

DOCKETED

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Project Title:	Stanton Energy Reliability Center
TN #:	223409
Document Title:	Stanton Energy Reliability Center LLC's Supplemental Responses to PSA Workshop Query Relating to Stormwater Discharge
Description:	N/A
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STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:

Application For Certification
**STANTON ENERGY RELIABILITY
CENTER**

DOCKET NO. 16-AFC-01

**STANTON ENERGY RELIABILITY
CENTER, LLC's SUPPLEMENTAL
RESPONSES TO PSA WORKSHOP
QUERY RELATING TO STORMWATER
DISCHARGE**

The following information is provided to the CEC Staff to supplement Stanton Energy Reliability Center, LLC's Responses to Workshop Queries docketed on April 26, 2018 (TN223281). The purpose of this Supplement is to provide clarification and a summary of the previously docketed information to demonstrate that the post construction stormwater discharge would be less than the 110 percent of the pre-development condition, required by Orange County Public Works guidelines.

To assist Staff, we have prepared Table 6, (attached) to summarize the required 2 year storm event modeling results of i) the predevelopment flows and ii) the post-construction flows after implementation of the stormwater drainage design for the SERC. For each of the project's drainage management areas (DMAs), Table 6 shows the modeled pre-development flows, the total modeled stormwater collected and received by SERC's stormwater system, and the modeled post-construction stormwater discharge to the Stanton Storm Channel. Table 6 provides details for the 2-year, 24-hour storm event. The results show that the post-project discharge rate for each DMA is significantly less than 110 percent of that DMA's pre-project condition.

To substantiate the values used in Table 6, Tables 4 and 5 (WQMP, TN 223184) have been revised with new descriptions and footnotes to the analyses previously docketed. Attachment A contains rational method and hydrograph results that were not previously docketed.

To provide continuity, we have also provided similar revisions to Table 1 (WQMP, TN 223184) for the 100-year analysis.

Dated: May 9, 2018

Respectfully Submitted,

A handwritten signature in blue ink, appearing to read "Scott A. Galati", with a horizontal line extending to the right from the end of the signature.

Scott A. Galati
Counsel to SERC, LLC

Table 6 - Summary of 2 Year Peak Discharge Rates

	DMA 1	DMA 2	DMA 3	Description
Pre-Project 2 Year Hydrograph Discharge Rate (cfs)	0.79 ^{1a}	1.43 ^{2a}	1.33 ^{3a}	Modeled Pre-Project Peak Discharge Rates to Storm Channel
Rational Method Peak (cfs)	2.03 ^{1b}	0.93 ^{2b}	0.86 ^{3b}	Modeled Post-Project Storm Water Collection Rates - Input Flows to Storm Drain System
Post-Project 2 Year Hydrograph Discharge Rate (cfs)	0.67 ^{1c}	0 ^{2c}	0.86 ^{3c}	Modeled Post-Project Peak Discharge Rates to Storm Channel from Storm Drain System
Increase/(Decrease) in Discharge Rate, cfs	(0.12) ^{1d}	(1.43) ^{2d}	(0.47) ^{3d}	Discharge Rate Difference between Pre-Project and Post-Project Conditions, cfs
Increase/-Decrease in Discharge Rate, %	-15% ^{1e}	-100% ^{2e}	-35% ^{3e}	Discharge Rate Difference between Pre-Project and Post-Project Conditions, %

Footnotes

Source Information Location

- ^{1a} Current Response, Table 5, value footnoted as 1f
- ^{1b} Current Response, Table 4, value footnoted as 1b
- ^{1c} Current Response, Table 5, value footnoted as 1e
- ^{1d} Current Response, Table 6, footnoted values (1c - 1a)
- ^{1e} Current Response, Table 6, footnoted values ((1c ÷ 1a) - 1)
- ^{2a} Current Response, Table 5, value footnoted as 2f
- ^{2b} Current Response, Table 4, value footnoted as 2b
- ^{2c} Current Response, Table 5, value footnoted as 2e
- ^{2d} Current Response, Table 6, footnoted values (2c - 2a)
- ^{2e} Current Response, Table 6, footnoted values ((2c ÷ 2a) - 1)
- ^{3a} Current Response, Table 5, value footnoted as 3f
- ^{3b} Current Response, Table 4, value footnoted as 3b
- ^{3c} Current Response, Table 5, value footnoted as 3e
- ^{3d} Current Response, Table 6, footnoted values (3c - 3a)
- ^{3e} Current Response, Table 6, footnoted values ((3c ÷ 3a) - 1)

Table 4 - 2 Year Storm Event Time of Concentration

	DMA 1	DMA 2	DMA 3	Description
Rational Method TC (minutes)	9.99 ^{1a}	9.52 ^{2a}	11.08 ^{3a}	Referenced in Rational Method Calculations
Rational Method Peak (cfs)	2.03 ^{1b}	0.93 ^{2b}	0.86 ^{3b}	Referenced in Rational Method Calculations
Available Storage Volume (ft3)	6852 ^{1c}	4002 ^{2c}	695 ^{3c}	From Table 2 for DMA 1, From StormTech Ref for DMA 2 & 3
Time to fill storage (seconds)	3375.4 ^{1d}	4303.2 ^{2d}	808.1 ^{3d}	Available Storage/Rational Method Peak
Time to fill storage (minutes)	56.3 ^{1e}	71.7 ^{2e}	13.5 ^{3e}	Time to Fill Storage Seconds/60
Total TC = Rat M TC + Time to fill (minutes)	66.2 ^{1f}	81.2 ^{2f}	24.5 ^{3f}	

Footnotes

Source Information Location

- ^{1a} TN #: 223184, WQMP, p. 96/313, TC(min)
- ^{1b} TN #: 223184, WQMP, p. 96/313, Peak Flow Rate (CFS)
- ^{1c} TN #: 223281, Response to PSA Workshop Queries, p. 43/52, Table 2, Total Storage at Top of Weir (ft3)
- ^{1d} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 4, (1c ÷ 1b)
- ^{1e} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 4, (1d ÷ 60 seconds/minute)
- ^{1f} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 4, (1a + 1e)
- ^{2a} TN #: 223184, WQMP, p. 97/313, TC(min)
- ^{2b} TN #: 223184, WQMP, p. 97/313, Peak Flow Rate (CFS)
- ^{2c} TN #: 223281, Response to PSA Workshop Queries, p. 43/52, Table 2, Total Storage at Top of Weir (ft3)
- ^{2d} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 4, (2c ÷ 2b)
- ^{2e} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 4, (2d ÷ 60 seconds/minute)
- ^{2f} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 4, (2a + 2e)
- ^{3a} TN #: 223184, WQMP, p. 96/313, TC(min)
- ^{3b} TN #: 223184, WQMP, p. 97/313, Peak Flow Rate (CFS)
- ^{3c} TN #: 223281, Response to PSA Workshop Queries, p. 43/52, Table 2, Total Storage at Top of Weir (ft3)
- ^{3d} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 4, (3c ÷ 3b)
- ^{3e} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 4, (3d ÷ 60 seconds/minute)
- ^{3f} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 4, (3a + 3e)

