Sunfox Campground Drainage Analysis

15 Kenyon Road, Lisbon, Connectict

Issued: August 31, 2021
Revised: February 14, 2022

Prepared for:
Sunfox Campground

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PROJECT OVERVIEW

Sunfox Campground, located in Lisbon Connecticut, proposes to expand their existing campground with 32 new campsites including an associated access road and utilities. Construction is to be split into 2 phases with a total project disturbance of approximately 8.6-acres. The proposed work will be located east and southeast of the pond on the lot. The site is located along Blissville Brook, which has an approximate watershed area of 1.67 sq. mi. at the southwest limits of the campground property.

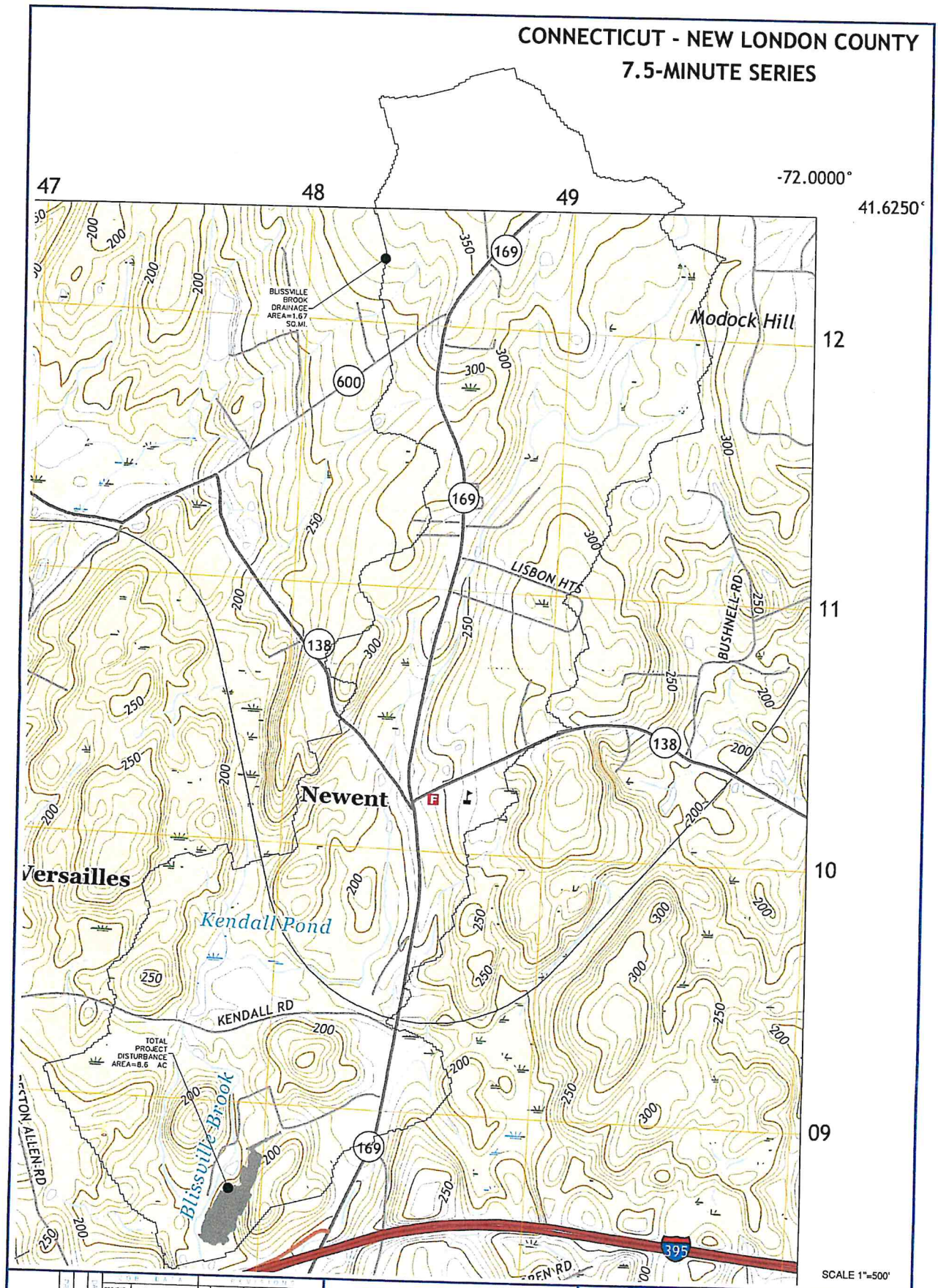
The proposed design conforms to the required Low Impact Development (LID) regulations with compacted areas flowing to vegetated areas prior to discharging, minimizing impervious areas, and minimizing erosion. The vegetated areas also serve to provide water quality treatment to the runoff produced onsite. The proposed development results in a minor increase in peak flow rates from the developed portion of the site. Given the large drainage area and much higher peak flows associated with Blissville Brook these increases will not impact overall peak flow discharges from the site and will not contribute to increased flooding potential downstream.

Methodology

Existing and proposed peak flow conditions were analyzed using the Rational Method. The Rational Method predicts the peak runoff according to the formula: Q=CiA, where C is a runoff coefficient, i is the rainfall intensity, and A is the sub-catchment area. The change in runoff coefficients (C) were determined by aerial imagery, survey data, and design plans. The catchment (A) was considered as the total project disturbance which is 8.6 acres. The rainfall intensities (i) were derived by calculating the time of concentrations using the sheet/shallow/channel flow method and NOAA Atlas 14's rainfall data. The Blissville Brook peak flow information was found using USGS's StreamStats program which uses regression equations to calculate peak flows. A flow comparison table is found below.

	Existing	Proposed	Blissville Watershed
Runoff Coefficient	0.42	0.57	---
Catchment Area (ac)	8.62	8.62	1070
Q2-year (cfs)	8.8	12.9	91.8
Q10-year (cfs)	13.1	19.3	168
Q25-year (cfs)	15.8	23.3	223
Q50-year (cfs)	17.9	26.3	272
Q100-year (cfs)	20.0	29.4	324

WATERSHED & PROJECT DISTURBANCE



PROJECT	2019160				
BOOK NO.	192	1	02/10/2021	HEALTH COMMENTS	RAC
DESIGNED	KLD/PWP	2	04/02/2021	CT DPH COMMENTS	PWP
DRAWN	ZBC/RAC	3	06/15/2021	CT DPH COMMENTS	RAC
CHECKED	KLD				
COGO FILE	2019160 ALL				
FILE					

PREPARED FOR:
DAVID NOWAKOWSKI

WATERSHED & PROJECT DISTURBANCE

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CALCULATIONS

PROPOSED						
DESCRIPTION	# units	SURFACE AREA/unit	Total Area (sf)	Area (acres)	RUNOFF COEFF	AC
PROPOSED SITES 1-9	9	3100	27900	0.64	0.7	0.448347107
PROPOSED SITES 9-30	21	2400	50400	1.16	0.7	0.809917355
PROPOSED SITES 30-53	23	2600	59800	1.37	0.7	0.96097337
GRAVEL ROADS	1	62892	62892	1.44	0.7	1.010661157
EXISTING IMPERVIOUS			94019	2.16	0.7	1.510865071
PERVIOUS			81065	1.86	0.3	0.558298382
TOTAL		376075.9	376075.9	8.63	0.61	5.30

EXISTING						
DESCRIPTION			Total Area (sf)	Area (acres)	RUNOFF COEFF	AC
EXISTING TRAILS (8' WIDE)			16656	0.38	0.7	0.267658402
IMPERVIOUS			94019	2.16	0.7	1.510865071
PERVIOUS			265401	6.09	0.3	1.827830062
TOTAL		376075.9	376075.9	8.63	0.42	3.61

Flow Comparsion			
Frequency (years)	Existing	Proposed	StreamStats
2	8.8	12.9	91.8
10	13.1	19.3	168
25	15.8	23.3	223
50	17.9	26.3	272
100	20.0	29.4	324

TIME of CONCENTRATION (Tc) or TRAVEL TIME (Tt)

NOTES:

Sheet Flow (Applicable to Tc only) **Segment ID**

1	Surface Description	Grass
2	Manning's Roughness Coeff.,....n (See table 3-1 TR-55)	0.400
	Max. Flow Elev.(ft)=	238.00
	Min. Flow Elev. (ft)=	235.00
3	Flow length, L (total L<=100ft.).....ft.	75.0
	Land Slope (ft/ft)=	0.040
4	Two-yr 24hr Rainfall, P2...in. (Fig. B-3 of TR-55)	3.37
6	Tt = 0.007 (nL)^0.8/ P2^0.5 * S^0.4 Computed Tt....hr.	0.210

0.210 hr.

Shallow Concentrated flow, Typical from sheet flow to well defined flow which is typically a solid blue line on the USGS contour map.

Shallow Concentration Flow **Segment ID**

7	Surface description (paved or unpaved).....	Unpaved
	Max. Elevation, ...ft	235.00
	Min Elevation, ...ft	140.00
8	Flow length, L.....ft.	1546.0
9	Watercourse slope, s.....ft/ft	0.061
10	Average velocity, V ..ft/s(INDOT eq 29-7.7 or7.8)	4.00
11	Tt = L/(3600 V).....Computed Tt..hr.	0.107

SUBTOTAL **0.107 hr.**

20	Watershed or Subarea Tc or Tt	0.317 hr.

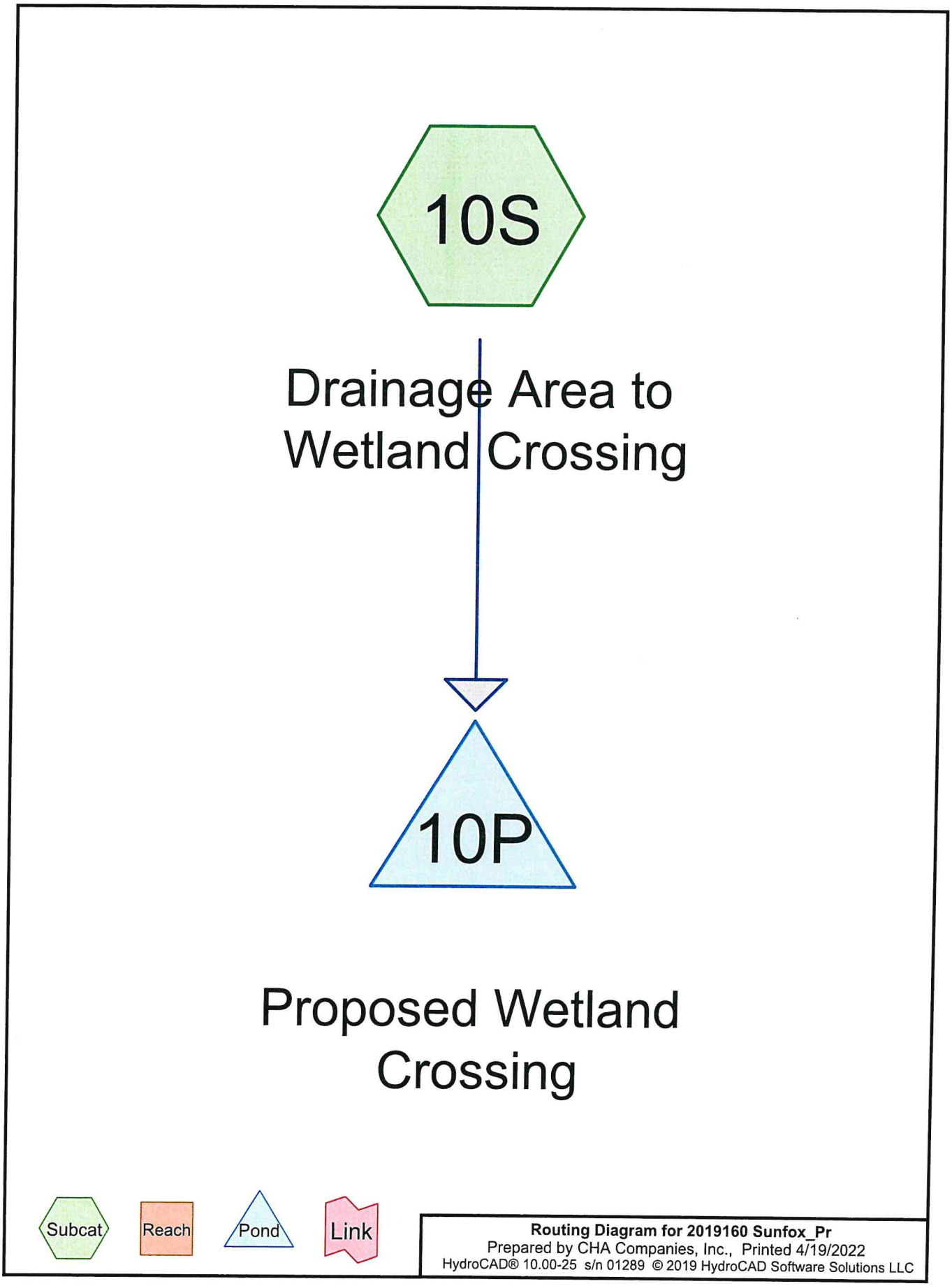
or

19 min.

Frequency (years)	Intensity (in/hr) Tc= 19 minutes, interpolated from NOAA
2	2.43
10	3.64
25	4.39
50	4.96
100	5.55

Roughness Coefficients (Manning's n) for Sheet Flow

Surface Description	n
Smooth Surfaces (conc., asph., gravel or bare soil)	0.011
Fallow (w/no residue)	0.05
Cultivated Soils	
Cover <= 20%	0.06
Cover >= 20%	0.17
Grass	
Short grass, prairie	0.15
Dense grass	0.24
Bermudagrass	0.41
Range	0.13
Woods	
Light underbrush	0.4
Dense underbrush	0.8


10S
Drainage Area to
Wetland Crossing
10P
Proposed Wetland
Crossing
Subcat
Reach
Pond
Link
Routing Diagram for 2019160 Sunfox_Pr
Prepared by CHA Companies, Inc., Printed 4/19/2022
HydroCAD® 10.00-25 s/n 01289 © 2019 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.137	65	2 acre lots, 12% imp, HSG B (10S)
0.654	55	Woods, Good, HSG B (10S)
2.792	**63**	**TOTAL AREA**

Time span=0.00-54.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Drainage Area to Runoff Area=121,600 sf 9.19% Impervious Runoff Depth=0.61"
Tc=10.0 min CN=63 Runoff=1.25 cfs 0.141 af

Pond 10P: Proposed Wetland Crossing Peak Elev=167.57' Storage=224 cf Inflow=1.25 cfs 0.141 af
12.0" Round Culvert x 2.00 n=0.012 L=30.0' S=0.0200 '/' Outflow=1.08 cfs 0.141 af

Total Runoff Area = 2.792 ac Runoff Volume = 0.141 af Average Runoff Depth = 0.61"
90.81% Pervious = 2.535 ac 9.19% Impervious = 0.256 ac

Summary for Subcatchment 10S: Drainage Area to Wetland Crossing

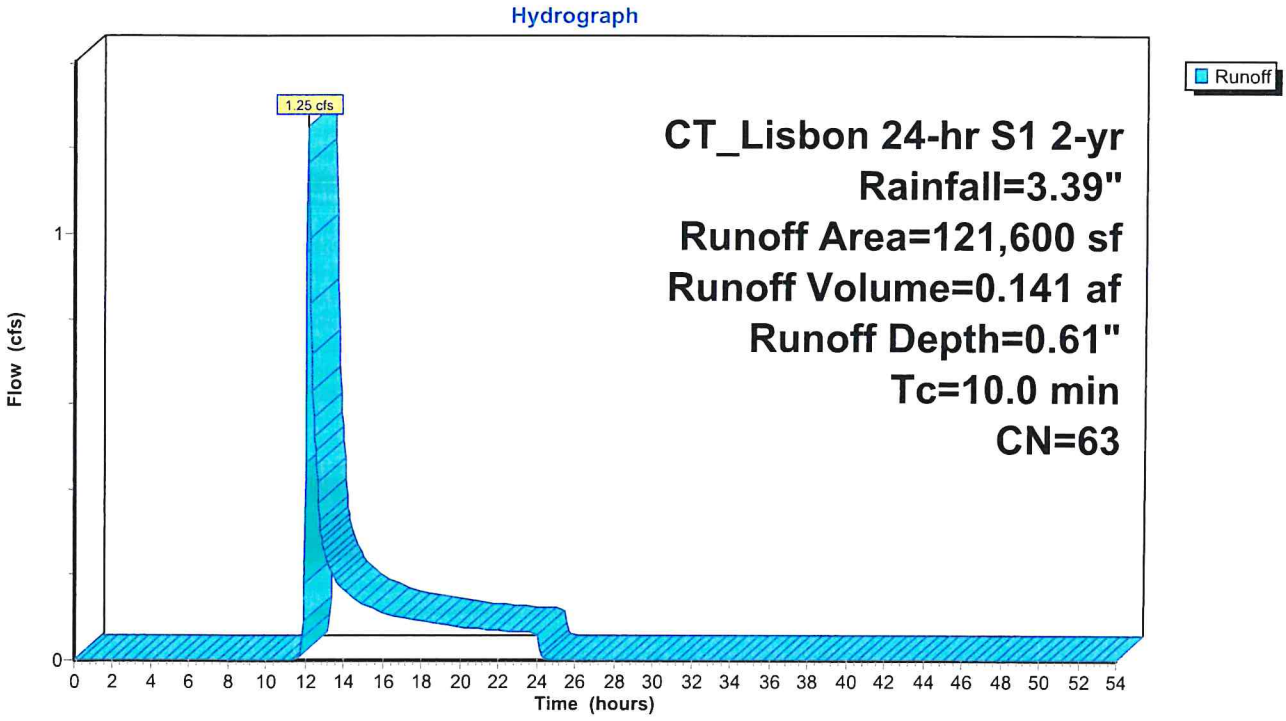
Runoff = 1.25 cfs @ 12.11 hrs, Volume= 0.141 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
CT_Lisbon 24-hr S1 2-yr Rainfall=3.39"

Area (sf)	CN	Description
93,100	65	2 acre lots, 12% imp, HSG B
28,500	55	Woods, Good, HSG B
121,600	63	Weighted Average
110,428		90.81% Pervious Area
11,172		9.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10S: Drainage Area to Wetland Crossing



Summary for Pond 10P: Proposed Wetland Crossing

Inflow Area = 2.792 ac, 9.19% Impervious, Inflow Depth = 0.61" for 2-yr event
Inflow = 1.25 cfs @ 12.11 hrs, Volume= 0.141 af
Outflow = 1.08 cfs @ 12.18 hrs, Volume= 0.141 af, Atten= 14%, Lag= 3.9 min
Primary = 1.08 cfs @ 12.18 hrs, Volume= 0.141 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Peak Elev= 167.57' @ 12.18 hrs Surf.Area= 1,217 sf Storage= 224 cf
Flood Elev= 169.00' Surf.Area= 4,995 sf Storage= 4,884 cf

Plug-Flow detention time= 3.3 min calculated for 0.141 af (100% of inflow)
Center-of-Mass det. time= 3.3 min (944.1 - 940.8)

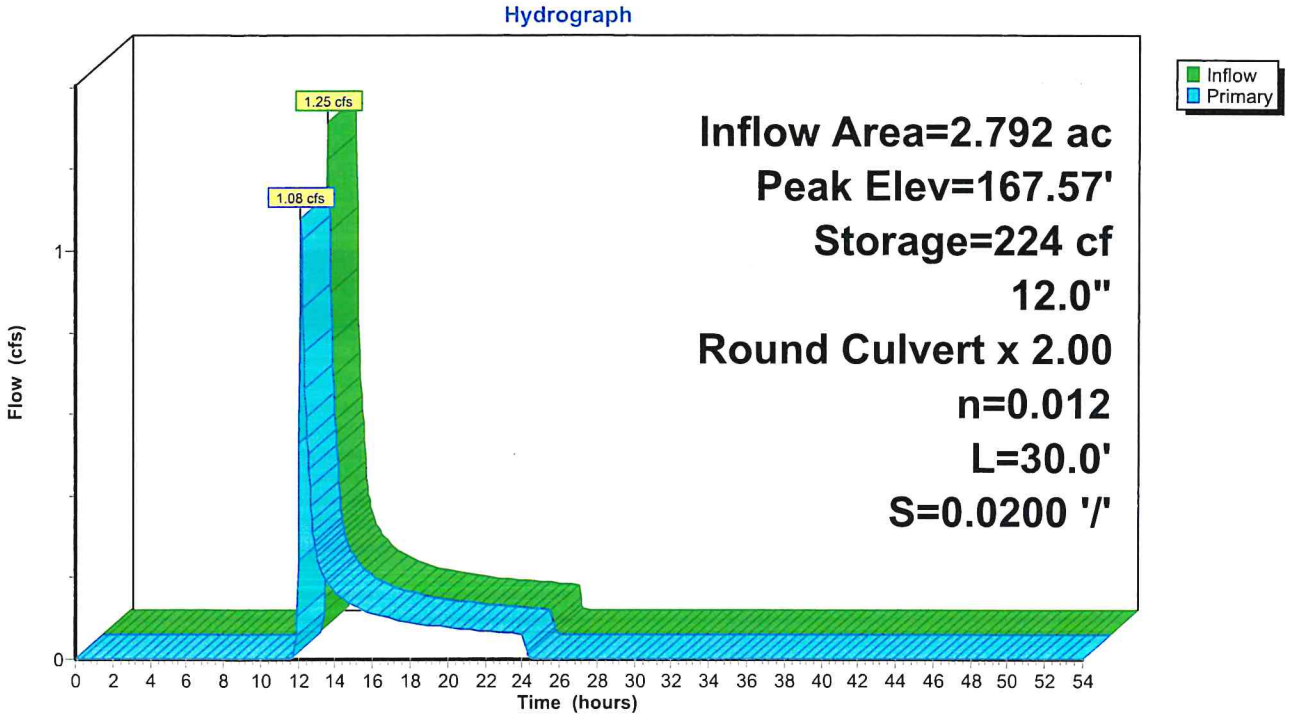
Volume	Invert	Avail.Storage	Storage Description
#1	167.20'	11,052 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
167.20	4	0	0
168.00	2,650	1,062	1,062
170.00	7,340	9,990	11,052

Device	Routing	Invert	Outlet Devices
#1	Primary	167.20'	**12.0" Round Culvert X 2.00** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.20' / 166.60' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.06 cfs @ 12.18 hrs HW=167.56' (Free Discharge)
↑**1=Culvert** (Inlet Controls 1.06 cfs @ 2.06 fps)

Pond 10P: Proposed Wetland Crossing



Time span=0.00-54.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Drainage Area to Runoff Area=121,600 sf 9.19% Impervious Runoff Depth=1.53"
Tc=10.0 min CN=63 Runoff=4.09 cfs 0.357 af

Pond 10P: Proposed Wetland Crossing Peak Elev=167.91' Storage=828 cf Inflow=4.09 cfs 0.357 af
12.0" Round Culvert x 2.00 n=0.012 L=30.0' S=0.0200 '/' Outflow=3.39 cfs 0.357 af

Total Runoff Area = 2.792 ac Runoff Volume = 0.357 af Average Runoff Depth = 1.53"
90.81% Pervious = 2.535 ac 9.19% Impervious = 0.256 ac

Summary for Subcatchment 10S: Drainage Area to Wetland Crossing

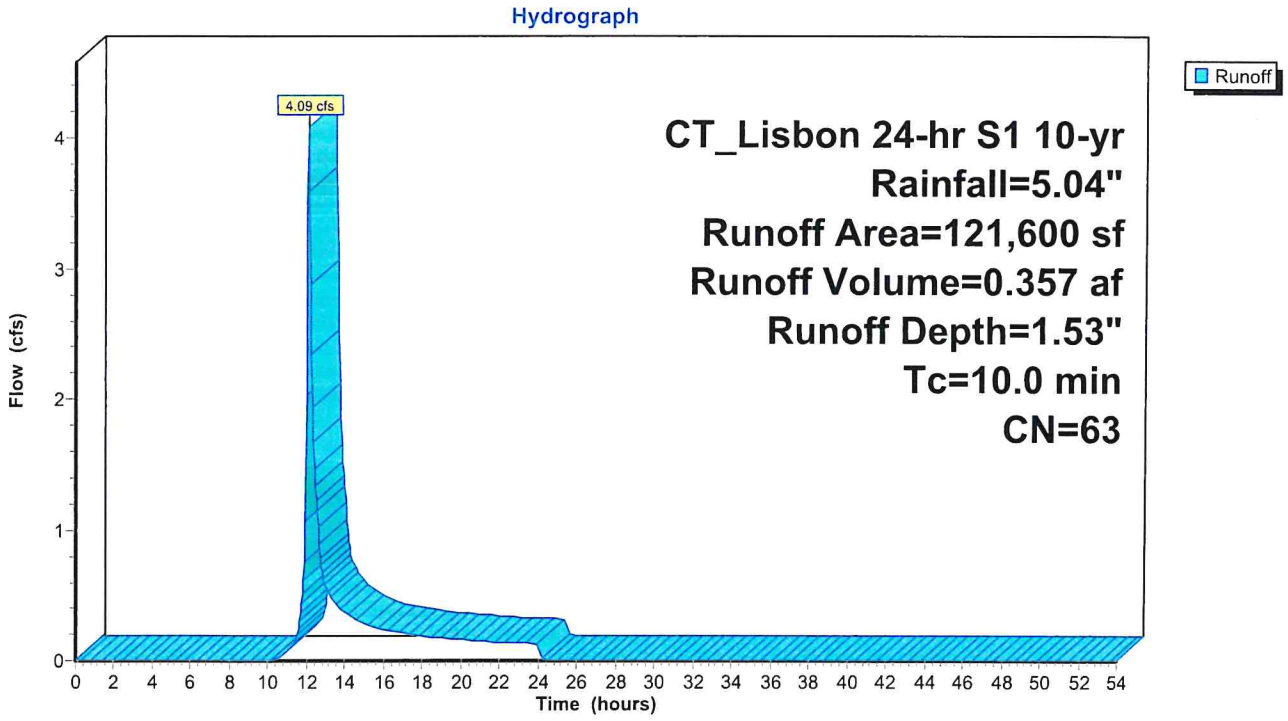
Runoff = 4.09 cfs @ 12.10 hrs, Volume= 0.357 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
CT_Lisbon 24-hr S1 10-yr Rainfall=5.04"

Area (sf)	CN	Description
93,100	65	2 acre lots, 12% imp, HSG B
28,500	55	Woods, Good, HSG B
121,600	63	Weighted Average
110,428		90.81% Pervious Area
11,172		9.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10S: Drainage Area to Wetland Crossing



Summary for Pond 10P: Proposed Wetland Crossing

Inflow Area = 2.792 ac, 9.19% Impervious, Inflow Depth = 1.53" for 10-yr event
Inflow = 4.09 cfs @ 12.10 hrs, Volume= 0.357 af
Outflow = 3.39 cfs @ 12.17 hrs, Volume= 0.357 af, Atten= 17%, Lag= 4.0 min
Primary = 3.39 cfs @ 12.17 hrs, Volume= 0.357 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Peak Elev= 167.91' @ 12.17 hrs Surf.Area= 2,340 sf Storage= 828 cf
Flood Elev= 169.00' Surf.Area= 4,995 sf Storage= 4,884 cf

Plug-Flow detention time= 3.4 min calculated for 0.357 af (100% of inflow)
Center-of-Mass det. time= 3.4 min (903.8 - 900.3)

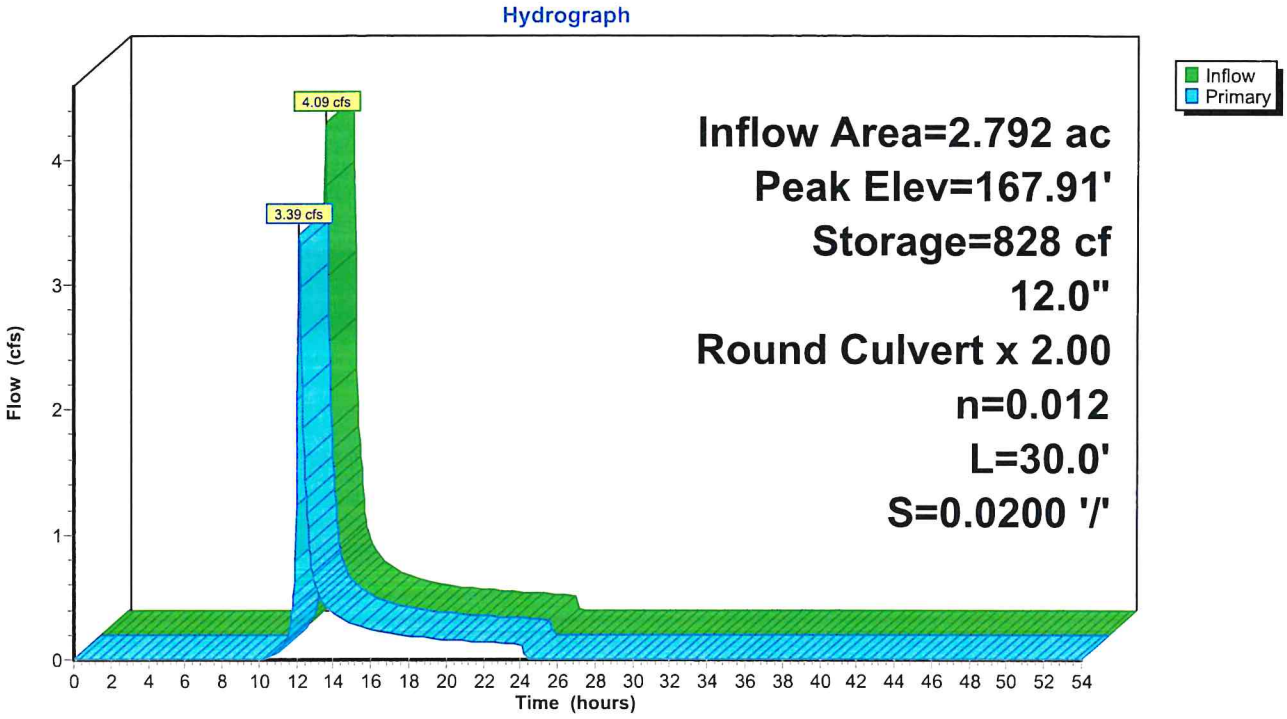
Volume	Invert	Avail.Storage	Storage Description
#1	167.20'	11,052 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
167.20	4	0	0
168.00	2,650	1,062	1,062
170.00	7,340	9,990	11,052

