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Engineering Report

November 3, 2022
Revised December 12, 2022
Revised January 6, 2023
Revised February 6, 2023
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Prepared For
Piage Management Corp
49 Plains Road
Essex, Connecticut 06426

Prepared By
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Table of Contents

Appendices

1.0 Introduction:

This Engineering Report has been prepared on behalf of Piage Management Corp. who is seeking approval for the development of an approximately 2.0-acre parcel located in the central portion of Essex. The parcel is located at 49 Plains Road (Conn. Route 153) in the Town of Essex, Connecticut. Please see Figure 1 for a location map.

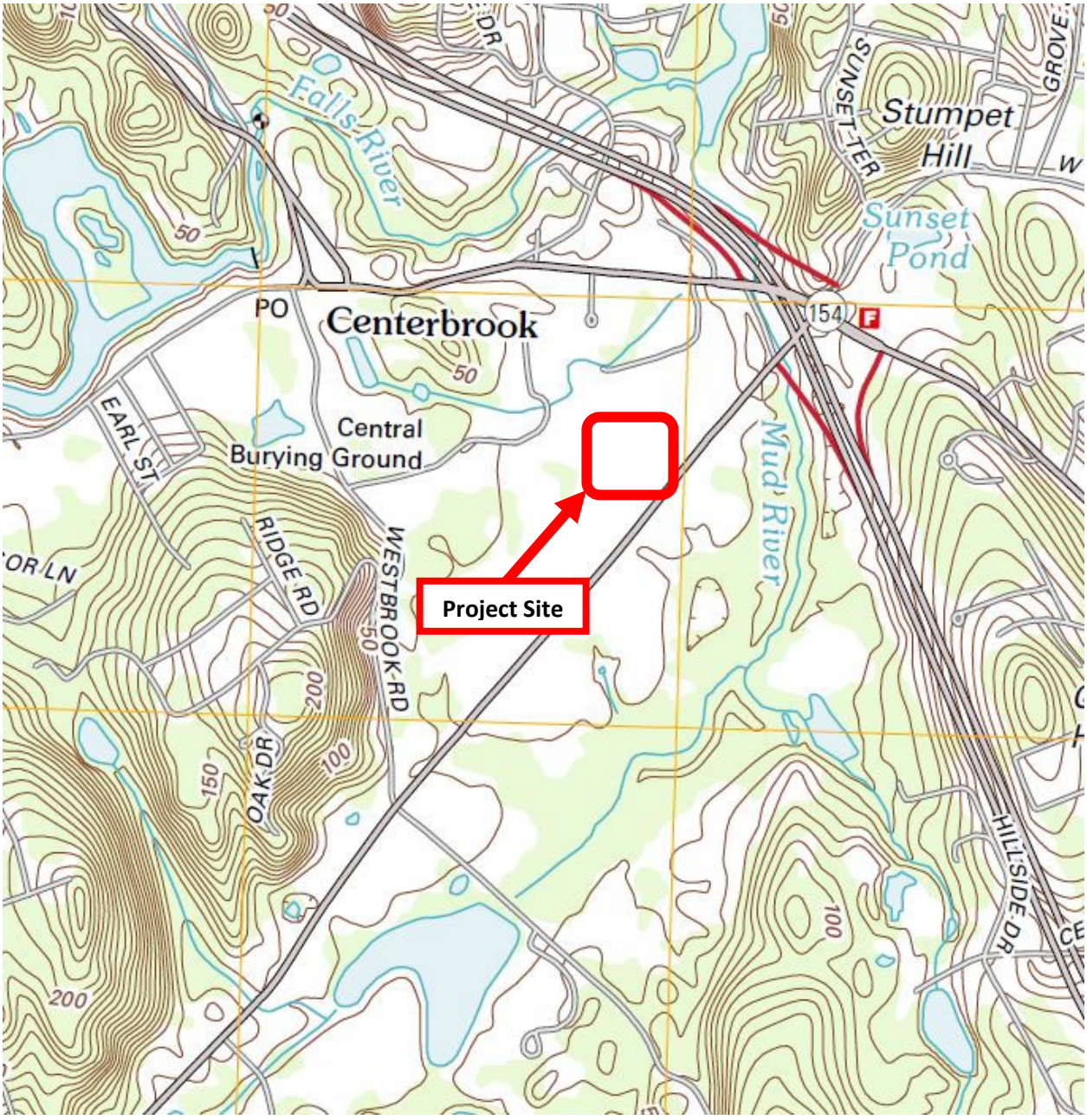

Figure 1. Project Location
U.S.G.S Essex Connecticut Quadrangle

The planned development proposal consists of the construction of a new 10,125 sf. warehouse to the rear of the existing 4,750 sf warehouse. Additional site improvements include driveways, parking areas, utility services, on-site wastewater system, landscaping, and stormwater management facilities.

The project site is located primarily within the Limited Industrial (LI) Zoning District. The access way to the site is in the Business District (B). The existing land used adjacent to and in the vicinity of the site is residential and commercial. The property is currently used as a warehouse that is occupied by Cross Island Provisions.

The site is served by the Connecticut Water Company public water system, public communication, and electric utilities located within the Plains Road Right of Way.

Surface runoff from the site currently drains to a small wetland located in the southeast corner of the site. This wetland discharges to a swale towards Plains Road and an 18" pipe crossing under Plains Road. The runoff ultimately discharges to the Mud River.

Surface runoff from the developed site will be collected by an on-site drainage system and detained in above ground and underground storage onsite. The proposed stormwater management system will continue to direct stormwater to the on-site wetland.

The site is not located within a flood zone per FIRM Community Panel Number 090065 0331 G map effective date 08-28-2008.

The site is located with the Water Resource Protection Area.

The site is not located within Aquifer Protection Area or identified Connecticut Department of Energy and Environmental Protection Diversity Database Area.

The Natural Resources Conservation Service Soil Survey of the State of Connecticut indicates that the uplands surficial soil type on the site is classified as Ninigret-Urban Land Complex 0%-5% Slopes (221A)

The site contains 0.06 acres of inland wetlands and 0.5 acres of upland review area.

The total area of land disturbance associated with the completed project construction activities is approximately 1.7 acres. The approximate area of disturbance within the upland review area is 0.4 acres.

2.0 Hydrologic Model Development:

The site stormwater management system has been designed in accordance with standard hydrologic and hydraulic engineering practices. HydroCAD Version 10.10 (Hydrologic Modeling Software 9 HydroCAD Software Solutions, LLC) was used to create the Hydrologic models and estimates of peak rates of discharge and volumes of runoff. The U.S. Department of Agriculture Soil Conservation Service (now Natural Resources Conservations Service) Technical Release 20 Computer Program for Project Formulation Hydrology Methodology was used within the HydroCAD software program. TR-20 is a single event, lumped parameter surface water hydrologic model that simulates the precipitation-runoff relationships of a drainage area. The model used the Soil Conservation Service Curve Number and Unit-Hydrograph Methods to represent infiltration losses and to transform excess precipitation into runoff, and the Modified Plus (Storage-Indication) Method to perform reservoir routing.

NOAA Precipitation Frequency Atlas 14 for the Northeastern States 24-hour rainfall depths in the project site vicinity shown in Table 1 were accessed from the NOAA Precipitation Frequency Data Server and entered into the model.

Table 1

24-Hour Rainfall Depths for the Project Site Vicinity

Recurrence Interval Year	Rainfall Depth Inches
2	3.44
10	5.20
25	6.31
50	7.13
100	8.01

Partial duration series precipitation frequency data was also accessed from the NOAA Precipitation Frequency Data Server and entered into the models to create a synthetic rainfall distribution specific to the project site vicinity.

Catchment area boundaries where delineated using the existing conditions mapping for the site. The delineations were checked and adjusted based on a field inspection.

Antecedent Moisture Condition II was used to represent the soil moisture condition in the catchment areas prior to the modeled rainfall events.

3.0 Stormwater Management System:

The site stormwater management system consists of an underground stormwater detention area, 2 above ground detention areas, and the associated collection system. The system has been designed to reduce the peak discharge from the site.

The storm drainage pipes have been sized to accommodate the 25-year storm. All discharges from the stormwater detention basins have been sized to accommodate the 100 year storm.

The above ground stormwater basins and underground infiltration basin have been designed to meet the water quality volume and annual groundwater recharge volume requirements of the Connecticut Department of Energy and Environmental Protection Stormwater Quality Manual for the developed site.

All catch basins will have 4' sumps and hooded outlets to help with debris collection and water quality.

Infiltration will be used in the underground basin. The basin has been designed to have 3' separation from the seasonal high ground water level (infiltration tests have been performed with the results shown in appendix H). A layer of unstable material was found from approximately elevation 36.0' to 34.0'. This material will be removed from the area under the infiltration basin and replaced with a material having a minimum infiltration rate of 4" per hour. To include a factor of safety, an infiltration rate of 1" per hour has been assumed in the storm water model.

The storm water management system provides attenuation of the peak discharge rates in addition to matching the 24 hour total storm water discharge from the developed site. A summary of the rates of peak discharge, reservoir elevations, and the 24-hour storm water flows are shown below.

Table 2: Peak Discharge Reservoir Elevations and 24-Hour Storm Water Flows

Storm	Existing Peak(cfs)	Proposed Peak (cfs)	Change Peak (cfs)	Existing 24 Hour(af)	Proposed 24 Hour (af)	Change 24 Hour (af)	Basin 20S Elevation	Basin 21SA Elevation	Underground 22SB Elevation
1 Year	1.76	0.46	-1.3	0.14	0.13	-0.01	33.64	37.42	37.61
2 Year	2.35	0.96	-1.39	0.20	0.19	-0.01	33.8	37.43	37.74
5 Year	3.37	1.95	-1.42	0.30	0.29	0.00	34.07	37.43	38
10 Year	4.25	2.59	-1.66	0.39	0.38	-0.01	34.26	37.44	38.28
25 Year	5.49	3.15	-2.34	0.53	0.52	0.00	34.49	37.45	38.5
50 Year	6.42	4.57	-1.85	0.63	0.63	0.00	34.63	37.45	38.58
100 Year	7.41	6.64	-0.77	0.75	0.75	0.00	34.74	37.46	38.67

5.0 Sanitary System Design Information:

The sanitary system has been designed based on water usage data collected from June 2019 through September 2022 by Connecticut Water Company. The calculated daily use of the existing warehouse business is 144 gallons per day. This is calculated excluding 2 outlying data points on 3/7/2022 and 3/9/2022. It is assumed that a leak caused this data to not be in line with the other water data collected.

Cross Island Provisions currently has 15 employees, 8 office staff and 7 delivery drivers that are on the road the majority of the day. Upon completion of the new warehouse building, it is estimated that the business will have 30 employees. Based on the average daily water usage of 144 gallons and the current number of employees (15) it is estimated that 10 gpd are generated by each employee.

144 gallons / 15 employees = 10 gallons per day per employee

A safety factor of 1.5 can then be applied, bringing the 10 gpd to the estimated design flow of 15 gpd per employee.

10 gallons per day per employee X 1.5 safety factor= 15 gallons per day per employee

It is estimated that once construction is completed, Cross Island Provisions will occupy both of the warehouse spaces and have 30 employees. Therefore, the total design flow can be calculated at 450 gallons per day.

15 gallons per day per employee X 30 employees = 450 gallons per day

Below is the full sanitary system design calculation.

DESIGN FLOW = 450 GPD (BASED ON WATER USAGE DATA)
PERCOLATION RATE = 1.0-10.0 MIN/IN
APPLICATION RATE = 1.5 GAL/SF/DAY
REQUIRED EFFECTIVE LEACHING AREA = 450/1.5 = 300 SF
PROVIDED 1 - 60 LF ROWS OF GST 6212
EFFECTIVE LEACHING AREA PROVIDED =
1 X 60 LF X 10.0 LF/SF = 600 SF
MINIMUM LEACHING SYSTEM SPREAD (MLSS)
DEPTH TO RESTRICTIVE LAYER = 38 INCHES
(BASED ON GROUND WATER MONITORING TP-10)
SLOPE= 1.0 %
HF= 36
FF= 450/300 = 1.5
PF= 1
MLSS REQUIRED = 36 X 1.5 X 1 = 54 LF
MLSS PROVIDED = 1 ROW X 60 = 60 LF

Appendix A
Design Computations

Water Quality Volume

WQV, Water Quality Volume (AC-FT)
RCV, Runoff Capture Volume (AC-FT)
R, Volumetric Runoff Coefficient
I, Percent Impervious Cover
A, Site Area (AC)

I= 69.02
R= 0.05+0.009 (69) = 0.671
A= 1.84

$$WQV = \frac{1" \text{ X } R \text{ X } A}{12} = \frac{1 \quad 0.6712 \quad 1.84}{12} = 0.1029 \text{ AC-FT}$$

$$= 4482.9 \text{ CF}$$

WQV=4482.9 CF

Groundwater Recharge

GVR=Groundwater Recharge Volume (ac-ft)
D=Depth of Runoff to be Recharged (inches) (Table 7-4)
A=Site Area (acres)
I=Post Development Impervious (decimal)
net inches increase in site impervious for redevelopment

$$GRV = \frac{(D)\ (A)\ (I)}{12}$$

Table 7-4 Groundwater Recharge Depth		
NCRS Hydrologic Soil Groups	Average Annual Recharge	Groundwater Recharge Depth (D)
A	18 inches/year	0.4 inches
B	12 inches/year	0.25 inches
C	6 inches/year	0.1 inches
D	3 inches/year	0 inces (waived)

Existing Impervious	0.67
Proposed Impervious	1.27
Change In Impervious	0.6

$$GRV = \frac{0.25\ \ 1.84\ \ 0.6}{12}$$

GRV=	**0.023**	**ac-ft**
	1001.9	**cf**

Appendix B
Hydrologic Model Input Data and Results

DATE	REVISION	CK.
11/29/22	REVISION	
12/12/22	TOWN COMMENTS	
01/06/23	TOWN COMMENTS	
02/06/23	TOWN COMMENTS	

EXISTING WATERSHED BOUNDARY

EXISTING TIME OF CONCENTRATION FLOW PATH

WS 11

WS 10

A

B

C

D

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

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WATERSHED AREAS EXISTING CONDITIONS

PREPARED FOR

PIAGE MANAGEMENT CORP

#49 PLAINS ROAD ,ESSEX , CONNECTICUT

SCALE:	DATE:	SHEET NO.:	IDENT. NO.:
1"=40'	11/03/22	1 OF 2	

FILE:N:\DRAWINGS\TOWNS\ESSEX\ESSEX\PLAINS ROAD\PIAGENTINI-B08\Hydro Areas.dwg

DATE	REVISION	CK.
11/29/22	REVISION	
12/12/22	TOWN COMMENTS	
01/06/23	TOWN COMMENTS	
02/06/23	TOWN COMMENTS	

PROPOSED WATERSHED BOUNDARY

WS 21

WS 22

WS 20

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

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WATERSHED AREAS PROPOSED CONDITIONS

PREPARED FOR

PIAGE MANAGEMENT CORP

#49 PLAINS ROAD ,ESSEX , CONNECTICUT

SCALE:	DATE:	SHEET NO.:	IDENT. NO.:
1"=40'	11/03/22	2 OF 2	

FILE:R:\DRAWINGS\TOWNS\ESSEX\ESSEX\PLAINS ROAD\PIAGENTINI-B08\Hydro Areas.dwg

Watershed Area's

Existing Watershed WS 10		
	SF	AC
Woods	9000	0.21
Grass	1200	0.03
Gravel	19300	0.44
Impervious	10000	0.23
Total	39500	0.91

Existing Watershed WS 11		
	SF	AC
Woods	30500	0.7
Grass	5600	0.13
Impervious	4500	0.1
Total	40600	0.93

Proposed Watershed WS 20		
		AC
Grass	14755	0.34
Impervious (Bituminous)	29400	0.67
Impervious (Building)	2375	0.05
Total	46530	1.07

Proposed Water Shed WS 21		
	SF	AC
Grass	6260	0.14
Impervious (Bituminous)	11200	0.26
Total	17460	0.4

Proposed Water Shed WS 22		
	SF	AC
Impervious (Building)	12500	0.29
Impervious (Bituminous)	210	0
Grass	3400	0.08
Total	16110	0.37

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Circle one: ***Present*** Developed
Circle one: ***T_c*** T_t

Watershed: EX WS10
Subwatershed:

Sheet flow (applicable to T_c only)