Table 5 - 2 Year Storm Event Runoff Volumes & Rates

	DMA 1	DMA 2	DMA 3	Description
2 Year Hydrograph Runoff Volume (ac/ft)	0.1677 ^{1a}	0.0424 ^{2a}	0.0472 ^{3a}	From Hydrograph output
2 Year Hydrograph Runoff Volume (ft3)	7305 ^{1b}	1847 ^{2b}	2056 ^{3b}	ac/ft x 43560 ft2/ac
Retention Storage (ft3)	6852 ^{1c}	4002 ^{2c}	695 ^{3c}	From Table 2 for DMA 1, From StormTech Ref for DMA 2 & 3
Volume Discharged (ft3)	453 ^{1d}	0 ^{2d}	1361 ^{3d}	2 year Hydrograph Runoff Volume - Volume Discharged
Post-Project 2 Year Hydrograph Discharge Rate (cfs)	0.67 ^{1e}	0 ^{2e}	0.86 ^{3e}	
Pre-Project 2 Year Hydrograph Discharge Rate (cfs)	0.79 ^{1f}	1.43 ^{2f}	1.33 ^{3f}	
Increase/-Decrease in Discharge Rate, %	-15% ^{1g}	-100%	-35%	

Footnotes

Source Information Location

- ^{1a} TN #: 223184, WQMP, p. 117/313, Time 24.33
- ^{1b} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 5, (1a x 43560 ft2/ac)
- ^{1c} TN #: 223281, Response to PSA Workshop Queries, p. 43/52, Table 2, Total Storage at Top of Weir (ft3)
- ^{1d} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 5, (1b - 1c)
- ^{1e} Current Response, Attachment A, p. 18, Peak Flow Rate (cfs), Time 16.333
- ^{1f} TN #: 223184, WQMP, p. 88/313, Peak Flow Rate (cfs), and Current Response Attachment A, p. 4
- ^{1g} Current Response, Table 5, ((1e ÷ 1f) - 1)
- ^{2a} TN #: 223184, WQMP, p. 122/313, Time 24.24
- ^{2b} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 5, (2a x 43560 ft2/ac)
- ^{2c} TN #: 223281, Response to PSA Workshop Queries, p. 43/52, Table 2, Total Storage at Top of Weir (ft3)
- ^{2d} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 5, (2b - 2c)
- ^{2e} Current Response, Attachment A, p. 23, Peak Flow Rate (cfs), Time 16.156
- ^{2f} TN #: 223184, WQMP, p. 88/313, Peak Flow Rate (cfs), and Current Response Attachment A, p. 4
- ^{2g} Current Response, Table 5, ((2e ÷ 2f) - 1)
- ^{3a} TN #: 223184, WQMP, p. 126/313, Time 24.31
- ^{3b} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 5, (3a x 43560 ft2/ac)
- ^{3c} TN #: 223281, Response to PSA Workshop Queries, p. 43/52, Table 2, Total Storage at Top of Weir (ft3)
- ^{3d} TN #: 223281, Response to PSA Workshop Queries, p. 44/52, Table 5, (3b - 3c)
- ^{3e} Current Response, Attachment A, p. 12, Peak Flow Rate (cfs)
- ^{3f} TN #: 223184, WQMP, p. 89/313, Peak Flow Rate (cfs), and Current Response Attachment A, p. 5
- ^{3g} Current Response, Table 5, ((3e ÷ 3f) - 1)

Table 1 - 100 Year Peak Flow Summary Table

Drainage Management Area	DMA 1	DMA 2	DMA 3
Drainage Area (Acres)	1.75 ^{1a}	0.8 ^{2a}	0.81 ^{3a}
Q100 Existing (cfs)	2.81 ^{1b}	2.48 ^{2b}	3.35 ^{3b}
Q100 Proposed (cfs)	2.24* ^{1c}	2.18* ^{2c}	2.43** ^{3c}

* Routed Hydrograph Peak

** Rational Method Peak - No Hydrograph Routing Necessary

Footnotes

Source Information Location

^{1a} TN #: 223281, Response to PSA Workshop Queries, p. 8/52, Effective Area (Acres)

^{1b} TN #: 223281, Response to PSA Workshop Queries, p. 8/52, Peak Flow Rate (CFS)

^{1c} TN #: 223281, Response to PSA Workshop Queries, p. 35/52, Time 16.307

^{2a} TN #: 223281, Response to PSA Workshop Queries, p. 8/52, Total Area (Acres)

^{2b} TN #: 223281, Response to PSA Workshop Queries, p. 8/52, Peak Flow Rate (CFS)

^{2c} TN #: 223281, Response to PSA Workshop Queries, p. 40/52, Time 16.156

^{3a} TN #: 223281, Response to PSA Workshop Queries, p. 10/52, Total Area (Acres)

^{3b} TN #: 223281, Response to PSA Workshop Queries, p. 10/52, Peak Flow Rate (CFS)

^{3c} TN #: 223281, Response to PSA Workshop Queries, p. 17/52, Peak Flow Rate (CFS)

Attachment A

2 Year Storm Event Model Runs

**Existing Condition Rational Method for All DMAs,
Proposed Condition Routed Hydrographs for DMA 1 & 2,
and Proposed Condition Rational Method for DMA 3**

XEAST.RES

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2011 Advanced Engineering Software (aes)
Ver. 18.0 Release Date: 07/01/2011 License ID 1501

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* Stanton Energy Reliability Center *
* Preconstruction Condition *
* 2 Year Storm Event *

FILE NAME: XEAST.DAT
TIME/DATE OF STUDY: 16:33 04/25/2017

=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I; IN/HR) vs. LOG(Tc; MIN)) = 0.5500
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.5550

ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

Table with 9 columns: NO., HALF-CROWN WIDTH (FT), CROWN TO CROSSFALL (FT), STREET-CROSSFALL IN- / OUT- / PARK- SIDE / SIDE / WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GUTTER GEOMETRIES LIP (FT), HIKE (FT), MANNING FACTOR (n). Row 1: 1, 30.0, 20.0, 0.018/0.018/0.020, 0.67, 2.00, 0.0313, 0.167, 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 341.00
ELEVATION DATA: UPSTREAM(FEET) = 72.70 DOWNSTREAM(FEET) = 72.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 25.086

XEAST. RES

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.897
 SUBAREA Tc AND LOSS RATE DATA(AMC I):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 NATURAL FAIR COVER
 "GRASS" B 0.88 0.30 1.000 50 25.09
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 0.47
 TOTAL AREA(ACRES) = 0.88 PEAK FLOW RATE(CFS) = 0.47

 FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 72.00 DOWNSTREAM(FEET) = 71.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 335.00 CHANNEL SLOPE = 0.0030
 CHANNEL BASE(FEET) = 5.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.020 MAXIMUM DEPTH(FEET) = 1.00
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.802
 SUBAREA LOSS RATE DATA(AMC I):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 NATURAL FAIR COVER
 "GRASS" B 0.85 0.30 1.000 50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.66
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.00
 AVERAGE FLOW DEPTH(FEET) = 0.13 TRAVEL TIME(MIN.) = 5.61
 Tc(MIN.) = 30.70
 SUBAREA AREA(ACRES) = 0.85 SUBAREA RUNOFF(CFS) = 0.39
 EFFECTIVE AREA(ACRES) = 1.73 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 0.78

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.14 FLOW VELOCITY(FEET/SEC.) = 1.06
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 676.00 FEET.

 FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 68.50 DOWNSTREAM(FEET) = 64.50
 FLOW LENGTH(FEET) = 35.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 1.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.59
 GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.78
 PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 30.77
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 711.00 FEET.

 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 30.77

DMA 1 Existing Q2

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 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.801
 SUBAREA LOSS RATE DATA(AMC I):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 0.02 0.30 0.100 36
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.02 SUBAREA RUNOFF(CFS) = 0.01
 EFFECTIVE AREA(ACRES) = 1.75 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
 TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 0.79

0.79

 FLOW PROCESS FROM NODE 203.00 TO NODE 204.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 160.00
 ELEVATION DATA: UPSTREAM(FEET) = 70.00 DOWNSTREAM(FEET) = 68.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.745
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 2.017

DMA 2 Existing Q2

SUBAREA Tc AND LOSS RATE DATA(AMC I):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL B 0.80 0.30 0.100 36 5.74
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.43
 TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 1.43

1.43

 FLOW PROCESS FROM NODE 204.00 TO NODE 205.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 65.50 DOWNSTREAM(FEET) = 64.00
 FLOW LENGTH(FEET) = 63.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 8.0 INCH PIPE IS 5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.63
 GIVEN PIPE DIAMETER(INCH) = 8.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.43
 PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 5.93
 LONGEST FLOWPATH FROM NODE 203.00 TO NODE 205.00 = 223.00 FEET.

 FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 64.00 DOWNSTREAM(FEET) = 63.60
 FLOW LENGTH(FEET) = 124.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 2.47
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.43
 PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 6.77
 LONGEST FLOWPATH FROM NODE 203.00 TO NODE 206.00 = 347.00 FEET.

XEAST.RES

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 195.00
ELEVATION DATA: UPSTREAM(FEET) = 69.90 DOWNSTREAM(FEET) = 68.50

DMA 3 Existing Q2

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.725
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.850
SUBAREA Tc AND LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL B 0.81 0.30 0.100 36 6.72
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.33
TOTAL AREA(ACRES) = 0.81 PEAK FLOW RATE(CFS) = 1.33

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 66.60 DOWNSTREAM(FEET) = 65.90
FLOW LENGTH(FEET) = 81.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.80
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 8.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.33
PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 7.08
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 276.00 FEET.

FLOW PROCESS FROM NODE 202.00 TO NODE 206.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 65.90 DOWNSTREAM(FEET) = 63.60
FLOW LENGTH(FEET) = 411.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 4.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.94
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.33
PIPE TRAVEL TIME(MIN.) = 2.33 Tc(MIN.) = 9.41
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 687.00 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.8 TC(MIN.) = 9.41
EFFECTIVE AREA(ACRES) = 0.81 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 1.33

END OF RATIONAL METHOD ANALYSIS

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SERC2. RES

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 18.0 Release Date: 07/01/2011 License ID 1501

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* Stanton Energy Reliability Center *
* Proposed Condition *
* 2 Year Storm Event *

FILE NAME: SERC1.DAT
TIME/DATE OF STUDY: 15:51 03/30/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I; IN/HR) vs. LOG(Tc; MIN)) = 0.5500
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.5550

ANTECEDENT MOISTURE CONDITION (AMC) ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 500.00 TO NODE 501.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

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INITIAL SUBAREA FLOW-LENGTH(FEET) = 140.00
ELEVATION DATA: UPSTREAM(FEET) = 72.50 DOWNSTREAM(FEET) = 71.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.982

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* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.812
 SUBAREA Tc AND LOSS RATE DATA(AMC I):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 CONDOMINIUMS B 0.25 0.30 0.350 36 6.98
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.350
 SUBAREA RUNOFF(CFS) = 0.38
 TOTAL AREA(ACRES) = 0.25 PEAK FLOW RATE(CFS) = 0.38

 FLOW PROCESS FROM NODE 501.00 TO NODE 502.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 66.50 DOWNSTREAM(FEET) = 65.25
 FLOW LENGTH(FEET) = 156.00 MANNING'S N = 0.010
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 1.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 2.74
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.38
 PIPE TRAVEL TIME(MIN.) = 0.95 Tc(MIN.) = 7.93
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 502.00 = 296.00 FEET.

 FLOW PROCESS FROM NODE 502.00 TO NODE 502.00 IS CODE = 81

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

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MAINLINE Tc(MIN.) = 7.93
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.689
 SUBAREA LOSS RATE DATA(AMC I):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.21 0.30 0.600 36
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 0.21 SUBAREA RUNOFF(CFS) = 0.29
 EFFECTIVE AREA(ACRES) = 0.46 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 0.64

 FLOW PROCESS FROM NODE 502.00 TO NODE 503.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 65.25 DOWNSTREAM(FEET) = 64.48
 FLOW LENGTH(FEET) = 111.00 MANNING'S N = 0.010
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 2.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.06
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.64
 PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 8.53
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 503.00 = 407.00 FEET.