Device	Routing	Invert	Outlet Devices
#1	Primary	167.20'	**12.0" Round Culvert X 2.00** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.20' / 166.60' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=3.34 cfs @ 12.17 hrs HW=167.90' (Free Discharge)
↑**1=Culvert** (Inlet Controls 3.34 cfs @ 2.85 fps)

Pond 10P: Proposed Wetland Crossing



Time span=0.00-54.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Drainage Area to Runoff Area=121,600 sf 9.19% Impervious Runoff Depth=2.23"
Tc=10.0 min CN=63 Runoff=6.21 cfs 0.518 af

Pond 10P: Proposed Wetland Crossing Peak Elev=168.11' Storage=1,377 cf Inflow=6.21 cfs 0.518 af
12.0" Round Culvert x 2.00 n=0.012 L=30.0' S=0.0200 '/' Outflow=4.90 cfs 0.518 af

Total Runoff Area = 2.792 ac Runoff Volume = 0.518 af Average Runoff Depth = 2.23"
90.81% Pervious = 2.535 ac 9.19% Impervious = 0.256 ac

Summary for Subcatchment 10S: Drainage Area to Wetland Crossing

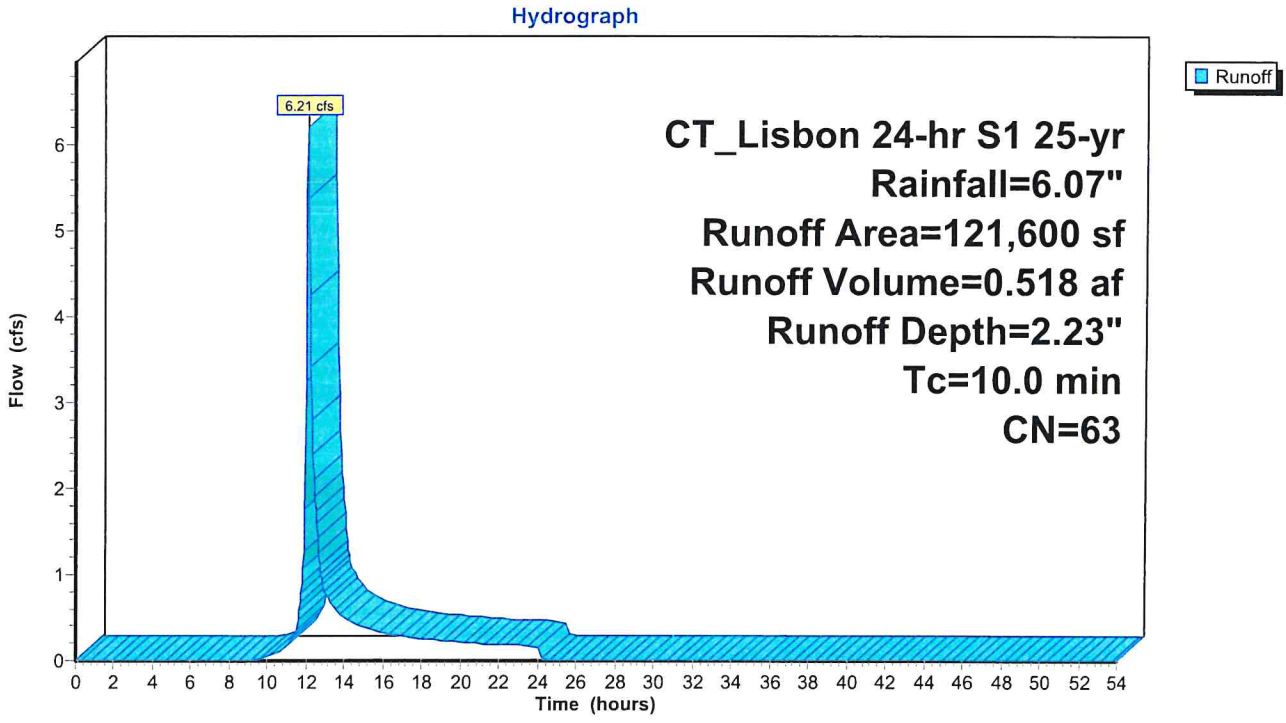
Runoff = 6.21 cfs @ 12.10 hrs, Volume= 0.518 af, Depth= 2.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
CT_Lisbon 24-hr S1 25-yr Rainfall=6.07"

Area (sf)	CN	Description
93,100	65	2 acre lots, 12% imp, HSG B
28,500	55	Woods, Good, HSG B
121,600	63	Weighted Average
110,428		90.81% Pervious Area
11,172		9.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10S: Drainage Area to Wetland Crossing



Summary for Pond 10P: Proposed Wetland Crossing

Inflow Area = 2.792 ac, 9.19% Impervious, Inflow Depth = 2.23" for 25-yr event
Inflow = 6.21 cfs @ 12.10 hrs, Volume= 0.518 af
Outflow = 4.90 cfs @ 12.17 hrs, Volume= 0.518 af, Atten= 21%, Lag= 4.5 min
Primary = 4.90 cfs @ 12.17 hrs, Volume= 0.518 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Peak Elev= 168.11' @ 12.17 hrs Surf.Area= 2,916 sf Storage= 1,377 cf
Flood Elev= 169.00' Surf.Area= 4,995 sf Storage= 4,884 cf

Plug-Flow detention time= 3.6 min calculated for 0.517 af (100% of inflow)
Center-of-Mass det. time= 3.6 min (889.8 - 886.2)

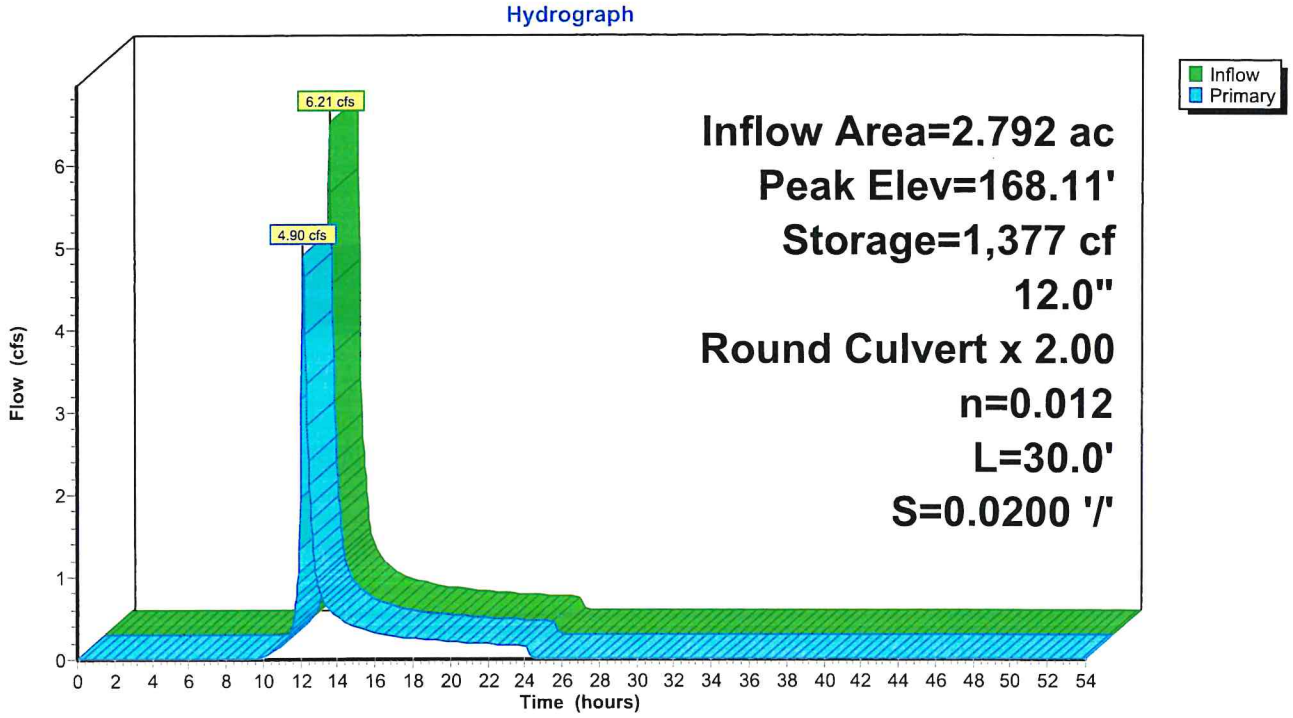
Volume	Invert	Avail.Storage	Storage Description
#1	167.20'	11,052 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
167.20	4	0	0
168.00	2,650	1,062	1,062
170.00	7,340	9,990	11,052

Device	Routing	Invert	Outlet Devices
#1	Primary	167.20'	**12.0" Round Culvert X 2.00** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.20' / 166.60' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=4.83 cfs @ 12.17 hrs HW=168.10' (Free Discharge)
↑**1=Culvert** (Inlet Controls 4.83 cfs @ 3.24 fps)

Pond 10P: Proposed Wetland Crossing



Time span=0.00-54.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Drainage Area to Runoff Area=121,600 sf 9.19% Impervious Runoff Depth=3.40"
Tc=10.0 min CN=63 Runoff=9.79 cfs 0.790 af

Pond 10P: Proposed Wetland Crossing Peak Elev=168.49' Storage=2,653 cf Inflow=9.79 cfs 0.790 af
12.0" Round Culvert x 2.00 n=0.012 L=30.0' S=0.0200 '/' Outflow=6.74 cfs 0.790 af

Total Runoff Area = 2.792 ac Runoff Volume = 0.790 af Average Runoff Depth = 3.40"
90.81% Pervious = 2.535 ac 9.19% Impervious = 0.256 ac

Summary for Subcatchment 10S: Drainage Area to Wetland Crossing

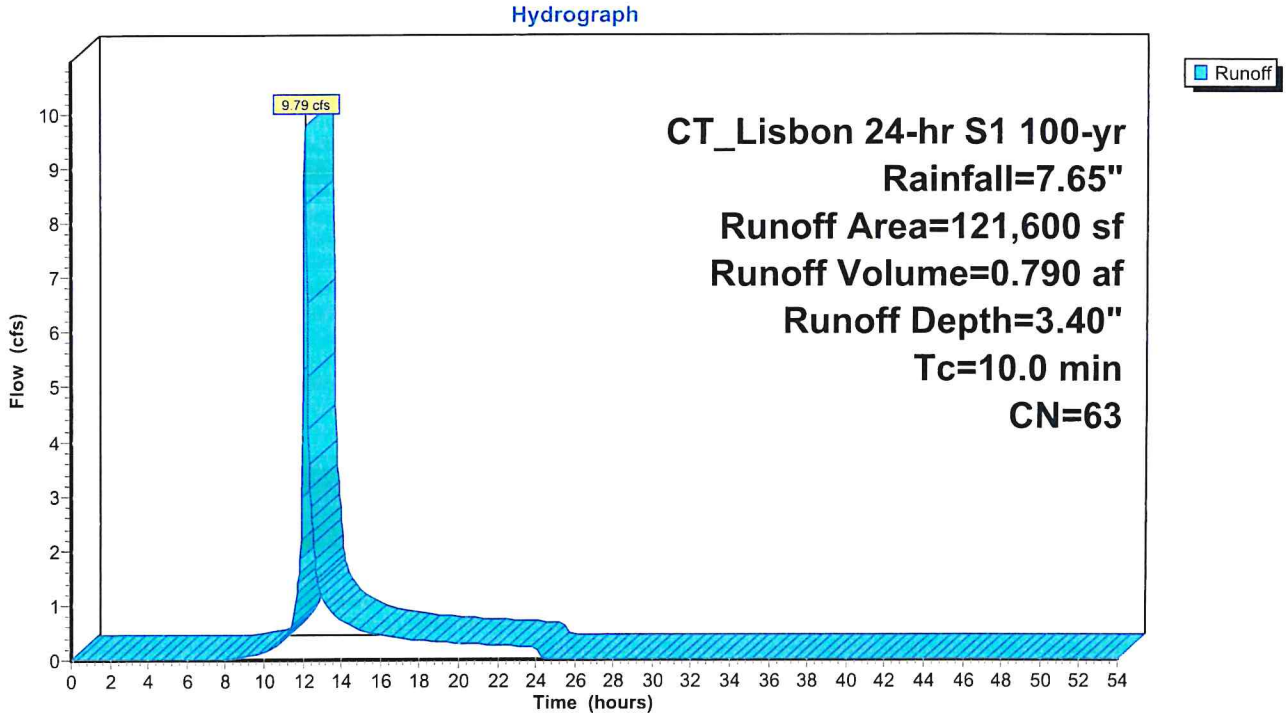
Runoff = 9.79 cfs @ 12.10 hrs, Volume= 0.790 af, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
CT_Lisbon 24-hr S1 100-yr Rainfall=7.65"

Area (sf)	CN	Description
93,100	65	2 acre lots, 12% imp, HSG B
28,500	55	Woods, Good, HSG B
121,600	63	Weighted Average
110,428		90.81% Pervious Area
11,172		9.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10S: Drainage Area to Wetland Crossing



Summary for Pond 10P: Proposed Wetland Crossing

Inflow Area = 2.792 ac, 9.19% Impervious, Inflow Depth = 3.40" for 100-yr event
Inflow = 9.79 cfs @ 12.10 hrs, Volume= 0.790 af
Outflow = 6.74 cfs @ 12.20 hrs, Volume= 0.790 af, Atten= 31%, Lag= 6.2 min
Primary = 6.74 cfs @ 12.20 hrs, Volume= 0.790 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Peak Elev= 168.49' @ 12.20 hrs Surf.Area= 3,806 sf Storage= 2,653 cf
Flood Elev= 169.00' Surf.Area= 4,995 sf Storage= 4,884 cf

Plug-Flow detention time= 4.0 min calculated for 0.789 af (100% of inflow)
Center-of-Mass det. time= 4.0 min (874.3 - 870.3)

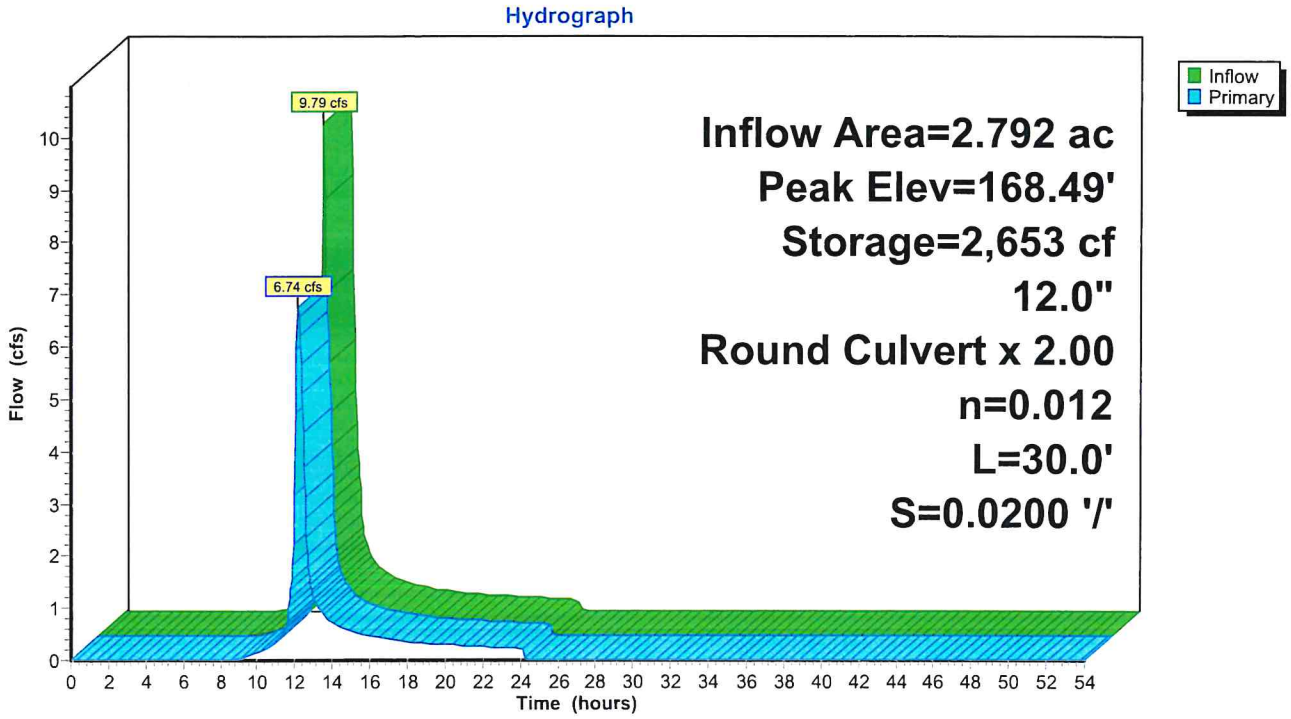
Volume	Invert	Avail.Storage	Storage Description
#1	167.20'	11,052 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
167.20	4	0	0
168.00	2,650	1,062	1,062
170.00	7,340	9,990	11,052

Device	Routing	Invert	Outlet Devices
#1	Primary	167.20'	**12.0" Round Culvert X 2.00** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.20' / 166.60' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=6.73 cfs @ 12.20 hrs HW=168.49' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 6.73 cfs @ 4.29 fps)

Pond 10P: Proposed Wetland Crossing



NOAA RAINFALL DATA

NOAA Atlas 14, Volume 10, Version 3
Location name: Jewett City, Connecticut, USA*
Latitude: 41.5942°, Longitude: -72.0241°
Elevation: 179.29 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	3.98 (3.07-5.11)	4.78 (3.68-6.13)	6.06 (4.67-7.81)	7.13 (5.46-9.20)	8.60 (6.38-11.5)	9.72 (7.07-13.2)	10.9 (7.69-15.2)	12.2 (8.18-17.2)	14.0 (9.07-20.3)	15.5 (9.80-22.8)
10-min	2.83 (2.18-3.62)	3.38 (2.61-4.34)	4.30 (3.31-5.53)	5.05 (3.86-6.53)	6.10 (4.52-8.14)	6.89 (5.00-9.33)	7.71 (5.45-10.7)	8.62 (5.80-12.2)	9.92 (6.43-14.4)	11.0 (6.94-16.1)
15-min	2.22 (1.71-2.84)	2.65 (2.05-3.40)	3.37 (2.59-4.34)	3.96 (3.03-5.12)	4.78 (3.55-6.38)	5.40 (3.92-7.32)	6.04 (4.27-8.42)	6.76 (4.54-9.54)	7.78 (5.04-11.3)	8.60 (5.44-12.7)
30-min	1.54 (1.19-1.97)	1.84 (1.42-2.37)	2.34 (1.80-3.01)	2.76 (2.11-3.56)	3.33 (2.47-4.44)	3.76 (2.73-5.09)	4.20 (2.97-5.85)	4.70 (3.16-6.64)	5.41 (3.50-7.84)	5.99 (3.79-8.81)
60-min	0.986 (0.761-1.26)	1.18 (0.911-1.52)	1.50 (1.15-1.93)	1.77 (1.35-2.28)	2.13 (1.58-2.84)	2.41 (1.75-3.26)	2.69 (1.90-3.75)	3.01 (2.02-4.26)	3.47 (2.25-5.02)	3.84 (2.43-5.64)
2-hr	0.642 (0.498-0.817)	0.766 (0.594-0.978)	0.971 (0.750-1.24)	1.14 (0.877-1.46)	1.37 (1.03-1.83)	1.55 (1.13-2.09)	1.74 (1.24-2.41)	1.95 (1.31-2.73)	2.26 (1.47-3.25)	2.52 (1.60-3.68)
3-hr	0.496 (0.386-0.629)	0.591 (0.460-0.752)	0.748 (0.580-0.952)	0.878 (0.677-1.12)	1.06 (0.791-1.40)	1.19 (0.874-1.60)	1.33 (0.953-1.85)	1.50 (1.01-2.09)	1.74 (1.13-2.50)	1.95 (1.24-2.83)
6-hr	0.319 (0.249-0.402)	0.379 (0.296-0.478)	0.478 (0.372-0.604)	0.560 (0.434-0.711)	0.672 (0.506-0.884)	0.756 (0.558-1.01)	0.846 (0.608-1.17)	0.951 (0.645-1.32)	1.11 (0.722-1.58)	1.24 (0.788-1.79)
12-hr	0.199 (0.156-0.249)	0.236 (0.186-0.296)	0.297 (0.233-0.374)	0.348 (0.271-0.439)	0.418 (0.315-0.545)	0.470 (0.348-0.623)	0.525 (0.378-0.718)	0.589 (0.401-0.813)	0.683 (0.448-0.967)	0.761 (0.488-1.09)
24-hr	0.118 (0.094-0.147)	0.141 (0.112-0.176)	0.179 (0.141-0.223)	0.210 (0.164-0.263)	0.253 (0.192-0.328)	0.285 (0.212-0.375)	0.319 (0.231-0.433)	0.358 (0.245-0.491)	0.416 (0.274-0.586)	0.465 (0.299-0.664)
2-day	0.067 (0.053-0.082)	0.080 (0.064-0.099)	0.103 (0.081-0.127)	0.121 (0.095-0.151)	0.146 (0.112-0.189)	0.165 (0.124-0.217)	0.186 (0.136-0.252)	0.210 (0.144-0.286)	0.246 (0.162-0.344)	0.277 (0.178-0.392)
3-day	0.048 (0.038-0.059)	0.058 (0.046-0.071)	0.074 (0.059-0.092)	0.088 (0.069-0.109)	0.106 (0.081-0.136)	0.120 (0.090-0.157)	0.134 (0.098-0.182)	0.152 (0.104-0.206)	0.179 (0.118-0.248)	0.201 (0.130-0.284)
4-day	0.039 (0.031-0.048)	0.047 (0.037-0.057)	0.059 (0.047-0.073)	0.070 (0.055-0.086)	0.084 (0.065-0.108)	0.095 (0.072-0.124)	0.107 (0.078-0.144)	0.121 (0.083-0.164)	0.142 (0.094-0.197)	0.160 (0.104-0.225)
7-day	0.026 (0.021-0.032)	0.031 (0.025-0.038)	0.039 (0.031-0.048)	0.046 (0.037-0.057)	0.055 (0.043-0.070)	0.062 (0.047-0.081)	0.069 (0.051-0.093)	0.078 (0.054-0.105)	0.091 (0.061-0.126)	0.103 (0.067-0.144)
10-day	0.021 (0.017-0.026)	0.025 (0.020-0.030)	0.031 (0.025-0.038)	0.036 (0.029-0.044)	0.043 (0.033-0.054)	0.048 (0.036-0.062)	0.053 (0.039-0.071)	0.059 (0.041-0.080)	0.069 (0.046-0.095)	0.077 (0.050-0.107)
20-day	0.015 (0.012-0.018)	0.017 (0.014-0.021)	0.020 (0.016-0.025)	0.023 (0.018-0.028)	0.027 (0.021-0.033)	0.029 (0.022-0.037)	0.032 (0.023-0.042)	0.035 (0.024-0.047)	0.039 (0.026-0.053)	0.042 (0.028-0.059)
30-day	0.013 (0.010-0.015)	0.014 (0.011-0.017)	0.016 (0.013-0.019)	0.018 (0.014-0.022)	0.020 (0.016-0.025)	0.022 (0.017-0.028)	0.024 (0.018-0.031)	0.026 (0.018-0.035)	0.028 (0.019-0.039)	0.030 (0.020-0.042)
45-day	0.011 (0.009-0.013)	0.011 (0.009-0.014)	0.013 (0.010-0.016)	0.014 (0.011-0.017)	0.016 (0.012-0.020)	0.017 (0.013-0.022)	0.019 (0.014-0.024)	0.020 (0.014-0.026)	0.021 (0.014-0.029)	0.022 (0.014-0.030)
60-day	0.009 (0.007-0.011)	0.010 (0.008-0.012)	0.011 (0.009-0.013)	0.012 (0.010-0.015)	0.013 (0.010-0.016)	0.014 (0.011-0.018)	0.015 (0.011-0.020)	0.016 (0.011-0.021)	0.017 (0.012-0.023)	0.018 (0.012-0.024)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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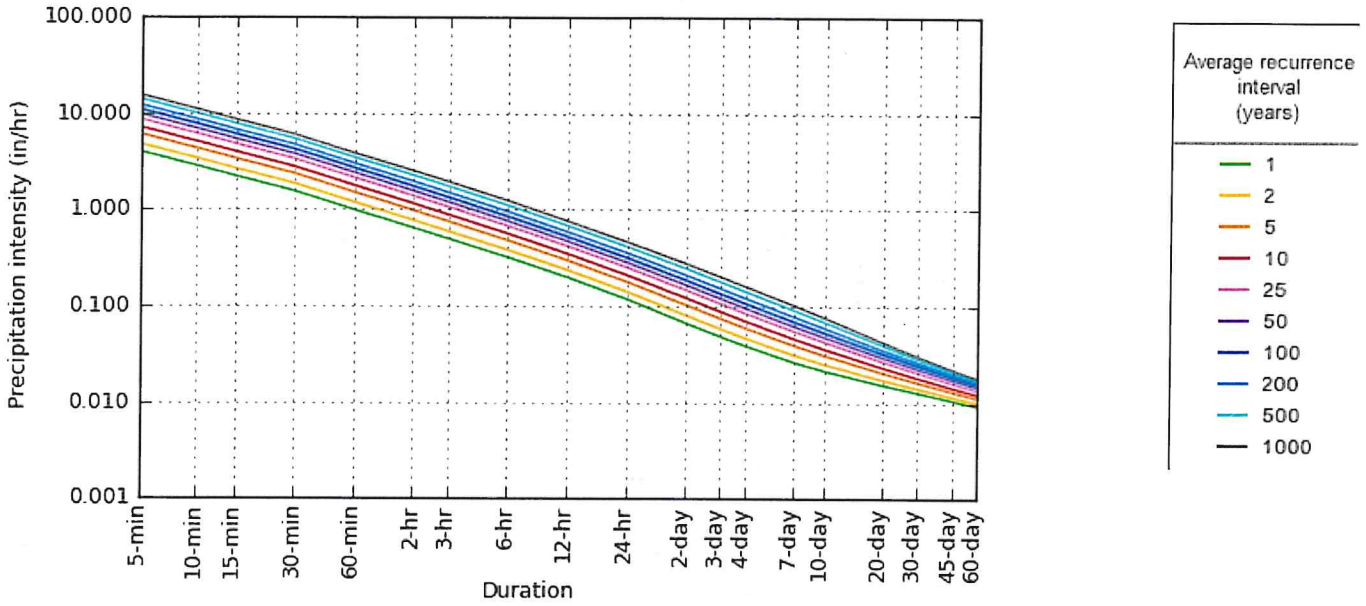
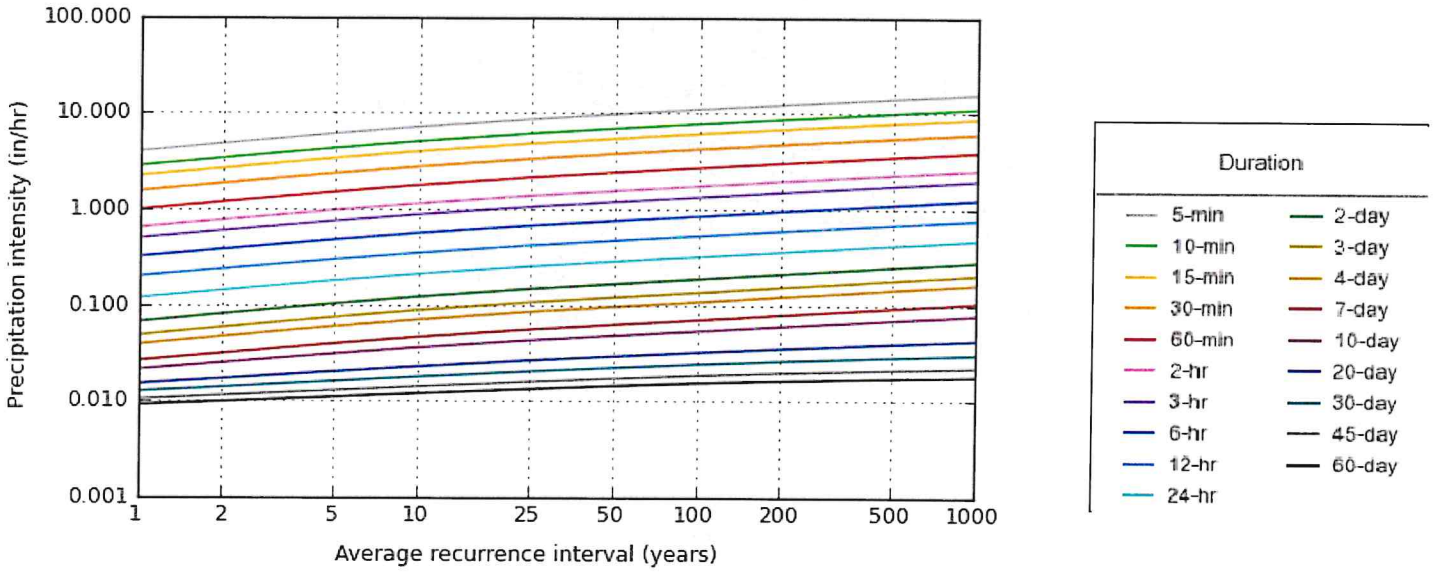
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 41.5942°, Longitude: -72.0241°





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Created (GMT): Mon Aug 30 15:51:27 2021