		Segment ID	A-B				
1.	Surface description (Table 3-1)		BIT				
2.	Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.010				
3.	Flow Length, L (< 300ft)	ft.	65.0				
4.	Two-year 24-hr rainfall, P_2	in.	3.44				
5.	Land slope, s	ft./ft.	0.040				
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.010	=	0.010		

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C	C-D			
7.	Surface description		BIT	WOODS			
8.	Manning's roughness coeff., n		0.015	0.100			
9.	Paved or unpaved		UNPVD	UNPVD			
10.	Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.	0.40	0.40			
11.	Flow Length, L	ft.	160.0	25.0			
12.	Watercourse slope, s	ft./ft.	0.005	0.100			
13.	Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	3.81	2.56			
14.	$T_t = \frac{L}{3600 * V}$	hr.	0.012	+ 0.003			= 0.014

Channel flow

		Segment ID					
15.	Channel Bottom width, b	ft.					
16.	Horizontal side slope component, z (z horiz:1 vert)	ft.					
17.	Depth of flow, d	ft.					
18.	Cross sectional flow area, A (assume trapazoidal)	$ft.^2$					
19.	Wetted perimeter, P_w	ft.					
20.	Hydraulic Radius, $R = \frac{A}{P_w}$	ft.					
21.	Channel slope, s	ft./ft.					
22.	Manning's roughness coeff., n						
23.	$V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.					
24.	Flow length, L	ft.					
25.	$T_t = \frac{L}{3600 * V}$	hr.					= 0.000

26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25) hr. 0.024

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Circle one: ***Present*** Developed
Circle one: ***T_c*** T_t

Watershed: EX WS11
Subwatershed:

Sheet flow (applicable to T_c only)

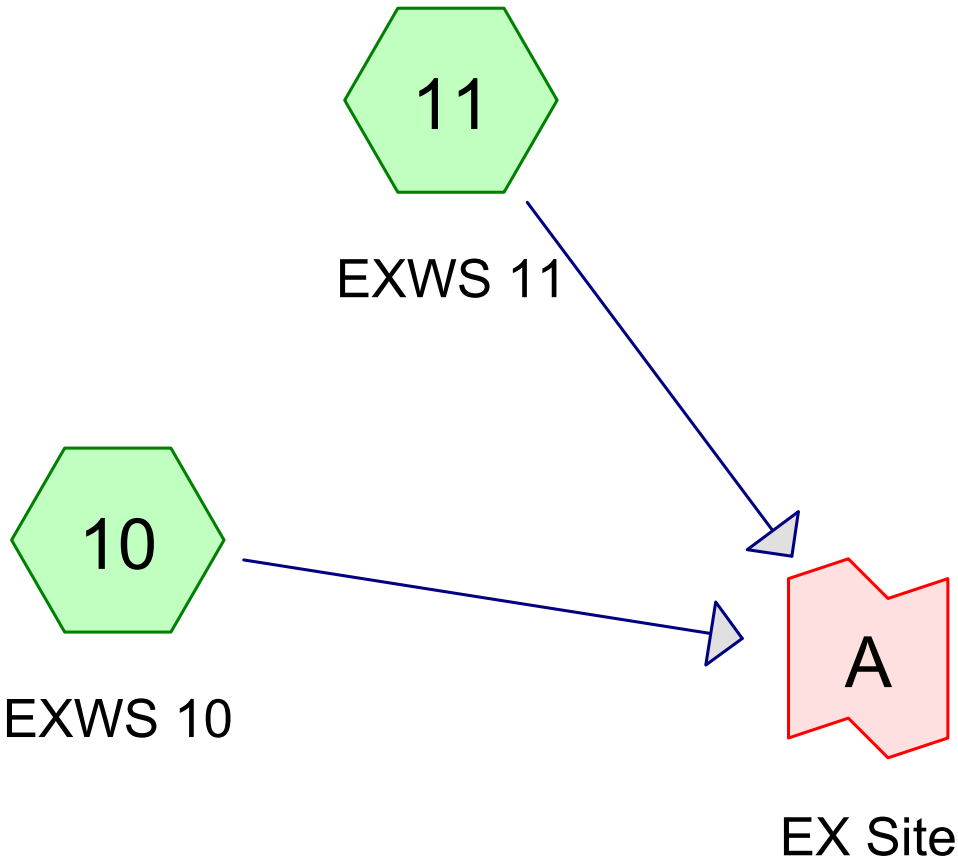
		Segment ID	A-B		
1.	Surface description (Table 3-1)		WOODS		
2.	Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.400		
3.	Flow Length, L (< 300ft)	ft.	50.0		
4.	Two-year 24-hr rainfall, P_2	in.	3.44		
5.	Land slope, s	ft./ft.	0.020		
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.198	=	0.198

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C	C-D			
7.	Surface description		WOODS	WOODS			
8.	Manning's roughness coeff., n		0.400	0.400			
9.	Paved or unpaved		UNPVD	UNPVD			
10.	Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.	0.40	0.40			
11.	Flow Length, L	ft.	218.0	60.0			
12.	Watercourse slope, s	ft./ft.	0.010	0.050			
13.	Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	0.20	0.45			
14.	$T_t = \frac{L}{3600 * V}$	hr.	0.299	+ 0.037			= 0.336

Channel flow

		Segment ID					
15.	Channel Bottom width, b	ft.					
16.	Horizontal side slope component, z (z horiz:1 vert)	ft.					
17.	Depth of flow, d	ft.					
18.	Cross sectional flow area, A (assume trapazoidal)	$ft.^2$					
19.	Wetted perimeter, P_w	ft.					
20.	Hydraulic Radius, $R = \frac{A}{P_w}$	ft.					
21.	Channel slope, s	ft./ft.					
22.	Manning's roughness coeff., n						
23.	$V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.					
24.	Flow length, L	ft.					
25.	$T_t = \frac{L}{3600 * V}$	hr.					= 0.000
26.	Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)					hr.	0.535



Subcat Reach Pond Link

Routing Diagram for 49 Plains Road Existing
Prepared by Doane Enginnering, Printed 2/6/2023

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	CT-49 Plains Road Essex 24-hr S1	1-yr	Default	24.00	1	2.85	2
2	2-yr	CT-49 Plains Road Essex 24-hr S1	2-yr	Default	24.00	1	3.44	2
3	5-yr	CT-49 Plains Road Essex 24-hr S1	5-yr	Default	24.00	1	4.40	2
4	10-yr	CT-49 Plains Road Essex 24-hr S1	10-yr	Default	24.00	1	5.20	2
5	25-yr	CT-49 Plains Road Essex 24-hr S1	25-yr	Default	24.00	1	6.31	2
6	50-yr	CT-49 Plains Road Essex 24-hr S1	50-yr	Default	24.00	1	7.13	2
7	100-yr	CT-49 Plains Road Essex 24-hr S1	100-yr	Default	24.00	1	8.01	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.156	61	>75% Grass cover, Good, HSG B (10, 11)
0.443	96	Gravel surface, HSG B (10)
0.333	98	Impervious (10, 11)
0.907	55	Woods, Good, HSG B (10, 11)
1.839	**73**	**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.156	0.000	0.000	0.000	0.156	>75% Grass cover, Good	10, 11
0.000	0.443	0.000	0.000	0.000	0.443	Gravel surface	10
0.000	0.000	0.000	0.000	0.333	0.333	Impervious	10, 11
0.000	0.907	0.000	0.000	0.000	0.907	Woods, Good	10, 11
0.000	**1.506**	**0.000**	**0.000**	**0.333**	**1.839**	**TOTAL AREA**	

Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 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

Subcatchment 10: EXWS 10 Runoff Area=39,500 sf 25.32% Impervious Runoff Depth>1.53"
Tc=6.0 min CN=86 Runoff=1.76 cfs 0.116 af

Subcatchment 11: EXWS 11 Runoff Area=40,600 sf 11.08% Impervious Runoff Depth>0.30"
Tc=32.1 min CN=61 Runoff=0.08 cfs 0.024 af

Link A: EX Site Inflow=1.76 cfs 0.140 af
Primary=1.76 cfs 0.140 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.140 af Average Runoff Depth = 0.91"
81.90% Pervious = 1.506 ac 18.10% Impervious = 0.333 ac

Summary for Subcatchment 10: EXWS 10

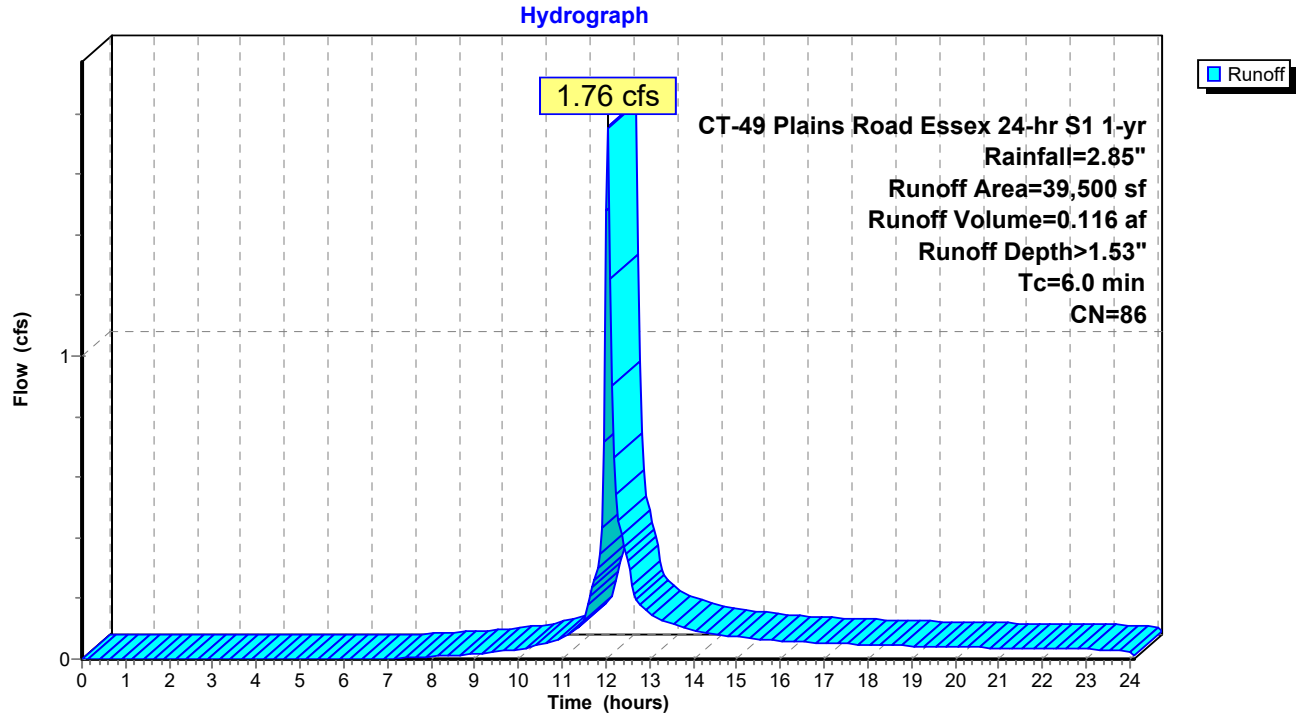
Runoff = 1.76 cfs @ 12.04 hrs, Volume= 0.116 af, Depth> 1.53"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 1-yr Rainfall=2.85"

	Area (sf)	CN	Description
	9,000	55	Woods, Good, HSG B
	1,200	61	>75% Grass cover, Good, HSG B
	19,300	96	Gravel surface, HSG B
*	10,000	98	Impervious
	39,500	86	Weighted Average
	29,500		74.68% Pervious Area
	10,000		25.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, MIN TR-55 TC 6.0 MIN**

Subcatchment 10: EXWS 10



Summary for Subcatchment 11: EXWS 11

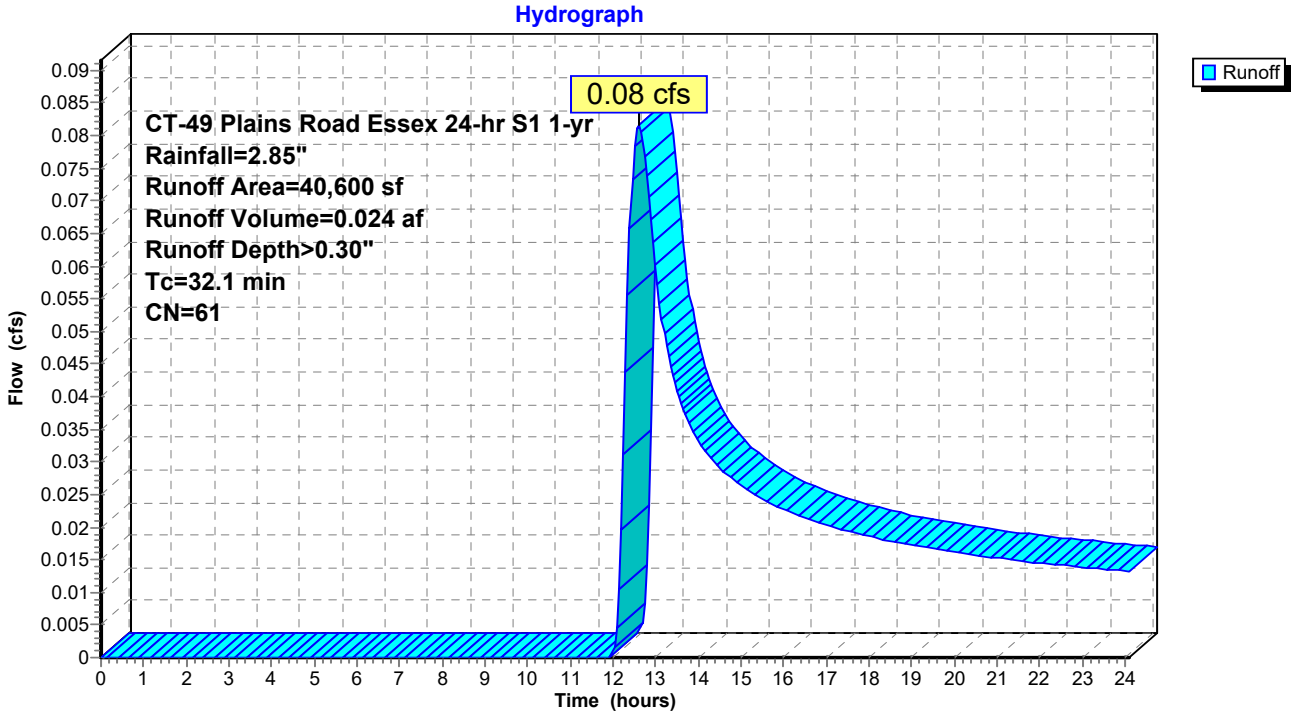
Runoff = 0.08 cfs @ 12.60 hrs, Volume= 0.024 af, Depth> 0.30"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 1-yr Rainfall=2.85"

	Area (sf)	CN	Description
	30,500	55	Woods, Good, HSG B
	5,600	61	>75% Grass cover, Good, HSG B
*	4,500	98	Impervious
	40,600	61	Weighted Average
	36,100		88.92% Pervious Area
	4,500		11.08% Impervious Area