 FLOW PROCESS FROM NODE 503.00 TO NODE 503.00 IS CODE = 81

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

SERC2. RES

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=====
MAINLINE Tc(MIN.) = 8.53
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.622
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 0.15 0.30 0.500 36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 0.15 SUBAREA RUNOFF(CFS) = 0.20
EFFECTIVE AREA(ACRES) = 0.61 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 0.81

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FLOW PROCESS FROM NODE 503.00 TO NODE 504.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 64.48 DOWNSTREAM(FEET) = 63.37
FLOW LENGTH(FEET) = 156.00 MANNING'S N = 0.010
DEPTH OF FLOW IN 36.0 INCH PIPE IS 2.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.29
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.81
PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 9.32
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 504.00 = 563.00 FEET.

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FLOW PROCESS FROM NODE 504.00 TO NODE 504.00 IS CODE = 81

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

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=====
MAINLINE Tc(MIN.) = 9.32
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.545
SUBAREA LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS B 0.24 0.30 0.350 36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 0.24 SUBAREA RUNOFF(CFS) = 0.31
EFFECTIVE AREA(ACRES) = 0.85 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 1.08

```

FLOW PROCESS FROM NODE 504.00 TO NODE 509.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 63.37 DOWNSTREAM(FEET) = 59.50
FLOW LENGTH(FEET) = 96.00 MANNING'S N = 0.010
DEPTH OF FLOW IN 36.0 INCH PIPE IS 2.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.61
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.08
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 9.56
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 509.00 = 659.00 FEET.

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SERC2.RES

 FLOW PROCESS FROM NODE 509.00 TO NODE 509.00 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.) = 9.56
 RAINFALL INTENSITY(INCH/HR) = 1.52
 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.44
 EFFECTIVE STREAM AREA(ACRES) = 0.85
 TOTAL STREAM AREA(ACRES) = 0.85
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.08

 FLOW PROCESS FROM NODE 505.00 TO NODE 506.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

 INITIAL SUBAREA FLOW-LENGTH(FEET) = 151.00
 ELEVATION DATA: UPSTREAM(FEET) = 73.00 DOWNSTREAM(FEET) = 71.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.999
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.809
 SUBAREA Tc AND LOSS RATE DATA(AMC I):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.23 0.30 0.400 36 7.00
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
 SUBAREA RUNOFF(CFS) = 0.35
 TOTAL AREA(ACRES) = 0.23 PEAK FLOW RATE(CFS) = 0.35

 FLOW PROCESS FROM NODE 506.00 TO NODE 507.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 66.50 DOWNSTREAM(FEET) = 66.25
 FLOW LENGTH(FEET) = 205.00 MANNING'S N = 0.010
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 2.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 1.39
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.35
 PIPE TRAVEL TIME(MIN.) = 2.47 Tc(MIN.) = 9.46
 LONGEST FLOWPATH FROM NODE 505.00 TO NODE 507.00 = 356.00 FEET.

 FLOW PROCESS FROM NODE 507.00 TO NODE 507.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 9.46
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.533
 SUBAREA LOSS RATE DATA(AMC I):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

SERC2. RES

RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.20 0.30 0.600 36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.24
 EFFECTIVE AREA(ACRES) = 0.43 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 0.4 PEAK FLOW RATE(CFS) = 0.54

 FLOW PROCESS FROM NODE 507.00 TO NODE 508.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 66.25 DOWNSTREAM(FEET) = 65.15
 FLOW LENGTH(FEET) = 175.00 MANNING'S N = 0.010
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 2.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 2.79
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.54
 PIPE TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 10.51
 LONGEST FLOWPATH FROM NODE 505.00 TO NODE 508.00 = 531.00 FEET.

 FLOW PROCESS FROM NODE 508.00 TO NODE 508.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 10.51
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.447
 SUBAREA LOSS RATE DATA(AMC I):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	0.16	0.30	0.600	36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600					
SUBAREA AREA(ACRES) = 0.16 SUBAREA RUNOFF(CFS) = 0.18					
EFFECTIVE AREA(ACRES) = 0.59 AREA-AVERAGED Fm(INCH/HR) = 0.16					