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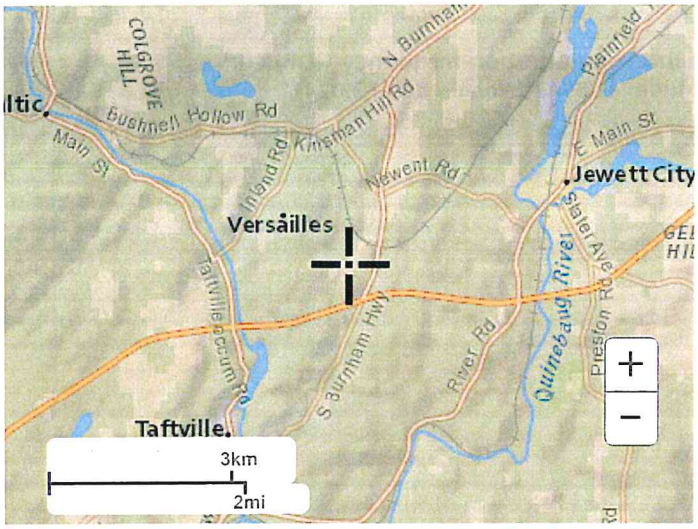
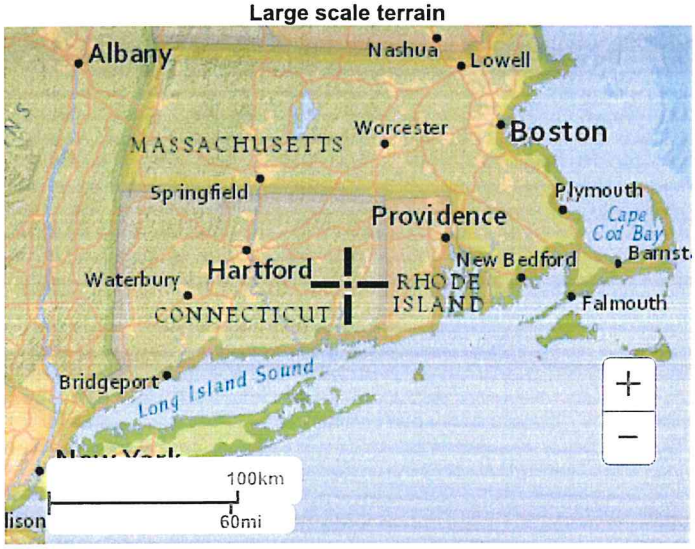
Maps & aerials

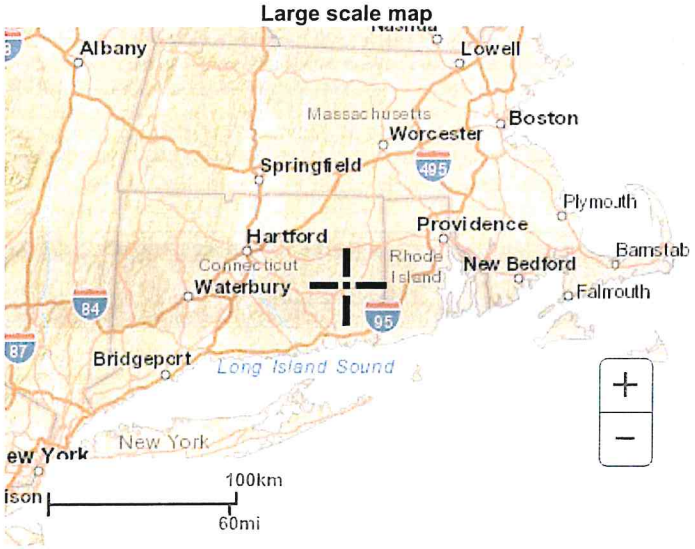
Small scale terrain



Large scale terrain



Large scale map

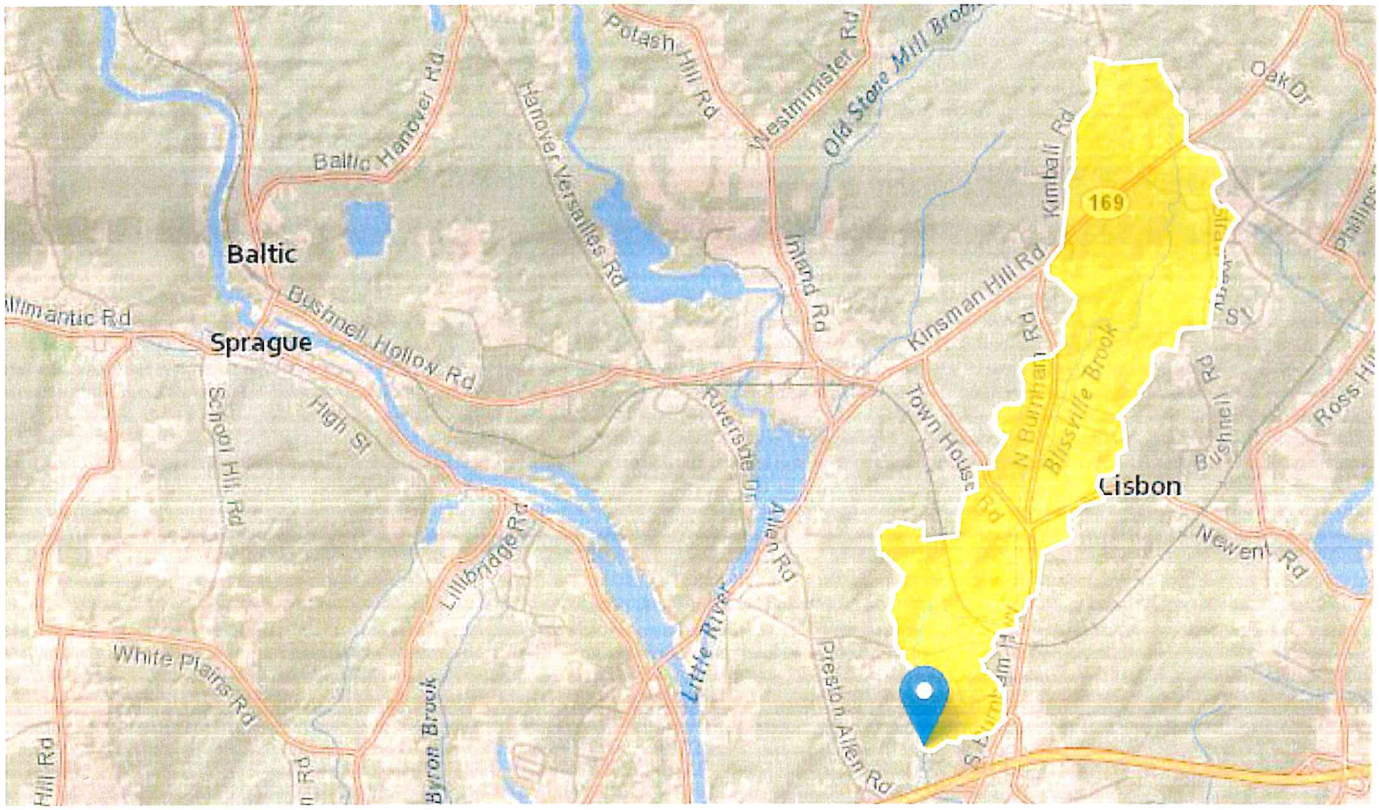


Large scale aerial

STREAMSTATS REPORT

StreamStats Report

Region ID: CT
Workspace ID: CT20210818202359630000
Clicked Point (Latitude, Longitude): 41.59065, -72.02716
Time: 2021-08-18 16:24:18 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CAT1ROADS	Length of interstates lmtd access highways and ramps for lmtd access highways, includes cloverleaf interchanges (USGS Ntl Transp Dataset)	0	miles
CAT2ROADS	Length of sec hwy or maj connecting roads; main arteries & hwys not lmtd access, usually in the US Hwy or State Hwy systems (USGS Ntl Transp Dataset)	0	miles

Parameter Code	Parameter Description	Value	Unit
CAT3ROADS	Length of local connecting roads; roads that collect traffic from local roads & connect towns, subdivisions & neighborhoods (USGS Nat Transp Dataset)	2.56	miles
CAT4ROADS	Length of local roads; generally paved street, road, or byway that usually have single lane of traffic in each direction (USGS Ntnl Transp Dataset)	4.29	miles
CROSCOUNT1	Number of intersections between streams and roads, where the roads are interstate, limited access highway, or ramp (CAT1ROADS)	0	dimensionless
CROSCOUNT2	Number of intersections between streams and roads, where the roads are secondary highway or major connecting road (CAT2ROADS)	0	dimensionless
CROSCOUNT3	Number of intersections between streams and roads, where roads are local conecting roads (CAT3ROADS)	3	dimensionless
CROSCOUNT4	Number of intersections between streams and roads, where roads are local roads (CAT4ROADS)	6	dimensionless
CRSDFT	Percentage of area of coarse-grained stratified drift	19.1	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	43	feet per mi
DRNAREA	Area that drains to a point on a stream	1.67	square miles
ELEV	Mean Basin Elevation	284	feet
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	7.64	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	4.97	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	8.7	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	6.03	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	3.1	inches

Parameter Code	Parameter Description	Value	Unit
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	10.1	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	6.84	inches
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	4.16	inches
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	11.3	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	2.09	percent
LFPLENGTH	Length of longest flow path	4.73	miles
MAPM	Mean Annual Precip Basin Average	48.819	inches
NOVAVPRE	Mean November Precipitation	4.7	inches
PRCWINTER	Mean annual precipitation for December through February	4.1	inches
SGSL	Total stream length intersecting sand and gravel deposits (in miles)	2.77	miles
SOILPERM	Average Soil Permeability	3.687	inches per hour
SSURGOCCDD	Percentage of area with hydrologic soil types C, D, or C/D from SSURGO	0.5009	percent
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	5.69	miles
WETLAND	Percentage of Wetlands	0.34	percent

Peak-Flow Statistics Parameters [Statewide DA only SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	0.69	325

Peak-Flow Statistics Parameters [Statewide Multiparameter SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	0.69	325
I24H2Y	24 Hour 2 Year Precipitation	3.1	inches	2.77	3.32
SSURGOCCDD	Percent soil type C or D from SSURGO	0.5009	percent	0.118	0.945
I24H5Y	24 Hour 5 Year Precipitation	4.16	inches	4	4.7
I24H10Y	24 Hour 10 Year Precipitation	4.97	inches	4.86	5.79
I24H25Y	24 Hour 25 Year Precipitation	6.03	inches	5.99	7.22
I24H50Y	24 Hour 50 Year Precipitation	6.84	inches	6.81	8.3
I24H100Y	24 Hour 100 Year Precipitation	7.64	inches	7.62	9.38
I24H200Y	24 Hour 200 YearPrecipitation	8.7	inches	8.7	11.22
I24H500Y	24 Hour 500 Year Precipitation	10.1	inches	10.1	13.64

Peak-Flow Statistics Flow Report [Statewide DA only SIR 2020 5054]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp
Drainage Area Only 50-percent AEP flood	95.6	ft^3/s	35
Drainage Area Only 20-percent AEP flood	168	ft^3/s	35
Drainage Area Only 10-percent AEP flood	228	ft^3/s	36.3
Drainage Area Only 4-percent AEP flood	317	ft^3/s	37.8
Drainage Area Only 2-percent AEP flood	392	ft^3/s	39.8
Drainage Area Only 1-percent AEP flood	476	ft^3/s	42.4
Drainage Area Only 0.5-percent AEP flood	570	ft^3/s	44.4
Drainage Area Only 0.2-percent AEP flood	710	ft^3/s	48

Peak-Flow Statistics Flow Report [Statewide Multiparameter SIR 2020 5054]

FLOW USED IN ANALYSIS

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	ASEp
50-percent AEP flood	91.8	ft^3/s	22.5	374	26.5
20-percent AEP flood	133	ft^3/s	29.6	598	26.3

Statistic	Value	Unit	PIl	PIu	ASEp
10-percent AEP flood	168	ft^3/s	34.4	820	28.4
4-percent AEP flood	223	ft^3/s	41.1	1210	31.5
2-percent AEP flood	272	ft^3/s	45.7	1620	34.3
1-percent AEP flood	324	ft^3/s	49.4	2120	37.1
0.5-percent AEP flood	385	ft^3/s	65.9	2250	40.6
0.2-percent AEP flood	481	ft^3/s	87.5	2640	45

Peak-Flow Statistics Flow Report [Area-Averaged]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp		
Drainage Area Only 50-percent AEP flood	95.6	ft^3/s	35		
Drainage Area Only 20-percent AEP flood	168	ft^3/s	35		
Drainage Area Only 10-percent AEP flood	228	ft^3/s	36.3		
Drainage Area Only 4-percent AEP flood	317	ft^3/s	37.8		
Drainage Area Only 2-percent AEP flood	392	ft^3/s	39.8		
Drainage Area Only 1-percent AEP flood	476	ft^3/s	42.4		
Drainage Area Only 0.5-percent AEP flood	570	ft^3/s	44.4		
Drainage Area Only 0.2-percent AEP flood	710	ft^3/s	48		
50-percent AEP flood	91.8	ft^3/s	22.5	374	26.5
20-percent AEP flood	133	ft^3/s	29.6	598	26.3
10-percent AEP flood	168	ft^3/s	34.4	820	28.4
4-percent AEP flood	223	ft^3/s	41.1	1210	31.5
2-percent AEP flood	272	ft^3/s	45.7	1620	34.3
1-percent AEP flood	324	ft^3/s	49.4	2120	37.1
0.5-percent AEP flood	385	ft^3/s	65.9	2250	40.6
0.2-percent AEP flood	481	ft^3/s	87.5	2640	45

Peak-Flow Statistics Citations

Ahearn, E.A., and Hodgkins, G.A.,2020, Estimating flood magnitude and frequency on streams and rivers in Connecticut, based on data through water year 2015: U.S. Geological

Survey Scientific Investigations Report 2020–5054, 42 p. (https://doi.org/10.3133/sir20205054)

Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	0.92	150
ELEV	Mean Basin Elevation	284	feet	168	1287
CRSDFT	Percent Coarse Stratified Drift	19.1	percent	0.1	55.1

Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
25 Percent Duration	4.28	ft^3/s
99 Percent Duration	0.0723	ft^3/s

Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

Seasonal Flow Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	0.92	150
PRCWINTER	Mean Annual Winter Precipitation	4.1	inches	3.19	4.4
CRSDFT	Percent Coarse Stratified Drift	19.1	percent	0.1	55.1

Seasonal Flow Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
25 Percent Duration December to February	4.66	ft^3/s
50 Percent Duration December to February	2.77	ft^3/s
75 Percent Duration December to February	1.66	ft^3/s

Statistic	Value	Unit
95 Percent Duration DEC FEB	0.765	ft^3/s
99 Percent Duration December to February	0.418	ft^3/s
25 Percent Duration March to April	7.02	ft^3/s
50 Percent Duration March to April	4.41	ft^3/s
75 Percent Duration March to April	3.21	ft^3/s
95 Percent Duration March to April	1.97	ft^3/s
99 Percent Duration March to April	1.42	ft^3/s
25 Percent Duration July to October	1.13	ft^3/s
50 Percent Duration July to October	0.508	ft^3/s
75 Percent Duration July to October	0.243	ft^3/s
80 Percent Duration July to October	0.201	ft^3/s
99 Percent Duration July to October	0.0294	ft^3/s

Seasonal Flow Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

May Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	0.92	150
CRSDFT	Percent Coarse Stratified Drift	19.1	percent	0.1	55.1

May Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
May 25 Percent Duration	4.79	ft^3/s
May 50 Percent Duration	3.24	ft^3/s
May 75 Percent Duration	2.26	ft^3/s
May 95 Percent Duration	1.29	ft^3/s
May 99 Percent Duration	0.87	ft^3/s

May Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

June Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	0.92	150
CRSDFT	Percent Coarse Stratified Drift	19.1	percent	0.1	55.1
WETLAND	Percent Wetlands	0.34	percent	0.3	18.1

June Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
June 25 Percent Duration	2.46	ft^3/s
June 50 Percent Duration	1.34	ft^3/s
June 75 Percent Duration	0.758	ft^3/s
June 90 Percent Duration	0.569	ft^3/s
June 99 Percent Duration	0.258	ft^3/s

June Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

November Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	0.92	150
NOVAVPRE	Mean November Precipitation	4.7	inches	3.48	4.93
CRSDFT	Percent Coarse Stratified Drift	19.1	percent	0.1	55.1

November Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit

Statistic	Value	Unit
November 25 Percent Duration	3.72	ft^3/s
November 50 Percent Duration	2.05	ft^3/s
November 75 Percent Duration	0.965	ft^3/s
November 90 Percent Duration	0.54	ft^3/s
November 99 Percent Duration	0.225	ft^3/s

November Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

Bankfull Statistics Parameters [Appalachian Highlands D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	0.07722	940.1535

Bankfull Statistics Parameters [New England P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	3.799224	138.999861

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	0.07722	59927.7393

Bankfull Statistics Flow Report [Appalachian Highlands D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	18.8	ft
Bieger_D_channel_depth	1.3	ft
Bieger_D_channel_cross_sectional_area	24.7	ft^2

Bankfull Statistics Disclaimers [New England P Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Bankfull Statistics Flow Report [New England P Bieger 2015]

Statistic	Value	Unit
Bieger_P_channel_width	8.89	ft
Bieger_P_channel_depth	0.469	ft
Bieger_P_channel_cross_sectional_area	45	ft^2

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	4.52	ft
Bieger_USA_channel_depth	0.41	ft
Bieger_USA_channel_cross_sectional_area	22.5	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

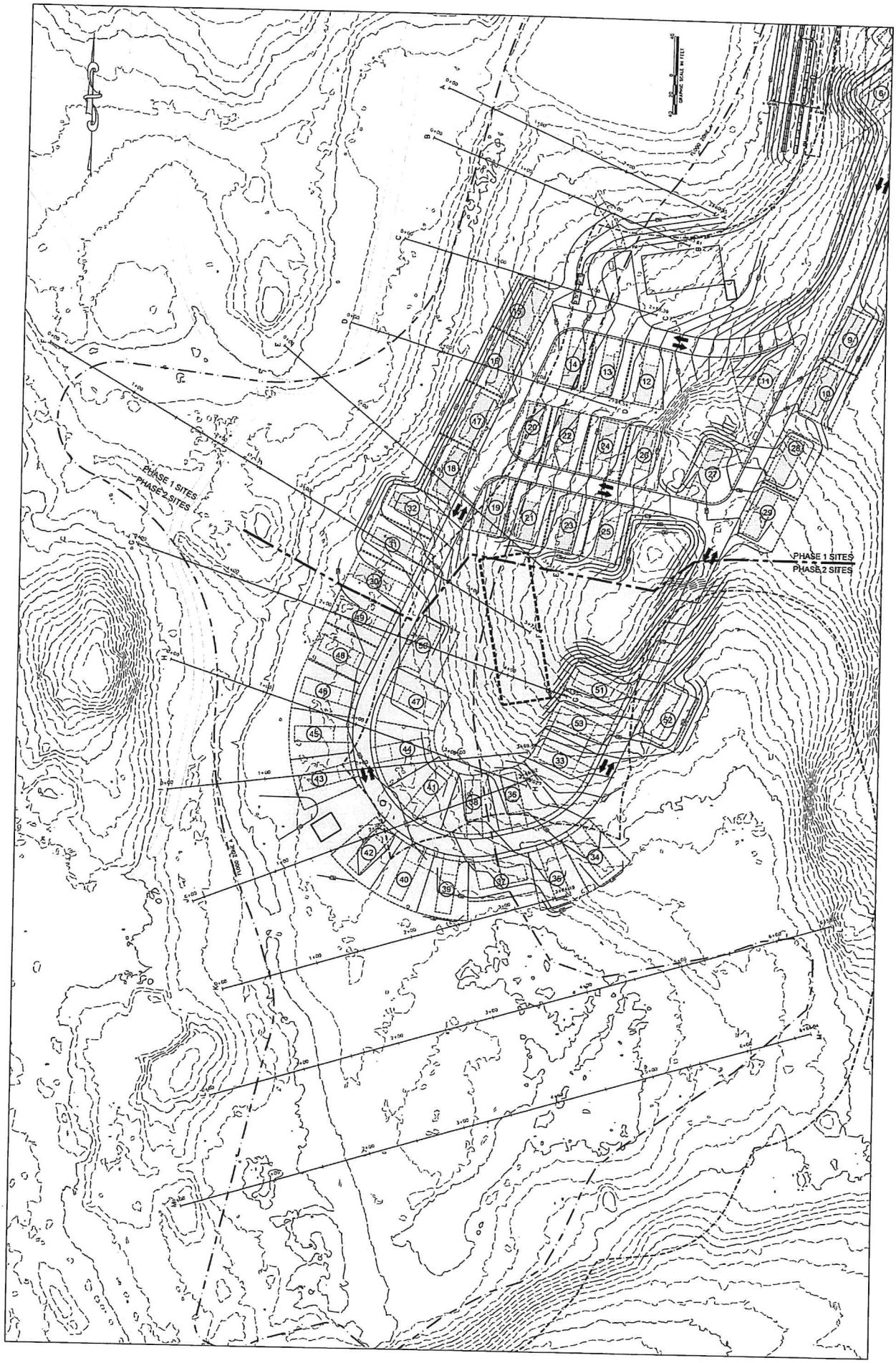
Statistic	Value	Unit
Bieger_D_channel_width	18.8	ft
Bieger_D_channel_depth	1.3	ft
Bieger_D_channel_cross_sectional_area	24.7	ft^2
Bieger_P_channel_width	8.89	ft
Bieger_P_channel_depth	0.469	ft
Bieger_P_channel_cross_sectional_area	45	ft^2
Bieger_USA_channel_width	4.52	ft
Bieger_USA_channel_depth	0.41	ft
Bieger_USA_channel_cross_sectional_area	22.5	ft^2

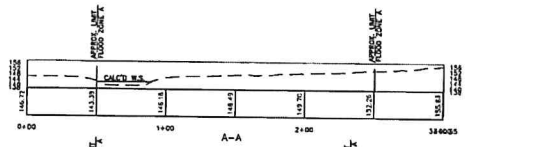
Bankfull Statistics Citations

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_can

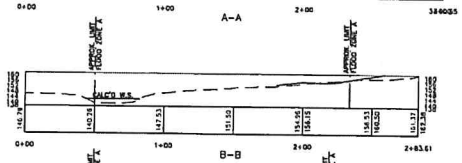
Application Version: 4.6.2
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

FLOOD DATA

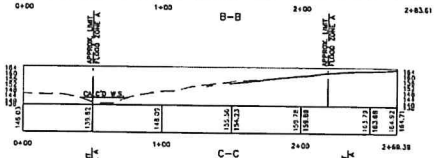

PHASE 1 SITES
PHASE 2 SITES
PHASE 1 SITES
PHASE 2 SITES



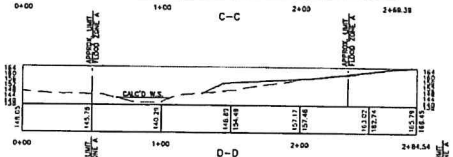
A–A



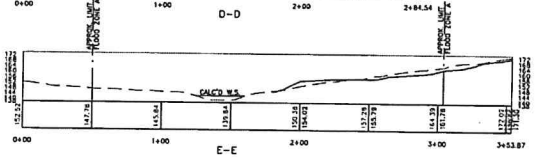
B–B



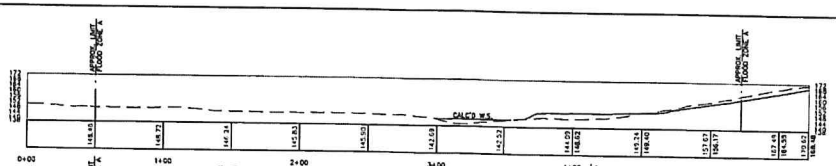
C–C



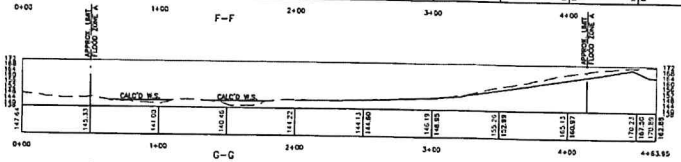
D–D



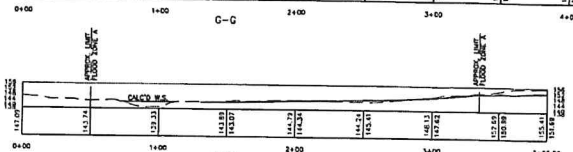
E–E



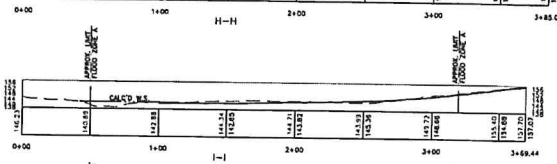
F–F



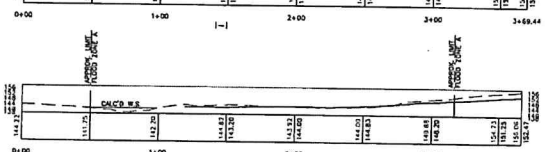
G–G



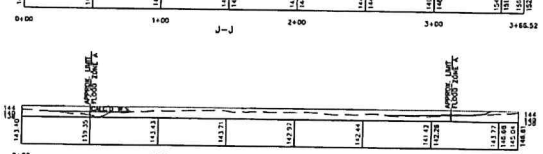
H–H



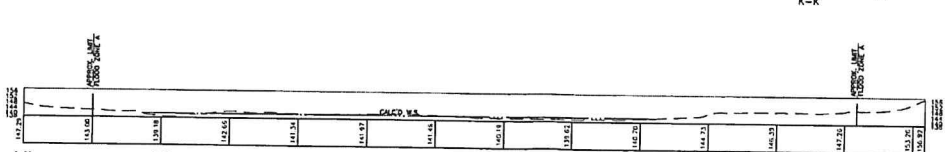
I–I



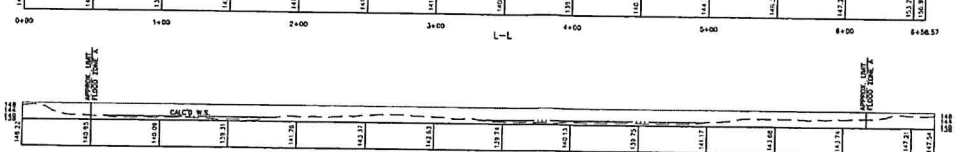
J–J



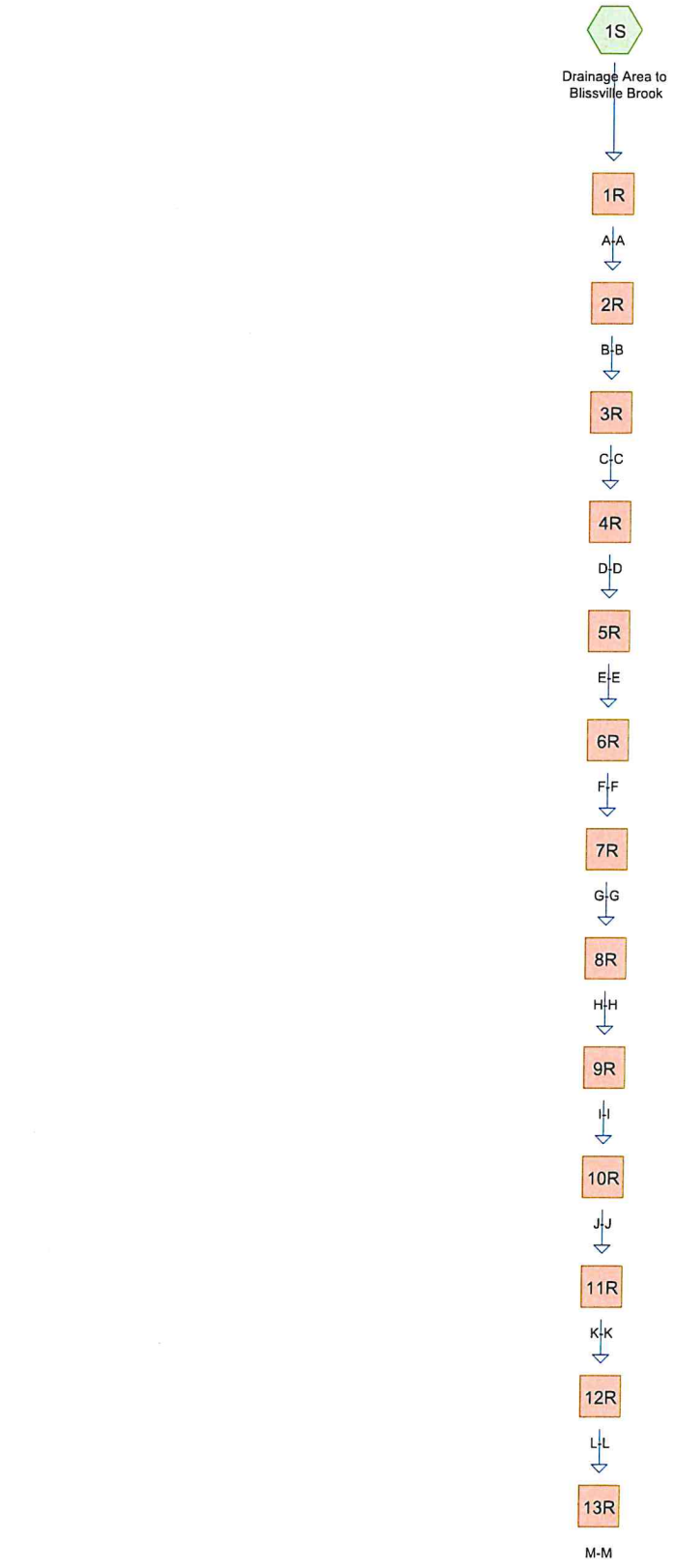
K–K

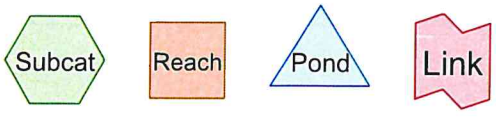


L–L



M–M





Routing Diagram for 2019160 Sunfox
Prepared by CHA Companies, Inc., Printed 12/7/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1,069.000	67	(1S)
1,069.000	**67**	**TOTAL AREA**

Time span=0.00-54.00 hrs, dt=0.01 hrs, 5401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Drainage Area to Runoff Area=1,069.000 ac 0.00% Impervious Runoff Depth>3.83"
Flow Length=24,974' Slope=0.0100 '/' Tc=602.8 min CN=67 Runoff=332.46 cfs 341.407 af

Reach 1R: A-A Avg. Flow Depth=1.45' Max Vel=7.73 fps Inflow=332.46 cfs 341.407 af
n=0.022 L=50.0' S=0.0100 '/' Capacity=3,665.36 cfs Outflow=332.46 cfs 341.406 af

Reach 2R: B-B Avg. Flow Depth=2.97' Max Vel=3.70 fps Inflow=332.46 cfs 341.406 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=1,354.45 cfs Outflow=332.46 cfs 341.405 af