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

Subcatchment 11: EXWS 11

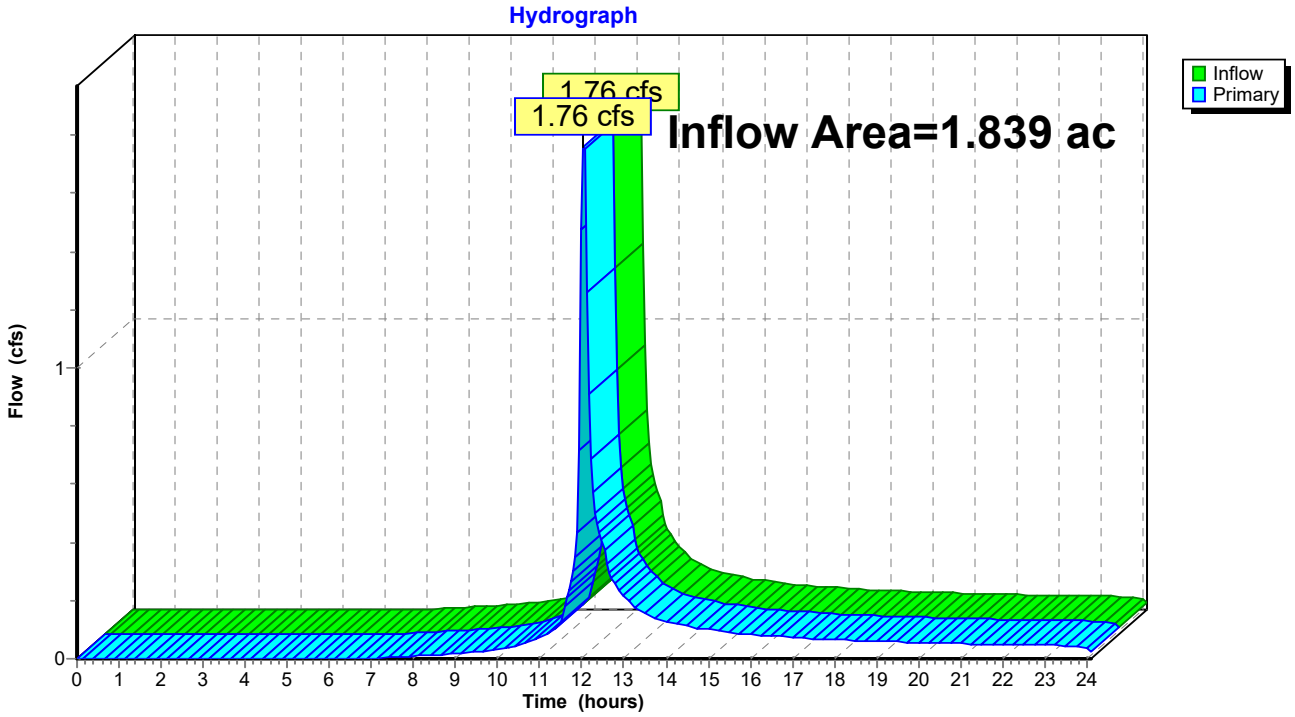


Summary for Link A: EX Site

Inflow Area = 1.839 ac, 18.10% Impervious, Inflow Depth > 0.91" for 1-yr event
Inflow = 1.76 cfs @ 12.04 hrs, Volume= 0.140 af
Primary = 1.76 cfs @ 12.04 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs

Link A: EX Site



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 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

Subcatchment 10: EXWS 10 Runoff Area=39,500 sf 25.32% Impervious Runoff Depth>2.05"
Tc=6.0 min CN=86 Runoff=2.34 cfs 0.155 af

Subcatchment 11: EXWS 11 Runoff Area=40,600 sf 11.08% Impervious Runoff Depth>0.54"
Tc=32.1 min CN=61 Runoff=0.20 cfs 0.042 af

Link A: EX Site Inflow=2.35 cfs 0.196 af
Primary=2.35 cfs 0.196 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.196 af Average Runoff Depth = 1.28"
81.90% Pervious = 1.506 ac 18.10% Impervious = 0.333 ac

Summary for Subcatchment 10: EXWS 10

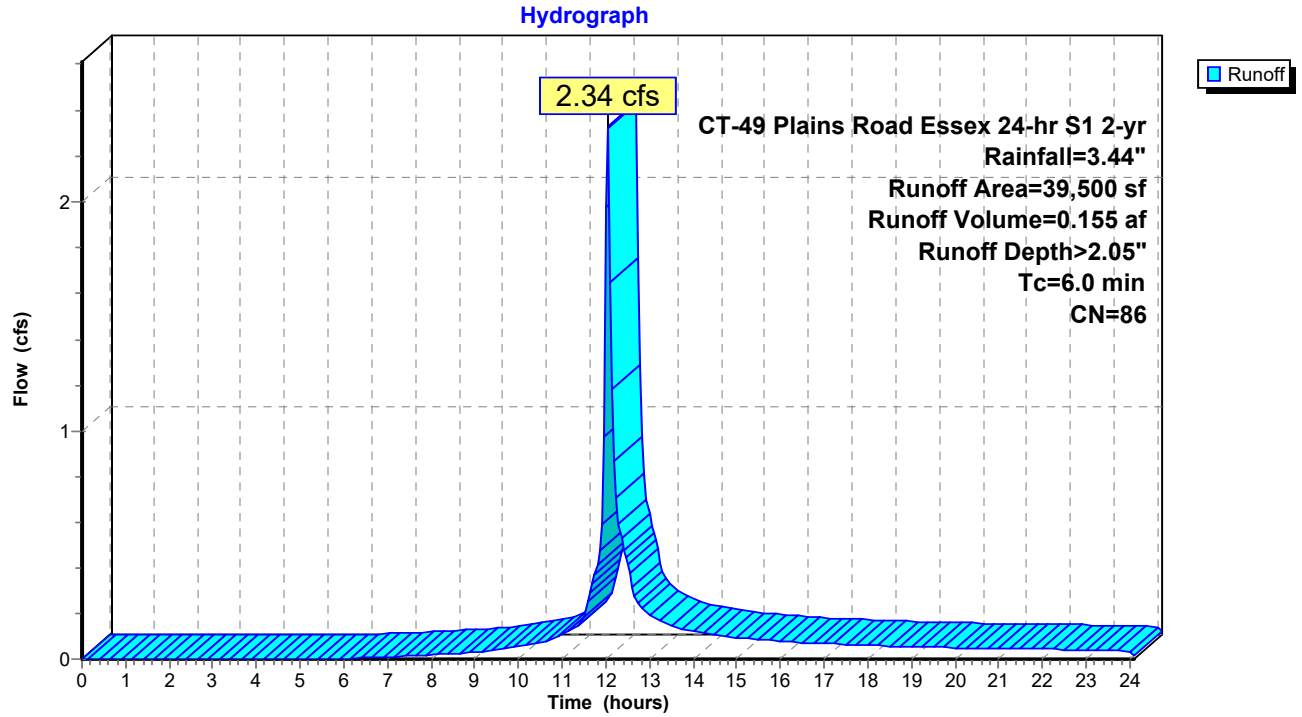
Runoff = 2.34 cfs @ 12.04 hrs, Volume= 0.155 af, Depth> 2.05"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 2-yr Rainfall=3.44"

	Area (sf)	CN	Description
	9,000	55	Woods, Good, HSG B
	1,200	61	>75% Grass cover, Good, HSG B
	19,300	96	Gravel surface, HSG B
*	10,000	98	Impervious
	39,500	86	Weighted Average
	29,500		74.68% Pervious Area
	10,000		25.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, MIN TR-55 TC 6.0 MIN**

Subcatchment 10: EXWS 10



Summary for Subcatchment 11: EXWS 11

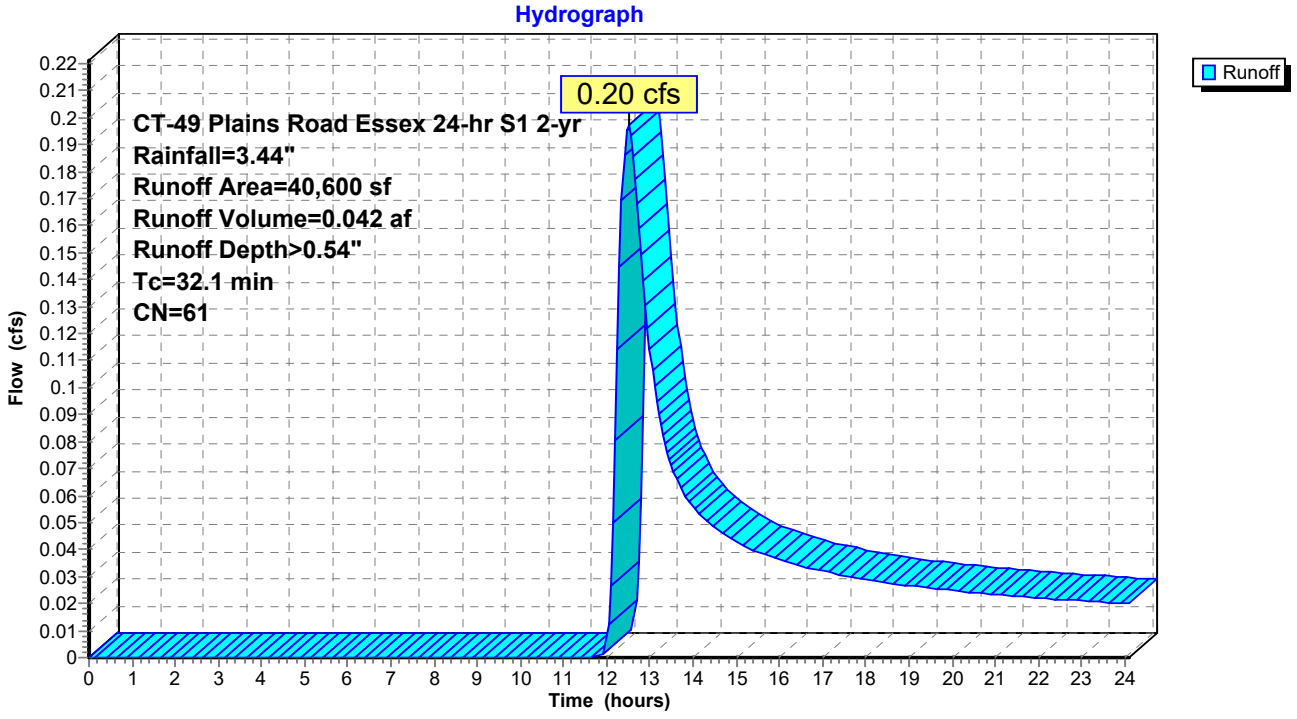
Runoff = 0.20 cfs @ 12.49 hrs, Volume= 0.042 af, Depth> 0.54"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 2-yr Rainfall=3.44"

	Area (sf)	CN	Description
	30,500	55	Woods, Good, HSG B
	5,600	61	>75% Grass cover, Good, HSG B
*	4,500	98	Impervious
	40,600	61	Weighted Average
	36,100		88.92% Pervious Area
	4,500		11.08% Impervious Area

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

Subcatchment 11: EXWS 11

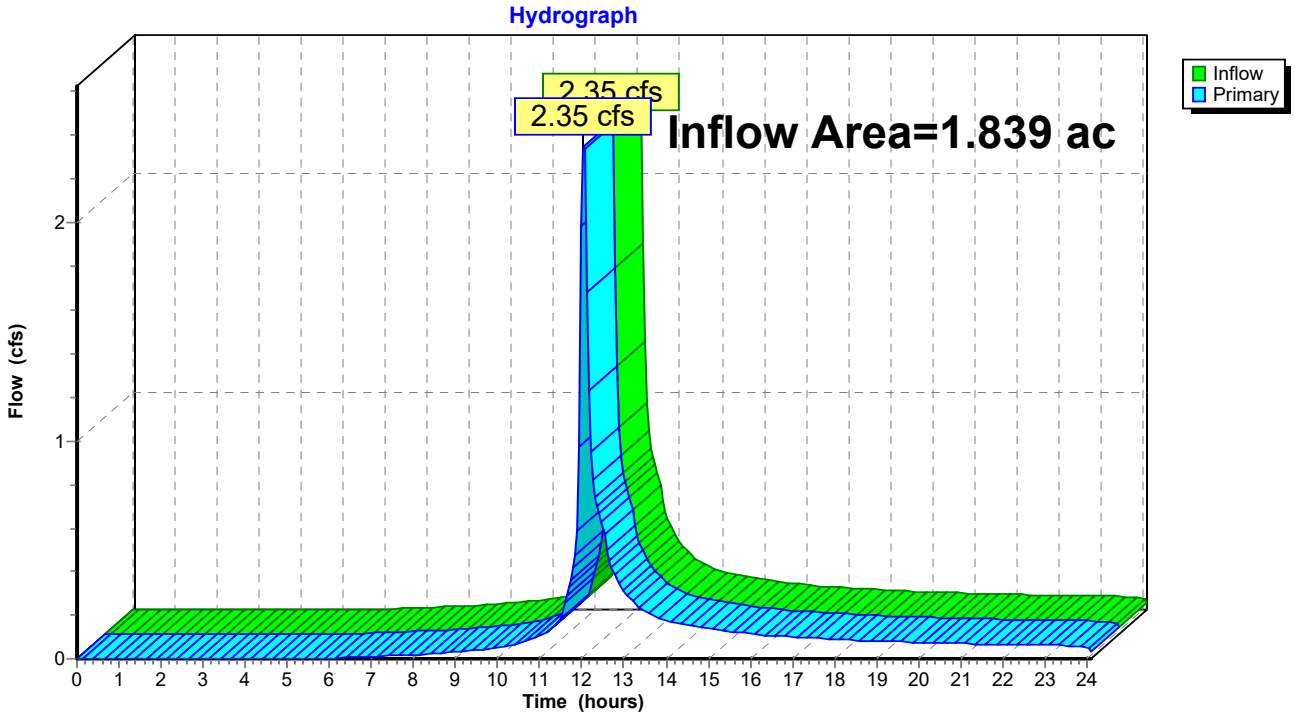


Summary for Link A: EX Site

Inflow Area = 1.839 ac, 18.10% Impervious, Inflow Depth > 1.28" for 2-yr event
Inflow = 2.35 cfs @ 12.04 hrs, Volume= 0.196 af
Primary = 2.35 cfs @ 12.04 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs

Link A: EX Site



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 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

Subcatchment 10: EXWS 10 Runoff Area=39,500 sf 25.32% Impervious Runoff Depth>2.91"
Tc=6.0 min CN=86 Runoff=3.29 cfs 0.220 af

Subcatchment 11: EXWS 11 Runoff Area=40,600 sf 11.08% Impervious Runoff Depth>1.01"
Tc=32.1 min CN=61 Runoff=0.46 cfs 0.079 af

Link A: EX Site Inflow=3.37 cfs 0.299 af
Primary=3.37 cfs 0.299 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.299 af Average Runoff Depth = 1.95"
81.90% Pervious = 1.506 ac 18.10% Impervious = 0.333 ac

Summary for Subcatchment 10: EXWS 10

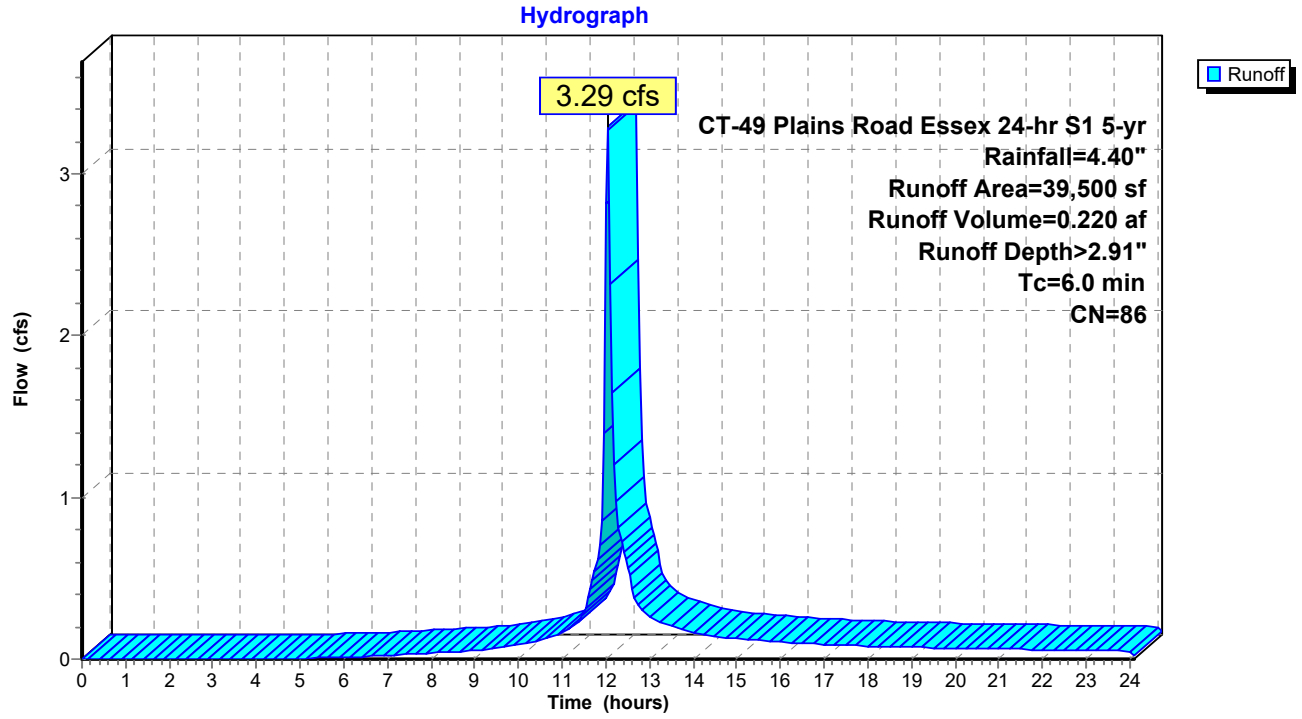
Runoff = 3.29 cfs @ 12.04 hrs, Volume= 0.220 af, Depth> 2.91"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 5-yr Rainfall=4.40"

