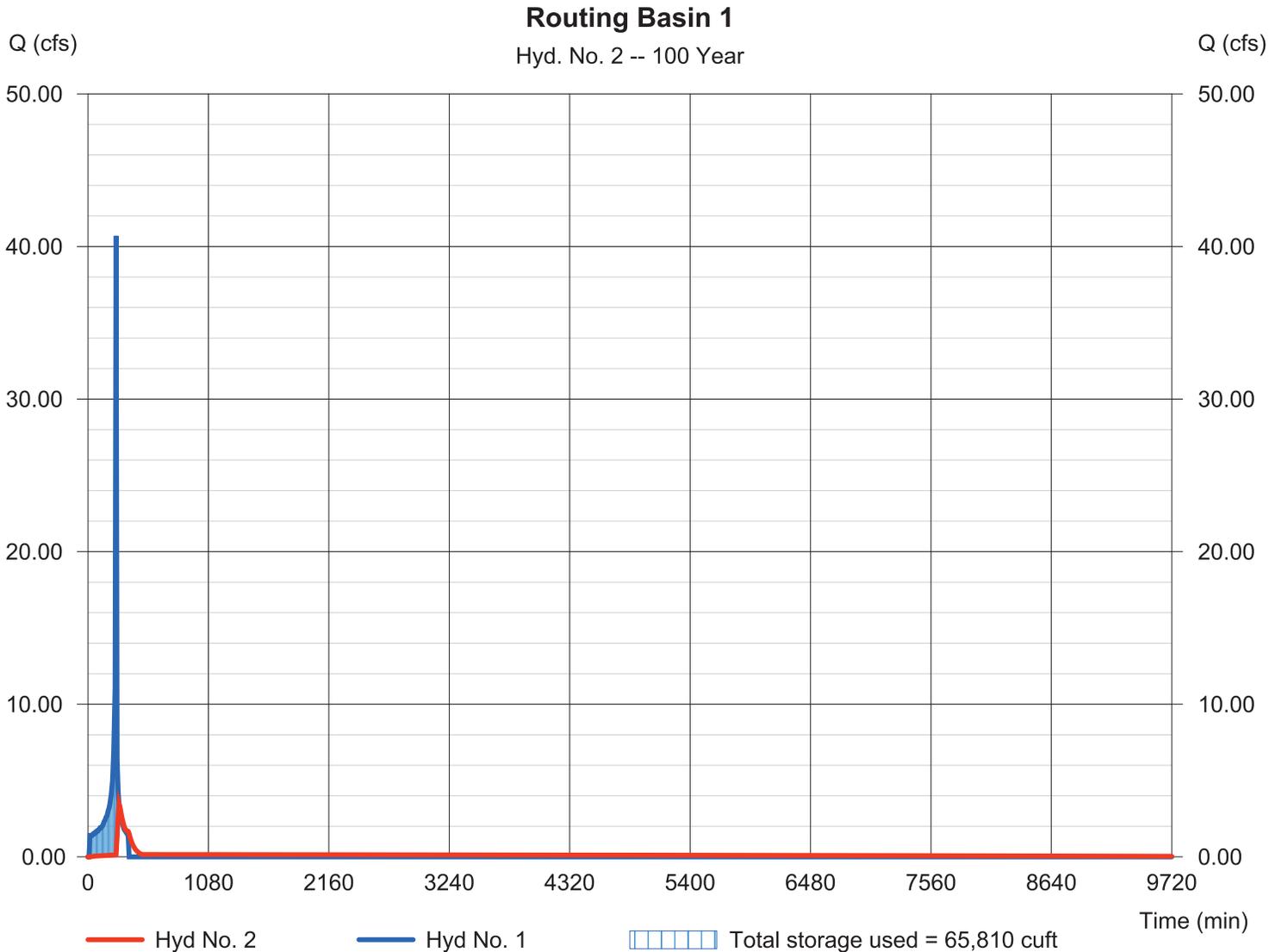
# Hydrograph Report

## Hyd. No. 2

### Routing Basin 1

Hydrograph type	= Reservoir	Peak discharge	= 3.464 cfs
Storm frequency	= 100 yrs	Time to peak	= 279 min
Time interval	= 9 min	Hyd. volume	= 80,323 cuft
Inflow hyd. No.	= 1 - B1 Inflow	Max. Elevation	= 103.80 ft
Reservoir name	= Basin 1	Max. Storage	= 65,810 cuft

Storage Indication method used.