Reach 3R: C-C Avg. Flow Depth=3.33' Max Vel=3.77 fps Inflow=332.46 cfs 341.405 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=905.35 cfs Outflow=332.45 cfs 341.404 af

Reach 4R: D-D Avg. Flow Depth=3.28' Max Vel=3.69 fps Inflow=332.45 cfs 341.404 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=2,297.67 cfs Outflow=332.45 cfs 341.403 af

Reach 5R: E-E Avg. Flow Depth=3.02' Max Vel=3.58 fps Inflow=332.45 cfs 341.403 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=9,968.85 cfs Outflow=332.45 cfs 341.402 af

Reach 6R: F-F Avg. Flow Depth=3.21' Max Vel=3.22 fps Inflow=332.45 cfs 341.402 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=11,356.35 cfs Outflow=332.45 cfs 341.402 af

Reach 7R: G-G Avg. Flow Depth=3.14' Max Vel=2.64 fps Inflow=332.45 cfs 341.402 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=6,147.81 cfs Outflow=332.45 cfs 341.401 af

Reach 8R: H-H Avg. Flow Depth=3.45' Max Vel=3.67 fps Inflow=332.45 cfs 341.401 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=3,947.51 cfs Outflow=332.45 cfs 341.399 af

Reach 9R: I-I Avg. Flow Depth=3.57' Max Vel=3.30 fps Inflow=332.45 cfs 341.399 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=2,897.62 cfs Outflow=332.44 cfs 341.398 af

Reach 10R: J-J Avg. Flow Depth=3.19' Max Vel=3.09 fps Inflow=332.44 cfs 341.398 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=946.99 cfs Outflow=332.44 cfs 341.397 af

Reach 11R: K-K Avg. Flow Depth=3.58' Max Vel=2.81 fps Inflow=332.44 cfs 341.397 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=580.62 cfs Outflow=332.44 cfs 341.396 af

Reach 12R: L-L Avg. Flow Depth=1.92' Max Vel=1.97 fps Inflow=332.44 cfs 341.396 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=5,319.69 cfs Outflow=332.44 cfs 341.394 af

Reach 13R: M-M Avg. Flow Depth=2.06' Max Vel=2.34 fps Inflow=332.44 cfs 341.394 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=3,275.94 cfs Outflow=332.44 cfs 341.393 af

Total Runoff Area = 1,069.000 ac Runoff Volume = 341.407 af Average Runoff Depth = 3.83"
100.00% Pervious = 1,069.000 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Drainage Area to Blissville Brook

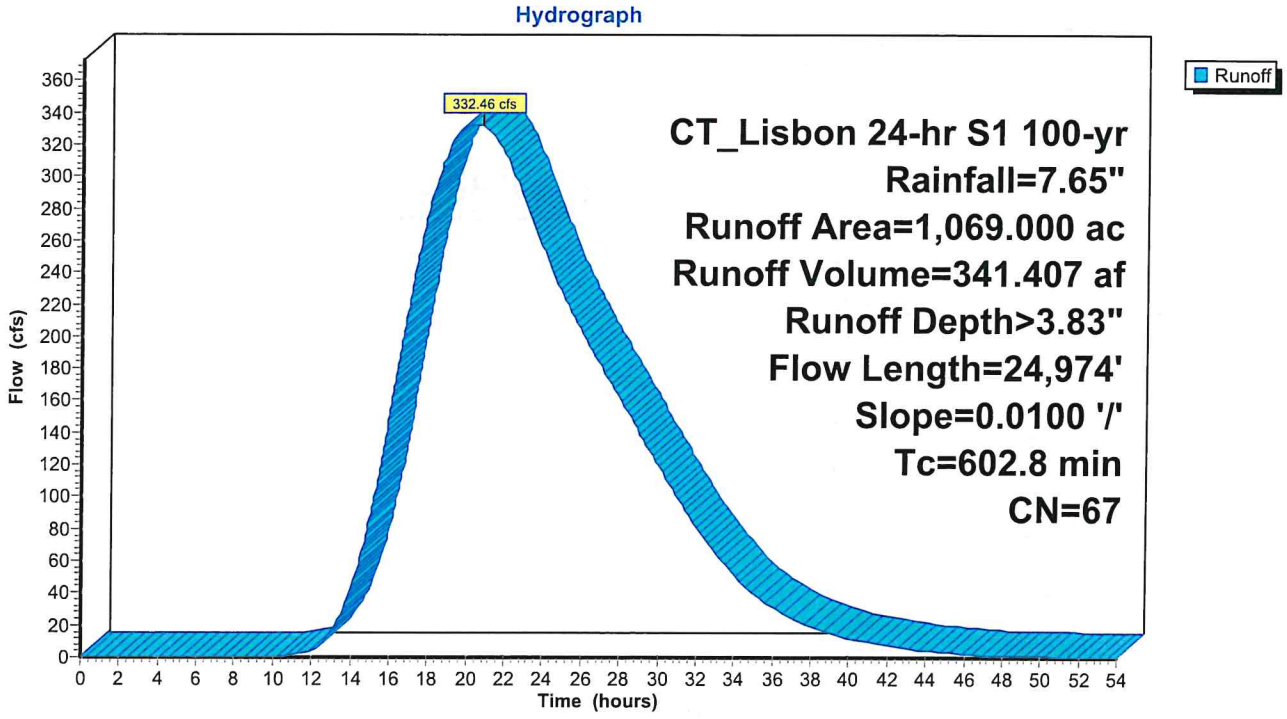
Runoff = 332.46 cfs @ 20.76 hrs, Volume= 341.407 af, Depth> 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
CT_Lisbon 24-hr S1 100-yr Rainfall=7.65"

	Area (ac)	CN	Description
*	1,069.000	67	
	1,069.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
602.8	24,974	0.0100	0.69		**Lag/CN Method,**

Subcatchment 1S: Drainage Area to Blissville Brook



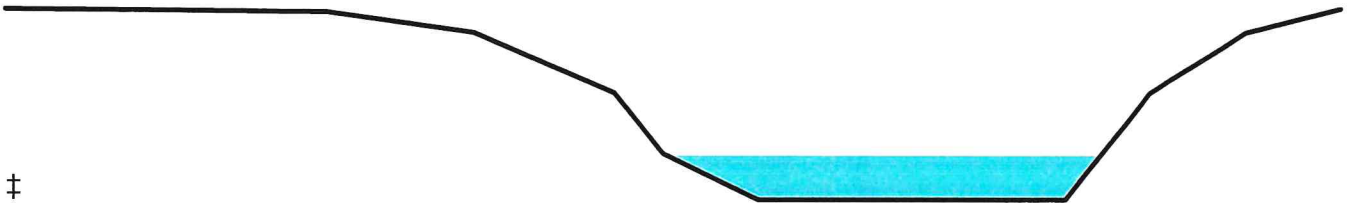
Summary for Reach 1R: A-A

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.46 cfs @ 20.76 hrs, Volume= 341.407 af
Outflow = 332.46 cfs @ 20.76 hrs, Volume= 341.406 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.73 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.74 fps, Avg. Travel Time= 0.2 min

Peak Storage= 2,149 cf @ 20.76 hrs
Average Depth at Peak Storage= 1.45'
Bank-Full Depth= 6.30' Flow Area= 285.0 sf, Capacity= 3,665.36 cfs

Custom cross-section, Length= 50.0' Slope= 0.0100 '/' (104 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 140.50', Outlet Invert= 140.00'

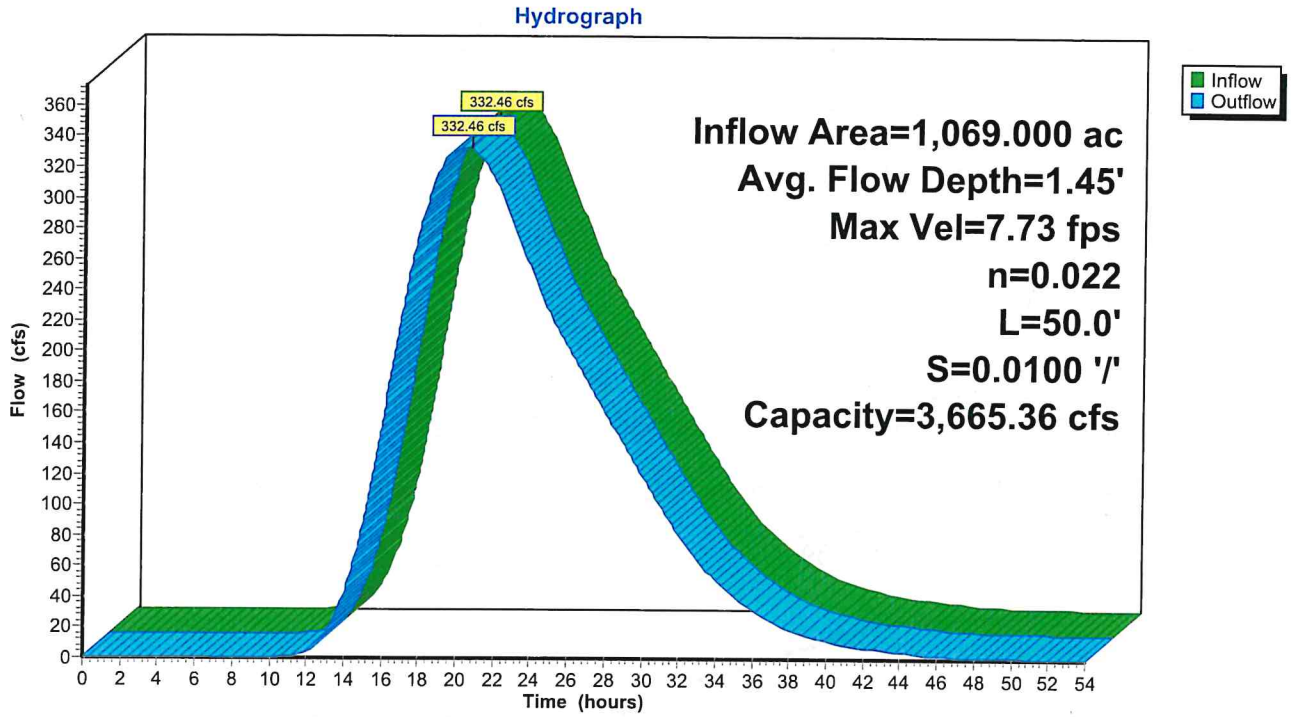


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	146.80	0.00
25.75	146.70	0.10
37.40	146.00	0.80
48.70	144.00	2.80
52.60	142.00	4.80
60.10	140.50	6.30
84.66	140.50	6.30
87.50	142.00	4.80
91.30	144.00	2.80
98.93	146.00	0.80
106.48	146.80	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	24.6	0	0.00
1.50	44.6	35.4	2,230	351.21
3.50	122.1	44.1	6,105	1,626.11
5.50	226.2	63.5	11,311	3,565.82
6.20	275.7	81.8	13,784	4,186.71
6.30	285.0	108.5	14,250	3,665.36

Reach 1R: A-A


Hydrograph
Inflow
Outflow
332.46 cfs
332.46 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=1.45'
Max Vel=7.73 fps
n=0.022
L=50.0'
S=0.0100 '/'
Capacity=3,665.36 cfs
Flow (cfs)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54

Summary for Reach 2R: B-B

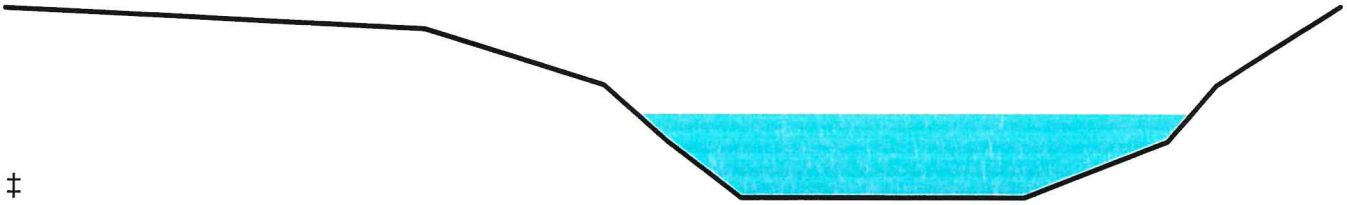
[63] Warning: Exceeded Reach 1R INLET depth by 1.02' @ 20.77 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.46 cfs @ 20.76 hrs, Volume= 341.406 af
Outflow = 332.46 cfs @ 20.76 hrs, Volume= 341.405 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.70 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.81 fps, Avg. Travel Time= 0.9 min

Peak Storage= 8,993 cf @ 20.76 hrs
Average Depth at Peak Storage= 2.97'
Bank-Full Depth= 6.80' Flow Area= 296.5 sf, Capacity= 1,354.45 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (103 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 140.00', Outlet Invert= 139.90'

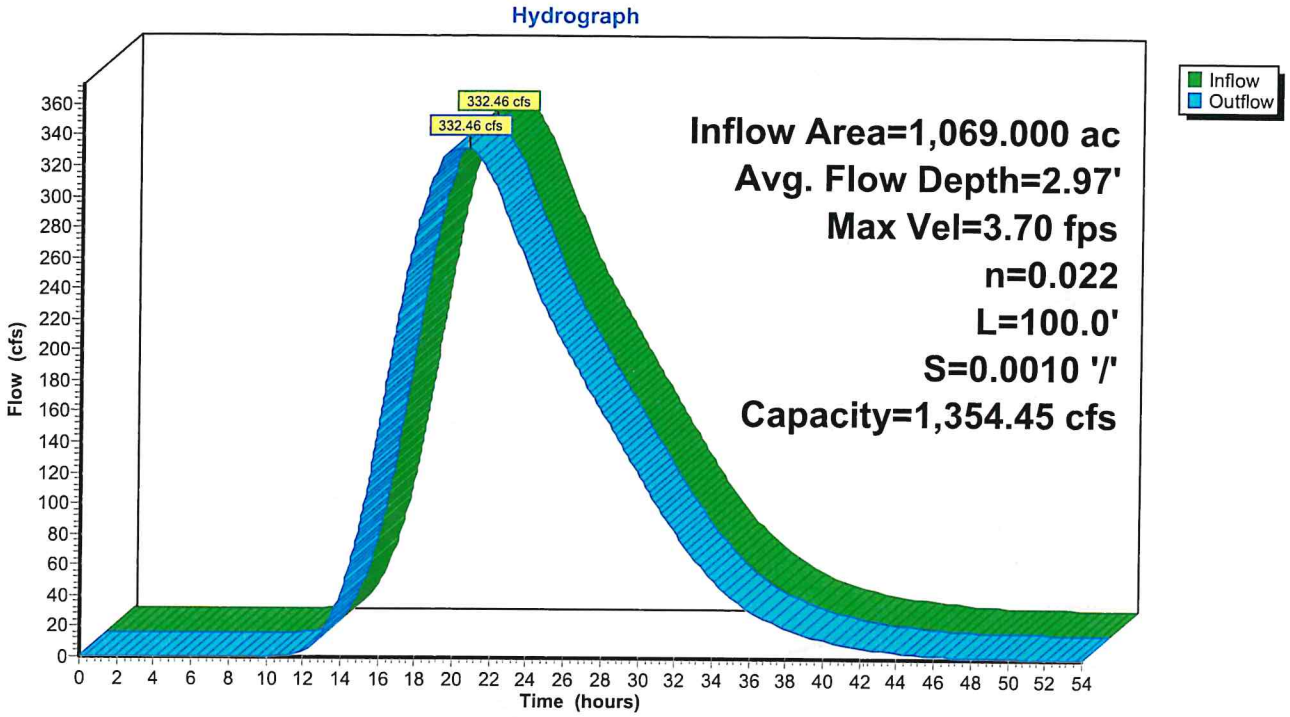


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	146.80	0.00
29.10	146.00	0.80
41.60	144.00	2.80
46.00	142.00	4.80
51.10	140.00	6.80
70.80	140.00	6.80
80.70	142.00	4.80
84.00	144.00	2.80
90.20	146.00	0.80
92.60	146.80	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	19.7	0	0.00
2.00	54.4	35.3	5,440	155.09
4.00	131.5	44.0	13,150	583.04
6.00	235.0	63.1	23,500	1,205.47
6.80	296.5	94.8	29,648	1,354.45

Reach 2R: B-B


Hydrograph
Inflow
Outflow
332.46 cfs
332.46 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=2.97'
Max Vel=3.70 fps
n=0.022
L=100.0'
S=0.0010 '/'
Capacity=1,354.45 cfs
Flow (cfs)
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54
Time (hours)

Summary for Reach 3R: C-C

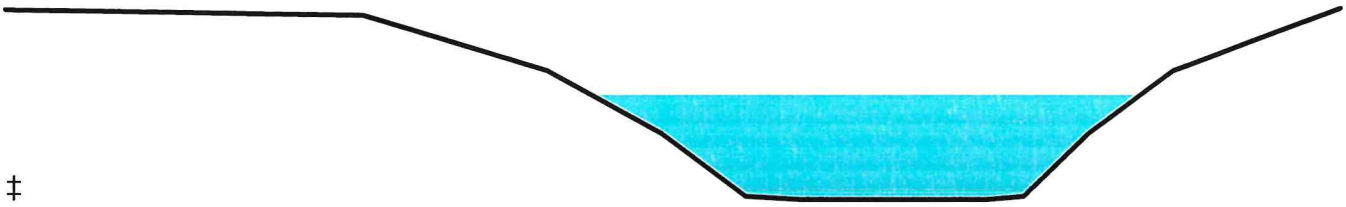
[63] Warning: Exceeded Reach 2R INLET depth by 0.25' @ 20.79 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.46 cfs @ 20.76 hrs, Volume= 341.405 af
Outflow = 332.45 cfs @ 20.76 hrs, Volume= 341.404 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.77 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.89 fps, Avg. Travel Time= 0.9 min

Peak Storage= 8,823 cf @ 20.76 hrs
Average Depth at Peak Storage= 3.33'
Bank-Full Depth= 6.10' Flow Area= 228.7 sf, Capacity= 905.35 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (104 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.90', Outlet Invert= 139.80'

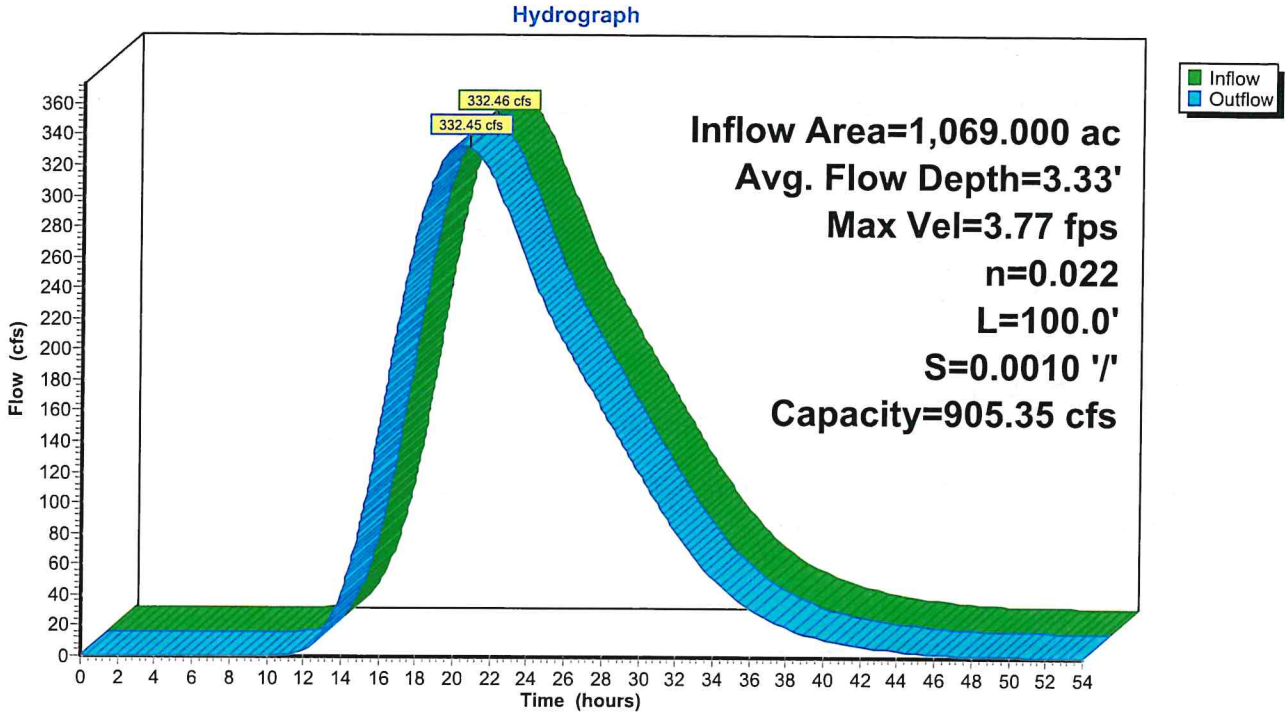


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	146.00	0.00
23.90	145.80	0.20
36.20	144.00	2.00
43.80	142.00	4.00
49.40	140.00	6.00
53.00	139.90	6.10
65.40	139.90	6.10
67.90	140.00	6.00
72.20	142.00	4.00
77.80	144.00	2.00
88.90	146.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.4	0	0.00
0.10	1.5	18.5	154	0.63
2.10	48.4	29.2	4,844	145.04
4.10	118.4	43.0	11,844	497.16
5.90	213.4	65.6	21,339	1,000.83
6.10	228.7	90.6	22,866	905.35

Reach 3R: C-C


Hydrograph
Inflow
Outflow
332.46 cfs
332.45 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=3.33'
Max Vel=3.77 fps
n=0.022
L=100.0'
S=0.0010 '/'
Capacity=905.35 cfs
Flow (cfs)
Time (hours)

Summary for Reach 4R: D-D

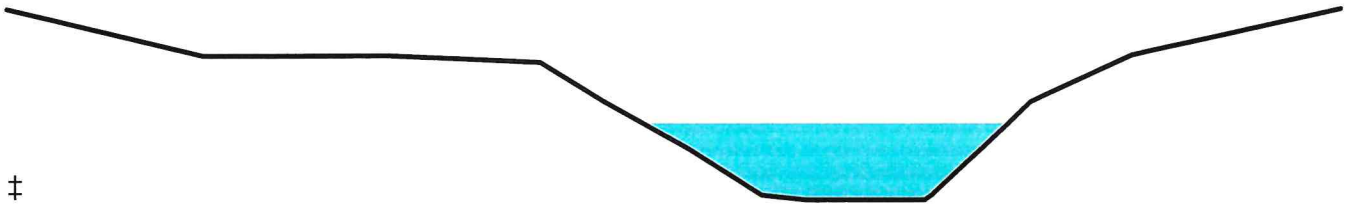
[62] Hint: Exceeded Reach 3R OUTLET depth by 0.03' @ 34.33 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.45 cfs @ 20.76 hrs, Volume= 341.404 af
Outflow = 332.45 cfs @ 20.76 hrs, Volume= 341.403 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.69 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.87 fps, Avg. Travel Time= 0.9 min

Peak Storage= 9,019 cf @ 20.76 hrs
Average Depth at Peak Storage= 3.28'
Bank-Full Depth= 8.20' Flow Area= 480.6 sf, Capacity= 2,297.67 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (104 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.80', Outlet Invert= 139.70'

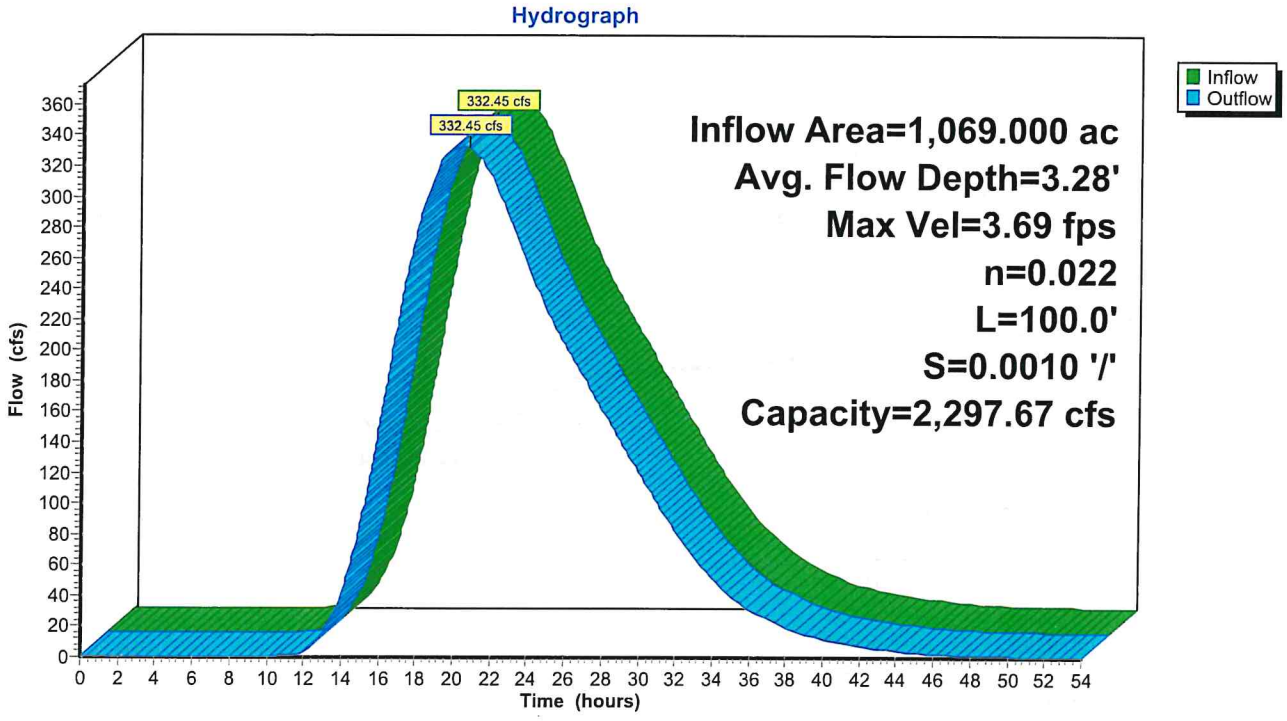


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	148.00	0.00
20.90	146.00	2.00
40.70	146.00	2.00
56.80	145.70	2.30
63.60	144.00	4.00
72.50	142.00	6.00
80.30	140.00	8.00
85.10	139.80	8.20
97.70	139.80	8.20
98.40	140.00	8.00
103.70	142.00	6.00
108.90	144.00	4.00
119.50	146.00	2.00
141.70	148.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.6	0	0.00
0.20	3.1	18.1	307	2.01
2.20	52.4	31.8	5,237	155.84
4.20	128.9	46.5	12,887	542.77
5.90	219.3	62.7	21,932	1,077.09
6.20	240.3	100.2	24,030	919.39
8.20	480.6	143.5	48,060	2,297.67

Reach 4R: D-D



Summary for Reach 5R: E-E

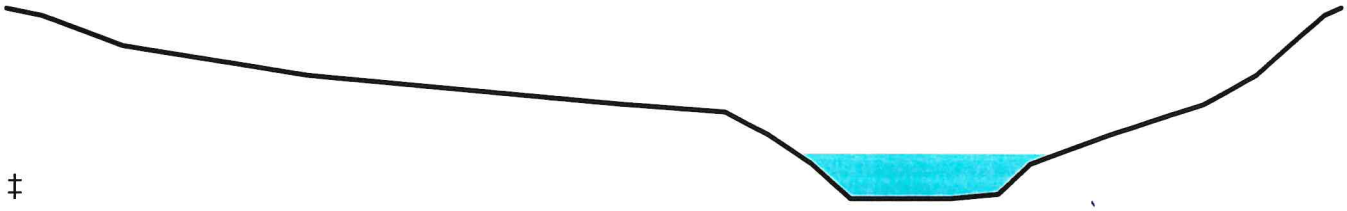
[61] Hint: Exceeded Reach 4R outlet invert by 3.02' @ 20.77 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.45 cfs @ 20.76 hrs, Volume= 341.403 af
Outflow = 332.45 cfs @ 20.77 hrs, Volume= 341.402 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.58 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.82 fps, Avg. Travel Time= 0.9 min

Peak Storage= 9,291 cf @ 20.77 hrs
Average Depth at Peak Storage= 3.02'
Bank-Full Depth= 12.80' Flow Area= 1,361.8 sf, Capacity= 9,968.85 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (107 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.70', Outlet Invert= 139.60'