	Area (sf)	CN	Description
	9,000	55	Woods, Good, HSG B
	1,200	61	>75% Grass cover, Good, HSG B
	19,300	96	Gravel surface, HSG B
*	10,000	98	Impervious
	39,500	86	Weighted Average
	29,500		74.68% Pervious Area
	10,000		25.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, MIN TR-55 TC 6.0 MIN**

Subcatchment 10: EXWS 10



Summary for Subcatchment 11: EXWS 11

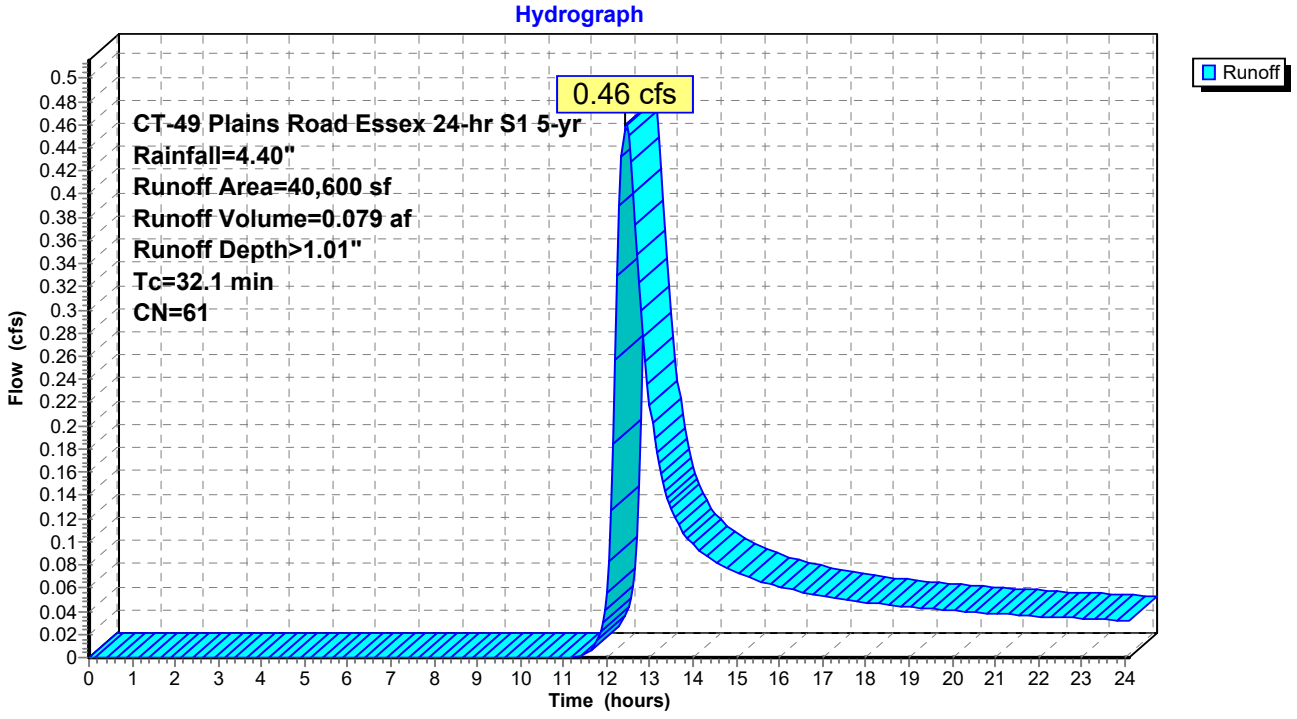
Runoff = 0.46 cfs @ 12.44 hrs, Volume= 0.079 af, Depth> 1.01"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 5-yr Rainfall=4.40"

	Area (sf)	CN	Description
	30,500	55	Woods, Good, HSG B
	5,600	61	>75% Grass cover, Good, HSG B
*	4,500	98	Impervious
	40,600	61	Weighted Average
	36,100		88.92% Pervious Area
	4,500		11.08% Impervious Area

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

Subcatchment 11: EXWS 11

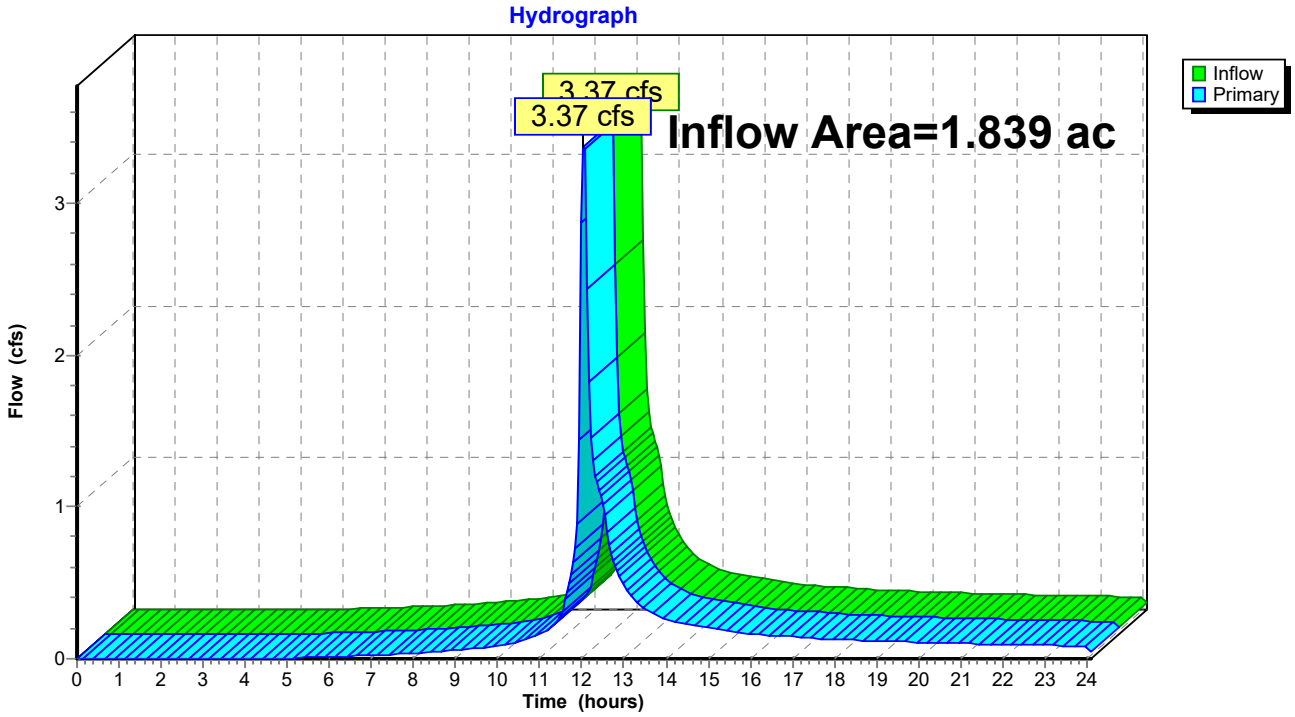


Summary for Link A: EX Site

Inflow Area = 1.839 ac, 18.10% Impervious, Inflow Depth > 1.95" for 5-yr event
Inflow = 3.37 cfs @ 12.04 hrs, Volume= 0.299 af
Primary = 3.37 cfs @ 12.04 hrs, Volume= 0.299 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs

Link A: EX Site



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 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

Subcatchment 10: EXWS 10 Runoff Area=39,500 sf 25.32% Impervious Runoff Depth>3.65"
Tc=6.0 min CN=86 Runoff=4.09 cfs 0.276 af

Subcatchment 11: EXWS 11 Runoff Area=40,600 sf 11.08% Impervious Runoff Depth>1.47"
Tc=32.1 min CN=61 Runoff=0.72 cfs 0.114 af

Link A: EX Site Inflow=4.25 cfs 0.391 af
Primary=4.25 cfs 0.391 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.391 af Average Runoff Depth = 2.55"
81.90% Pervious = 1.506 ac 18.10% Impervious = 0.333 ac

Summary for Subcatchment 10: EXWS 10

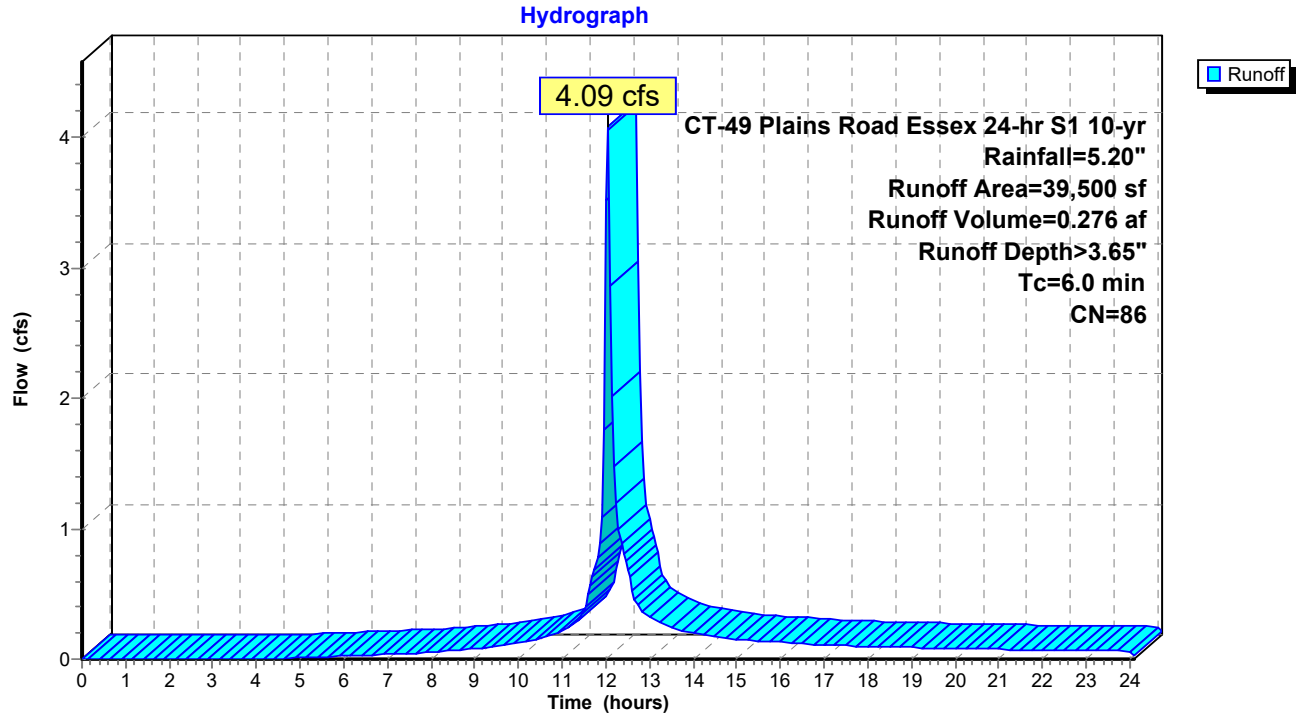
Runoff = 4.09 cfs @ 12.04 hrs, Volume= 0.276 af, Depth> 3.65"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 10-yr Rainfall=5.20"

	Area (sf)	CN	Description
	9,000	55	Woods, Good, HSG B
	1,200	61	>75% Grass cover, Good, HSG B
	19,300	96	Gravel surface, HSG B
*	10,000	98	Impervious
	39,500	86	Weighted Average
	29,500		74.68% Pervious Area
	10,000		25.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, MIN TR-55 TC 6.0 MIN**

Subcatchment 10: EXWS 10



Summary for Subcatchment 11: EXWS 11

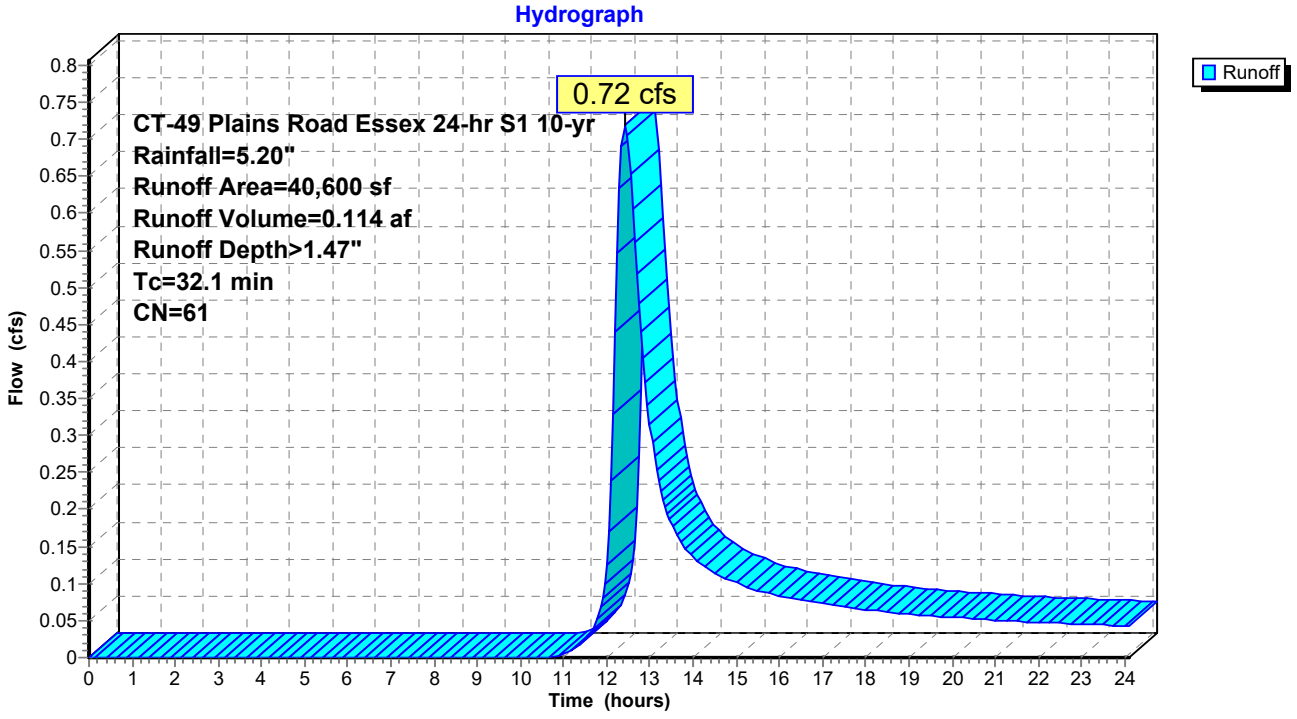
Runoff = 0.72 cfs @ 12.42 hrs, Volume= 0.114 af, Depth> 1.47"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 10-yr Rainfall=5.20"

	Area (sf)	CN	Description
	30,500	55	Woods, Good, HSG B
	5,600	61	>75% Grass cover, Good, HSG B
*	4,500	98	Impervious
	40,600	61	Weighted Average
	36,100		88.92% Pervious Area
	4,500		11.08% Impervious Area