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52					
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 0.69					

 FLOW PROCESS FROM NODE 508.00 TO NODE 509.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 65.15 DOWNSTREAM(FEET) = 59.50
 FLOW LENGTH(FEET) = 114.00 MANNING'S N = 0.010
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 1.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.19
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.69
 PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 10.82
 LONGEST FLOWPATH FROM NODE 505.00 TO NODE 509.00 = 645.00 FEET.

 FLOW PROCESS FROM NODE 509.00 TO NODE 509.00 IS CODE = 81

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

SERC2. RES

MAINLINE Tc(MIN.) = 10.82
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.424
 SUBAREA LOSS RATE DATA(AMC I):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 CONDOMINIUMS B 0.19 0.30 0.350 36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
 SUBAREA AREA(ACRES) = 0.19 SUBAREA RUNOFF(CFS) = 0.23
 EFFECTIVE AREA(ACRES) = 0.78 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 0.90

FLOW PROCESS FROM NODE 509.00 TO NODE 509.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.82
 RAINFALL INTENSITY(INCH/HR) = 1.42
 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.48
 EFFECTIVE STREAM AREA(ACRES) = 0.78
 TOTAL STREAM AREA(ACRES) = 0.78
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.90

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.08	9.56	1.524	0.30(0.13)	0.44	0.9	500.00
2	0.90	10.82	1.424	0.30(0.14)	0.48	0.8	505.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.94	9.56	1.524	0.30(0.14)	0.46	1.5	500.00
2	1.90	10.82	1.424	0.30(0.14)	0.46	1.6	505.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1.94 Tc(MIN.) = 9.56
 EFFECTIVE AREA(ACRES) = 1.54 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 1.6
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 509.00 = 659.00 FEET.

FLOW PROCESS FROM NODE 509.00 TO NODE 510.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 59.50 DOWNSTREAM(FEET) = 58.50
 FLOW LENGTH(FEET) = 117.00 MANNING'S N = 0.010
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.58
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

SERC2. RES

PIPE-FLOW(CFS) = 1.94
PIPE TRAVEL TIME(MIN.) = 0.43 Tc(MIN.) = 9.99
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 510.00 = 776.00 FEET.

FLOW PROCESS FROM NODE 510.00 TO NODE 510.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 9.99
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.488
SUBAREA LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 0.12 0.30 0.200 36
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTI ON, Ap = 0.200
SUBAREA AREA(ACRES) = 0.12 SUBAREA RUNOFF(CFS) = 0.15
EFFECTIVE AREA(ACRES) = 1.66 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 2.03

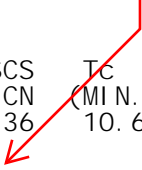
FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 195.00
ELEVATION DATA: UPSTREAM(FEET) = 69.90 DOWNSTREAM(FEET) = 68.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.684
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.434
SUBAREA Tc AND LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
PUBLIC PARK B 0.81 0.30 0.850 36 10.68
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTI ON, Ap = 0.850
SUBAREA RUNOFF(CFS) = 0.86
TOTAL AREA(ACRES) = 0.81 PEAK FLOW RATE(CFS) = 0.86

Proposed Q2 Peak



0.86

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 66.60 DOWNSTREAM(FEET) = 65.90
FLOW LENGTH(FEET) = 81.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 8.0 INCH PIPE IS 5.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.38
GIVEN PIPE DIAMETER(INCH) = 8.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.86
PIPE TRAVEL TIME(MIN.) = 0.40 Tc(MIN.) = 11.08
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 276.00 FEET.

FLOW PROCESS FROM NODE 202.00 TO NODE 205.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

SERC2.RES

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=====
ELEVATION DATA: UPSTREAM(FEET) = 65.90 DOWNSTREAM(FEET) = 63.97
FLOW LENGTH(FEET) = 290.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 3.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.74
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.86
PIPE TRAVEL TIME(MIN.) = 1.76 Tc(MIN.) = 12.85
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 566.00 FEET.

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*****
FLOW PROCESS FROM NODE 202.00 TO NODE 205.00 IS CODE = 1

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

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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 12.85
RAINFALL INTENSITY(INCH/HR) = 1.30
AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.85
EFFECTIVE STREAM AREA(ACRES) = 0.81
TOTAL STREAM AREA(ACRES) = 0.81
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.86

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*****