# Pond Report

## Pond No. 1 - Basin 1

### Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 100.00 ft

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	15,065	0	0
0.25	100.25	15,359	3,803	3,803
0.50	100.50	15,653	3,877	7,680
0.75	100.75	15,946	3,950	11,629
1.00	101.00	16,240	4,023	15,653
1.25	101.25	16,540	4,098	19,750
1.50	101.50	16,840	4,173	23,923
1.75	101.75	17,140	4,248	28,170
2.00	102.00	17,440	4,323	32,493
2.25	102.25	17,746	4,398	36,891
2.50	102.50	18,052	4,475	41,366
2.75	102.75	18,358	4,551	45,917
3.00	103.00	18,664	4,628	50,545
3.25	103.25	18,976	4,705	55,250
3.50	103.50	19,289	4,783	60,033
3.75	103.75	19,601	4,861	64,894
4.00	104.00	19,913	4,939	69,833
4.25	104.25	20,232	5,018	74,851
4.50	104.50	20,551	5,098	79,949
4.75	104.75	20,870	5,178	85,127
5.00	105.00	21,189	5,257	90,384

### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000	(by Wet area)		
TW Elev. (ft)	= 0.00			

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

### Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	---	---	---	---	---	---	---	---	---	---	0.000
0.25	3,803	100.25	---	---	---	---	---	---	---	---	---	0.046	0.046
0.50	7,680	100.50	---	---	---	---	---	---	---	---	---	0.064	0.064
0.75	11,629	100.75	---	---	---	---	---	---	---	---	---	0.081	0.081
1.00	15,653	101.00	---	---	---	---	---	---	---	---	---	0.092	0.092
1.25	19,750	101.25	---	---	---	---	---	---	---	---	---	0.101	0.101
1.50	23,923	101.50	---	---	---	---	---	---	---	---	---	0.109	0.109
1.75	28,170	101.75	---	---	---	---	---	---	---	---	---	0.115	0.115
2.00	32,493	102.00	---	---	---	---	---	---	---	---	---	0.122	0.122
2.25	36,891	102.25	---	---	---	---	---	---	---	---	---	0.127	0.127
2.50	41,366	102.50	---	---	---	---	---	---	---	---	---	0.133	0.133
2.75	45,917	102.75	---	---	---	---	---	---	---	---	---	0.138	0.138
3.00	50,545	103.00	---	---	---	---	---	---	---	---	---	0.143	0.143
3.25	55,250	103.25	---	---	---	---	---	---	---	---	---	0.147	0.147
3.50	60,033	103.50	---	---	---	---	---	---	---	---	---	0.151	0.151
3.75	64,894	103.75	---	---	---	---	---	---	---	---	---	1.760	1.760
4.00	69,833	104.00	---	---	---	---	---	---	---	---	---	10.95	10.95
4.25	74,851	104.25	---	---	---	---	---	---	---	---	---	24.42	24.42
4.50	79,949	104.50	---	---	---	---	---	---	---	---	---	41.11	41.11
4.75	85,127	104.75	---	---	---	---	---	---	---	---	---	60.47	60.47
5.00	90,384	105.00	---	---	---	---	---	---	---	---	---	82.18	82.18