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

Subcatchment 11: EXWS 11

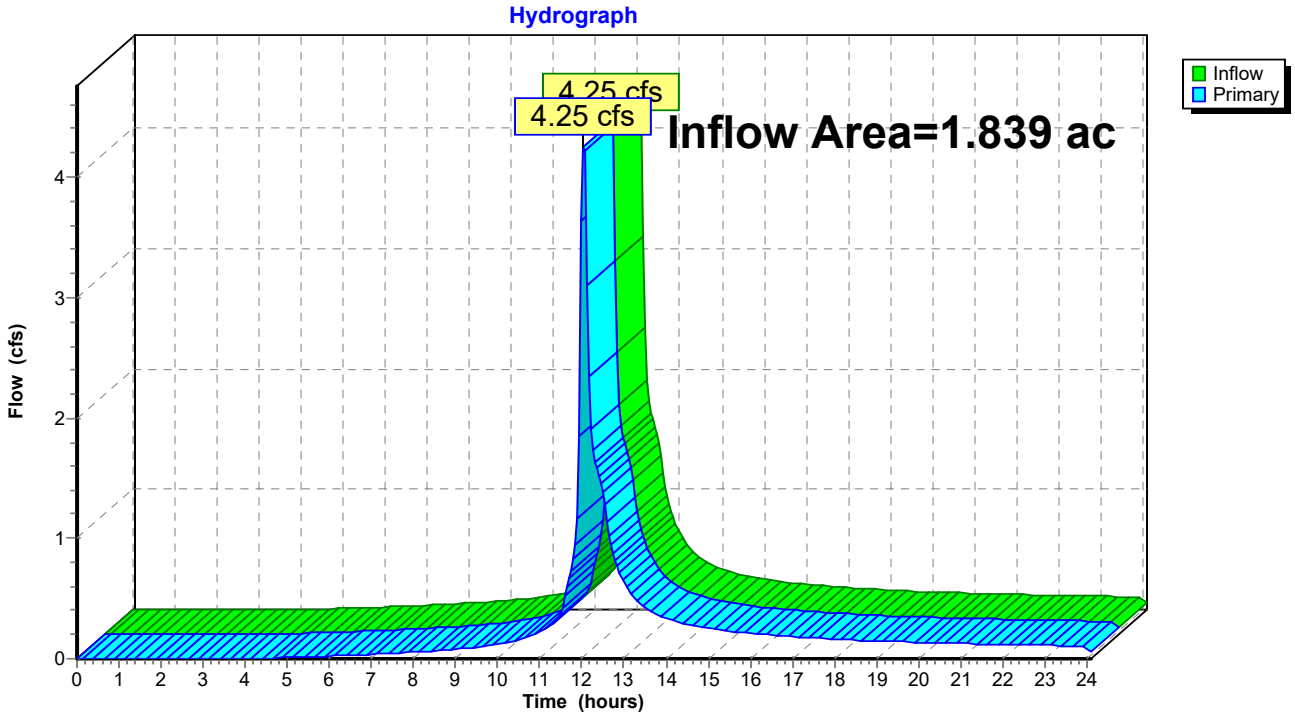


Summary for Link A: EX Site

Inflow Area = 1.839 ac, 18.10% Impervious, Inflow Depth > 2.55" for 10-yr event
Inflow = 4.25 cfs @ 12.04 hrs, Volume= 0.391 af
Primary = 4.25 cfs @ 12.04 hrs, Volume= 0.391 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs

Link A: EX Site



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 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

Subcatchment 10: EXWS 10 Runoff Area=39,500 sf 25.32% Impervious Runoff Depth>4.70"
Tc=6.0 min CN=86 Runoff=5.19 cfs 0.355 af

Subcatchment 11: EXWS 11 Runoff Area=40,600 sf 11.08% Impervious Runoff Depth>2.19"
Tc=32.1 min CN=61 Runoff=1.12 cfs 0.170 af

Link A: EX Site Inflow=5.49 cfs 0.526 af
Primary=5.49 cfs 0.526 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.526 af Average Runoff Depth = 3.43"
81.90% Pervious = 1.506 ac 18.10% Impervious = 0.333 ac

Summary for Subcatchment 10: EXWS 10

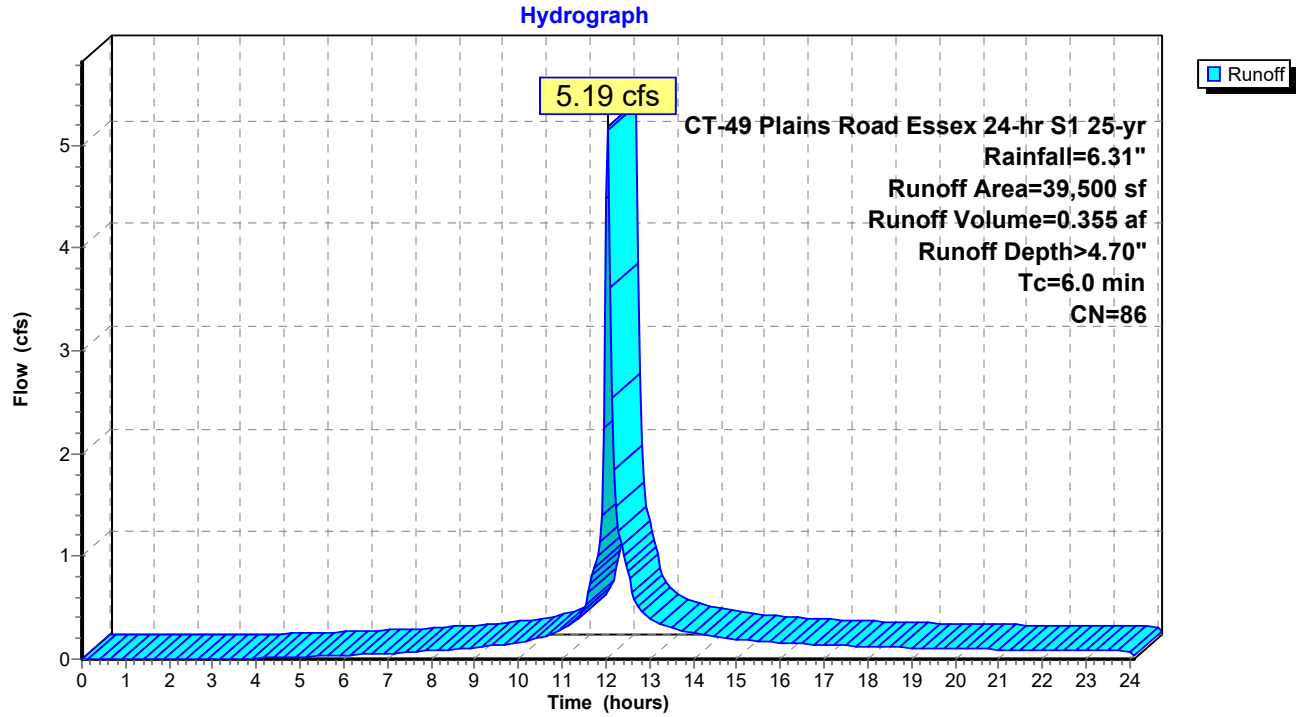
Runoff = 5.19 cfs @ 12.04 hrs, Volume= 0.355 af, Depth> 4.70"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 25-yr Rainfall=6.31"

	Area (sf)	CN	Description
	9,000	55	Woods, Good, HSG B
	1,200	61	>75% Grass cover, Good, HSG B
	19,300	96	Gravel surface, HSG B
*	10,000	98	Impervious
	39,500	86	Weighted Average
	29,500		74.68% Pervious Area
	10,000		25.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, MIN TR-55 TC 6.0 MIN**

Subcatchment 10: EXWS 10



Summary for Subcatchment 11: EXWS 11

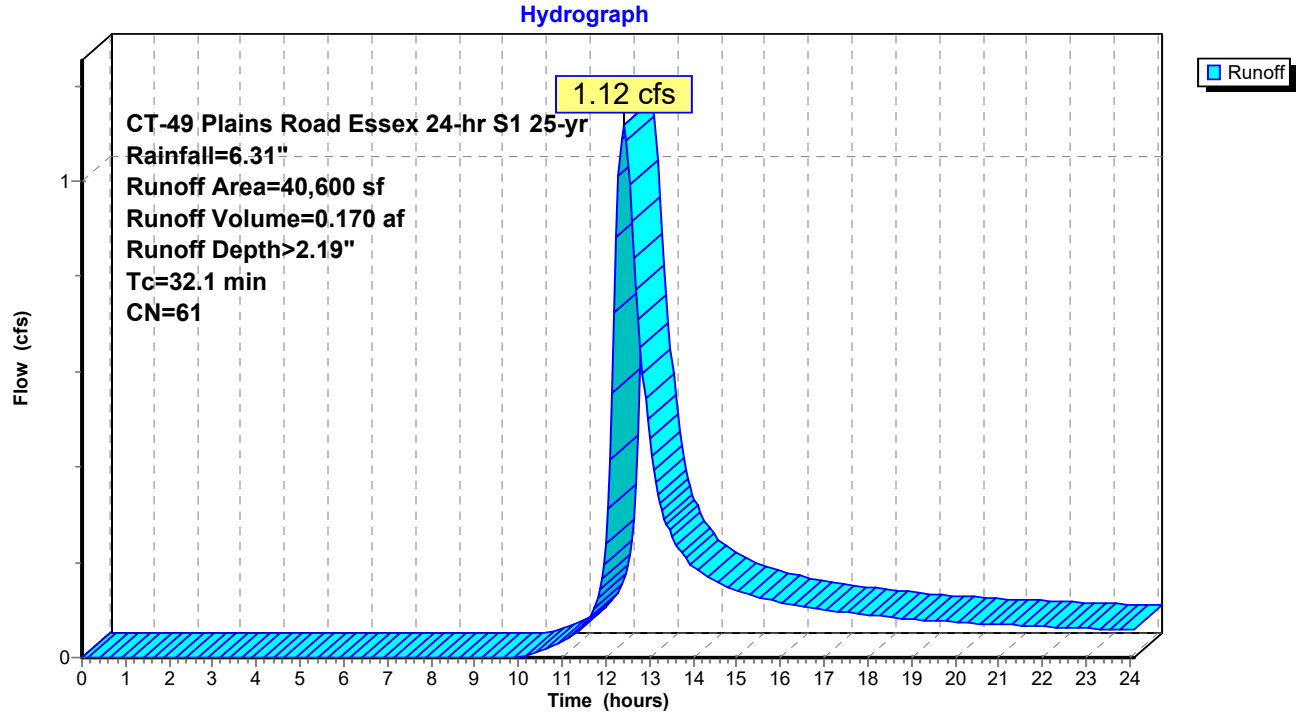
Runoff = 1.12 cfs @ 12.41 hrs, Volume= 0.170 af, Depth> 2.19"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 25-yr Rainfall=6.31"

	Area (sf)	CN	Description
	30,500	55	Woods, Good, HSG B
	5,600	61	>75% Grass cover, Good, HSG B
*	4,500	98	Impervious
	40,600	61	Weighted Average
	36,100		88.92% Pervious Area
	4,500		11.08% Impervious Area

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

Subcatchment 11: EXWS 11

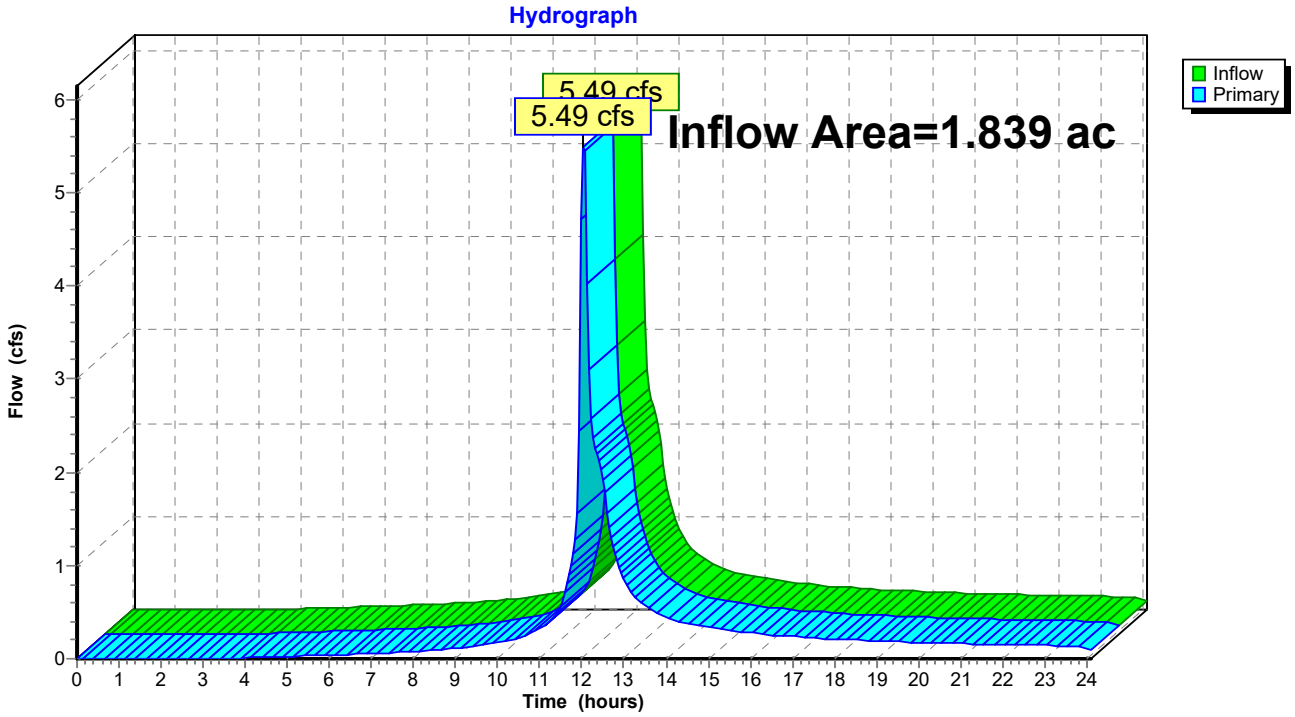


Summary for Link A: EX Site

Inflow Area = 1.839 ac, 18.10% Impervious, Inflow Depth > 3.43" for 25-yr event
Inflow = 5.49 cfs @ 12.04 hrs, Volume= 0.526 af
Primary = 5.49 cfs @ 12.04 hrs, Volume= 0.526 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs

Link A: EX Site



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 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

Subcatchment 10: EXWS 10 Runoff Area=39,500 sf 25.32% Impervious Runoff Depth>5.49"
Tc=6.0 min CN=86 Runoff=6.02 cfs 0.415 af

Subcatchment 11: EXWS 11 Runoff Area=40,600 sf 11.08% Impervious Runoff Depth>2.77"
Tc=32.1 min CN=61 Runoff=1.45 cfs 0.215 af

Link A: EX Site Inflow=6.42 cfs 0.630 af
Primary=6.42 cfs 0.630 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.630 af Average Runoff Depth = 4.11"
81.90% Pervious = 1.506 ac 18.10% Impervious = 0.333 ac

Summary for Subcatchment 10: EXWS 10

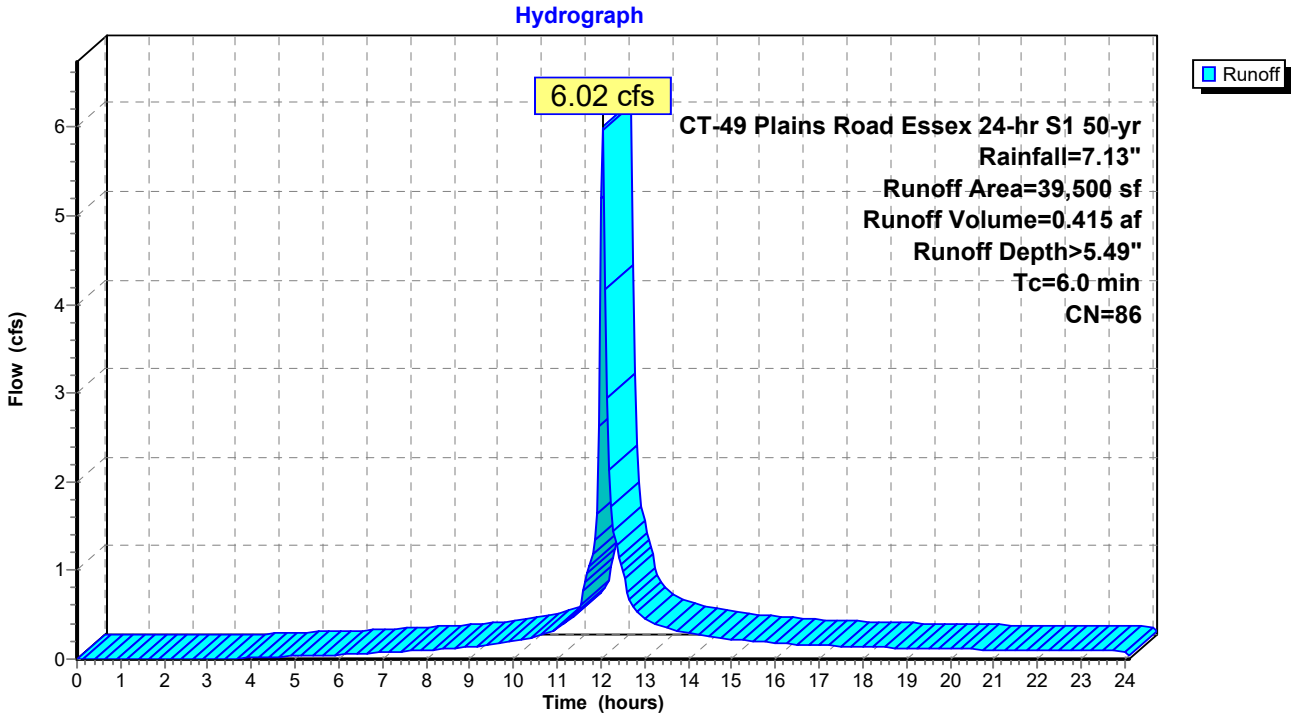
Runoff = 6.02 cfs @ 12.04 hrs, Volume= 0.415 af, Depth> 5.49"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 50-yr Rainfall=7.13"