FLOW PROCESS FROM NODE 203.00 TO NODE 204.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

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=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 166.00
ELEVATION DATA: UPSTREAM(FEET) = 70.00 DOWNSTREAM(FEET) = 68.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.331
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.545
SUBAREA Tc AND LOSS RATE DATA(AMC I):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
PUBLIC PARK B 0.80 0.30 0.850 36 9.33
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA RUNOFF(CFS) = 0.93
TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 0.93

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FLOW PROCESS FROM NODE 204.00 TO NODE 205.00 IS CODE = 41

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 65.53 DOWNSTREAM(FEET) = 63.97
FLOW LENGTH(FEET) = 61.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 8.0 INCH PIPE IS 4.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.27
GIVEN PIPE DIAMETER(INCH) = 8.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.93
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 9.52
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 205.00 = 227.00 FEET.

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FLOW PROCESS FROM NODE 205.00 TO NODE 205.00 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.) = 9.52
 RAINFALL INTENSITY(INCH/HR) = 1.53
 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.85
 EFFECTIVE STREAM AREA(ACRES) = 0.80
 TOTAL STREAM AREA(ACRES) = 0.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.93

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.86	12.85	1.296	0.30(0.26)	0.85	0.8	200.00
2	0.93	9.52	1.527	0.30(0.25)	0.85	0.8	203.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.71	9.52	1.527	0.30(0.25)	0.85	1.4	203.00
2	1.62	12.85	1.296	0.30(0.26)	0.85	1.6	200.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1.71 Tc(MIN.) = 9.52
 EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.26
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.85
 TOTAL AREA(ACRES) = 1.6
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 566.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.6 TC(MIN.) = 9.52
 EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.26
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.850
 PEAK FLOW RATE(CFS) = 1.71

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.71	9.52	1.527	0.30(0.25)	0.85	1.4	203.00
2	1.62	12.85	1.296	0.30(0.26)	0.85	1.6	200.00

END OF RATIONAL METHOD ANALYSIS

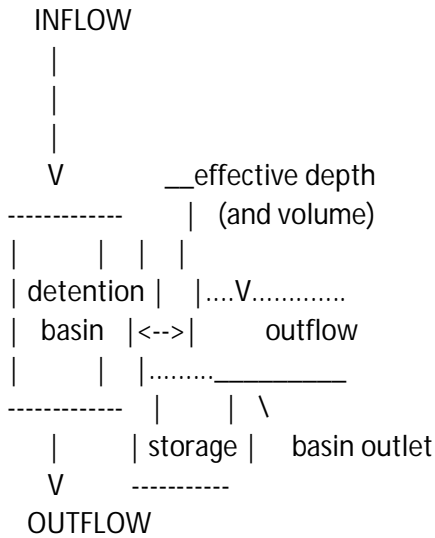
‡

DMA 1 - 2 Year Storm Routed Hydrograph

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FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
 CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 9.990
 DEAD STORAGE(AF) = 0.00
 SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
 ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:

TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 5

* (FEET)	(ACRE-FEET)	(CFS)	** (FEET)	(ACRE-FEET)	(CFS)	*
0.000	0.000	0.000**	1.000	0.040	0.000*	
1.600	0.070	0.600**	3.250	0.160	2.700*	
4.000	0.210	9.550**				

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BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	1.00	0.04000	0.04000
3	1.60	0.06587	0.07413
4	3.25	0.14142	0.17858
5	4.00	0.14429	0.27571

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

=====

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME DEAD-STORAGE INFLOW EFFECTIVE OUTFLOW EFFECTIVE
 (HRS) FILLED(AF) (CFS) DEPTH(FT) (CFS) VOLUME(AF)

0.016	0.000	0.00	0.00	0.00	0.000
0.183	0.000	0.03	0.01	0.00	0.000
0.349	0.000	0.03	0.02	0.00	0.001
0.516	0.000	0.03	0.03	0.00	0.001
0.682	0.000	0.03	0.04	0.00	0.002
0.849	0.000	0.03	0.05	0.00	0.002
1.015	0.000	0.03	0.06	0.00	0.003
1.182	0.000	0.03	0.07	0.00	0.003
1.348	0.000	0.03	0.08	0.00	0.003
1.515	0.000	0.03	0.10	0.00	0.004
1.681	0.000	0.03	0.11	0.00	0.004
1.848	0.000	0.03	0.12	0.00	0.005
2.014	0.000	0.03	0.13	0.00	0.005
2.181	0.000	0.03	0.14	0.00	0.006
2.347	0.000	0.03	0.15	0.00	0.006
2.514	0.000	0.03	0.16	0.00	0.006
2.680	0.000	0.03	0.17	0.00	0.007
2.847	0.000	0.03	0.19	0.00	0.007
3.013	0.000	0.03	0.20	0.00	0.008
3.180	0.000	0.03	0.21	0.00	0.008
3.346	0.000	0.03	0.22	0.00	0.009
3.513	0.000	0.03	0.23	0.00	0.009
3.679	0.000	0.03	0.24	0.00	0.010
3.846	0.000	0.04	0.26	0.00	0.010
4.012	0.000	0.04	0.27	0.00	0.011
4.179	0.000	0.04	0.28	0.00	0.011
4.345	0.000	0.04	0.29	0.00	0.012
4.511	0.000	0.04	0.31	0.00	0.012
4.678	0.000	0.04	0.32	0.00	0.013
4.845	0.000	0.04	0.33	0.00	0.013
5.011	0.000	0.04	0.34	0.00	0.014
5.178	0.000	0.04	0.36	0.00	0.014
5.344	0.000	0.04	0.37	0.00	0.015
5.510	0.000	0.04	0.38	0.00	0.015
5.677	0.000	0.04	0.40	0.00	0.016
5.844	0.000	0.04	0.41	0.00	0.016
6.010	0.000	0.04	0.42	0.00	0.017
6.177	0.000	0.04	0.44	0.00	0.018
6.343	0.000	0.04	0.45	0.00	0.018

6.510	0.000	0.04	0.47	0.00	0.019