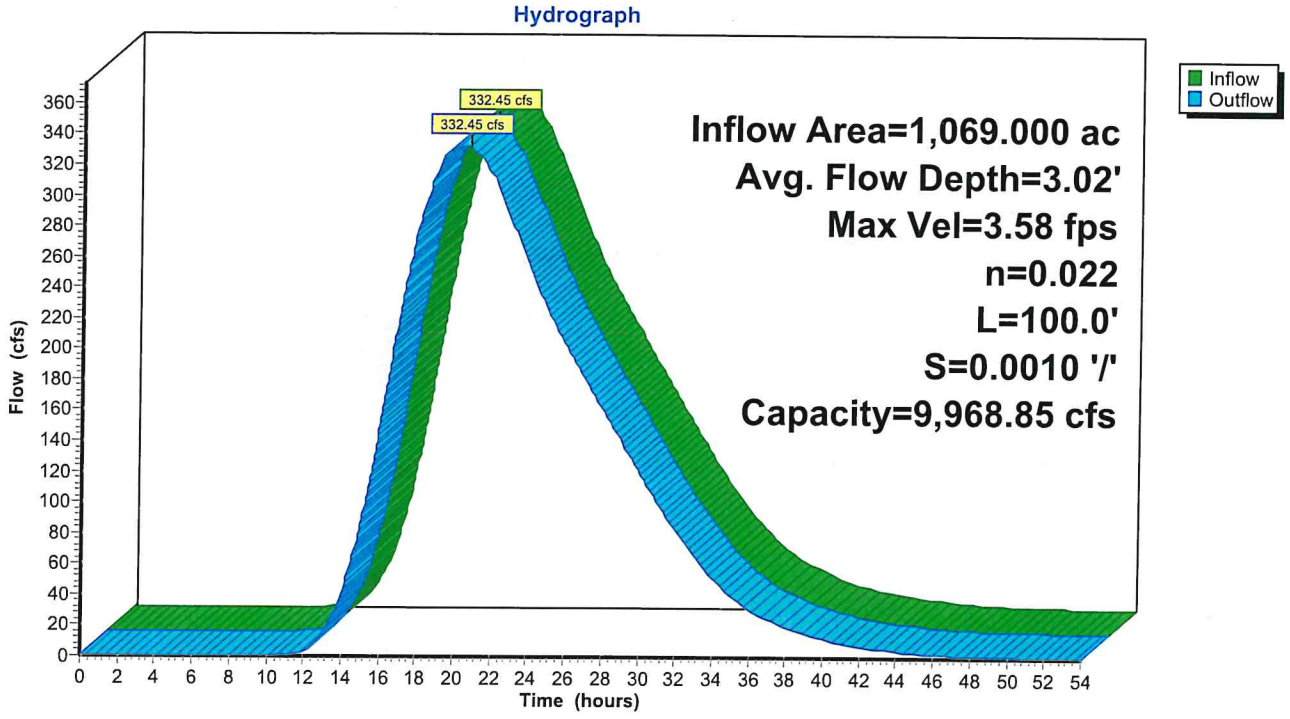


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	152.50	0.00
5.60	152.00	0.50
18.30	150.00	2.50
48.10	148.00	4.50
97.80	146.00	6.50
114.10	145.50	7.00
120.90	144.00	8.50
127.90	142.00	10.50
134.10	139.70	12.80
150.00	139.70	12.80
157.70	140.00	12.50
162.70	142.00	10.50
175.40	144.00	8.50
189.90	146.00	6.50
198.40	148.00	4.50
209.20	152.00	0.50
211.80	152.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	15.9	0	0.00
0.30	6.0	24.5	605	5.09
2.30	65.3	35.6	6,526	208.69
4.30	154.6	55.7	15,456	651.56
5.80	249.6	73.7	24,956	1,202.22
6.30	290.6	93.6	29,063	1,320.77
8.30	533.0	152.1	53,303	2,626.57
10.30	868.8	187.7	86,883	5,153.54
12.30	1,257.9	206.4	125,793	8,966.11
12.80	1,361.8	214.6	136,178	9,968.85

Reach 5R: E-E



Summary for Reach 6R: F-F

[63] Warning: Exceeded Reach 5R INLET depth by 0.23' @ 30.46 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.45 cfs @ 20.77 hrs, Volume= 341.402 af
Outflow = 332.45 cfs @ 20.77 hrs, Volume= 341.402 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.22 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.75 fps, Avg. Travel Time= 1.0 min

Peak Storage= 10,324 cf @ 20.77 hrs
Average Depth at Peak Storage= 3.21'
Bank-Full Depth= 10.80' Flow Area= 1,999.4 sf, Capacity= 11,356.35 cfs

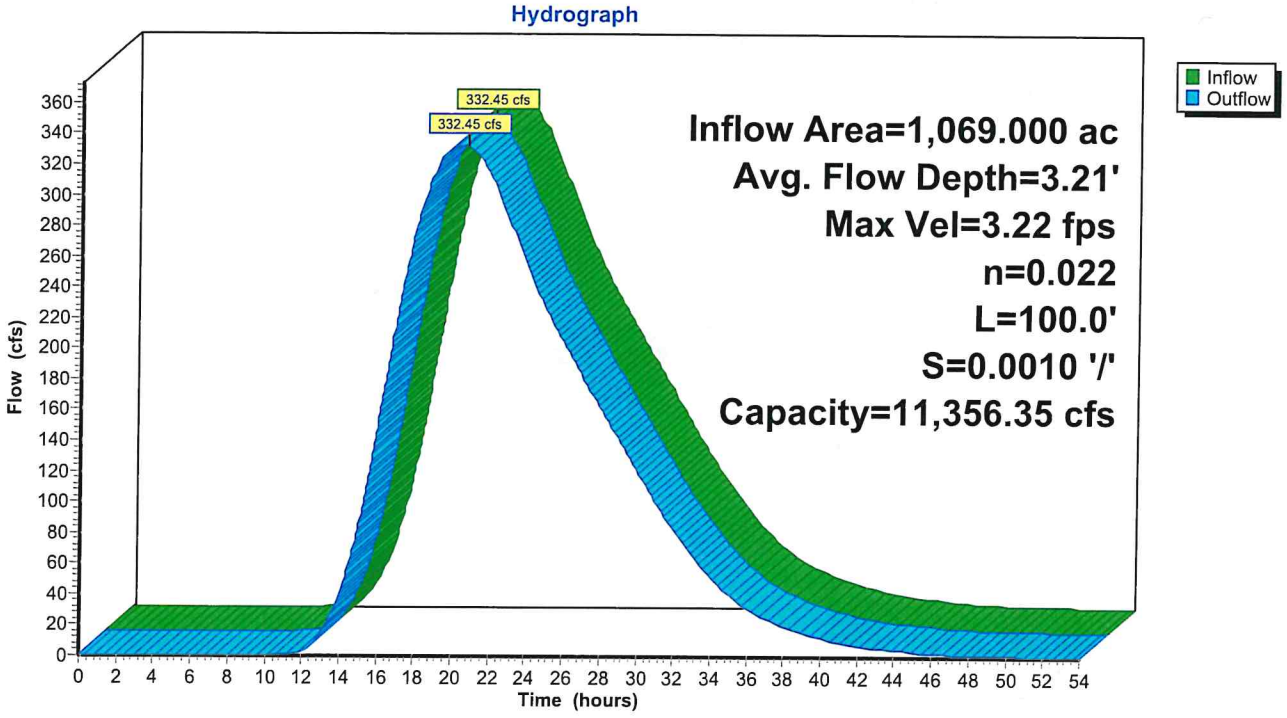
Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (108 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.60', Outlet Invert= 139.50'

‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	150.40	0.00
12.60	150.00	0.40
121.20	148.00	2.40
171.00	146.00	4.40
248.10	146.00	4.40
277.70	145.30	5.10
291.70	144.00	6.40
302.10	142.00	8.40
310.80	140.00	10.40
314.90	139.60	10.80
323.40	139.60	10.80
326.60	140.00	10.40
344.90	142.00	8.40
365.30	144.00	6.40
378.30	144.90	5.50
397.20	144.00	6.40
431.60	146.00	4.40
457.00	148.00	2.40
459.00	150.40	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	8.5	0	0.00
0.40	4.9	15.8	486	4.72
2.40	63.5	43.2	6,346	175.22
4.40	179.9	74.3	17,986	692.81
5.30	271.8	131.5	27,178	942.11
5.70	326.3	142.7	32,629	1,209.74
6.40	440.2	261.4	44,016	1,330.55
8.40	1,036.6	336.8	103,656	4,684.94
10.40	1,818.4	448.0	181,843	9,883.56
10.80	1,999.4	461.1	199,945	11,356.35

Reach 6R: F-F



Summary for Reach 7R: G-G

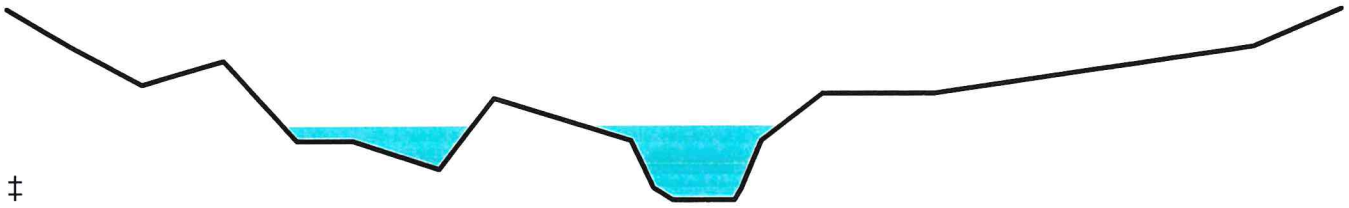
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)
[63] Warning: Exceeded Reach 6R INLET depth by 0.05' @ 27.72 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.45 cfs @ 20.77 hrs, Volume= 341.402 af
Outflow = 332.45 cfs @ 20.77 hrs, Volume= 341.401 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.64 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.59 fps, Avg. Travel Time= 1.1 min

Peak Storage= 12,609 cf @ 20.77 hrs
Average Depth at Peak Storage= 3.14'
Bank-Full Depth= 8.10' Flow Area= 1,185.2 sf, Capacity= 6,147.81 cfs

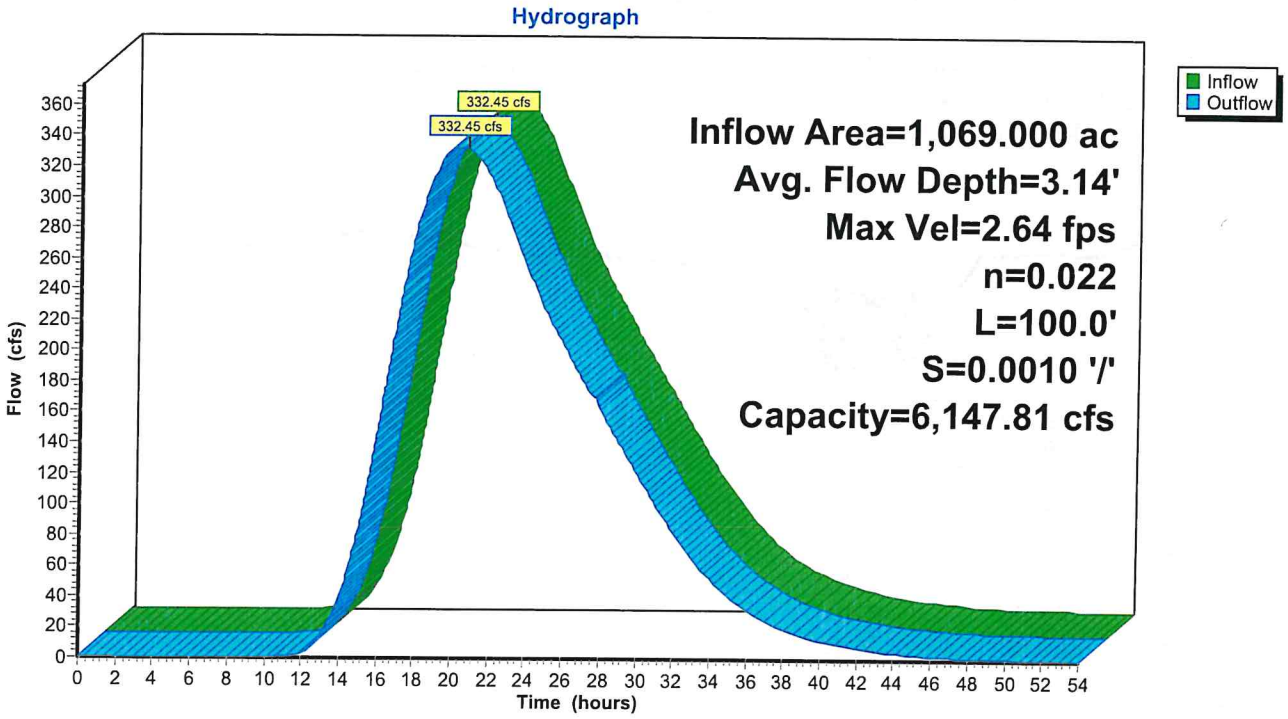
Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (107 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.50', Outlet Invert= 139.40'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	147.60	0.00
14.80	146.00	1.60
31.60	144.40	3.20
50.80	145.40	2.20
68.00	142.00	5.60
81.00	142.00	5.60
101.30	140.80	6.80
106.40	142.00	5.60
114.00	143.80	3.80
145.90	142.00	5.60
151.20	140.00	7.60
155.60	139.50	8.10
170.00	139.50	8.10
171.70	140.00	7.60
176.20	142.00	5.60
190.50	144.00	3.60
216.50	144.00	3.60
290.90	146.00	1.60
311.10	147.60	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	14.4	0	0.00
0.50	8.7	20.6	873	10.51
1.30	26.7	24.8	2,670	59.71
2.50	74.8	69.8	7,476	167.24
4.30	253.8	131.8	25,375	838.82
4.50	280.0	160.3	28,003	867.68
4.90	346.9	177.2	34,686	1,159.23
5.90	558.4	249.4	55,836	2,041.23
6.50	715.4	278.0	71,543	2,869.61
8.10	1,185.2	313.2	118,519	6,147.81

Reach 7R: G-G



Summary for Reach 8R: H-H

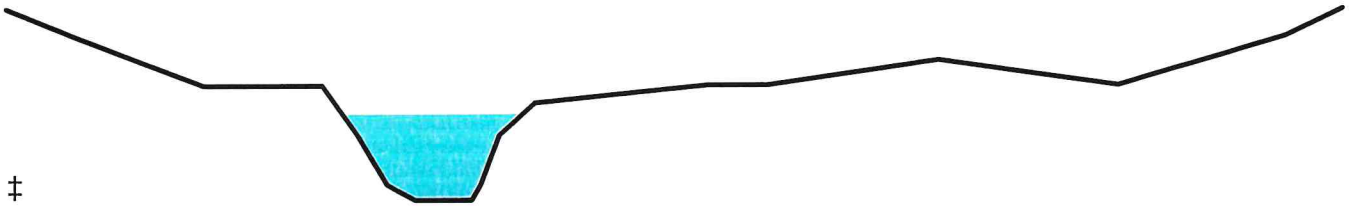
[63] Warning: Exceeded Reach 7R INLET depth by 0.21' @ 20.79 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.45 cfs @ 20.77 hrs, Volume= 341.401 af
Outflow = 332.45 cfs @ 20.78 hrs, Volume= 341.399 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.67 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.90 fps, Avg. Travel Time= 0.9 min

Peak Storage= 9,063 cf @ 20.78 hrs
Average Depth at Peak Storage= 3.45'
Bank-Full Depth= 7.70' Flow Area= 883.7 sf, Capacity= 3,947.51 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (106 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.40', Outlet Invert= 139.30'

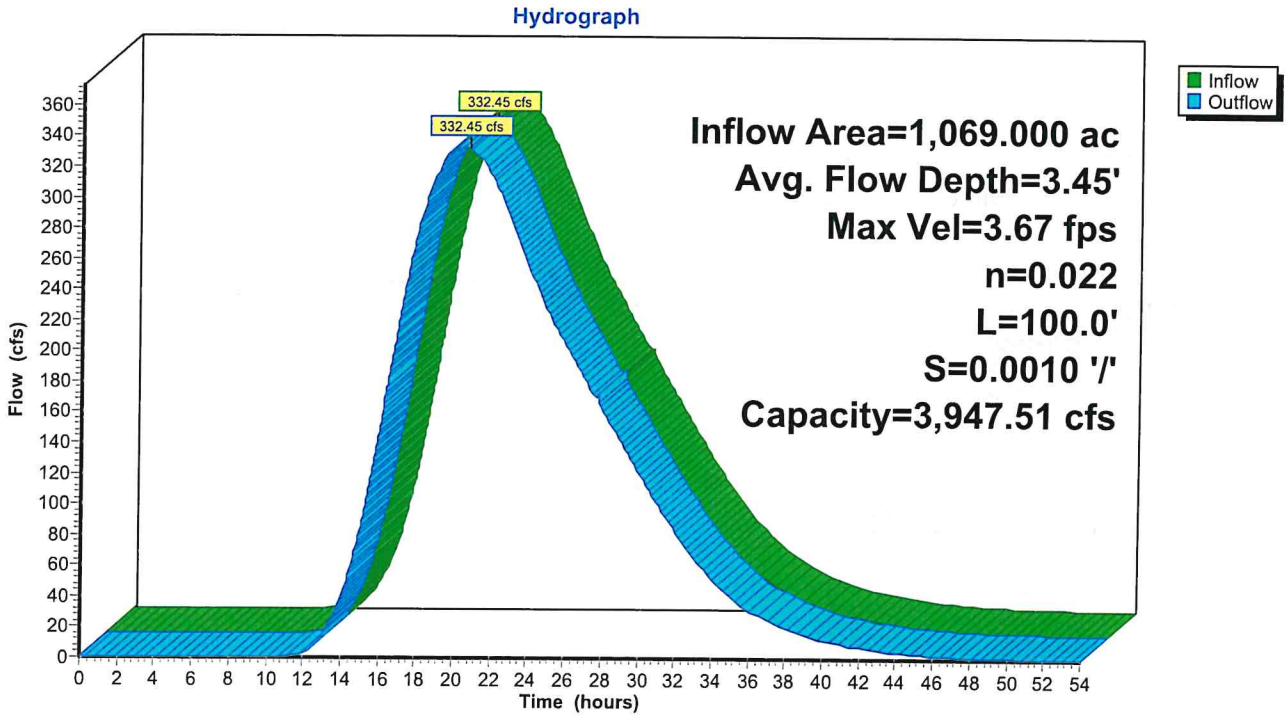


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	147.10	0.00
14.60	146.00	1.10
42.90	144.00	3.10
69.00	144.00	3.10
76.80	142.00	5.10
83.20	140.00	7.10
89.20	139.40	7.70
101.60	139.40	7.70
103.50	140.00	7.10
107.60	142.00	5.10
115.40	143.30	3.80
152.80	144.00	3.10
165.80	144.00	3.10
203.00	145.00	2.10
242.00	144.00	3.10
278.40	146.00	1.10
290.70	147.10	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.4	0	0.00
0.60	9.8	20.4	981	12.85
2.60	60.9	31.7	6,091	201.13
3.90	109.3	44.8	10,932	423.01
4.60	153.9	124.2	15,393	379.45
5.60	331.1	232.8	33,110	894.45
6.60	578.7	265.2	57,873	2,079.69
7.70	883.7	292.2	88,370	3,947.51

Reach 8R: H-H



Summary for Reach 9R: I-I

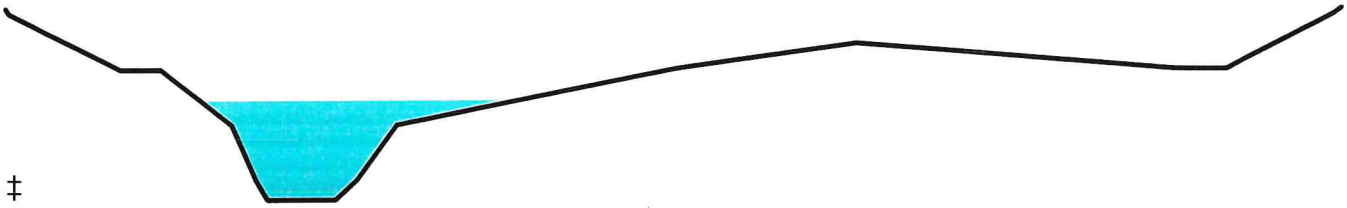
[63] Warning: Exceeded Reach 8R INLET depth by 0.03' @ 23.00 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.45 cfs @ 20.78 hrs, Volume= 341.399 af
Outflow = 332.44 cfs @ 20.78 hrs, Volume= 341.398 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.30 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.79 fps, Avg. Travel Time= 0.9 min

Peak Storage= 11,073 cf @ 20.78 hrs
Average Depth at Peak Storage= 3.57'
Bank-Full Depth= 6.90' Flow Area= 718.0 sf, Capacity= 2,897.62 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (105 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.30', Outlet Invert= 139.20'

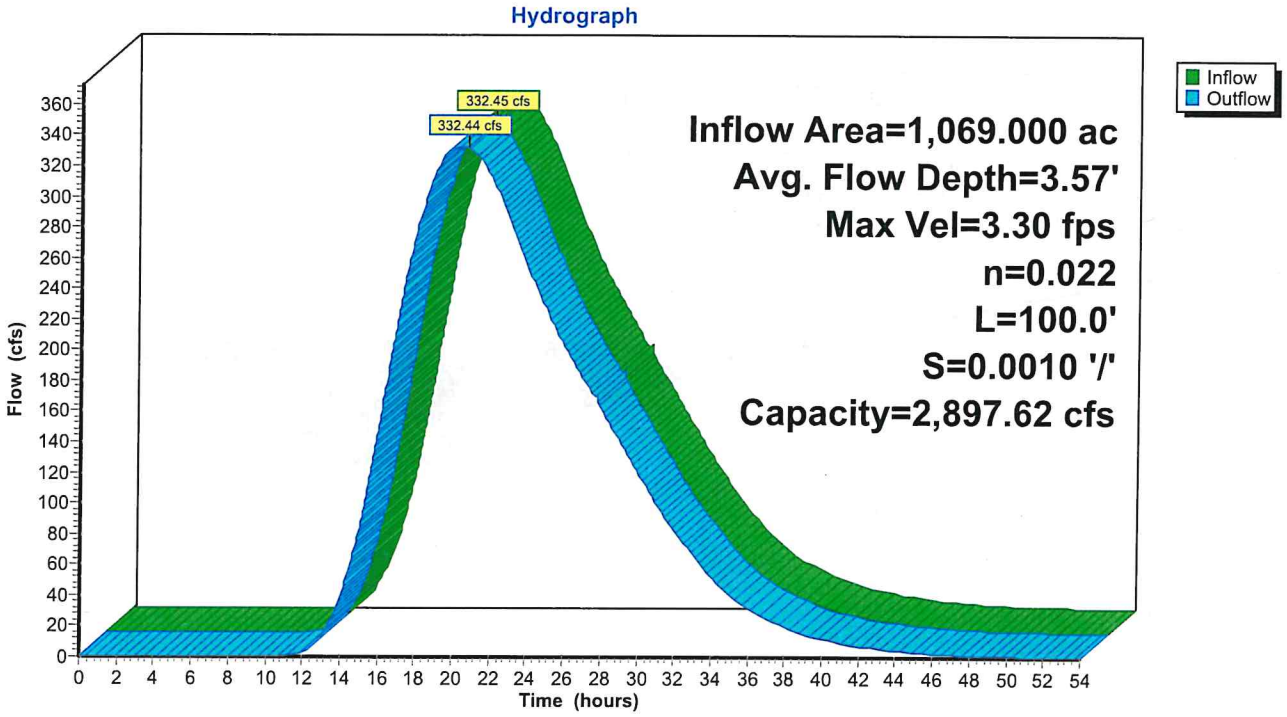


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	146.20	0.00
0.70	146.00	0.20
23.60	144.00	2.20
32.00	144.00	2.20
46.60	142.00	4.20
51.70	140.00	6.20
54.10	139.30	6.90
68.20	139.30	6.90
72.60	140.00	6.20
80.90	142.00	4.20
138.60	144.00	2.20
175.40	144.90	1.30
241.20	144.00	2.20
251.60	144.00	2.20
273.70	146.00	0.20
275.30	146.20	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	14.1	0	0.00
0.70	12.2	21.1	1,225	18.24
2.70	67.4	35.1	6,745	222.81
4.70	208.3	126.3	20,835	621.18
5.60	376.5	249.3	37,649	1,058.57
6.70	663.2	274.1	66,318	2,552.72
6.90	718.0	276.5	71,801	2,897.62

Reach 9R: I-I



Summary for Reach 10R: J-J

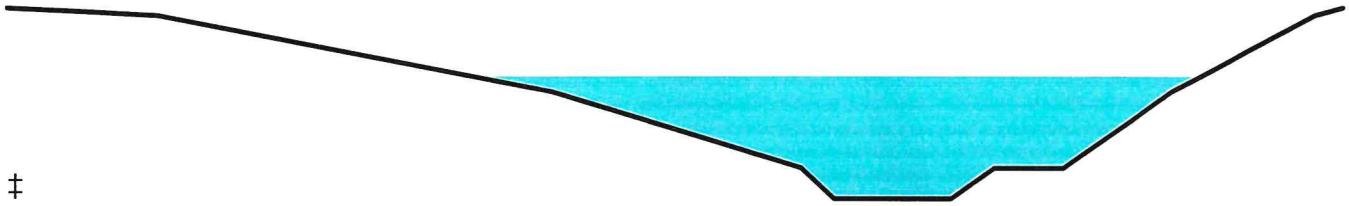
[63] Warning: Exceeded Reach 9R INLET depth by 0.11' @ 39.52 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.78 hrs, Volume= 341.398 af
Outflow = 332.44 cfs @ 20.79 hrs, Volume= 341.397 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.09 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.71 fps, Avg. Travel Time= 1.0 min

Peak Storage= 10,770 cf @ 20.79 hrs
Average Depth at Peak Storage= 3.19'
Bank-Full Depth= 5.00' Flow Area= 257.6 sf, Capacity= 946.99 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/'
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.20', Outlet Invert= 139.10'

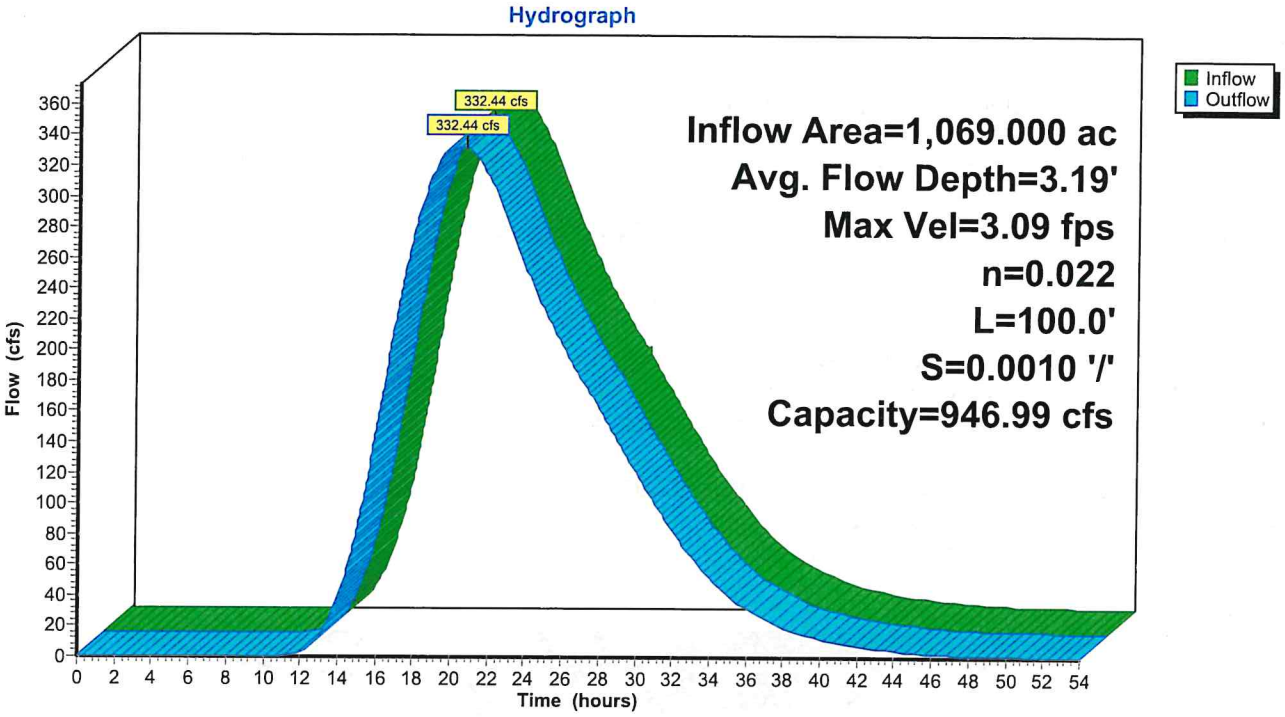


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	144.20	0.00
12.90	144.00	0.20
46.30	142.00	2.20
67.50	140.00	4.20
70.30	139.20	5.00
80.30	139.20	5.00
84.00	140.00	4.20
89.90	140.00	4.20
99.00	142.00	2.20
111.00	144.00	0.20
113.40	144.20	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	10.0	0	0.00
0.80	10.6	22.6	1,060	13.67
2.80	85.7	53.2	8,570	251.52
4.80	236.5	98.8	23,650	903.74
5.00	257.6	114.1	25,765	946.99

Reach 10R: J-J


Hydrograph
Inflow
Outflow
332.44 cfs
332.44 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=3.19'
Max Vel=3.09 fps
n=0.022
L=100.0'
S=0.0010 '/'
Capacity=946.99 cfs
Flow (cfs)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54

Summary for Reach 11R: K-K

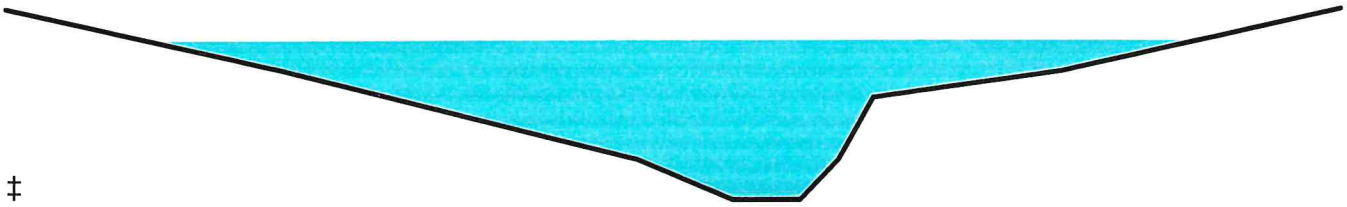
[63] Warning: Exceeded Reach 10R INLET depth by 0.39' @ 16.49 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.79 hrs, Volume= 341.397 af
Outflow = 332.44 cfs @ 20.79 hrs, Volume= 341.396 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.81 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.70 fps, Avg. Travel Time= 1.0 min

Peak Storage= 11,822 cf @ 20.79 hrs
Average Depth at Peak Storage= 3.58'
Bank-Full Depth= 4.30' Flow Area= 181.8 sf, Capacity= 580.62 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (102 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.10', Outlet Invert= 139.00'