	Area (sf)	CN	Description
	9,000	55	Woods, Good, HSG B
	1,200	61	>75% Grass cover, Good, HSG B
	19,300	96	Gravel surface, HSG B
*	10,000	98	Impervious
	39,500	86	Weighted Average
	29,500		74.68% Pervious Area
	10,000		25.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, MIN TR-55 TC 6.0 MIN**

Subcatchment 10: EXWS 10



Summary for Subcatchment 11: EXWS 11

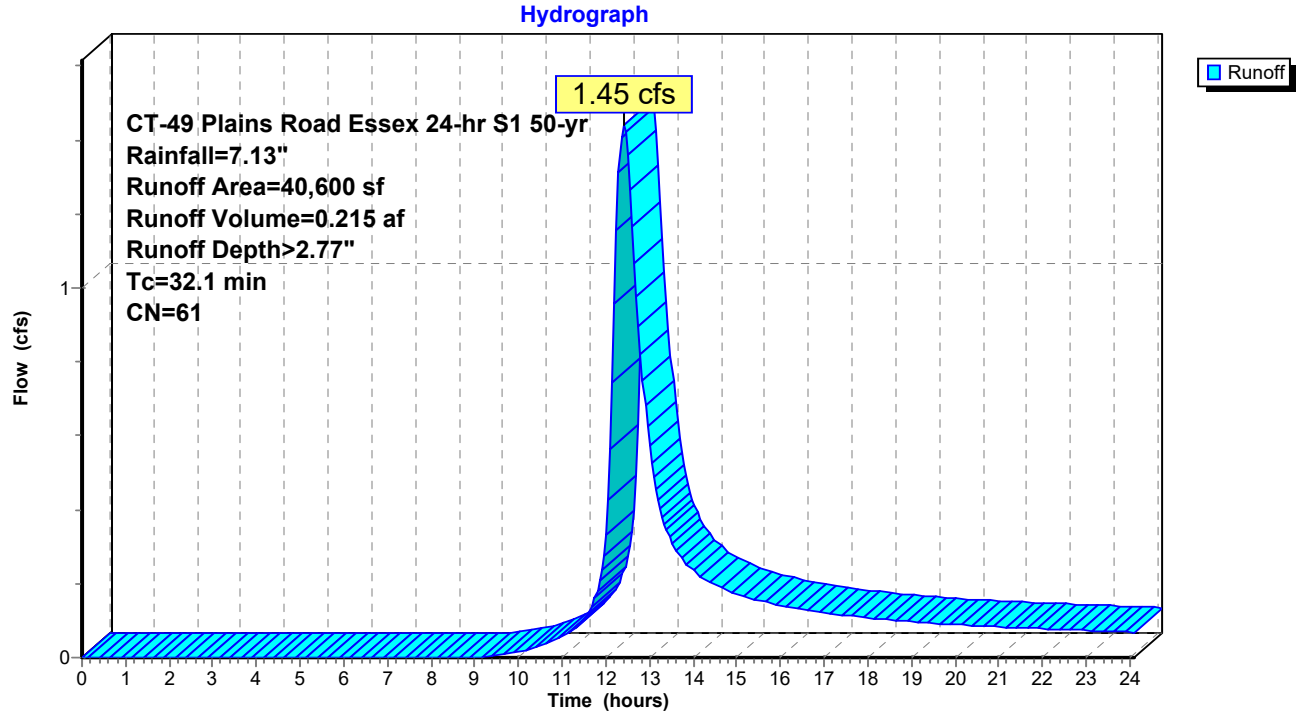
Runoff = 1.45 cfs @ 12.41 hrs, Volume= 0.215 af, Depth> 2.77"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 50-yr Rainfall=7.13"

	Area (sf)	CN	Description
	30,500	55	Woods, Good, HSG B
	5,600	61	>75% Grass cover, Good, HSG B
*	4,500	98	Impervious
	40,600	61	Weighted Average
	36,100		88.92% Pervious Area
	4,500		11.08% Impervious Area

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

Subcatchment 11: EXWS 11

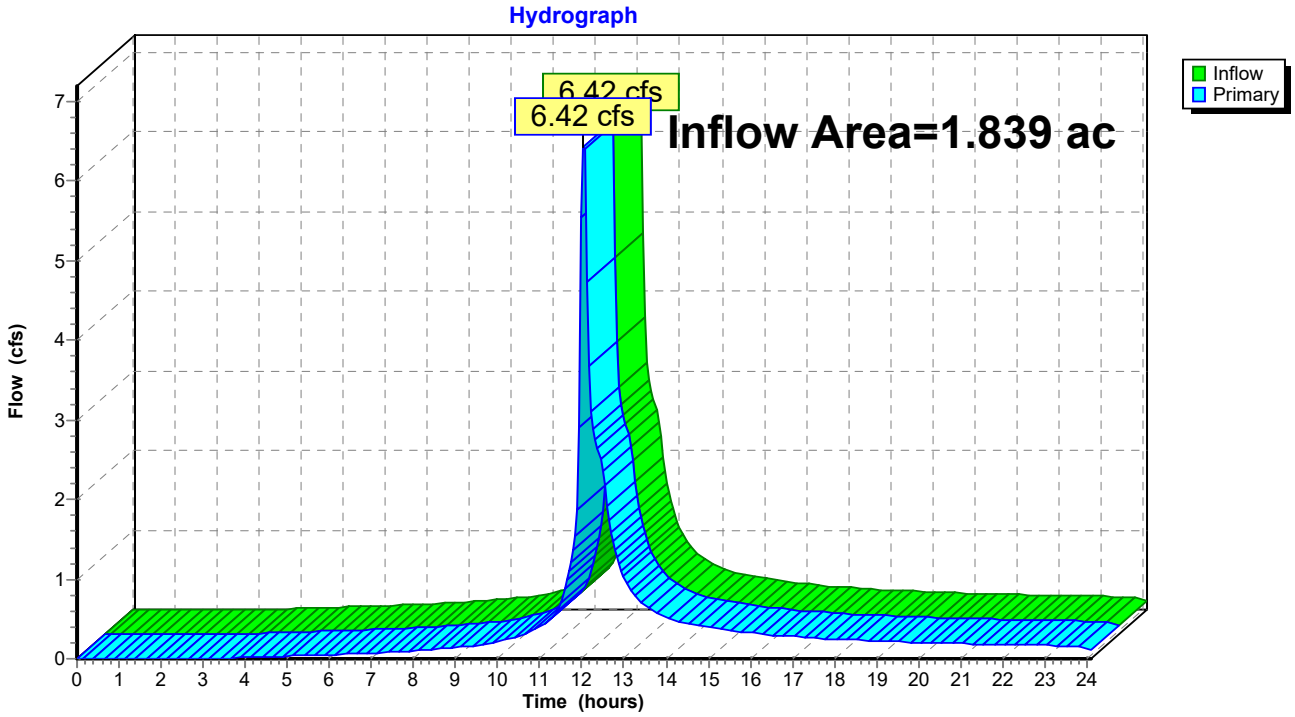


Summary for Link A: EX Site

Inflow Area = 1.839 ac, 18.10% Impervious, Inflow Depth > 4.11" for 50-yr event
Inflow = 6.42 cfs @ 12.04 hrs, Volume= 0.630 af
Primary = 6.42 cfs @ 12.04 hrs, Volume= 0.630 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs

Link A: EX Site



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 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

Subcatchment 10: EXWS 10 Runoff Area=39,500 sf 25.32% Impervious Runoff Depth>6.34"
Tc=6.0 min CN=86 Runoff=6.88 cfs 0.479 af

Subcatchment 11: EXWS 11 Runoff Area=40,600 sf 11.08% Impervious Runoff Depth>3.42"
Tc=32.1 min CN=61 Runoff=1.80 cfs 0.266 af

Link A: EX Site Inflow=7.41 cfs 0.745 af
Primary=7.41 cfs 0.745 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.745 af Average Runoff Depth = 4.86"
81.90% Pervious = 1.506 ac 18.10% Impervious = 0.333 ac

Summary for Subcatchment 10: EXWS 10

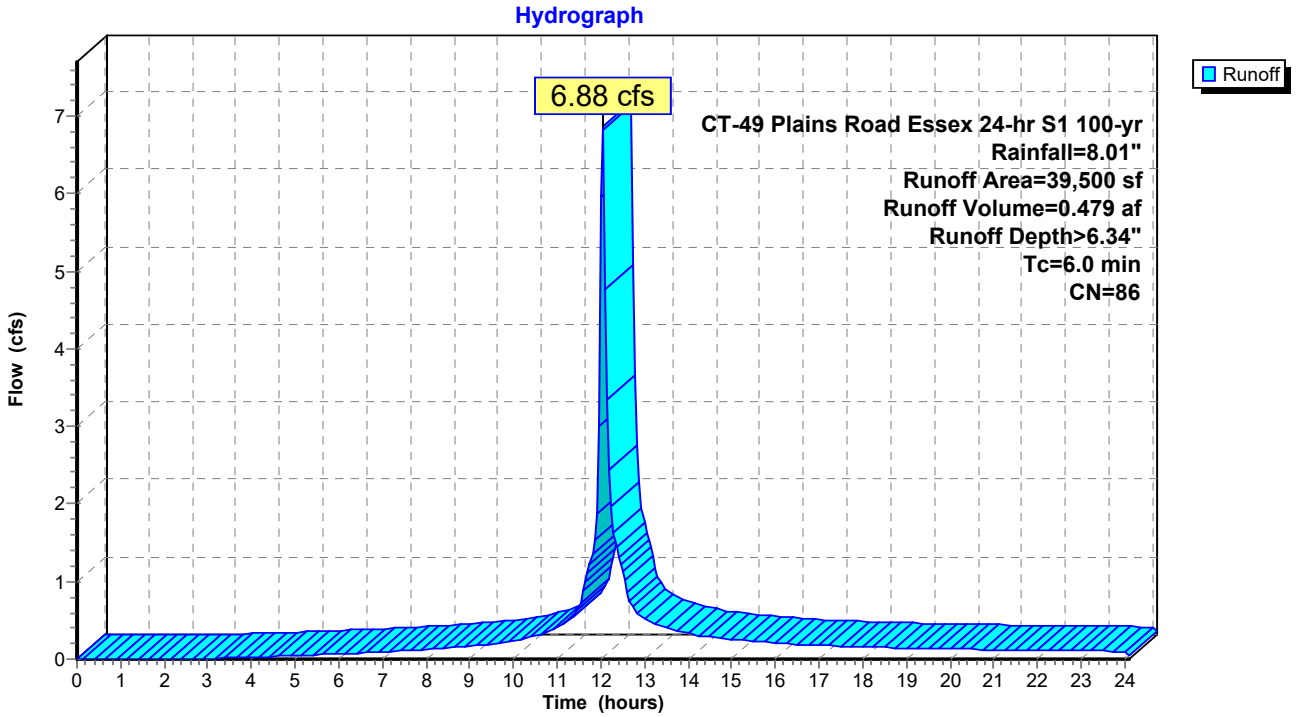
Runoff = 6.88 cfs @ 12.04 hrs, Volume= 0.479 af, Depth> 6.34"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 100-yr Rainfall=8.01"

	Area (sf)	CN	Description
	9,000	55	Woods, Good, HSG B
	1,200	61	>75% Grass cover, Good, HSG B
	19,300	96	Gravel surface, HSG B
*	10,000	98	Impervious
	39,500	86	Weighted Average
	29,500		74.68% Pervious Area
	10,000		25.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, MIN TR-55 TC 6.0 MIN**

Subcatchment 10: EXWS 10



Summary for Subcatchment 11: EXWS 11

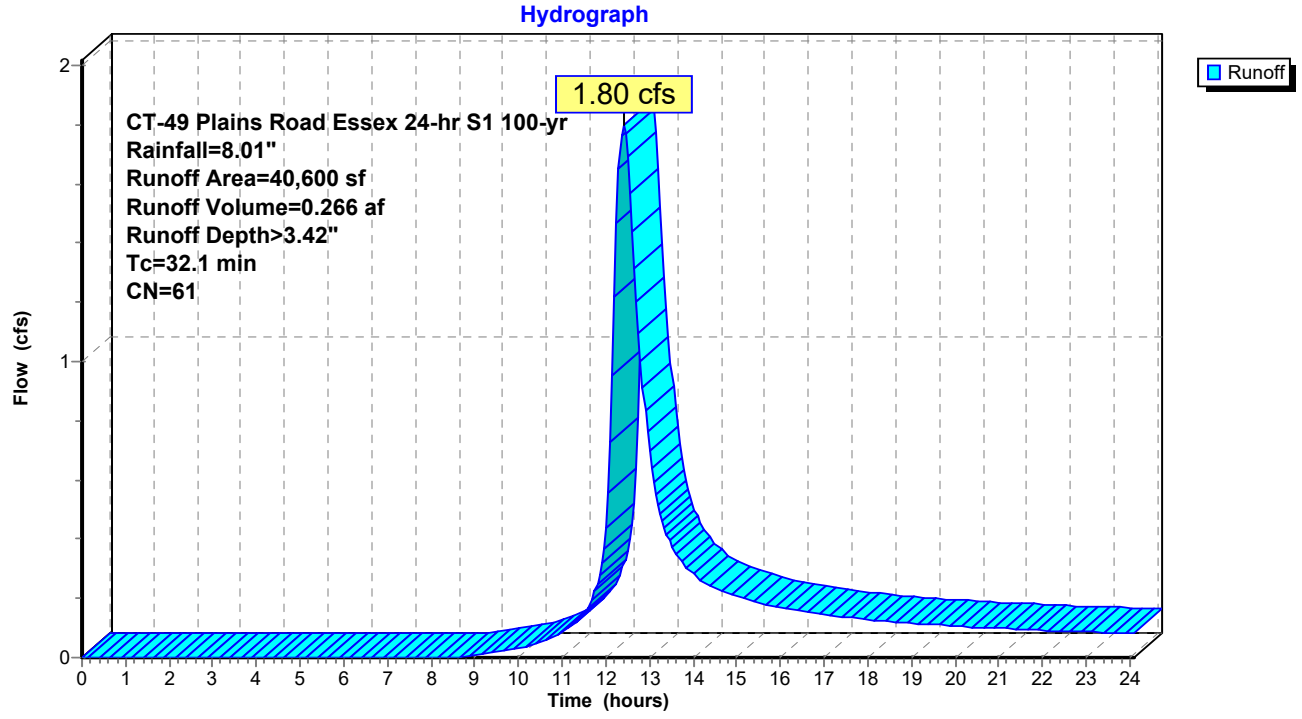
Runoff = 1.80 cfs @ 12.40 hrs, Volume= 0.266 af, Depth> 3.42"
Routed to Link A : EX Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 100-yr Rainfall=8.01"

	Area (sf)	CN	Description
	30,500	55	Woods, Good, HSG B
	5,600	61	>75% Grass cover, Good, HSG B
*	4,500	98	Impervious
	40,600	61	Weighted Average
	36,100		88.92% Pervious Area
	4,500		11.08% Impervious Area