6.676	0.000	0.04	0.48	0.00	0.019
6.843	0.000	0.04	0.49	0.00	0.020
7.009	0.000	0.04	0.51	0.00	0.020
7.175	0.000	0.04	0.52	0.00	0.021
7.342	0.000	0.04	0.54	0.00	0.022
7.509	0.000	0.04	0.55	0.00	0.022
7.675	0.000	0.04	0.57	0.00	0.023
7.842	0.000	0.04	0.58	0.00	0.023
8.008	0.000	0.05	0.60	0.00	0.024
8.175	0.000	0.05	0.62	0.00	0.025
8.341	0.000	0.05	0.63	0.00	0.025
8.508	0.000	0.05	0.65	0.00	0.026
8.674	0.000	0.05	0.66	0.00	0.027
8.840	0.000	0.05	0.68	0.00	0.027
9.007	0.000	0.05	0.70	0.00	0.028
9.174	0.000	0.05	0.72	0.00	0.029
9.340	0.000	0.05	0.73	0.00	0.029
9.507	0.000	0.05	0.75	0.00	0.030
9.673	0.000	0.05	0.77	0.00	0.031
9.839	0.000	0.05	0.79	0.00	0.031
10.006	0.000	0.05	0.81	0.00	0.032
10.173	0.000	0.06	0.83	0.00	0.033
10.339	0.000	0.06	0.84	0.00	0.034
10.505	0.000	0.06	0.86	0.00	0.035
10.672	0.000	0.06	0.88	0.00	0.035
10.839	0.000	0.06	0.90	0.00	0.036
11.005	0.000	0.06	0.92	0.00	0.037
11.171	0.000	0.06	0.95	0.00	0.038
11.338	0.000	0.06	0.97	0.00	0.039
11.505	0.000	0.06	0.99	0.00	0.040
11.671	0.000	0.07	1.01	0.00	0.040
11.837	0.000	0.07	1.02	0.02	0.041
12.004	0.000	0.07	1.03	0.03	0.042
12.170	0.000	0.09	1.05	0.04	0.042
12.337	0.000	0.09	1.06	0.05	0.043
12.503	0.000	0.09	1.07	0.06	0.043
12.670	0.000	0.09	1.07	0.07	0.044
12.837	0.000	0.10	1.08	0.08	0.044
13.003	0.000	0.10	1.08	0.08	0.044
13.169	0.000	0.10	1.09	0.09	0.044
13.336	0.000	0.10	1.09	0.09	0.045
13.503	0.000	0.11	1.10	0.09	0.045
13.669	0.000	0.11	1.10	0.10	0.045
13.835	0.000	0.12	1.10	0.10	0.045
14.002	0.000	0.12	1.11	0.11	0.045
14.168	0.000	0.14	1.12	0.11	0.046

14.335	0.000	0.14	1.12	0.12	0.046
14.502	0.000	0.15	1.13	0.13	0.046
14.668	0.000	0.16	1.14	0.13	0.047
14.835	0.000	0.17	1.14	0.14	0.047
15.001	0.000	0.18	1.15	0.15	0.048
15.167	0.000	0.20	1.16	0.16	0.048
15.334	0.000	0.21	1.17	0.17	0.049
15.501	0.000	0.23	1.19	0.18	0.049
15.667	0.000	0.26	1.20	0.20	0.050
15.833	0.000	0.34	1.24	0.22	0.052
16.000	0.000	0.45	1.29	0.26	0.055
16.167	0.000	2.03	1.70	0.51	0.075
16.333	0.000	0.29	1.61	0.67	0.070
16.500	0.000	0.22	1.51	0.56	0.066
16.666	0.000	0.19	1.43	0.47	0.062
16.833	0.000	0.16	1.37	0.40	0.058
16.999	0.000	0.15	1.31	0.34	0.056
17.166	0.000	0.12	1.27	0.29	0.053
17.332	0.000	0.11	1.23	0.25	0.052
17.499	0.000	0.11	1.20	0.22	0.050
17.665	0.000	0.10	1.18	0.19	0.049
17.832	0.000	0.10	1.16	0.17	0.048
17.998	0.000	0.09	1.14	0.15	0.047
18.164	0.000	0.07	1.12	0.13	0.046
18.331	0.000	0.07	1.11	0.12	0.046
18.497	0.000	0.06	1.10	0.10	0.045
18.664	0.000	0.06	1.09	0.09	0.044
18.830	0.000	0.06	1.08	0.09	0.044
18.997	0.000	0.06	1.08	0.08	0.044
19.163	0.000	0.05	1.07	0.07	0.044
19.330	0.000	0.05	1.07	0.07	0.043
19.497	0.000	0.05	1.06	0.06	0.043
19.663	0.000	0.05	1.06	0.06	0.043
19.830	0.000	0.05	1.06	0.06	0.043
19.996	0.000	0.05	1.05	0.06	0.043
20.163	0.000	0.05	1.05	0.05	0.043
20.329	0.000	0.04	1.05	0.05	0.043
20.496	0.000	0.04	1.05	0.05	0.042
20.662	0.000	0.04	1.05	0.05	0.042
20.828	0.000	0.04	1.05	0.05	0.042
20.995	0.000	0.04	1.04	0.05	0.042
21.161	0.000	0.04	1.04	0.04	0.042
21.328	0.000	0.04	1.04	0.04	0.042
21.495	0.000	0.04	1.04	0.04	0.042
21.661	0.000	0.04	1.04	0.04	0.042
21.828	0.000	0.04	1.04	0.04	0.042
21.994	0.000	0.04	1.04	0.04	0.042

2.03 cfs inflow reduced to 0.67 cfs outflow

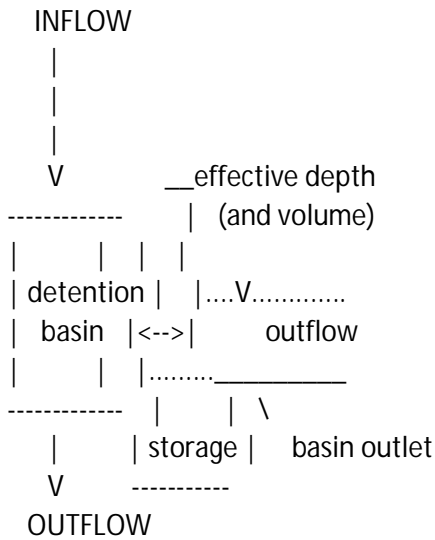
22.160	0.000	0.04	1.04	0.04	0.042
22.327	0.000	0.04	1.04	0.04	0.042
22.493	0.000	0.03	1.04	0.04	0.042
22.660	0.000	0.03	1.04	0.04	0.042
22.826	0.000	0.03	1.04	0.04	0.042
22.993	0.000	0.03	1.03	0.04	0.042
23.159	0.000	0.03	1.03	0.03	0.042
23.326	0.000	0.03	1.03	0.03	0.042
23.493	0.000	0.03	1.03	0.03	0.042
23.659	0.000	0.03	1.03	0.03	0.042
23.826	0.000	0.03	1.03	0.03	0.042
23.992	0.000	0.03	1.03	0.03	0.042
24.159	0.000	0.03	1.03	0.03	0.042
24.325	0.000	0.00	1.02	0.03	0.041

DMA 2 - 2 Year Storm Routed Hydrograph

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FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
 CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 9.330
 DEAD STORAGE(AF) = 0.00
 SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
 ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
 TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 4

* (FEET)	(ACRE-FEET)	(CFS)	** (FEET)	(ACRE-FEET)	(CFS)
0.000	0.000	0.000	0.750	0.007	0.000
5.500	0.092	0.000	5.800	0.100	0.930

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	0.75	0.00700	0.00700
3	5.50	0.09200	0.09200
4	5.80	0.09402	0.10598

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE

AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME DEAD-STORAGE INFLOW EFFECTIVE OUTFLOW EFFECTIVE
 (HRS) FILLED(AF) (CFS) DEPTH(FT) (CFS) VOLUME(AF)

0.139	0.000	0.01	0.01	0.00	0.000
0.295	0.000	0.01	0.02	0.00	0.000
0.450	0.000	0.01	0.03	0.00	0.000
0.606	0.000	0.01	0.04	0.00	0.000
0.761	0.000	0.01	0.05	0.00	0.000
0.917	0.000	0.01	0.05	0.00	0.001
1.072	0.000	0.01	0.06	0.00	0.001
1.228	0.000	0.01	0.07	0.00	0.001
1.383	0.000	0.01	0.08	0.00	0.001
1.539	0.000	0.01	0.09	0.00	0.001
1.694	0.000	0.01	0.10	0.00	0.001