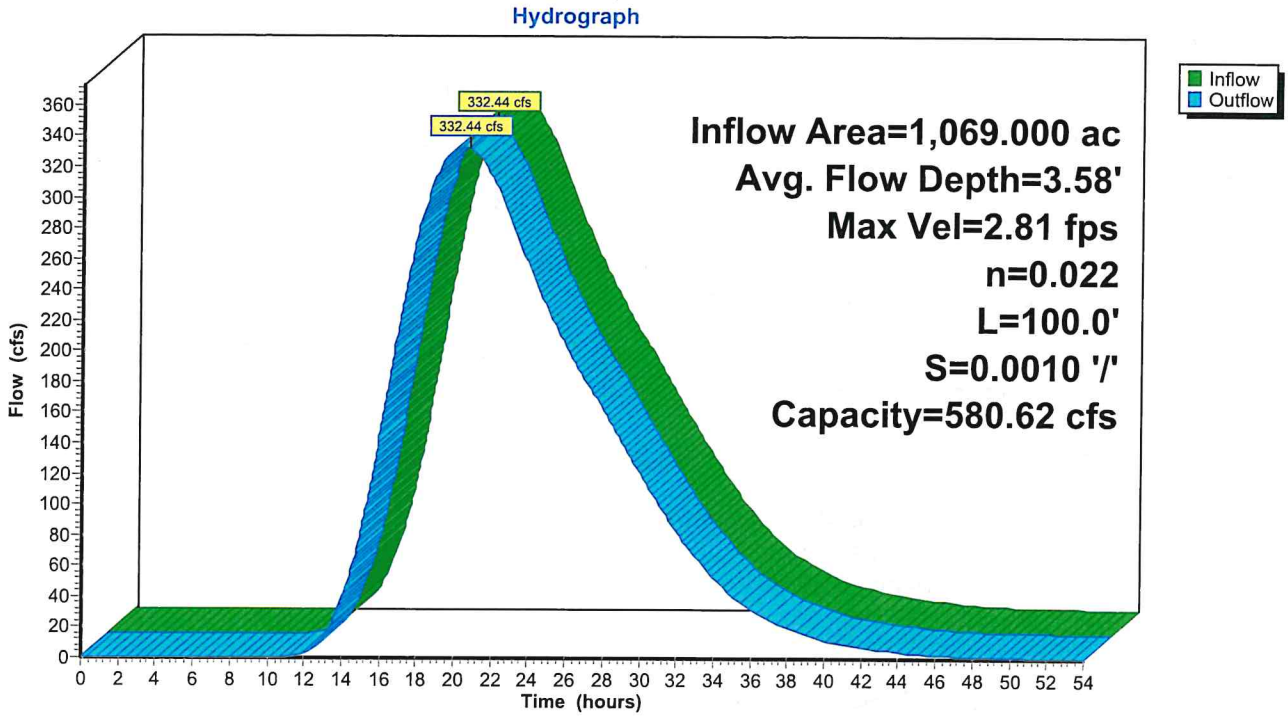


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	143.40	0.00
20.60	142.00	1.40
46.80	140.00	3.40
53.80	139.10	4.30
58.80	139.10	4.30
61.60	140.00	3.40
64.20	141.40	2.00
78.30	142.00	1.40
98.70	143.40	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	5.0	0	0.00
0.90	8.9	15.0	891	13.44
2.30	44.3	36.3	4,429	107.92
2.90	72.3	58.3	7,232	178.26
4.30	181.8	99.4	18,180	580.62

Reach 11R: K-K


Hydrograph
Inflow
Outflow
332.44 cfs
332.44 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=3.58'
Max Vel=2.81 fps
n=0.022
L=100.0'
S=0.0010 '/'
Capacity=580.62 cfs
Flow (cfs)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54

Summary for Reach 12R: L-L

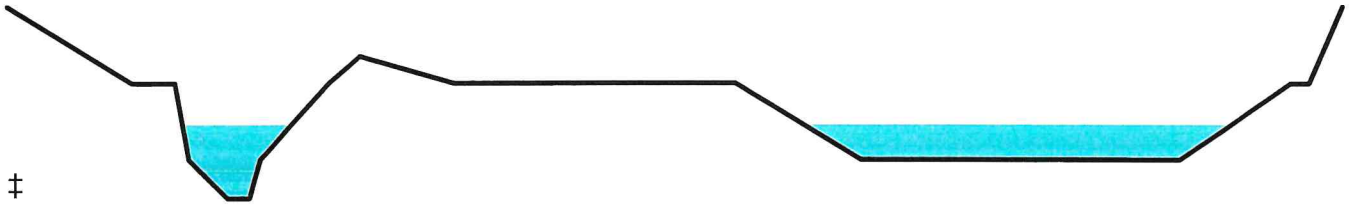
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)
[63] Warning: Exceeded Reach 11R INLET depth by 0.17' @ 41.41 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.79 hrs, Volume= 341.396 af
Outflow = 332.44 cfs @ 20.80 hrs, Volume= 341.394 af, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.97 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 1.5 min

Peak Storage= 16,903 cf @ 20.80 hrs
Average Depth at Peak Storage= 1.92'
Bank-Full Depth= 5.00' Flow Area= 1,282.8 sf, Capacity= 5,319.69 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/'
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.00', Outlet Invert= 138.90'



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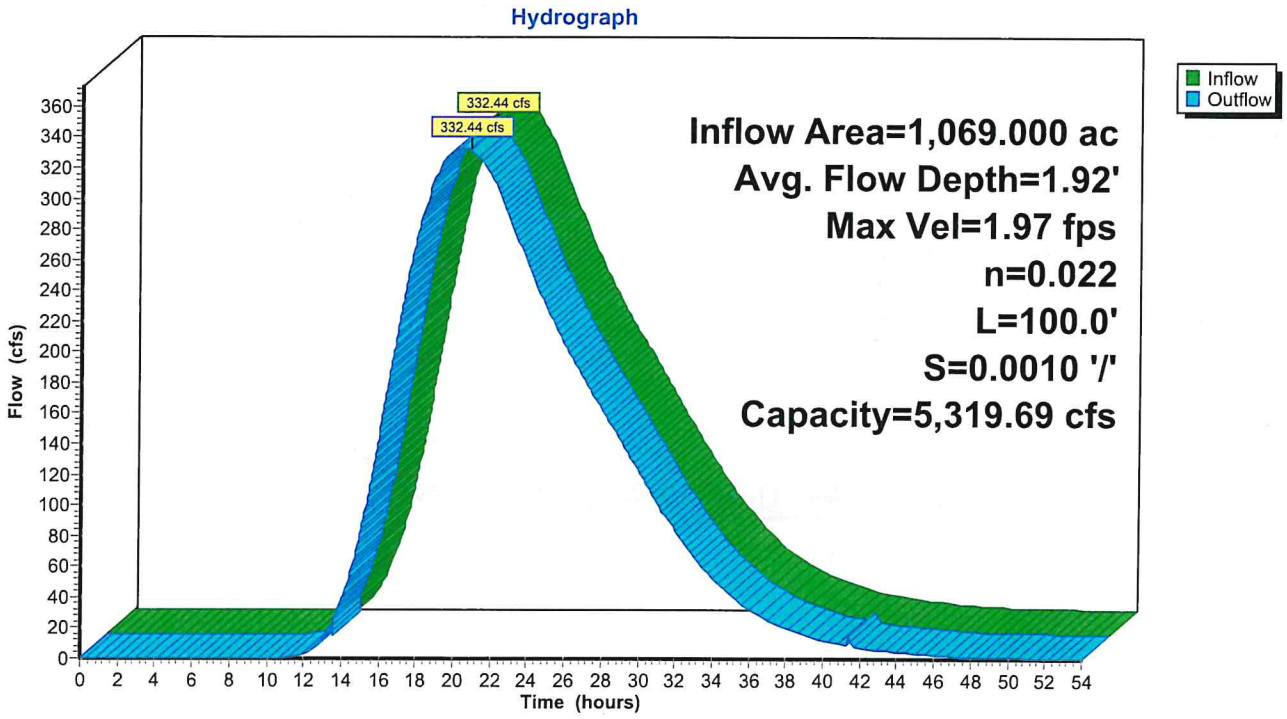
Offset (feet)	Elevation (feet)	Chan.Depth (feet)
24.90	144.00	0.00
68.90	142.00	2.00
84.30	142.00	2.00
89.20	140.00	4.00
103.10	139.00	5.00
111.10	139.00	5.00
114.90	140.00	4.00
139.30	142.00	2.00
150.30	142.70	1.30
183.50	142.00	2.00
283.20	142.00	2.00
327.70	140.00	4.00
440.80	140.00	4.00
480.00	142.00	2.00
486.50	142.00	2.00
498.10	144.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	8.0	0	0.00
1.00	16.9	139.0	1,685	8.82
3.00	407.5	374.1	40,745	921.23
3.70	691.1	437.9	69,111	2,001.05
5.00	1,282.8	474.2	128,278	5,319.69

Reach 12R: L-L



Summary for Reach 13R: M-M

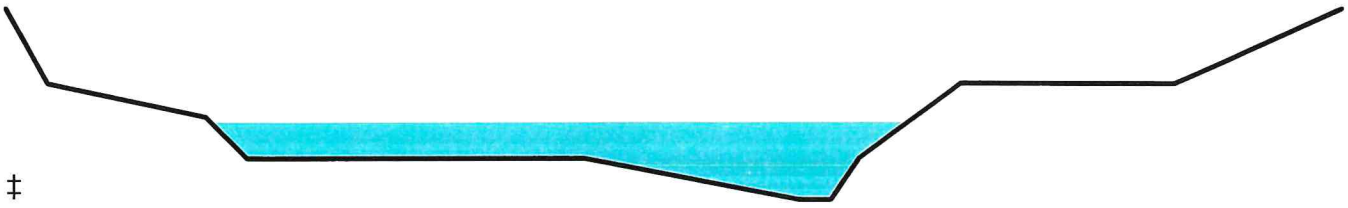
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)
[63] Warning: Exceeded Reach 12R INLET depth by 0.04' @ 20.85 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.80 hrs, Volume= 341.394 af
Outflow = 332.44 cfs @ 20.81 hrs, Volume= 341.393 af, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.34 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.26 fps, Avg. Travel Time= 1.3 min

Peak Storage= 14,237 cf @ 20.81 hrs
Average Depth at Peak Storage= 2.06'
Bank-Full Depth= 5.10' Flow Area= 728.6 sf, Capacity= 3,275.94 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (103 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 138.90', Outlet Invert= 138.80'

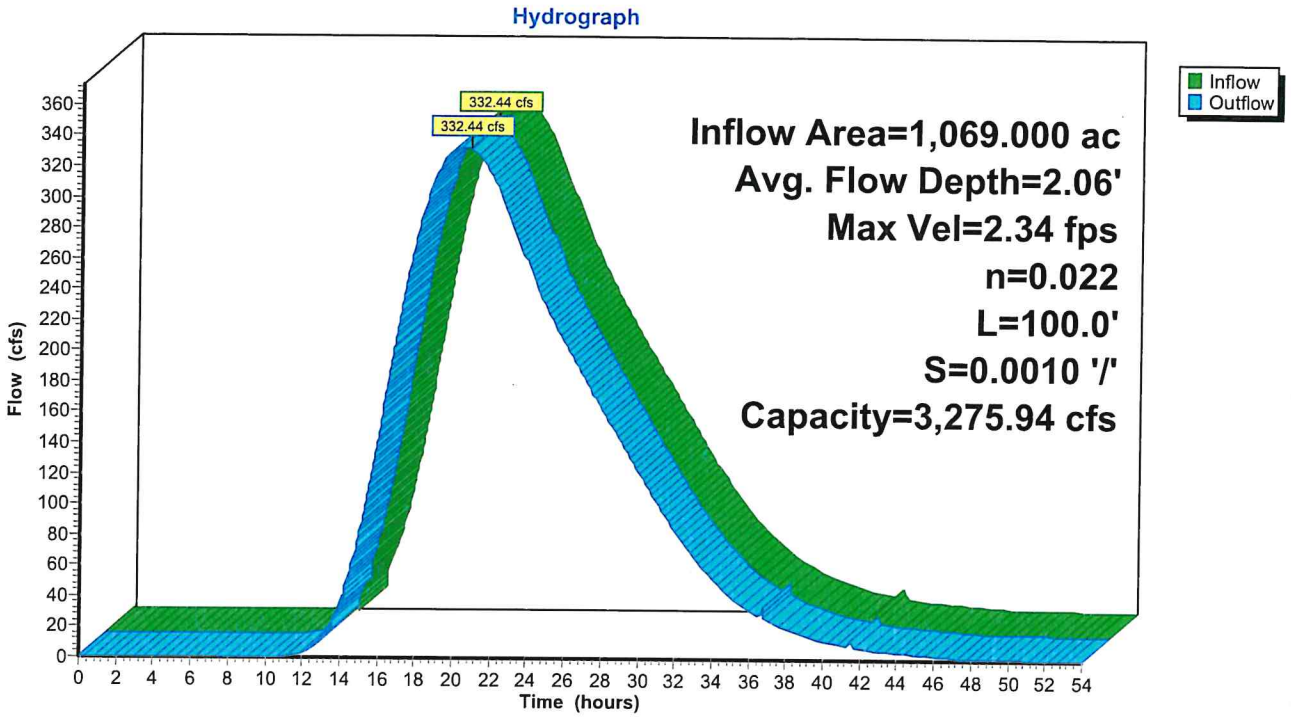


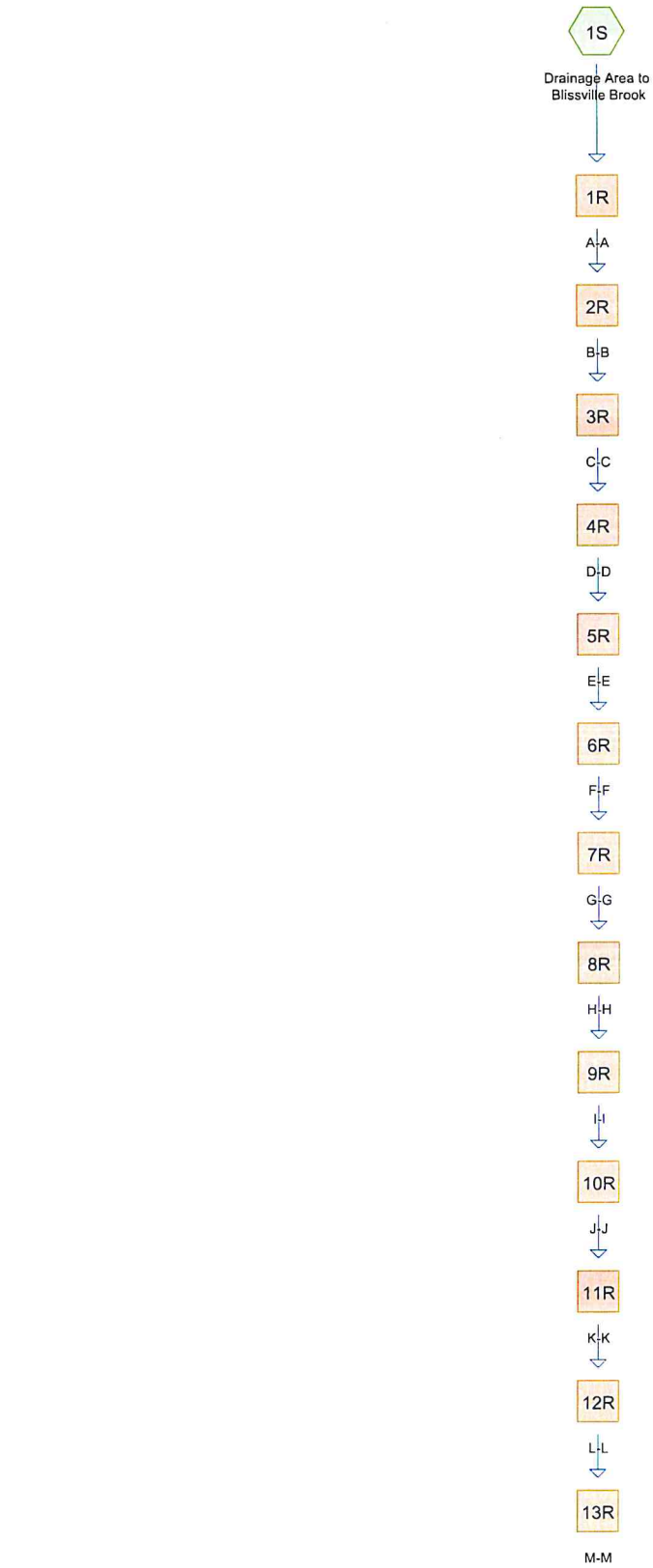
‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
8.10	144.00	0.00
15.60	142.00	2.00
43.70	141.10	2.90
51.10	140.00	4.00
111.40	140.00	4.00
149.50	138.90	5.10
155.30	138.90	5.10
160.20	140.00	4.00
178.40	142.00	2.00
216.50	142.00	2.00
246.00	144.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	5.8	0	0.00
1.10	30.0	109.2	3,003	27.12
2.20	159.6	126.8	15,962	397.50
3.10	289.8	201.2	28,980	789.39
5.10	728.6	238.6	72,860	3,275.94

Reach 13R: M-M


Hydrograph
Inflow
Outflow
332.44 cfs
332.44 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=2.06'
Max Vel=2.34 fps
n=0.022
L=100.0'
S=0.0010 '/'
Capacity=3,275.94 cfs
Flow (cfs)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54



Subcat Reach Pond Link

Routing Diagram for 2019160 Sunfox_Pr
Prepared by CHA Companies, Inc., Printed 12/7/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1,069.000	67	(1S)
1,069.000	**67**	**TOTAL AREA**

Time span=0.00-54.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Drainage Area to Runoff Area=1,069.000 ac 0.00% Impervious Runoff Depth>3.83"
Flow Length=24,974' Slope=0.0100 '/' Tc=602.8 min CN=67 Runoff=332.44 cfs 341.407 af

Reach 1R: A-A Avg. Flow Depth=1.45' Max Vel=7.73 fps Inflow=332.44 cfs 341.407 af
n=0.022 L=50.0' S=0.0100 '/' Capacity=3,665.36 cfs Outflow=332.44 cfs 341.407 af

Reach 2R: B-B Avg. Flow Depth=2.97' Max Vel=3.70 fps Inflow=332.44 cfs 341.407 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=1,354.45 cfs Outflow=332.44 cfs 341.406 af

Reach 3R: C-C Avg. Flow Depth=3.33' Max Vel=3.77 fps Inflow=332.44 cfs 341.406 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=905.35 cfs Outflow=332.44 cfs 341.404 af

Reach 4R: D-D Avg. Flow Depth=3.28' Max Vel=3.69 fps Inflow=332.44 cfs 341.404 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=2,325.52 cfs Outflow=332.44 cfs 341.403 af

Reach 5R: E-E Avg. Flow Depth=3.02' Max Vel=3.58 fps Inflow=332.44 cfs 341.403 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=9,667.86 cfs Outflow=332.45 cfs 341.403 af

Reach 6R: F-F Avg. Flow Depth=3.21' Max Vel=3.22 fps Inflow=332.45 cfs 341.403 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=8,997.16 cfs Outflow=332.45 cfs 341.402 af

Reach 7R: G-G Avg. Flow Depth=3.14' Max Vel=2.64 fps Inflow=332.45 cfs 341.402 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=6,147.81 cfs Outflow=332.44 cfs 341.401 af

Reach 8R: H-H Avg. Flow Depth=3.45' Max Vel=3.67 fps Inflow=332.44 cfs 341.401 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=3,947.51 cfs Outflow=332.44 cfs 341.400 af

Reach 9R: I-I Avg. Flow Depth=3.57' Max Vel=3.30 fps Inflow=332.44 cfs 341.400 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=2,897.62 cfs Outflow=332.43 cfs 341.398 af

Reach 10R: J-J Avg. Flow Depth=3.19' Max Vel=3.09 fps Inflow=332.43 cfs 341.398 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=946.99 cfs Outflow=332.43 cfs 341.397 af

Reach 11R: K-K Avg. Flow Depth=3.58' Max Vel=2.81 fps Inflow=332.43 cfs 341.397 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=580.62 cfs Outflow=332.42 cfs 341.396 af

Reach 12R: L-L Avg. Flow Depth=1.92' Max Vel=1.97 fps Inflow=332.42 cfs 341.396 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=5,319.69 cfs Outflow=332.42 cfs 341.395 af

Reach 13R: M-M Avg. Flow Depth=2.06' Max Vel=2.33 fps Inflow=332.42 cfs 341.395 af
n=0.022 L=100.0' S=0.0010 '/' Capacity=3,275.94 cfs Outflow=332.42 cfs 341.393 af

Total Runoff Area = 1,069.000 ac Runoff Volume = 341.407 af Average Runoff Depth = 3.83"
100.00% Pervious = 1,069.000 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Drainage Area to Blissville Brook

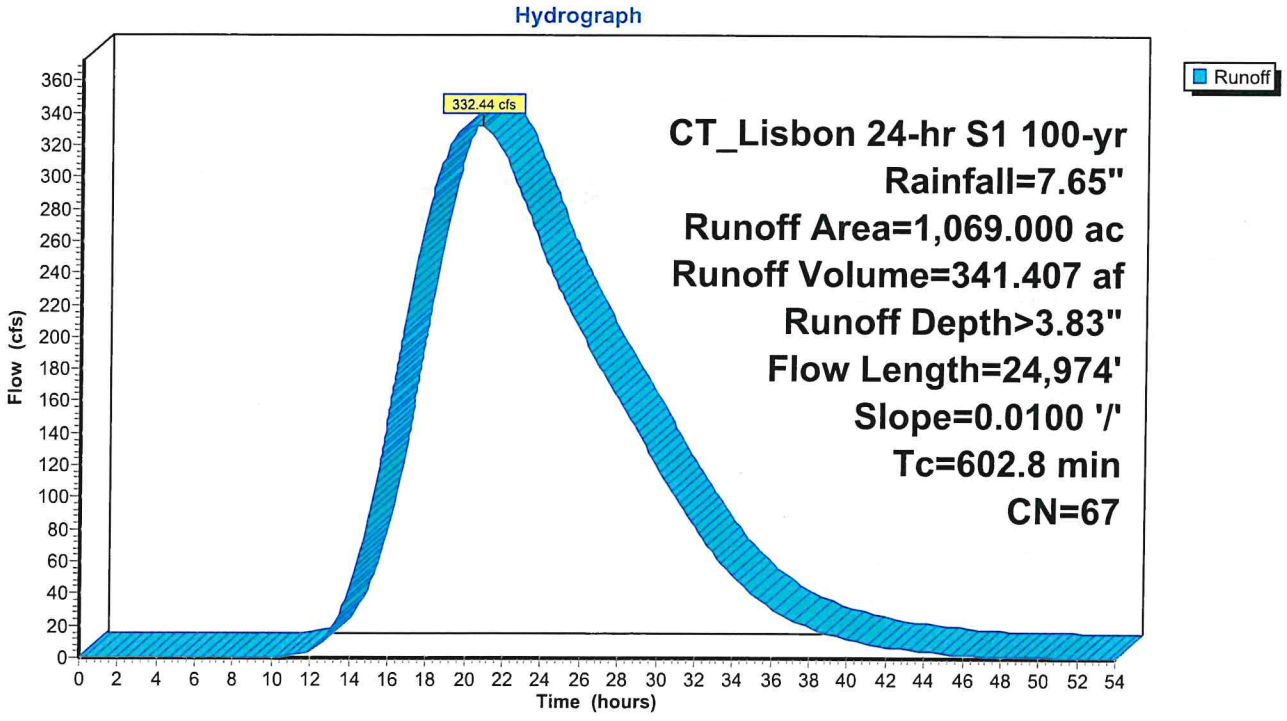
Runoff = 332.44 cfs @ 20.75 hrs, Volume= 341.407 af, Depth> 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
CT_Lisbon 24-hr S1 100-yr Rainfall=7.65"

	Area (ac)	CN	Description
*	1,069.000	67	
	1,069.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
602.8	24,974	0.0100	0.69		**Lag/CN Method,**

Subcatchment 1S: Drainage Area to Blissville Brook



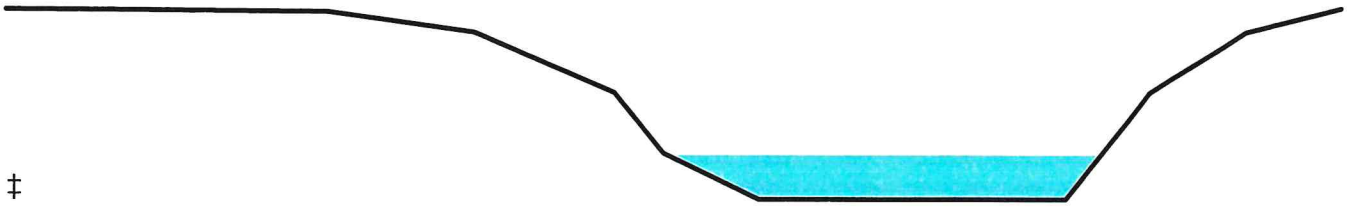
Summary for Reach 1R: A-A

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.75 hrs, Volume= 341.407 af
Outflow = 332.44 cfs @ 20.75 hrs, Volume= 341.407 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.73 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.74 fps, Avg. Travel Time= 0.2 min

Peak Storage= 2,149 cf @ 20.75 hrs
Average Depth at Peak Storage= 1.45'
Bank-Full Depth= 6.30' Flow Area= 285.0 sf, Capacity= 3,665.36 cfs

Custom cross-section, Length= 50.0' Slope= 0.0100 '/' (104 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 140.50', Outlet Invert= 140.00'

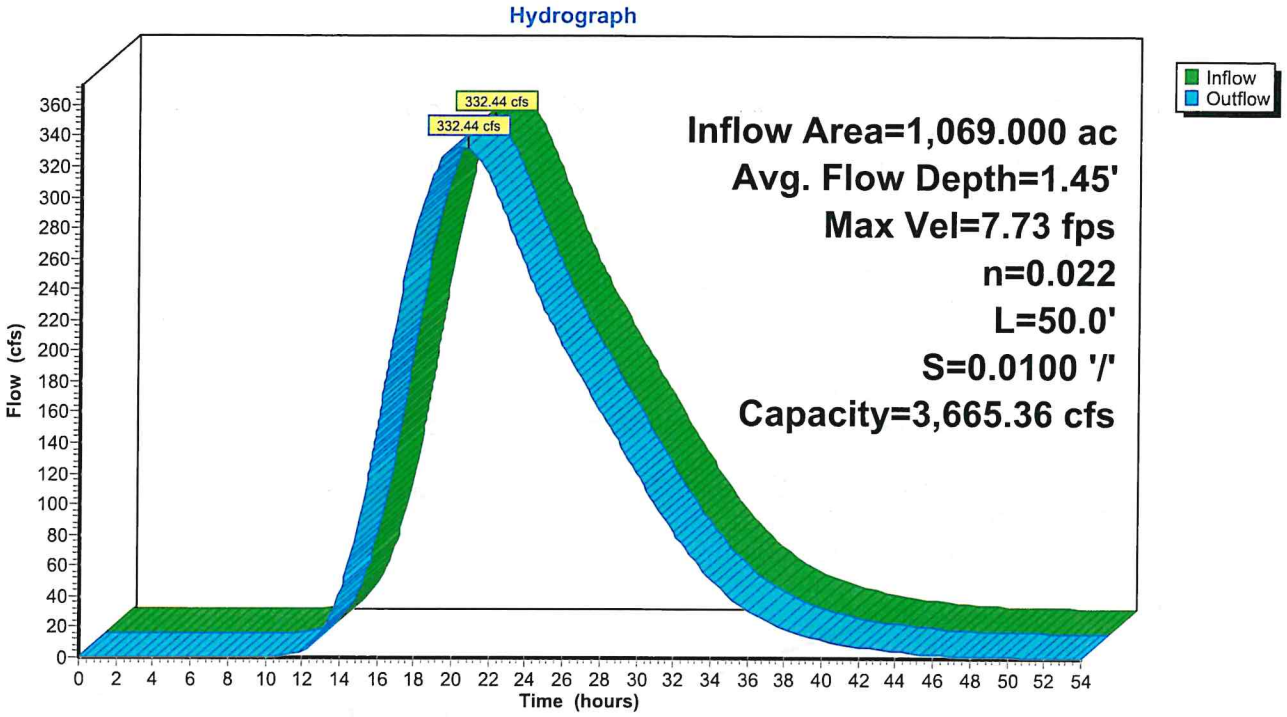


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	146.80	0.00
25.75	146.70	0.10
37.40	146.00	0.80
48.70	144.00	2.80
52.60	142.00	4.80
60.10	140.50	6.30
84.66	140.50	6.30
87.50	142.00	4.80
91.30	144.00	2.80
98.93	146.00	0.80
106.48	146.80	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	24.6	0	0.00
1.50	44.6	35.4	2,230	351.21
3.50	122.1	44.1	6,105	1,626.11
5.50	226.2	63.5	11,311	3,565.82
6.20	275.7	81.8	13,784	4,186.71
6.30	285.0	108.5	14,250	3,665.36

Reach 1R: A-A


Hydrograph
Inflow
Outflow
332.44 cfs
332.44 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=1.45'
Max Vel=7.73 fps
n=0.022
L=50.0'
S=0.0100 '/'
Capacity=3,665.36 cfs
Flow (cfs)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54

Summary for Reach 2R: B-B

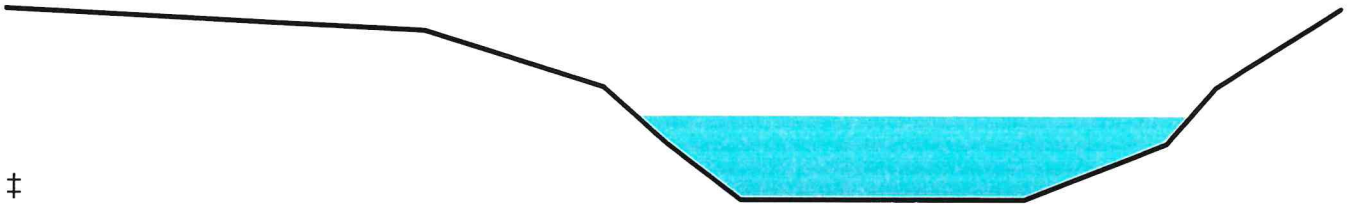
[63] Warning: Exceeded Reach 1R INLET depth by 1.02' @ 20.75 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.75 hrs, Volume= 341.407 af
Outflow = 332.44 cfs @ 20.75 hrs, Volume= 341.406 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.70 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.80 fps, Avg. Travel Time= 0.9 min

Peak Storage= 8,993 cf @ 20.75 hrs
Average Depth at Peak Storage= 2.97'
Bank-Full Depth= 6.80' Flow Area= 296.5 sf, Capacity= 1,354.45 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (103 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 140.00', Outlet Invert= 139.90'