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

Subcatchment 11: EXWS 11

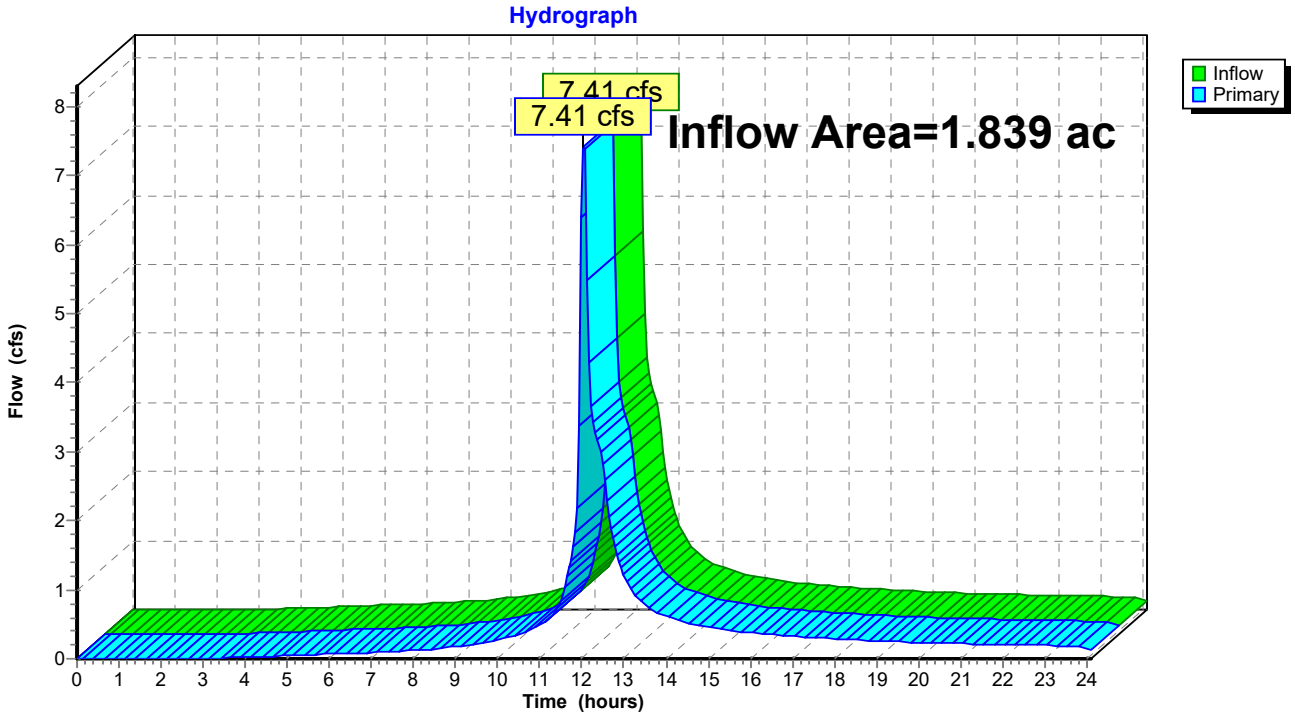


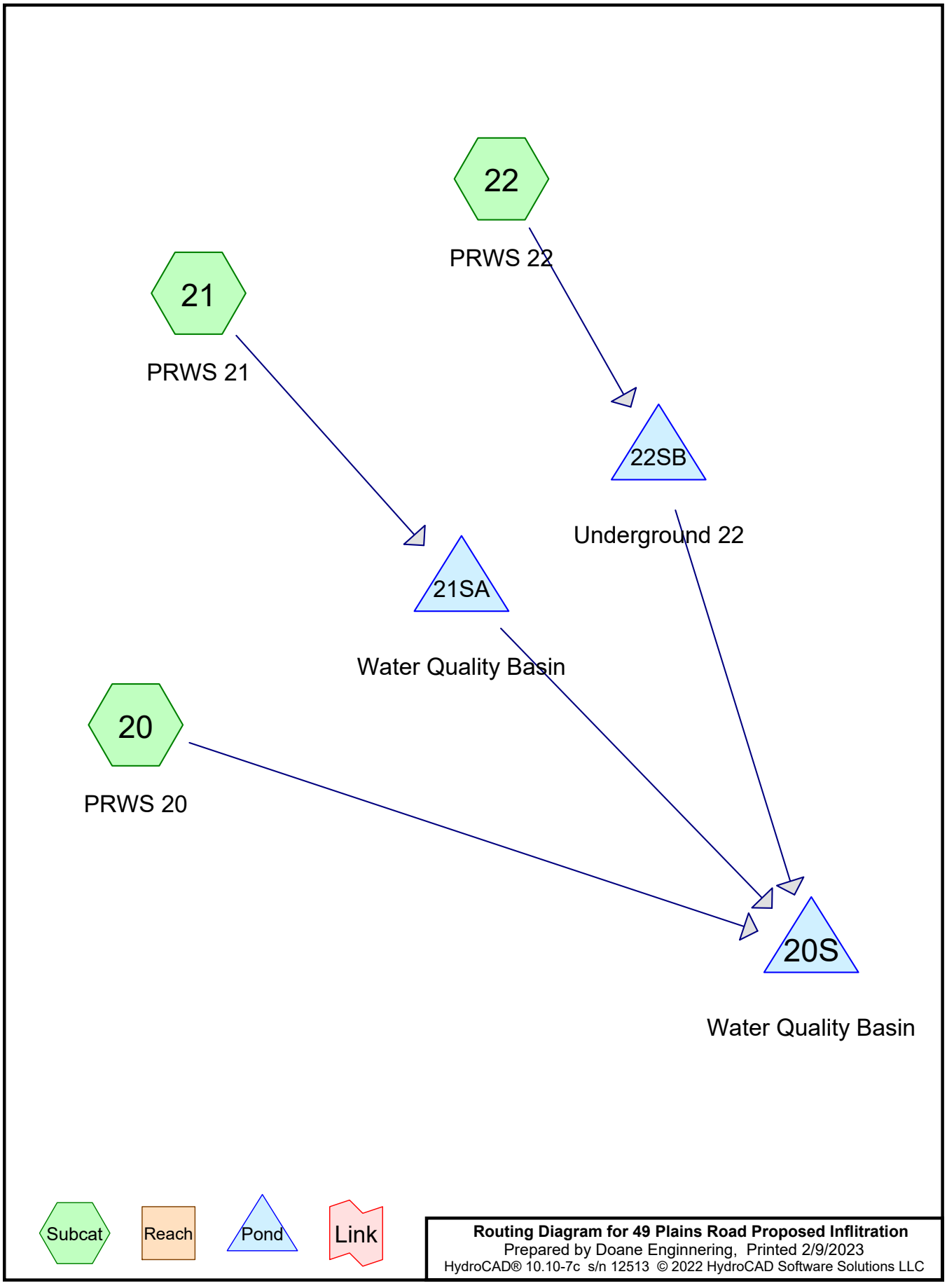
Summary for Link A: EX Site

Inflow Area = 1.839 ac, 18.10% Impervious, Inflow Depth > 4.86" for 100-yr event
Inflow = 7.41 cfs @ 12.04 hrs, Volume= 0.745 af
Primary = 7.41 cfs @ 12.04 hrs, Volume= 0.745 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs

Link A: EX Site





Routing Diagram for 49 Plains Road Proposed Inflitration
Prepared by Doane Enginnering, Printed 2/9/2023

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	CT-49 Plains Road Essex 24-hr S1	1-yr	Default	24.00	1	2.85	2
2	2-yr	CT-49 Plains Road Essex 24-hr S1	2-yr	Default	24.00	1	3.44	2
3	5-yr	CT-49 Plains Road Essex 24-hr S1	5-yr	Default	24.00	1	4.40	2
4	10-yr	CT-49 Plains Road Essex 24-hr S1	10-yr	Default	24.00	1	5.20	2
5	25-yr	CT-49 Plains Road Essex 24-hr S1	25-yr	Default	24.00	1	6.31	2
6	50-yr	CT-49 Plains Road Essex 24-hr S1	50-yr	Default	24.00	1	7.13	2
7	100-yr	CT-49 Plains Road Essex 24-hr S1	100-yr	Default	24.00	1	8.01	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.560	61	>75% Grass cover, Good, HSG B (20, 21, 22)
0.937	98	Paved parking, HSG B (20, 21, 22)
0.287	98	Roofs, HSG B (22)
0.055	98	Unconnected roofs, HSG B (20)
1.839	**87**	**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.560	0.000	0.000	0.000	0.560	>75% Grass cover, Good	20, 21, 22
0.000	0.937	0.000	0.000	0.000	0.937	Paved parking	20, 21, 22
0.000	0.287	0.000	0.000	0.000	0.287	Roofs	22
0.000	0.055	0.000	0.000	0.000	0.055	Unconnected roofs	20
0.000	**1.839**	**0.000**	**0.000**	**0.000**	**1.839**	**TOTAL AREA**	

Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 20: PRWS 20 Runoff Area=46,530 sf 68.29% Impervious Runoff Depth>1.53"
Tc=6.0 min CN=86 Runoff=2.07 cfs 0.137 af

Subcatchment 21: PRWS 21 Runoff Area=17,460 sf 64.15% Impervious Runoff Depth>1.46"
Tc=0.0 min CN=85 Runoff=0.89 cfs 0.049 af

Subcatchment 22: PRWS 22 Runoff Area=16,110 sf 78.90% Impervious Runoff Depth>1.85"
Tc=6.0 min CN=90 Runoff=0.86 cfs 0.057 af

Pond 20S: Water Quality Basin Peak Elev=33.64' Storage=6,467 cf Inflow=2.57 cfs 0.185 af
Outflow=0.46 cfs 0.128 af

Pond 21SA: Water Quality Basin Peak Elev=37.42' Storage=1,929 cf Inflow=0.89 cfs 0.049 af
Outflow=0.85 cfs 0.049 af

Pond 22SB: Underground 22 Peak Elev=37.61' Storage=0.017 af Inflow=0.86 cfs 0.057 af
Discarded=0.09 cfs 0.057 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.057 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.242 af Average Runoff Depth = 1.58"
30.48% Pervious = 0.560 ac 69.52% Impervious = 1.278 ac

Summary for Subcatchment 20: PRWS 20

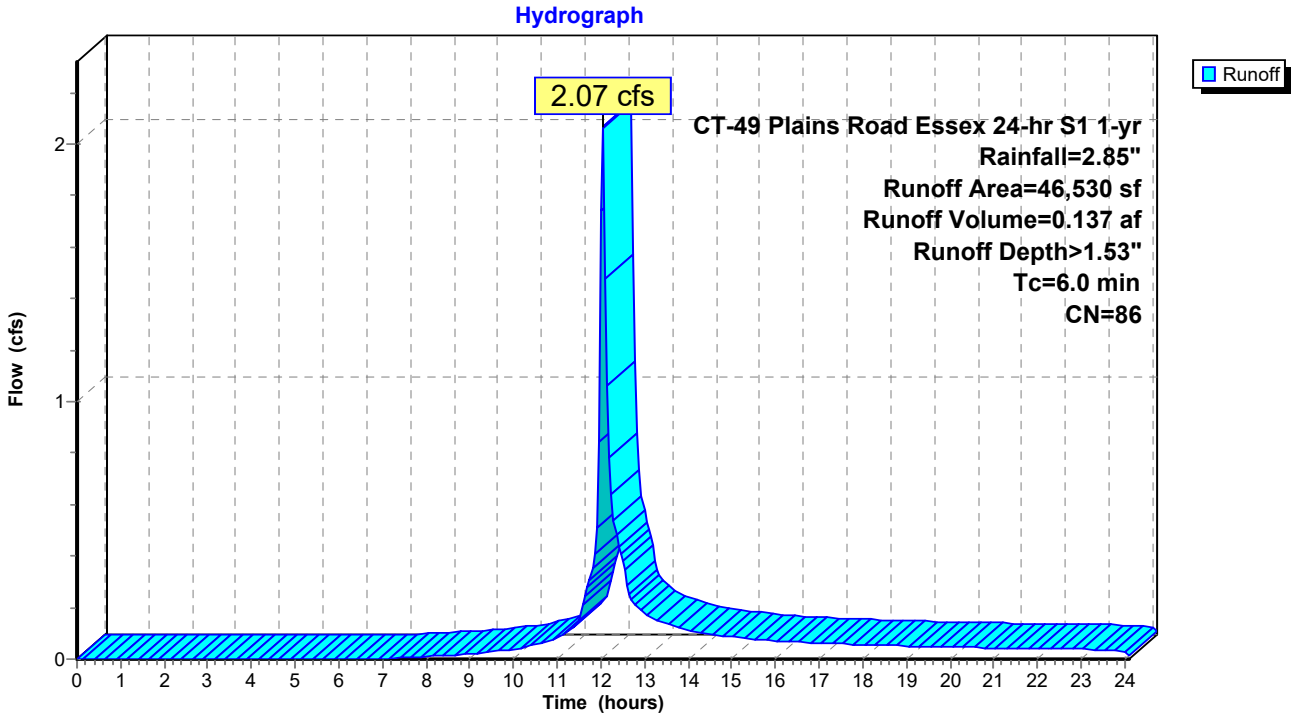
Runoff = 2.07 cfs @ 12.04 hrs, Volume= 0.137 af, Depth> 1.53"
Routed to Pond 20S : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 1-yr Rainfall=2.85"

Area (sf)	CN	Description
14,755	61	>75% Grass cover, Good, HSG B
29,400	98	Paved parking, HSG B
2,375	98	Unconnected roofs, HSG B
46,530	86	Weighted Average
14,755		31.71% Pervious Area
31,775		68.29% Impervious Area
2,375		7.47% Unconnected

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

Subcatchment 20: PRWS 20



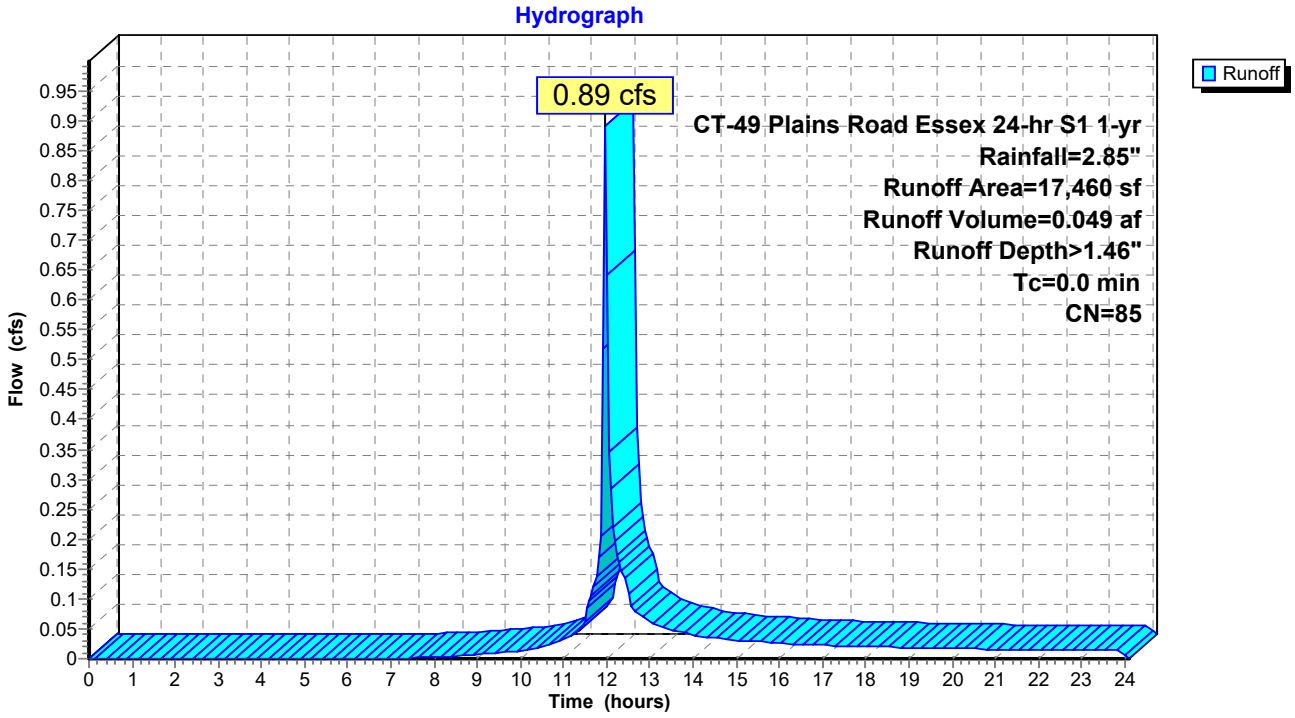
Summary for Subcatchment 21: PRWS 21

Runoff = 0.89 cfs @ 11.96 hrs, Volume= 0.049 af, Depth> 1.46"
Routed to Pond 21SA : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 1-yr Rainfall=2.85"

Area (sf)	CN	Description
6,260	61	>75% Grass cover, Good, HSG B
11,200	98	Paved parking, HSG B
17,460	85	Weighted Average
6,260		35.85% Pervious Area
11,200		64.15% Impervious Area