1.850	0.000	0.01	0.11	0.00	0.001
2.005	0.000	0.01	0.12	0.00	0.001
2.161	0.000	0.01	0.13	0.00	0.001
2.316	0.000	0.01	0.14	0.00	0.001
2.472	0.000	0.01	0.15	0.00	0.001
2.627	0.000	0.01	0.16	0.00	0.001
2.783	0.000	0.01	0.17	0.00	0.002
2.938	0.000	0.01	0.18	0.00	0.002
3.093	0.000	0.01	0.19	0.00	0.002
3.249	0.000	0.01	0.20	0.00	0.002
3.405	0.000	0.01	0.21	0.00	0.002
3.560	0.000	0.01	0.22	0.00	0.002
3.716	0.000	0.01	0.23	0.00	0.002
3.871	0.000	0.01	0.24	0.00	0.002
4.027	0.000	0.01	0.25	0.00	0.002
4.182	0.000	0.01	0.26	0.00	0.002
4.338	0.000	0.01	0.27	0.00	0.003
4.493	0.000	0.01	0.29	0.00	0.003
4.648	0.000	0.01	0.30	0.00	0.003
4.804	0.000	0.01	0.31	0.00	0.003
4.960	0.000	0.01	0.32	0.00	0.003
5.115	0.000	0.01	0.33	0.00	0.003
5.271	0.000	0.01	0.34	0.00	0.003
5.426	0.000	0.01	0.35	0.00	0.003
5.582	0.000	0.01	0.36	0.00	0.003
5.737	0.000	0.01	0.38	0.00	0.004
5.893	0.000	0.01	0.39	0.00	0.004
6.048	0.000	0.01	0.40	0.00	0.004
6.203	0.000	0.01	0.41	0.00	0.004
6.359	0.000	0.01	0.42	0.00	0.004
6.515	0.000	0.01	0.44	0.00	0.004

6.670	0.000	0.01	0.45	0.00	0.004
6.826	0.000	0.01	0.46	0.00	0.004
6.981	0.000	0.01	0.47	0.00	0.004
7.136	0.000	0.01	0.49	0.00	0.005
7.292	0.000	0.01	0.50	0.00	0.005
7.448	0.000	0.01	0.51	0.00	0.005
7.603	0.000	0.01	0.53	0.00	0.005
7.759	0.000	0.01	0.54	0.00	0.005
7.914	0.000	0.01	0.55	0.00	0.005
8.069	0.000	0.01	0.57	0.00	0.005
8.225	0.000	0.01	0.58	0.00	0.005
8.380	0.000	0.01	0.59	0.00	0.006
8.536	0.000	0.01	0.61	0.00	0.006
8.691	0.000	0.01	0.62	0.00	0.006
8.847	0.000	0.01	0.64	0.00	0.006
9.003	0.000	0.01	0.65	0.00	0.006
9.158	0.000	0.01	0.67	0.00	0.006
9.314	0.000	0.01	0.68	0.00	0.006
9.469	0.000	0.01	0.70	0.00	0.007
9.625	0.000	0.01	0.71	0.00	0.007
9.780	0.000	0.01	0.73	0.00	0.007
9.936	0.000	0.01	0.75	0.00	0.007
10.091	0.000	0.01	0.76	0.00	0.007
10.247	0.000	0.01	0.77	0.00	0.007
10.402	0.000	0.01	0.77	0.00	0.007
10.557	0.000	0.01	0.78	0.00	0.008
10.713	0.000	0.01	0.79	0.00	0.008
10.868	0.000	0.01	0.80	0.00	0.008
11.024	0.000	0.01	0.81	0.00	0.008
11.180	0.000	0.01	0.82	0.00	0.008
11.335	0.000	0.01	0.83	0.00	0.008
11.490	0.000	0.01	0.84	0.00	0.009
11.646	0.000	0.01	0.85	0.00	0.009
11.802	0.000	0.01	0.86	0.00	0.009
11.957	0.000	0.01	0.87	0.00	0.009
12.113	0.000	0.02	0.88	0.00	0.009
12.268	0.000	0.02	0.90	0.00	0.010
12.423	0.000	0.02	0.91	0.00	0.010
12.579	0.000	0.02	0.93	0.00	0.010
12.734	0.000	0.02	0.94	0.00	0.010
12.890	0.000	0.02	0.96	0.00	0.011
13.045	0.000	0.02	0.97	0.00	0.011
13.201	0.000	0.02	0.99	0.00	0.011
13.357	0.000	0.02	1.01	0.00	0.012
13.512	0.000	0.02	1.02	0.00	0.012
13.667	0.000	0.02	1.04	0.00	0.012
13.823	0.000	0.03	1.06	0.00	0.013

13.979	0.000	0.03	1.08	0.00	0.013
14.134	0.000	0.03	1.10	0.00	0.013
14.290	0.000	0.03	1.12	0.00	0.014
14.445	0.000	0.03	1.14	0.00	0.014
14.601	0.000	0.03	1.17	0.00	0.014
14.756	0.000	0.04	1.19	0.00	0.015
14.911	0.000	0.04	1.22	0.00	0.015
15.067	0.000	0.04	1.25	0.00	0.016
15.222	0.000	0.04	1.28	0.00	0.016
15.378	0.000	0.05	1.31	0.00	0.017
15.533	0.000	0.05	1.35	0.00	0.018
15.689	0.000	0.06	1.39	0.00	0.018
15.844	0.000	0.08	1.45	0.00	0.019
16.000	0.000	0.10	1.52	0.00	0.021
16.156	0.000	0.93	2.19	0.00	0.033
16.311	0.000	0.07	2.24	0.00	0.034
16.466	0.000	0.05	2.27	0.00	0.034
16.622	0.000	0.04	2.30	0.00	0.035
16.778	0.000	0.04	2.33	0.00	0.035
16.933	0.000	0.03	2.35	0.00	0.036
17.089	0.000	0.03	2.37	0.00	0.036
17.244	0.000	0.03	2.39	0.00	0.036
17.399	0.000	0.02	2.41	0.00	0.037
17.555	0.000	0.02	2.42	0.00	0.037
17.711	0.000	0.02	2.44	0.00	0.037
17.866	0.000	0.02	2.45	0.00	0.037
18.022	0.000	0.02	2.47	0.00	0.038
18.177	0.000	0.02	2.48	0.00	0.038
18.332	0.000	0.01	2.49	0.00	0.038
18.488	0.000	0.01	2.50	0.00	0.038
18.643	0.000	0.01	2.51	0.00	0.038
18.799	0.000	0.01	2.52	0.00	0.039
18.955	0.000	0.01	2.53	0.00	0.039
19.110	0.000	0.01	2.54	0.00	0.039
19.266	0.000	0.01	2.54	0.00	0.039
19.421	0.000	0.01	2.55	0.00	0.039
19.576	0.000	0.01	2.56	0.00	0.039
19.732	0.000	0.01	2.57	0.00	0.040
19.888	0.000	0.01	2.57	0.00	0.040
20.043	0.000	0.01	2.58	0.00	0.040
20.198	0.000	0.01	2.59	0.00	0.040
20.354	0.000	0.01	2.60	0.00	0.040
20.509	0.000	0.01	2.60	0.00	0.040
20.665	0.000	0.01	2.61	0.00	0.040
20.820	0.000	0.01	2.62	0.00	0.040
20.976	0.000	0.01	2.62	0.00	0.041
21.132	0.000	0.01	2.63	0.00	0.041

0.93 cfs inflow completely retained, reduced to 0 cfs outflow

21.287	0.000	0.01	2.63	0.00	0.041
21.443	0.000	0.01	2.64	0.00	0.041
21.598	0.000	0.01	2.65	0.00	0.041
21.753	0.000	0.01	2.65	0.00	0.041
21.909	0.000	0.01	2.66	0.00	0.041
22.065	0.000	0.01	2.66	0.00	0.041
22.220	0.000	0.01	2.67	0.00	0.041
22.375	0.000	0.01	2.67	0.00	0.041
22.531	0.000	0.01	2.68	0.00	0.042
22.686	0.000	0.01	2.69	0.00	0.042
22.842	0.000	0.01	2.69	0.00	0.042
22.997	0.000	0.01	2.70	0.00	0.042
23.153	0.000	0.01	2.70	0.00	0.042
23.309	0.000	0.01	2.71	0.00	0.042
23.464	0.000	0.01	2.71	0.00	0.042
23.620	0.000	0.01	2.72	0.00	0.042
23.775	0.000	0.01	2.72	0.00	0.042
23.931	0.000	0.01	2.73	0.00	0.042
24.086	0.000	0.01	2.73	0.00	0.042
24.241	0.000	0.00	2.73	0.00	0.042