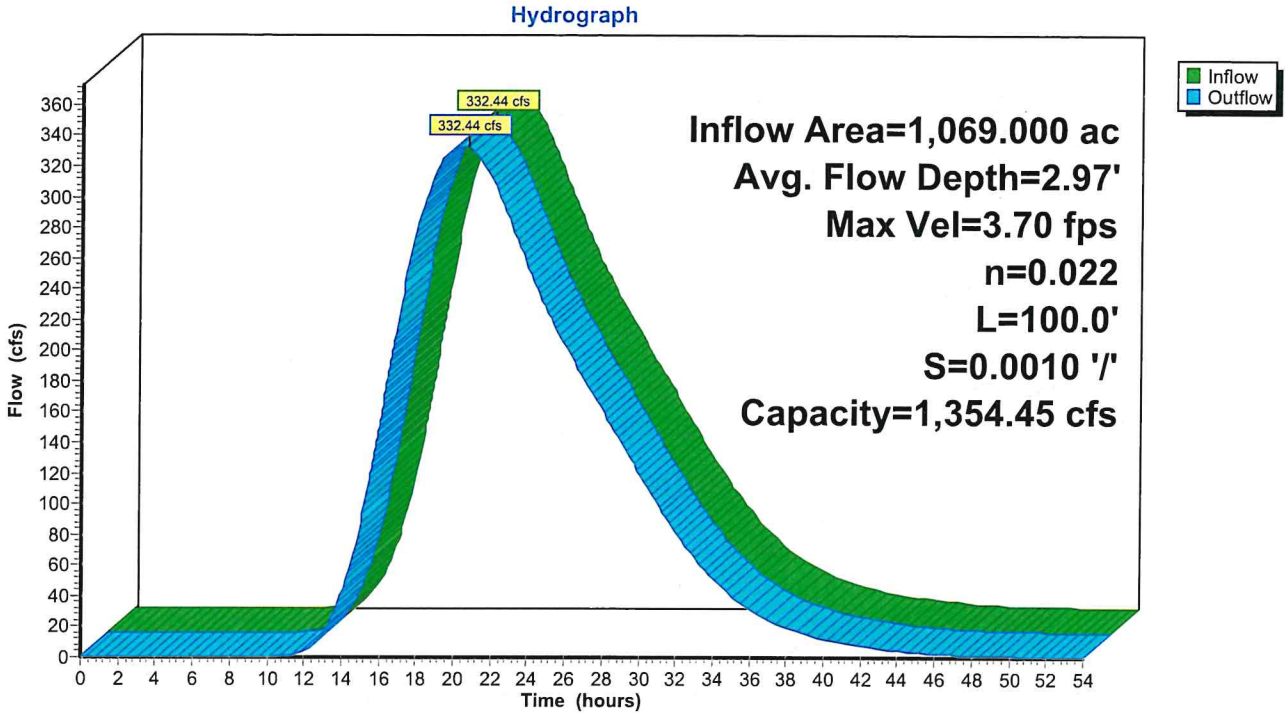


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	146.80	0.00
29.10	146.00	0.80
41.60	144.00	2.80
46.00	142.00	4.80
51.10	140.00	6.80
70.80	140.00	6.80
80.70	142.00	4.80
84.00	144.00	2.80
90.20	146.00	0.80
92.60	146.80	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	19.7	0	0.00
2.00	54.4	35.3	5,440	155.09
4.00	131.5	44.0	13,150	583.04
6.00	235.0	63.1	23,500	1,205.47
6.80	296.5	94.8	29,648	1,354.45

Reach 2R: B-B


Hydrograph
Inflow
Outflow
332.44 cfs
332.44 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=2.97'
Max Vel=3.70 fps
n=0.022
L=100.0'
S=0.0010 '/'
Capacity=1,354.45 cfs
Flow (cfs)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54

Summary for Reach 3R: C-C

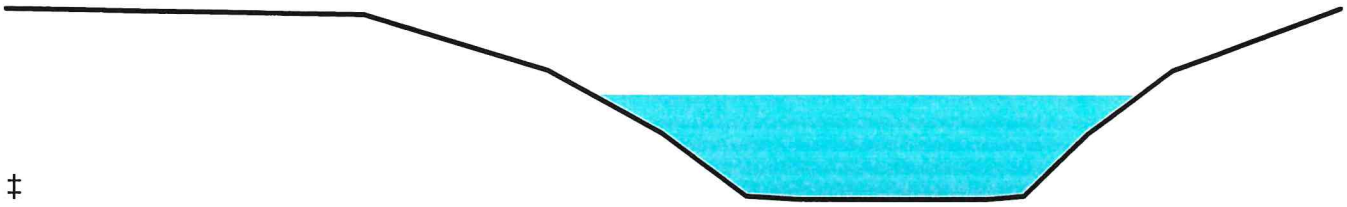
[63] Warning: Exceeded Reach 2R INLET depth by 0.25' @ 20.80 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.75 hrs, Volume= 341.406 af
Outflow = 332.44 cfs @ 20.75 hrs, Volume= 341.404 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.77 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.88 fps, Avg. Travel Time= 0.9 min

Peak Storage= 8,822 cf @ 20.75 hrs
Average Depth at Peak Storage= 3.33'
Bank-Full Depth= 6.10' Flow Area= 228.7 sf, Capacity= 905.35 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (104 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.90', Outlet Invert= 139.80'

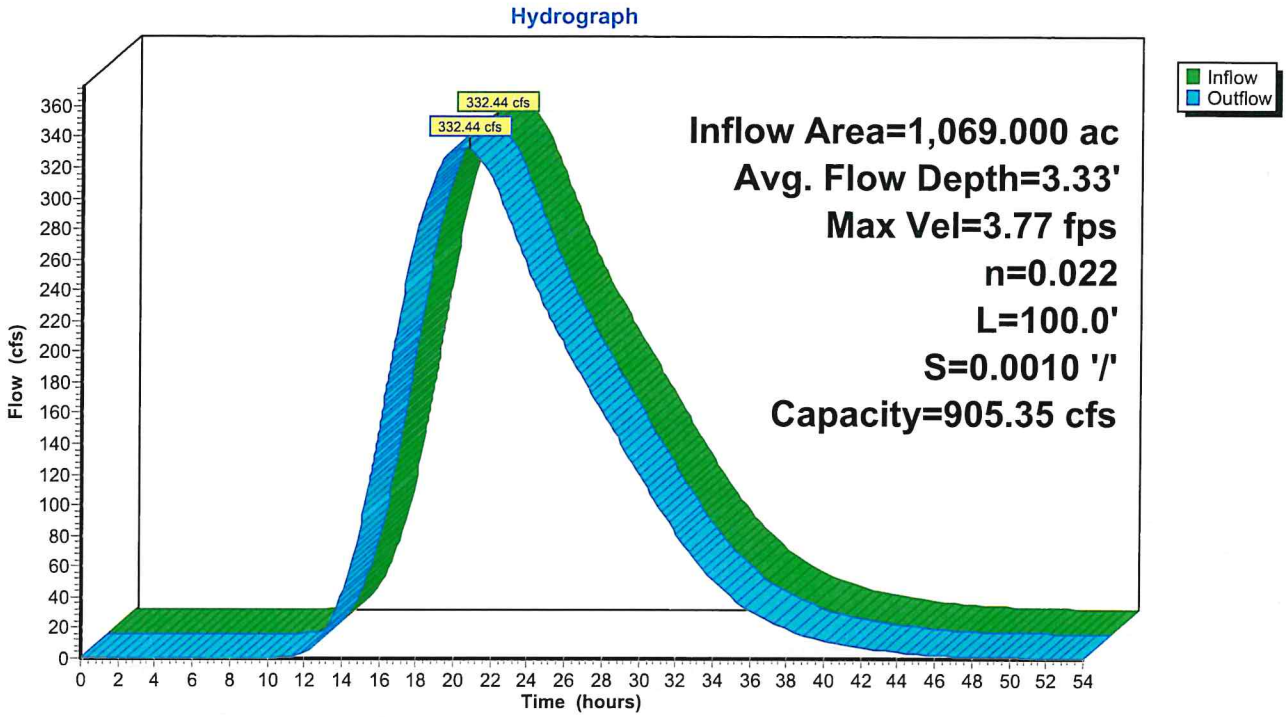


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	146.00	0.00
23.90	145.80	0.20
36.20	144.00	2.00
43.80	142.00	4.00
49.40	140.00	6.00
53.00	139.90	6.10
65.40	139.90	6.10
67.90	140.00	6.00
72.20	142.00	4.00
77.80	144.00	2.00
88.90	146.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.4	0	0.00
0.10	1.5	18.5	154	0.63
2.10	48.4	29.2	4,844	145.04
4.10	118.4	43.0	11,844	497.16
5.90	213.4	65.6	21,339	1,000.83
6.10	228.7	90.6	22,866	905.35

Reach 3R: C-C


Hydrograph
Inflow
Outflow
332.44 cfs
332.44 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=3.33'
Max Vel=3.77 fps
n=0.022
L=100.0'
S=0.0010 '/'
Capacity=905.35 cfs
Flow (cfs)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54
Time (hours)

Summary for Reach 4R: D-D

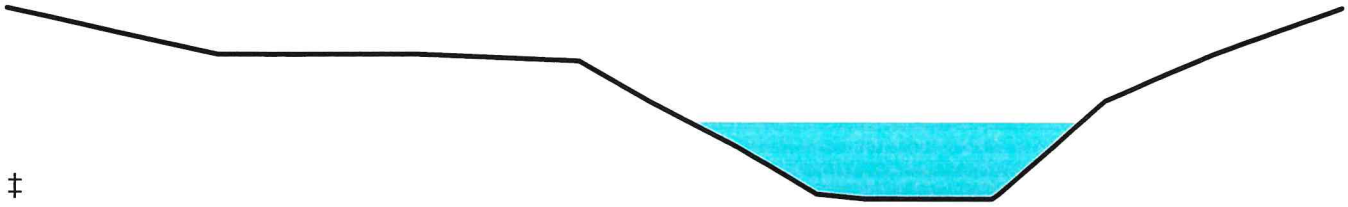
[62] Hint: Exceeded Reach 3R OUTLET depth by 0.03' @ 33.85 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.75 hrs, Volume= 341.404 af
Outflow = 332.44 cfs @ 20.75 hrs, Volume= 341.403 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.69 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.87 fps, Avg. Travel Time= 0.9 min

Peak Storage= 9,019 cf @ 20.75 hrs
Average Depth at Peak Storage= 3.28'
Bank-Full Depth= 8.20' Flow Area= 471.1 sf, Capacity= 2,325.52 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (104 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.80', Outlet Invert= 139.70'

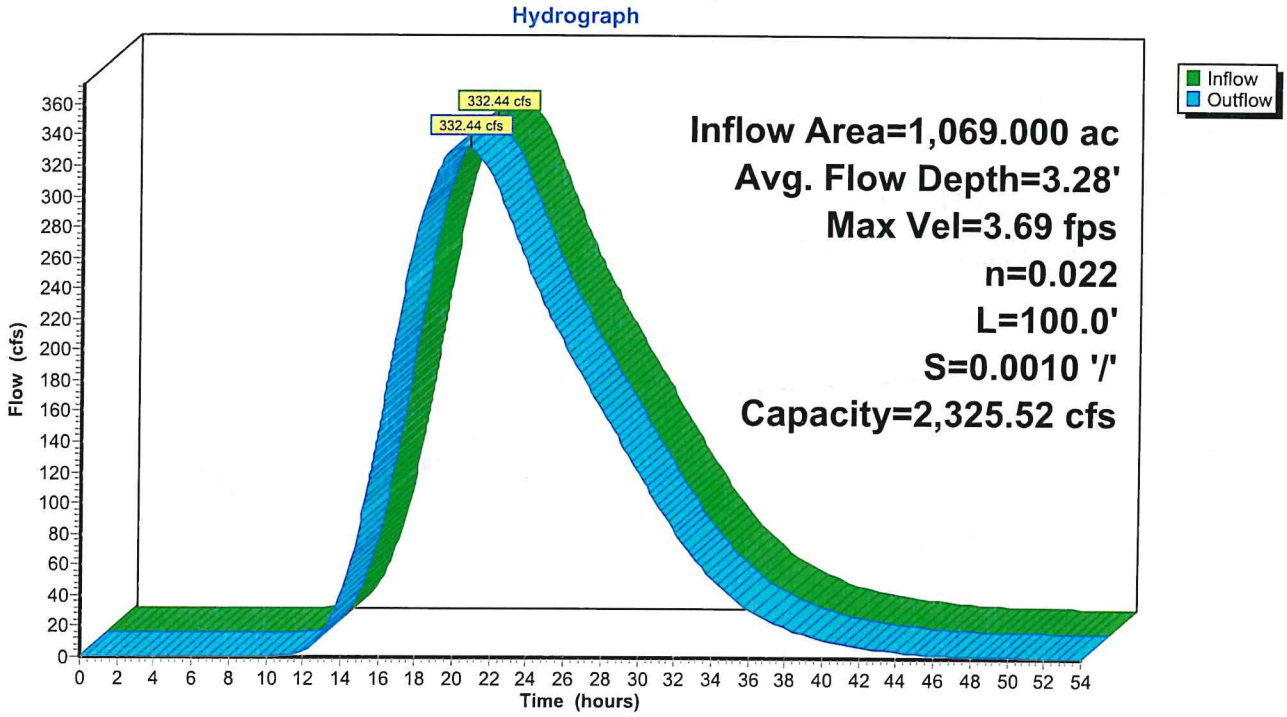


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	148.00	0.00
20.90	146.00	2.00
40.70	146.00	2.00
56.80	145.70	2.30
63.60	144.00	4.00
72.50	142.00	6.00
80.30	140.00	8.00
85.10	139.80	8.20
97.70	139.80	8.20
98.40	140.00	8.00
103.70	142.00	6.00
108.90	144.00	4.00
119.50	146.00	2.00
132.20	148.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.6	0	0.00
0.20	3.1	18.1	307	2.01
2.20	52.4	31.8	5,237	155.84
4.20	128.9	46.5	12,887	542.77
5.90	219.3	62.7	21,932	1,077.09
6.20	240.3	100.2	24,030	919.39
8.20	471.1	134.1	47,110	2,325.52

Reach 4R: D-D



Summary for Reach 5R: E-E

[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[61] Hint: Exceeded Reach 4R outlet invert by 3.02' @ 20.75 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.75 hrs, Volume= 341.403 af
Outflow = 332.45 cfs @ 20.73 hrs, Volume= 341.403 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.58 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.82 fps, Avg. Travel Time= 0.9 min

Peak Storage= 9,291 cf @ 20.73 hrs
Average Depth at Peak Storage= 3.02'
Bank-Full Depth= 12.80' Flow Area= 1,301.7 sf, Capacity= 9,667.86 cfs

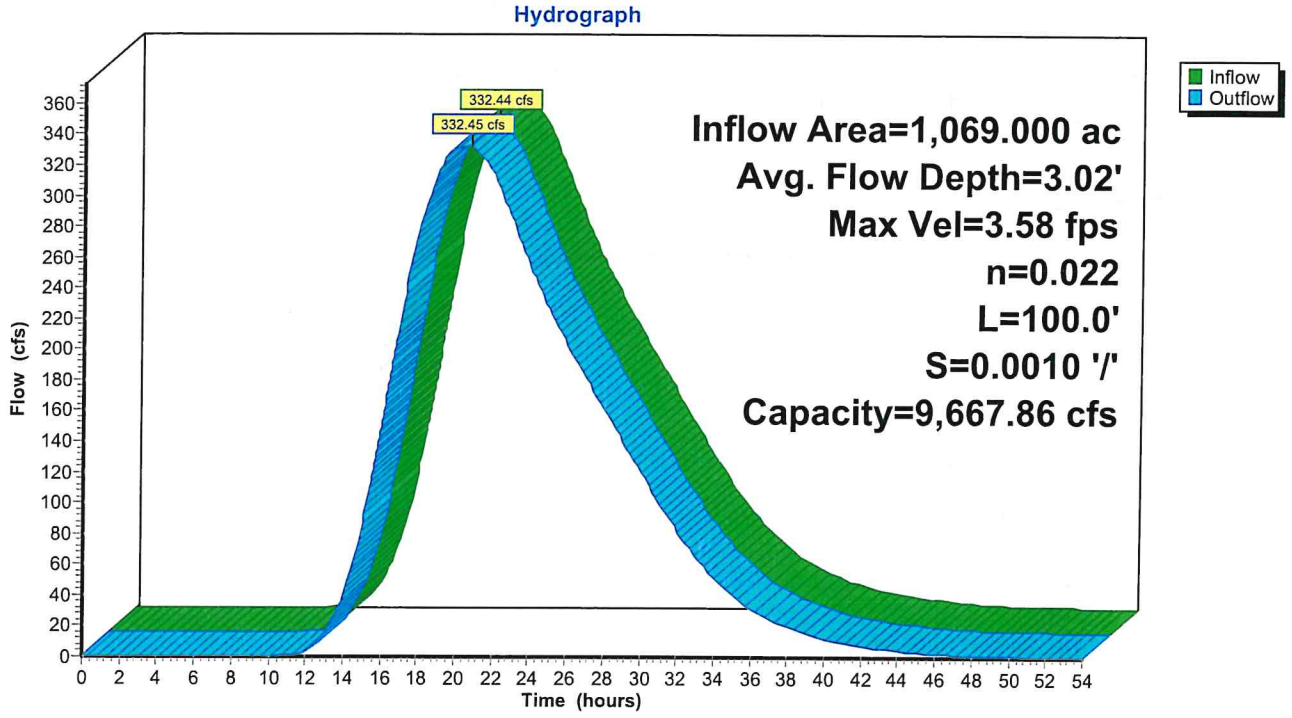
Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (107 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.70', Outlet Invert= 139.60'

‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	152.50	0.00
5.60	152.00	0.50
18.30	150.00	2.50
48.10	148.00	4.50
97.80	146.00	6.50
114.10	145.50	7.00
120.90	144.00	8.50
127.90	142.00	10.50
134.10	139.70	12.80
150.00	139.70	12.80
157.70	140.00	12.50
162.70	142.00	10.50
175.40	144.00	8.50
187.40	146.00	6.50
191.50	148.00	4.50
195.60	152.00	0.50
196.70	152.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	15.9	0	0.00
0.30	6.0	24.5	605	5.09
2.30	65.3	35.6	6,526	208.69
4.30	154.6	55.7	15,456	651.56
5.80	248.2	71.8	24,816	1,211.36
6.30	288.1	91.2	28,813	1,325.32
8.30	521.1	145.5	52,113	2,605.99
10.30	839.8	178.2	83,978	5,041.78
12.30	1,205.0	193.9	120,503	8,699.51
12.80	1,301.7	200.8	130,171	9,667.86

Reach 5R: E-E



Summary for Reach 6R: F-F

[63] Warning: Exceeded Reach 5R INLET depth by 0.23' @ 30.45 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.45 cfs @ 20.73 hrs, Volume= 341.403 af
Outflow = 332.45 cfs @ 20.73 hrs, Volume= 341.402 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.22 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.75 fps, Avg. Travel Time= 1.0 min

Peak Storage= 10,324 cf @ 20.73 hrs
Average Depth at Peak Storage= 3.21'
Bank-Full Depth= 10.80' Flow Area= 1,753.2 sf, Capacity= 8,997.16 cfs

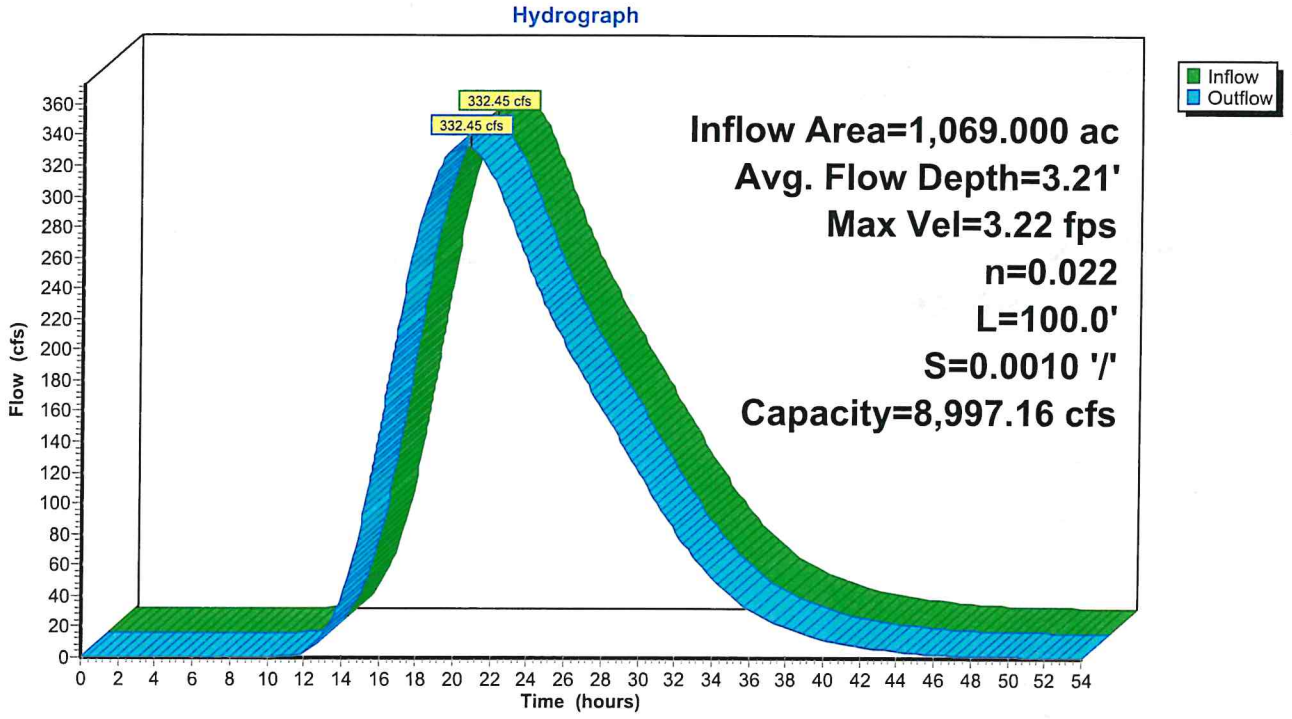
Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (109 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.60', Outlet Invert= 139.50'

‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	150.40	0.00
12.60	150.00	0.40
121.20	148.00	2.40
171.00	146.00	4.40
248.10	146.00	4.40
277.70	145.30	5.10
291.70	144.00	6.40
302.10	142.00	8.40
310.80	140.00	10.40
314.90	139.60	10.80
323.40	139.60	10.80
326.60	140.00	10.40
344.90	142.00	8.40
365.30	144.00	6.40
369.40	146.00	4.40
373.40	148.00	2.40
382.30	148.50	1.90
424.60	148.70	1.70
466.20	148.00	2.40
467.70	150.40	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	8.5	0	0.00
0.40	4.9	15.8	486	4.72
2.40	63.5	43.2	6,346	175.22
4.40	179.9	74.3	17,986	692.81
5.70	286.4	91.3	28,637	1,310.75
6.40	360.4	199.6	36,042	1,141.58
8.40	811.0	253.9	81,102	3,757.17
8.90	953.6	320.3	95,364	4,215.76
9.10	1,023.8	385.6	102,381	4,193.32
10.40	1,568.7	457.7	156,871	7,616.80
10.80	1,753.2	470.8	175,322	8,997.16

Reach 6R: F-F



Summary for Reach 7R: G-G

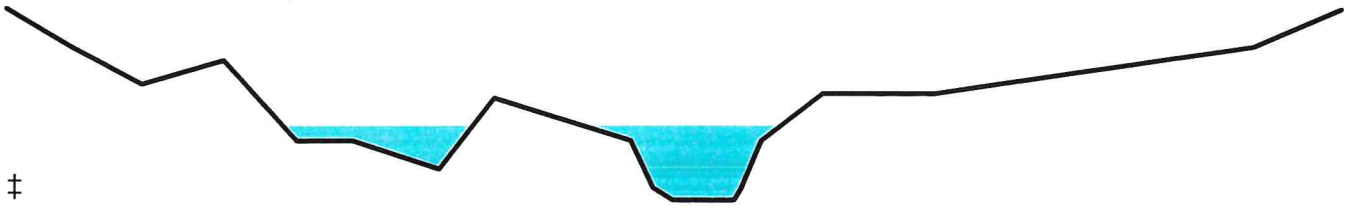
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=3)
[63] Warning: Exceeded Reach 6R INLET depth by 0.05' @ 27.70 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.45 cfs @ 20.73 hrs, Volume= 341.402 af
Outflow = 332.44 cfs @ 20.73 hrs, Volume= 341.401 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.64 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.58 fps, Avg. Travel Time= 1.1 min

Peak Storage= 12,609 cf @ 20.73 hrs
Average Depth at Peak Storage= 3.14'
Bank-Full Depth= 8.10' Flow Area= 1,185.2 sf, Capacity= 6,147.81 cfs

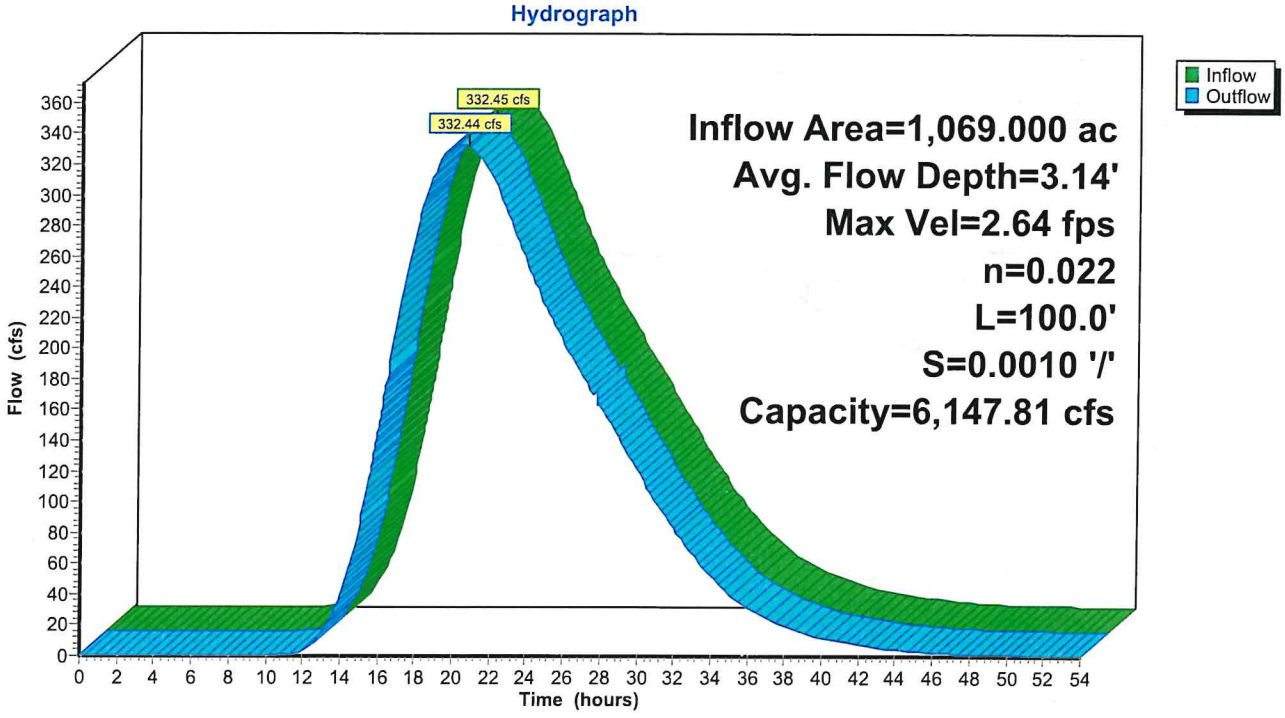
Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (107 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.50', Outlet Invert= 139.40'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	147.60	0.00
14.80	146.00	1.60
31.60	144.40	3.20
50.80	145.40	2.20
68.00	142.00	5.60
81.00	142.00	5.60
101.30	140.80	6.80
106.40	142.00	5.60
114.00	143.80	3.80
145.90	142.00	5.60
151.20	140.00	7.60
155.60	139.50	8.10
170.00	139.50	8.10
171.70	140.00	7.60
176.20	142.00	5.60
190.50	144.00	3.60
216.50	144.00	3.60
290.90	146.00	1.60
311.10	147.60	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	14.4	0	0.00
0.50	8.7	20.6	873	10.51
1.30	26.7	24.8	2,670	59.71
2.50	74.8	69.8	7,476	167.24
4.30	253.8	131.8	25,375	838.82
4.50	280.0	160.3	28,003	867.68
4.90	346.9	177.2	34,686	1,159.23
5.90	558.4	249.4	55,836	2,041.23
6.50	715.4	278.0	71,543	2,869.61
8.10	1,185.2	313.2	118,519	6,147.81

Reach 7R: G-G



Summary for Reach 8R: H-H

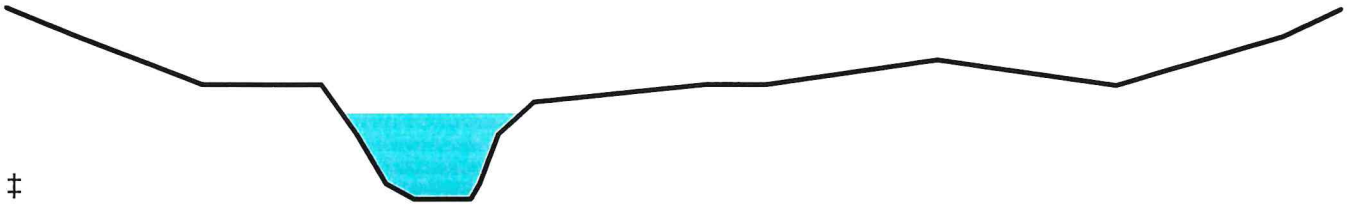
[63] Warning: Exceeded Reach 7R INLET depth by 0.21' @ 20.75 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.73 hrs, Volume= 341.401 af
Outflow = 332.44 cfs @ 20.73 hrs, Volume= 341.400 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.67 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.90 fps, Avg. Travel Time= 0.9 min

Peak Storage= 9,063 cf @ 20.73 hrs
Average Depth at Peak Storage= 3.45'
Bank-Full Depth= 7.70' Flow Area= 883.7 sf, Capacity= 3,947.51 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (106 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.40', Outlet Invert= 139.30'