RUN DATE 5/26/2015  
HYDROGRAPH FILE NAME Text1  
TIME OF CONCENTRATION 9 MIN.  
6 HOUR RAINFALL 3.3 INCHES  
BASIN AREA 18.7 ACRES  
RUNOFF COEFFICIENT 0.68  
PEAK DISCHARGE 78.9 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 9	DISCHARGE (CFS) = 0
TIME (MIN) = 18	DISCHARGE (CFS) = 2.6
TIME (MIN) = 27	DISCHARGE (CFS) = 2.6
TIME (MIN) = 36	DISCHARGE (CFS) = 2.7
TIME (MIN) = 45	DISCHARGE (CFS) = 2.7
TIME (MIN) = 54	DISCHARGE (CFS) = 2.8
TIME (MIN) = 63	DISCHARGE (CFS) = 2.9
TIME (MIN) = 72	DISCHARGE (CFS) = 3
TIME (MIN) = 81	DISCHARGE (CFS) = 3.1
TIME (MIN) = 90	DISCHARGE (CFS) = 3.2
TIME (MIN) = 99	DISCHARGE (CFS) = 3.3
TIME (MIN) = 108	DISCHARGE (CFS) = 3.5
TIME (MIN) = 117	DISCHARGE (CFS) = 3.6
TIME (MIN) = 126	DISCHARGE (CFS) = 3.8
TIME (MIN) = 135	DISCHARGE (CFS) = 4
TIME (MIN) = 144	DISCHARGE (CFS) = 4.2
TIME (MIN) = 153	DISCHARGE (CFS) = 4.4
TIME (MIN) = 162	DISCHARGE (CFS) = 4.8
TIME (MIN) = 171	DISCHARGE (CFS) = 5
TIME (MIN) = 180	DISCHARGE (CFS) = 5.6
TIME (MIN) = 189	DISCHARGE (CFS) = 5.9
TIME (MIN) = 198	DISCHARGE (CFS) = 6.8
TIME (MIN) = 207	DISCHARGE (CFS) = 7.3
TIME (MIN) = 216	DISCHARGE (CFS) = 9
TIME (MIN) = 225	DISCHARGE (CFS) = 10.2
TIME (MIN) = 234	DISCHARGE (CFS) = 15
TIME (MIN) = 243	DISCHARGE (CFS) = 17.9
TIME (MIN) = 252	DISCHARGE (CFS) = 78.9
TIME (MIN) = 261	DISCHARGE (CFS) = 12
TIME (MIN) = 270	DISCHARGE (CFS) = 8
TIME (MIN) = 279	DISCHARGE (CFS) = 6.3
TIME (MIN) = 288	DISCHARGE (CFS) = 5.3
TIME (MIN) = 297	DISCHARGE (CFS) = 4.6
TIME (MIN) = 306	DISCHARGE (CFS) = 4.1
TIME (MIN) = 315	DISCHARGE (CFS) = 3.7
TIME (MIN) = 324	DISCHARGE (CFS) = 3.4
TIME (MIN) = 333	DISCHARGE (CFS) = 3.2
TIME (MIN) = 342	DISCHARGE (CFS) = 3
TIME (MIN) = 351	DISCHARGE (CFS) = 2.8
TIME (MIN) = 360	DISCHARGE (CFS) = 2.6
TIME (MIN) = 369	DISCHARGE (CFS) = 0

# Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

1



2

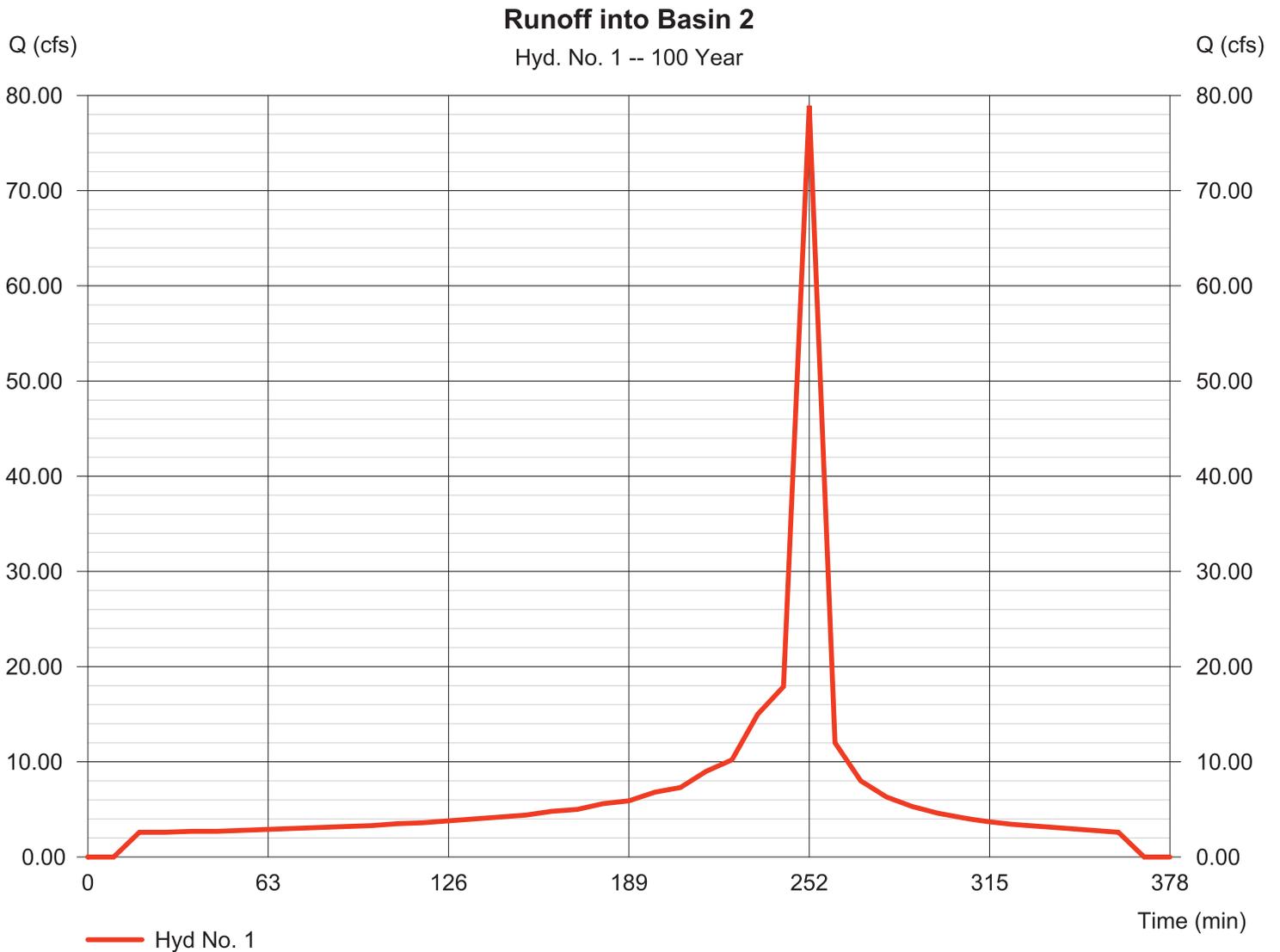
# Hydrograph Report

## Hyd. No. 1

### Runoff into Basin 2

Hydrograph type = Manual  
Storm frequency = 100 yrs  
Time interval = 9 min

Peak discharge = 78.90 cfs  
Time to peak = 252 min  
Hyd. volume = 150,012 cuft



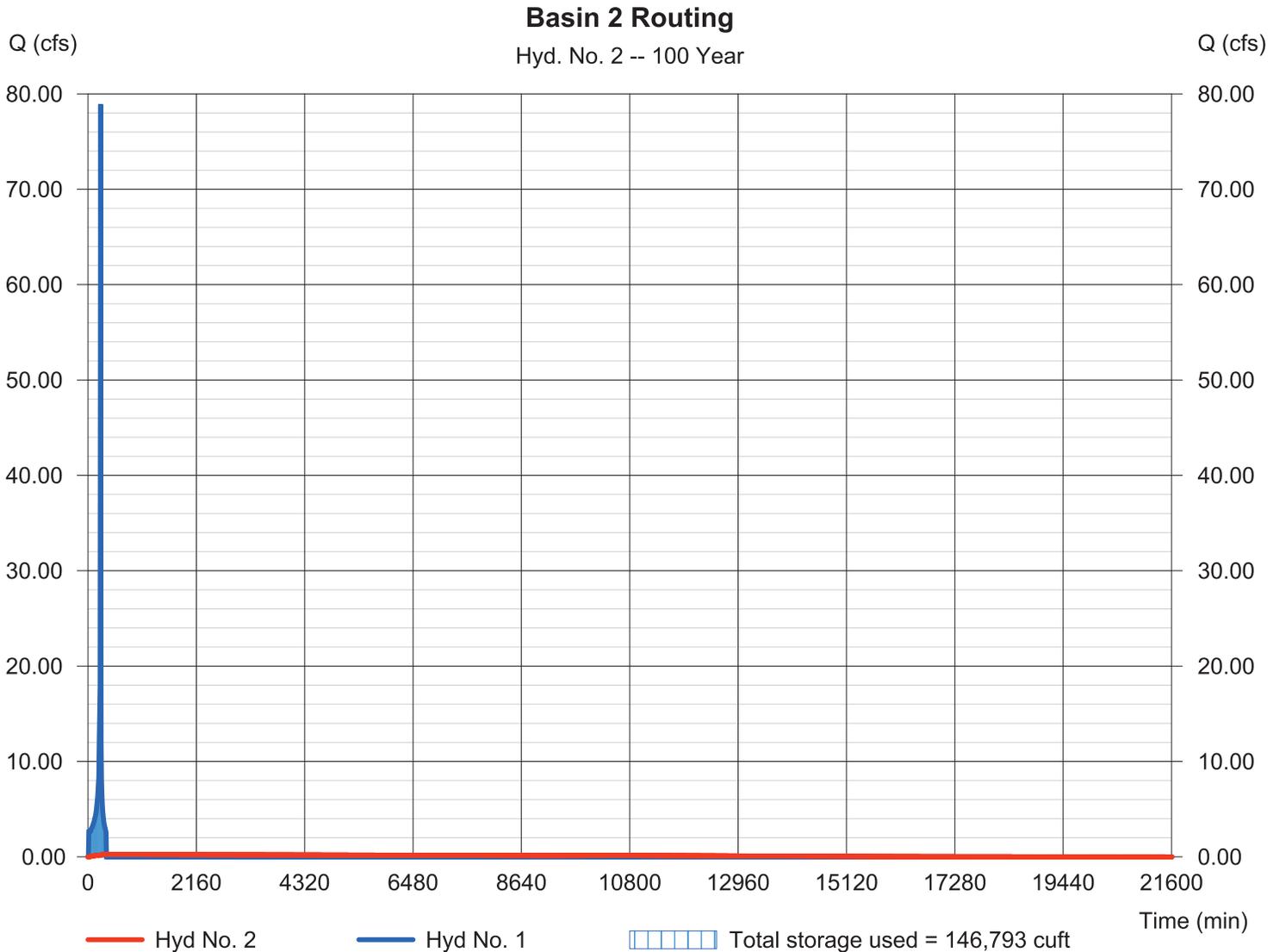
# Hydrograph Report

## Hyd. No. 2

### Basin 2 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.249 cfs
Storm frequency	= 100 yrs	Time to peak	= 369 min
Time interval	= 9 min	Hyd. volume	= 149,896 cuft
Inflow hyd. No.	= 1 - Runoff into Basin 2	Max. Elevation	= 103.86 ft
Reservoir name	= Basin 2	Max. Storage	= 146,793 cuft

Storage Indication method used.



# Pond Report

## Pond No. 1 - Basin 2

### Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 100.00 ft

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	21,148	0	0
0.25	100.25	21,470	5,327	5,327
0.50	100.50	21,793	5,408	10,735
0.75	100.75	22,115	5,489	16,224
1.00	101.00	22,437	5,569	21,793
1.25	101.25	22,766	5,650	27,443
1.50	101.50	23,094	5,733	33,176
2.00	101.75	23,751	11,711	44,887
2.50	102.00	24,420	12,043	56,930
3.00	102.25	25,088	12,377	69,307
3.50	102.50	25,770	12,715	82,021
4.00	102.75	26,452	13,056	95,077
4.50	103.00	27,147	13,400	108,476
5.00	103.25	27,841	13,747	122,223
5.50	103.50	28,548	14,097	136,321
6.00	103.75	29,254	14,451	150,771
6.50	104.00	29,974	14,807	165,578
7.00	104.25	30,694	15,167	180,745
7.50	104.50	31,426	15,530	196,275
8.00	104.75	32,158	15,896	212,171
8.50	105.00	32,900	16,265	228,436

### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000	(by Wet area)		
TW Elev. (ft)	= 0.00			

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

### Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	---	---	---	---	---	---	---	---	---	---	0.000
0.25	5,327	100.25	---	---	---	---	---	---	---	---	---	0.046	0.046
0.50	10,735	100.50	---	---	---	---	---	---	---	---	---	0.071	0.071
0.75	16,224	100.75	---	---	---	---	---	---	---	---	---	0.106	0.106
1.00	21,793	101.00	---	---	---	---	---	---	---	---	---	0.126	0.126
1.25	27,443	101.25	---	---	---	---	---	---	---	---	---	0.143	0.143
1.50	33,176	101.50	---	---	---	---	---	---	---	---	---	0.156	0.156
2.00	44,887	101.75	---	---	---	---	---	---	---	---	---	0.134	0.134
2.50	56,930	102.00	---	---	---	---	---	---	---	---	---	0.154	0.154
3.00	69,307	102.25	---	---	---	---	---	---	---	---	---	0.171	0.171
3.50	82,021	102.50	---	---	---	---	---	---	---	---	---	0.187	0.187
4.00	95,077	102.75	---	---	---	---	---	---	---	---	---	0.202	0.202
4.50	108,476	103.00	---	---	---	---	---	---	---	---	---	0.215	0.215
5.00	122,223	103.25	---	---	---	---	---	---	---	---	---	0.228	0.228
5.50	136,321	103.50	---	---	---	---	---	---	---	---	---	0.240	0.240
6.00	150,771	103.75	---	---	---	---	---	---	---	---	---	0.252	0.252
6.50	165,578	104.00	---	---	---	---	---	---	---	---	---	2.560	2.560
7.00	180,745	104.25	---	---	---	---	---	---	---	---	---	4.440	4.440
7.50	196,275	104.50	---	---	---	---	---	---	---	---	---	14.25	14.25
8.00	212,171	104.75	---	---	---	---	---	---	---	---	---	44.10	44.10
8.50	228,436	105.00	---	---	---	---	---	---	---	---	---	85.00	85.00