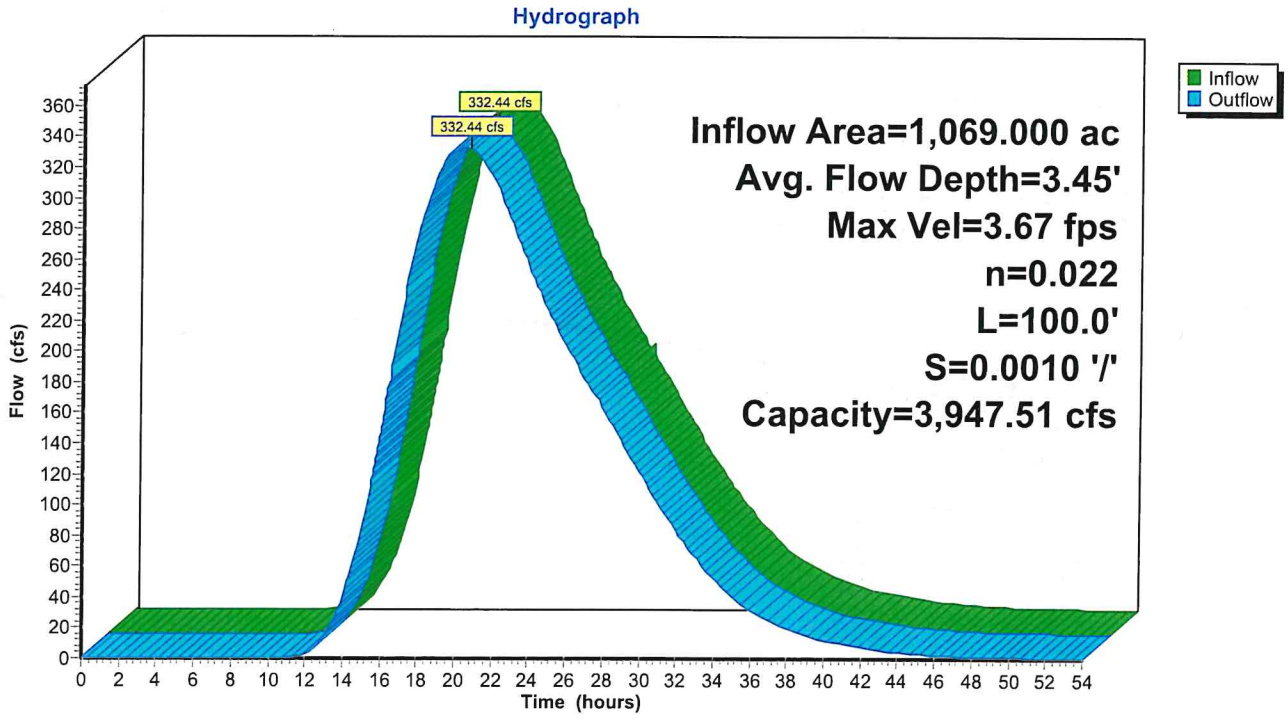


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	147.10	0.00
14.60	146.00	1.10
42.90	144.00	3.10
69.00	144.00	3.10
76.80	142.00	5.10
83.20	140.00	7.10
89.20	139.40	7.70
101.60	139.40	7.70
103.50	140.00	7.10
107.60	142.00	5.10
115.40	143.30	3.80
152.80	144.00	3.10
165.80	144.00	3.10
203.00	145.00	2.10
242.00	144.00	3.10
278.40	146.00	1.10
290.70	147.10	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.4	0	0.00
0.60	9.8	20.4	981	12.85
2.60	60.9	31.7	6,091	201.13
3.90	109.3	44.8	10,932	423.01
4.60	153.9	124.2	15,393	379.45
5.60	331.1	232.8	33,110	894.45
6.60	578.7	265.2	57,873	2,079.69
7.70	883.7	292.2	88,370	3,947.51

Reach 8R: H-H



Summary for Reach 9R: I-I

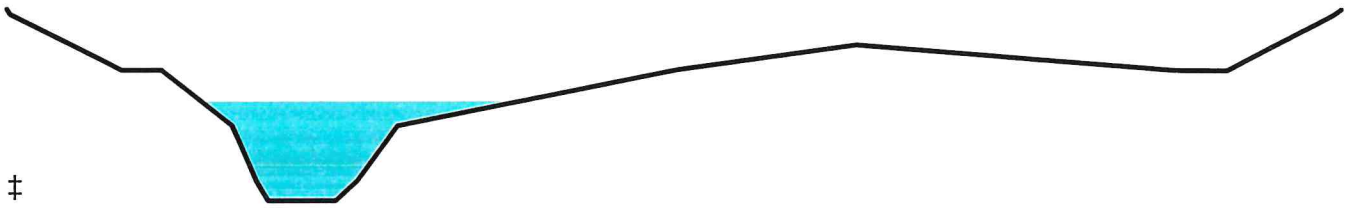
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)
[63] Warning: Exceeded Reach 8R INLET depth by 0.03' @ 23.00 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.44 cfs @ 20.73 hrs, Volume= 341.400 af
Outflow = 332.43 cfs @ 20.74 hrs, Volume= 341.398 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.30 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.79 fps, Avg. Travel Time= 0.9 min

Peak Storage= 11,073 cf @ 20.74 hrs
Average Depth at Peak Storage= 3.57'
Bank-Full Depth= 6.90' Flow Area= 718.0 sf, Capacity= 2,897.62 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (105 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.30', Outlet Invert= 139.20'

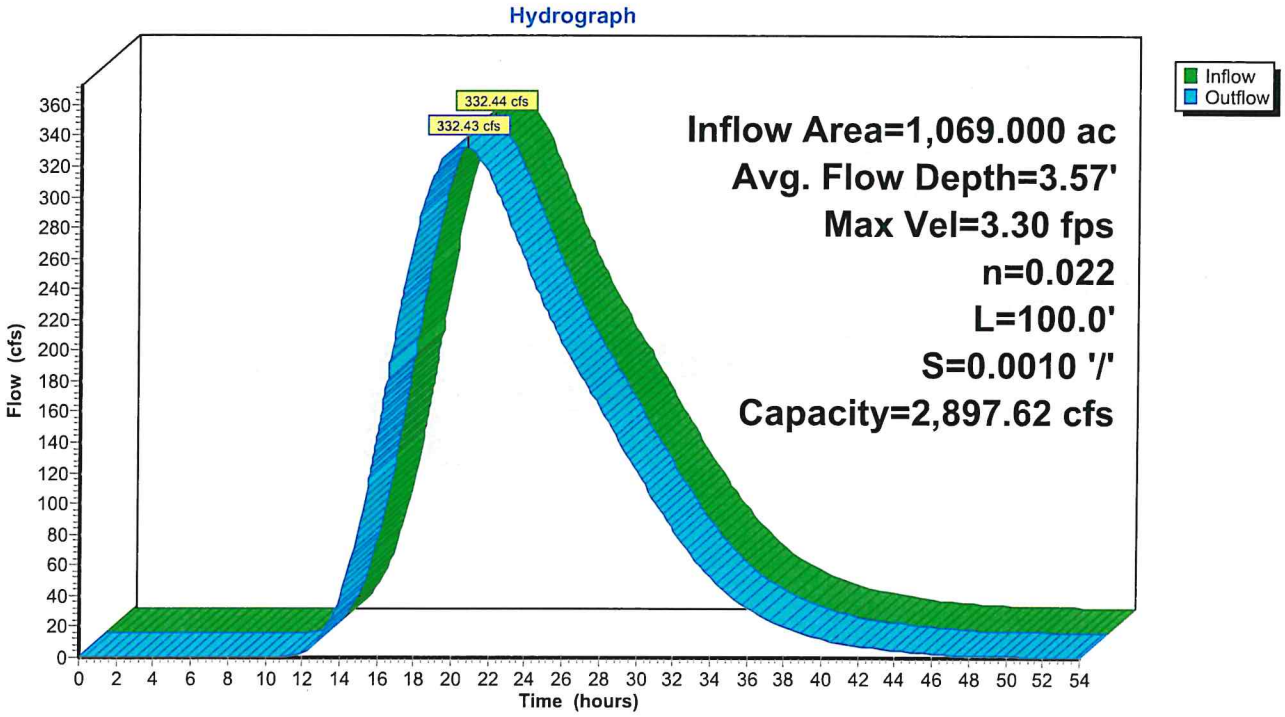


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	146.20	0.00
0.70	146.00	0.20
23.60	144.00	2.20
32.00	144.00	2.20
46.60	142.00	4.20
51.70	140.00	6.20
54.10	139.30	6.90
68.20	139.30	6.90
72.60	140.00	6.20
80.90	142.00	4.20
138.60	144.00	2.20
175.40	144.90	1.30
241.20	144.00	2.20
251.60	144.00	2.20
273.70	146.00	0.20
275.30	146.20	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	14.1	0	0.00
0.70	12.2	21.1	1,225	18.24
2.70	67.4	35.1	6,745	222.81
4.70	208.3	126.3	20,835	621.18
5.60	376.5	249.3	37,649	1,058.57
6.70	663.2	274.1	66,318	2,552.72
6.90	718.0	276.5	71,801	2,897.62

Reach 9R: I-I



Summary for Reach 10R: J-J

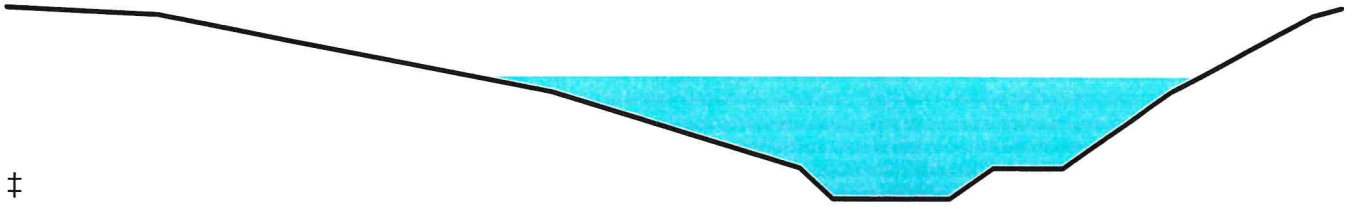
[63] Warning: Exceeded Reach 9R INLET depth by 0.11' @ 39.50 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.43 cfs @ 20.74 hrs, Volume= 341.398 af
Outflow = 332.43 cfs @ 20.74 hrs, Volume= 341.397 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.09 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.71 fps, Avg. Travel Time= 1.0 min

Peak Storage= 10,770 cf @ 20.74 hrs
Average Depth at Peak Storage= 3.19'
Bank-Full Depth= 5.00' Flow Area= 257.6 sf, Capacity= 946.99 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/'
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.20', Outlet Invert= 139.10'

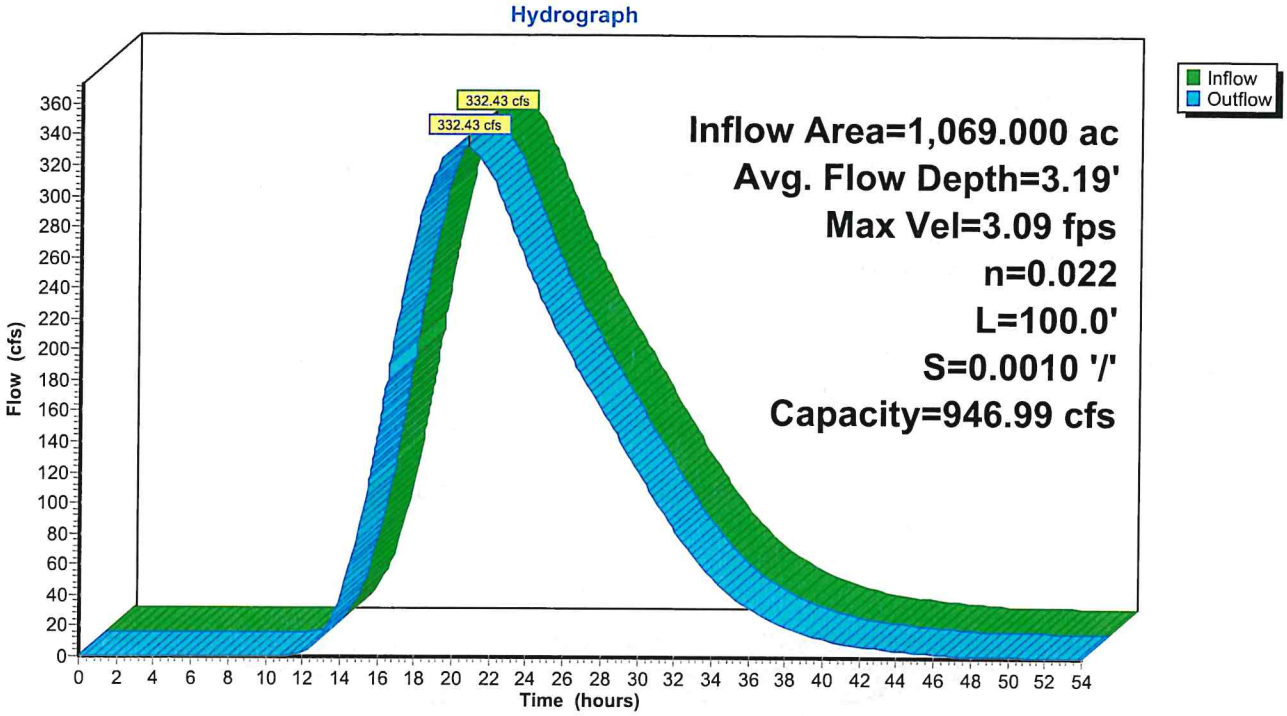


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	144.20	0.00
12.90	144.00	0.20
46.30	142.00	2.20
67.50	140.00	4.20
70.30	139.20	5.00
80.30	139.20	5.00
84.00	140.00	4.20
89.90	140.00	4.20
99.00	142.00	2.20
111.00	144.00	0.20
113.40	144.20	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	10.0	0	0.00
0.80	10.6	22.6	1,060	13.67
2.80	85.7	53.2	8,570	251.52
4.80	236.5	98.8	23,650	903.74
5.00	257.6	114.1	25,765	946.99

Reach 10R: J-J


Hydrograph
Inflow
Outflow
332.43 cfs
332.43 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=3.19'
Max Vel=3.09 fps
n=0.022
L=100.0'
S=0.0010 '/'
Capacity=946.99 cfs
Flow (cfs)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54
Time (hours)

Summary for Reach 11R: K-K

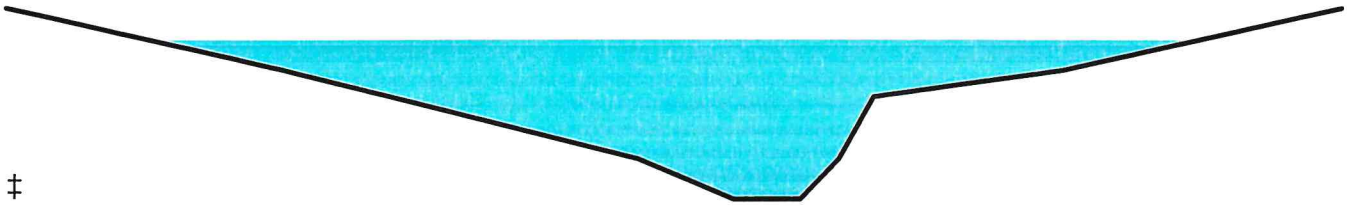
[63] Warning: Exceeded Reach 10R INLET depth by 0.39' @ 16.50 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.43 cfs @ 20.74 hrs, Volume= 341.397 af
Outflow = 332.42 cfs @ 20.75 hrs, Volume= 341.396 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.81 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.70 fps, Avg. Travel Time= 1.0 min

Peak Storage= 11,821 cf @ 20.75 hrs
Average Depth at Peak Storage= 3.58'
Bank-Full Depth= 4.30' Flow Area= 181.8 sf, Capacity= 580.62 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (102 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.10', Outlet Invert= 139.00'

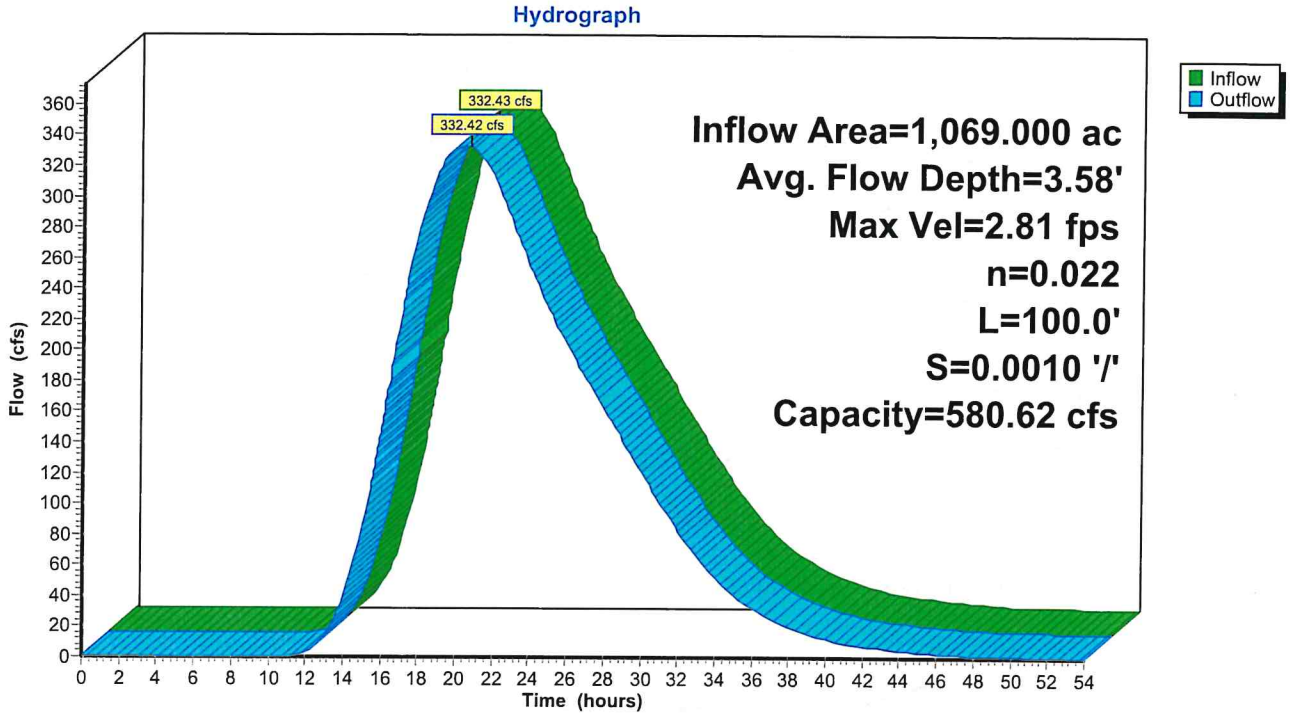


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	143.40	0.00
20.60	142.00	1.40
46.80	140.00	3.40
53.80	139.10	4.30
58.80	139.10	4.30
61.60	140.00	3.40
64.20	141.40	2.00
78.30	142.00	1.40
98.70	143.40	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	5.0	0	0.00
0.90	8.9	15.0	891	13.44
2.30	44.3	36.3	4,429	107.92
2.90	72.3	58.3	7,232	178.26
4.30	181.8	99.4	18,180	580.62

Reach 11R: K-K


Hydrograph
Inflow
Outflow
332.43 cfs
332.42 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=3.58'
Max Vel=2.81 fps
n=0.022
L=100.0'
S=0.0010 '/'
Capacity=580.62 cfs
Flow (cfs)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54

Summary for Reach 12R: L-L

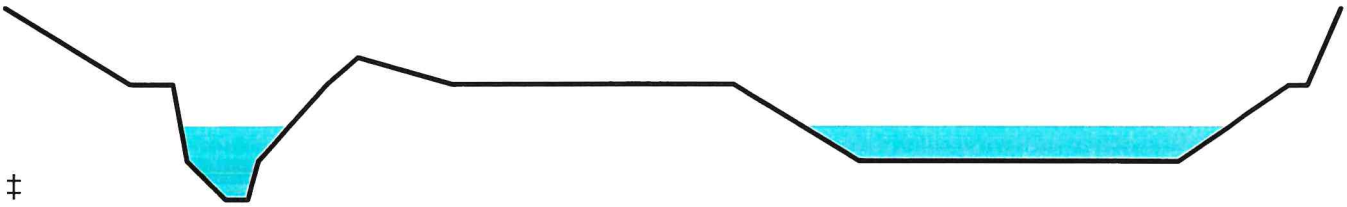
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)
[63] Warning: Exceeded Reach 11R INLET depth by 0.17' @ 41.40 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.42 cfs @ 20.75 hrs, Volume= 341.396 af
Outflow = 332.42 cfs @ 20.76 hrs, Volume= 341.395 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.97 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 1.5 min

Peak Storage= 16,902 cf @ 20.76 hrs
Average Depth at Peak Storage= 1.92'
Bank-Full Depth= 5.00' Flow Area= 1,282.8 sf, Capacity= 5,319.69 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/'
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 139.00', Outlet Invert= 138.90'

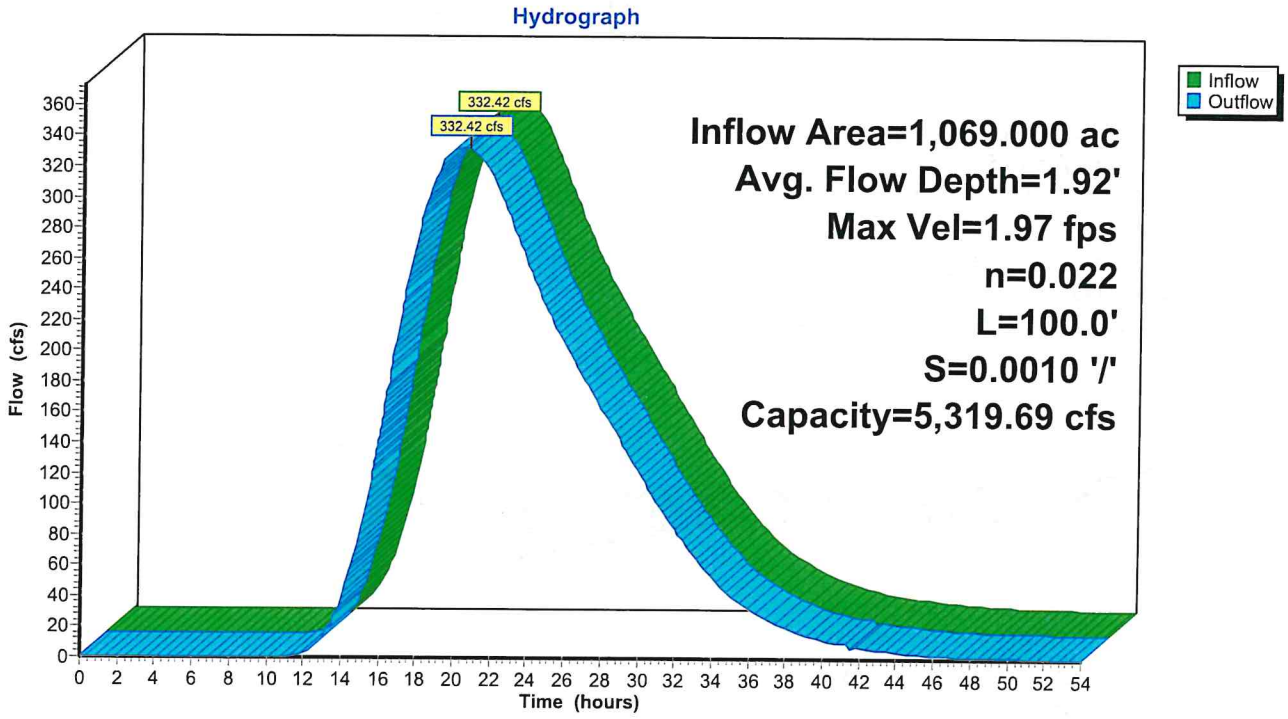


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
24.90	144.00	0.00
68.90	142.00	2.00
84.30	142.00	2.00
89.20	140.00	4.00
103.10	139.00	5.00
111.10	139.00	5.00
114.90	140.00	4.00
139.30	142.00	2.00
150.30	142.70	1.30
183.50	142.00	2.00
283.20	142.00	2.00
327.70	140.00	4.00
440.80	140.00	4.00
480.00	142.00	2.00
486.50	142.00	2.00
498.10	144.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	8.0	0	0.00
1.00	16.9	139.0	1,685	8.82
3.00	407.5	374.1	40,745	921.23
3.70	691.1	437.9	69,111	2,001.05
5.00	1,282.8	474.2	128,278	5,319.69

Reach 12R: L-L



Summary for Reach 13R: M-M

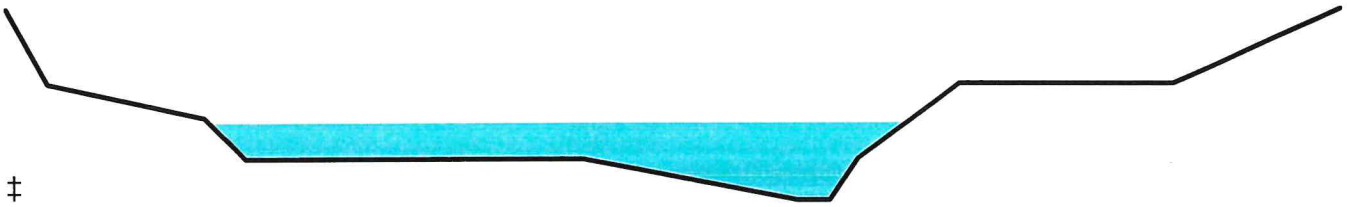
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=3)
[63] Warning: Exceeded Reach 12R INLET depth by 0.04' @ 20.85 hrs

Inflow Area = 1,069.000 ac, 0.00% Impervious, Inflow Depth > 3.83" for 100-yr event
Inflow = 332.42 cfs @ 20.76 hrs, Volume= 341.395 af
Outflow = 332.42 cfs @ 20.77 hrs, Volume= 341.393 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-54.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.33 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.26 fps, Avg. Travel Time= 1.3 min

Peak Storage= 14,236 cf @ 20.77 hrs
Average Depth at Peak Storage= 2.06'
Bank-Full Depth= 5.10' Flow Area= 728.6 sf, Capacity= 3,275.94 cfs

Custom cross-section, Length= 100.0' Slope= 0.0010 '/' (103 Elevation Intervals)
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 138.90', Outlet Invert= 138.80'

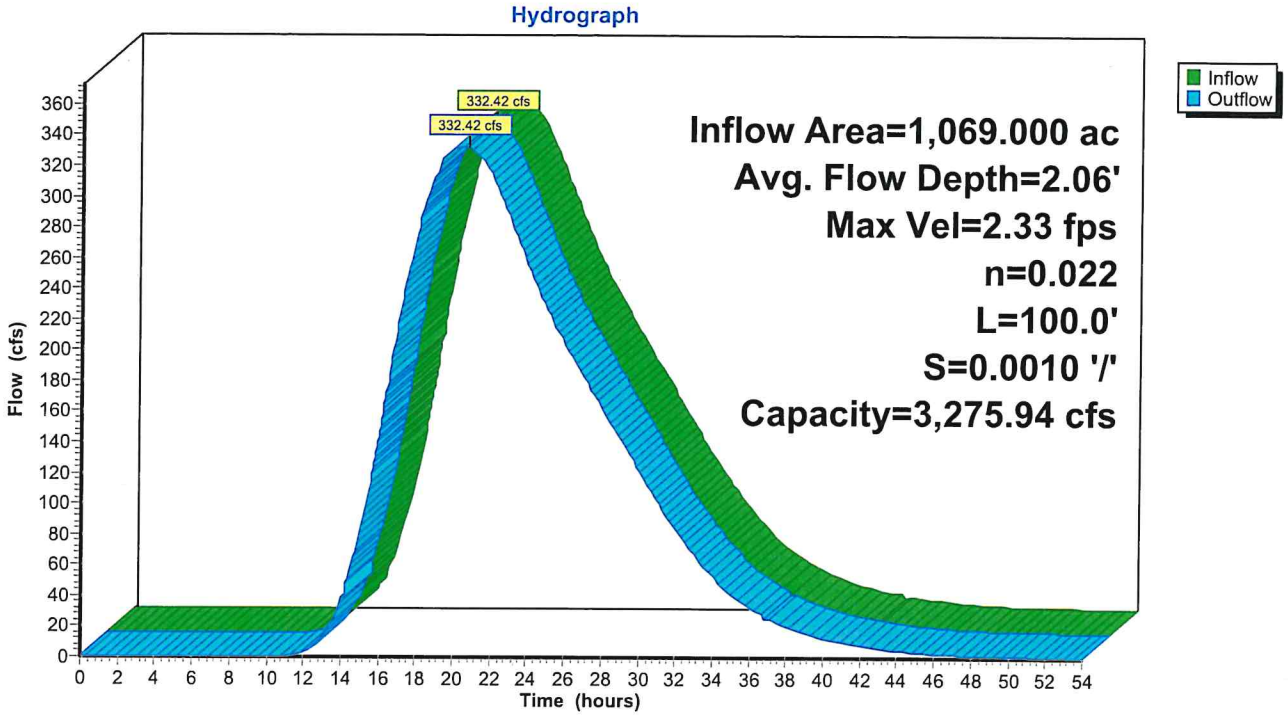


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
8.10	144.00	0.00
15.60	142.00	2.00
43.70	141.10	2.90
51.10	140.00	4.00
111.40	140.00	4.00
149.50	138.90	5.10
155.30	138.90	5.10
160.20	140.00	4.00
178.40	142.00	2.00
216.50	142.00	2.00
246.00	144.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	5.8	0	0.00
1.10	30.0	109.2	3,003	27.12
2.20	159.6	126.8	15,962	397.50
3.10	289.8	201.2	28,980	789.39
5.10	728.6	238.6	72,860	3,275.94

Reach 13R: M-M


Hydrograph
Inflow
Outflow
332.42 cfs
332.42 cfs
Inflow Area=1,069.000 ac
Avg. Flow Depth=2.06'
Max Vel=2.33 fps
n=0.022
L=100.0'
S=0.0010 '/'
Capacity=3,275.94 cfs
Flow (cfs)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54