Subcatchment 21: PRWS 21



Summary for Subcatchment 22: PRWS 22

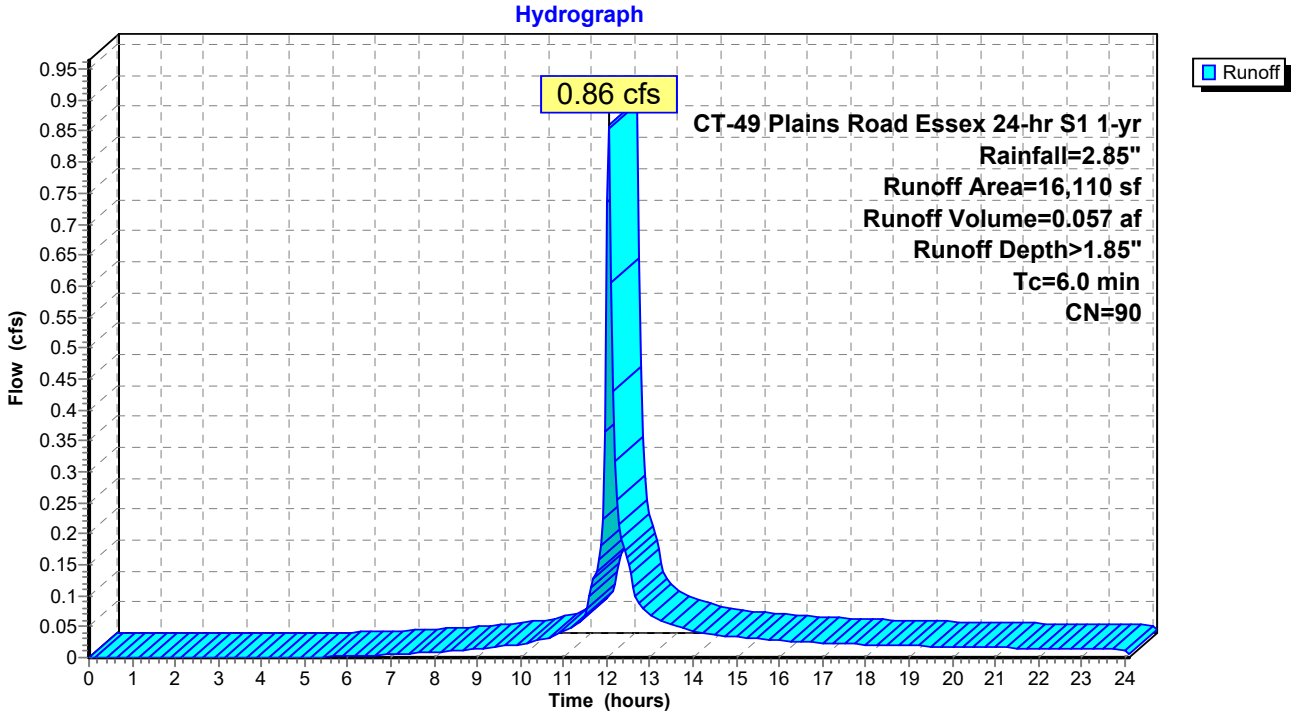
Runoff = 0.86 cfs @ 12.04 hrs, Volume= 0.057 af, Depth> 1.85"
Routed to Pond 22SB : Underground 22

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 1-yr Rainfall=2.85"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
210	98	Paved parking, HSG B
3,400	61	>75% Grass cover, Good, HSG B
16,110	90	Weighted Average
3,400		21.10% Pervious Area
12,710		78.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. TR-55 TC**

Subcatchment 22: PRWS 22



Summary for Pond 20S: Water Quality Basin

Inflow Area = 1.839 ac, 69.52% Impervious, Inflow Depth > 1.21" for 1-yr event
Inflow = 2.57 cfs @ 12.02 hrs, Volume= 0.185 af
Outflow = 0.46 cfs @ 12.53 hrs, Volume= 0.128 af, Atten= 82%, Lag= 30.6 min
Primary = 0.46 cfs @ 12.53 hrs, Volume= 0.128 af
Routed to nonexistent node 30

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 32.80' Surf.Area= 3,942 sf Storage= 2,955 cf
Peak Elev= 33.64' @ 12.53 hrs Surf.Area= 4,465 sf Storage= 6,467 cf (3,512 cf above start)

Plug-Flow detention time= 444.4 min calculated for 0.060 af (32% of inflow)
Center-of-Mass det. time= 105.9 min (954.5 - 848.6)

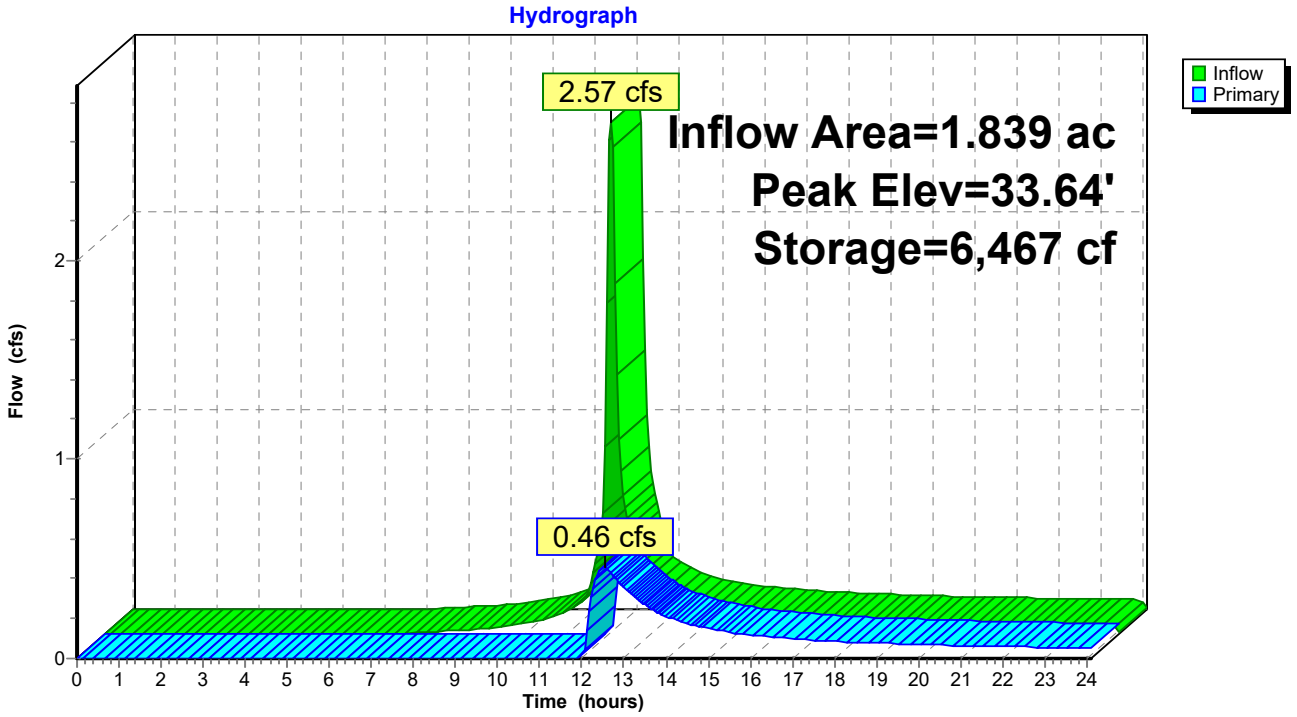
Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	13,158 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
32.00	3,450	299.0	0	0	3,450
33.00	4,070	311.0	3,756	3,756	4,108
34.00	4,700	322.0	4,381	8,137	4,746
35.00	5,350	335.0	5,021	13,158	5,501

Device	Routing	Invert	Outlet Devices
#1	Primary	34.50'	**10.0' long + 0.5 '/' SideZ x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	33.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.46 cfs @ 12.53 hrs HW=33.64' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Orifice/Grate (Orifice Controls 0.46 cfs @ 1.97 fps)

Pond 20S: Water Quality Basin



Summary for Pond 21SA: Water Quality Basin

Inflow Area = 0.401 ac, 64.15% Impervious, Inflow Depth > 1.46" for 1-yr event
Inflow = 0.89 cfs @ 11.96 hrs, Volume= 0.049 af
Outflow = 0.85 cfs @ 11.97 hrs, Volume= 0.049 af, Atten= 5%, Lag= 0.7 min
Primary = 0.85 cfs @ 11.97 hrs, Volume= 0.049 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 37.40' Surf.Area= 1,493 sf Storage= 1,899 cf
Peak Elev= 37.42' @ 11.97 hrs Surf.Area= 1,504 sf Storage= 1,929 cf (29 cf above start)

Plug-Flow detention time= 675.4 min calculated for 0.005 af (11% of inflow)
Center-of-Mass det. time= 0.6 min (848.5 - 847.9)

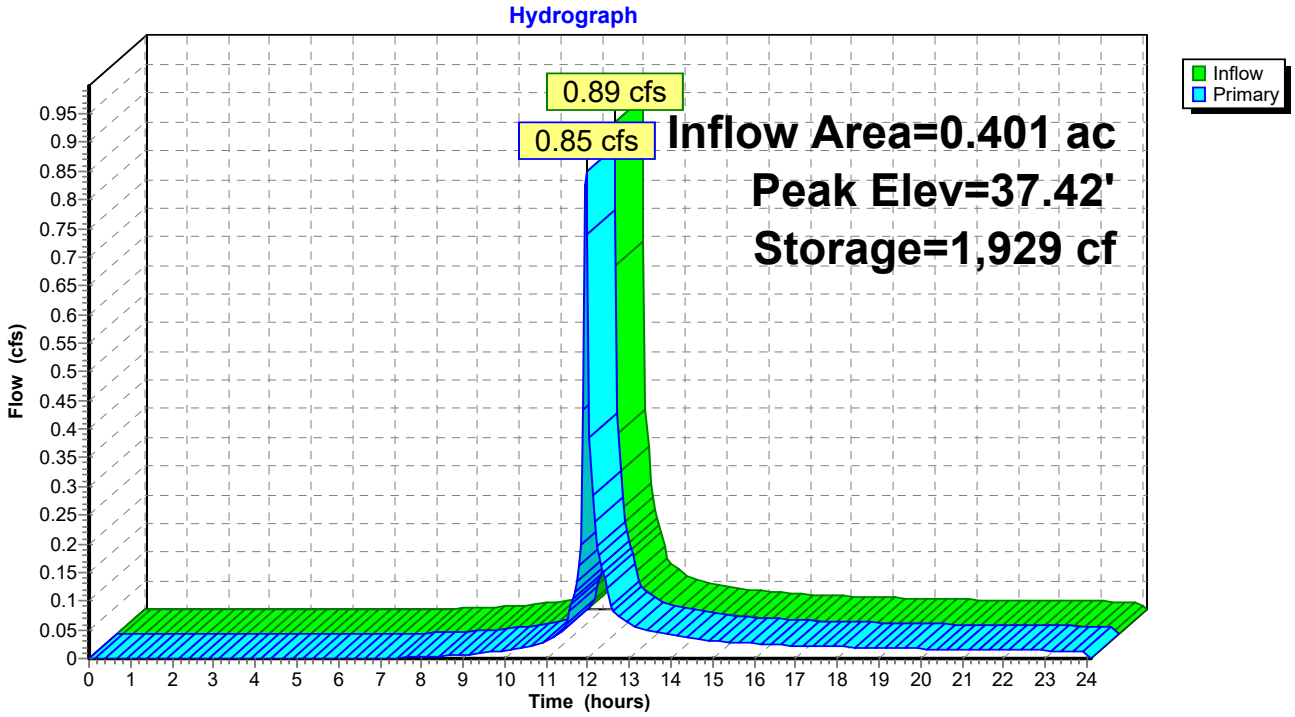
Volume	Invert	Avail.Storage	Storage Description
#1	35.00'	2,903 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
35.00	166	238.0	0	0	166
36.00	681	264.0	394	394	1,235
37.00	1,259	291.0	955	1,350	2,459
37.50	1,554	298.0	702	2,052	2,819
38.00	1,856	304.0	851	2,903	3,143

Device	Routing	Invert	Outlet Devices
#1	Primary	37.40'	**2.4" x 4.0" Horiz. Orifice/Grate X 8.00 columns** X 9 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.62 cfs @ 11.97 hrs HW=37.42' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 0.62 cfs @ 0.44 fps)

Pond 21SA: Water Quality Basin



Summary for Pond 22SB: Underground 22

Inflow Area = 0.370 ac, 78.90% Impervious, Inflow Depth > 1.85" for 1-yr event
Inflow = 0.86 cfs @ 12.04 hrs, Volume= 0.057 af
Outflow = 0.09 cfs @ 12.69 hrs, Volume= 0.057 af, Atten= 89%, Lag= 39.1 min
Discarded = 0.09 cfs @ 12.69 hrs, Volume= 0.057 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Peak Elev= 37.61' @ 12.69 hrs Surf.Area= 0.072 ac Storage= 0.017 af

Plug-Flow detention time= 56.5 min calculated for 0.057 af (100% of inflow)
Center-of-Mass det. time= 55.9 min (883.8 - 827.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	37.00'	0.034 af	**27.00'W x 116.39'L x 2.00'H Field A** 0.144 af Overall - 0.030 af Embedded = 0.114 af x 30.0% Voids
#2A	37.50'	0.030 af	**ADS_StormTech SC-160LP +Cap** x 192 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 192 Chambers in 12 Rows
		0.064 af	Total Available Storage

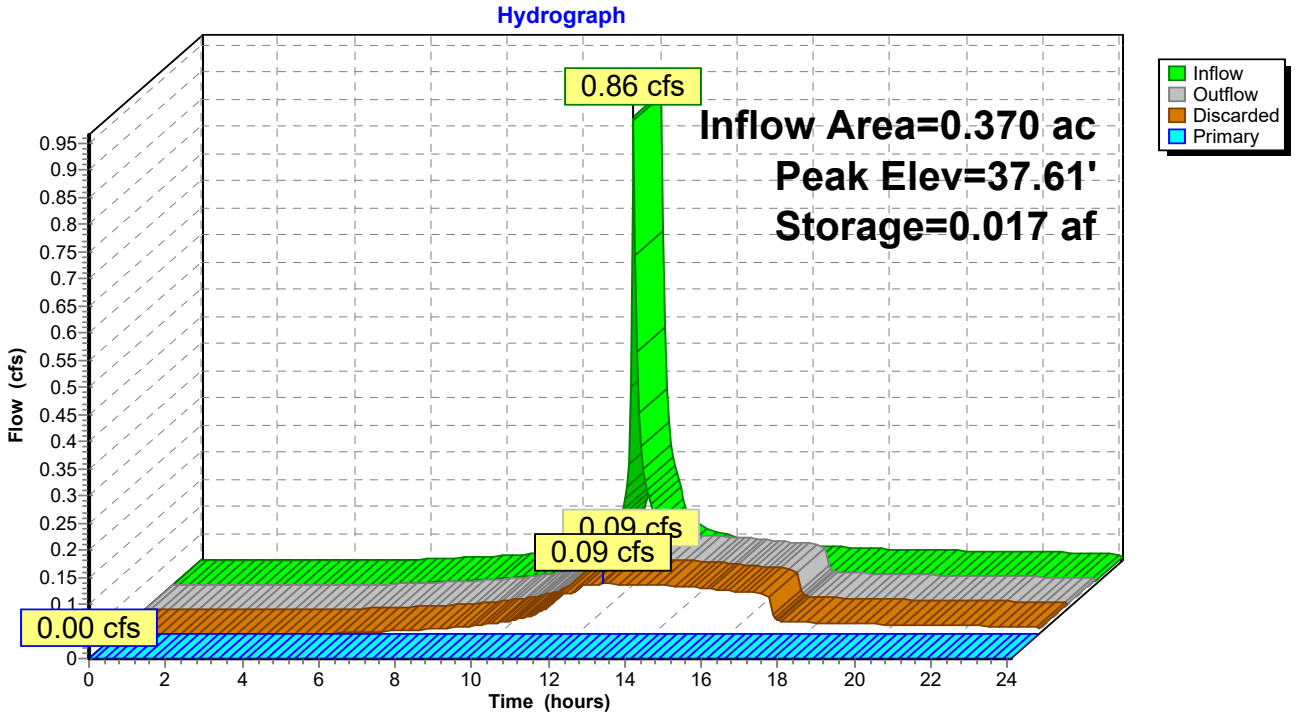
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 34.00'
#2	Primary	38.40'	**4.0' long + 1.0 '/' SideZ x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.09 cfs @ 12.69 hrs HW=37.61' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=37.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 22SB: Underground 22



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 20: PRWS 20 Runoff Area=46,530 sf 68.29% Impervious Runoff Depth>2.05"
Tc=6.0 min CN=86 Runoff=2.75 cfs 0.182 af

Subcatchment 21: PRWS 21 Runoff Area=17,460 sf 64.15% Impervious Runoff Depth>1.96"
Tc=0.0 min CN=85 Runoff=1.20 cfs 0.066 af

Subcatchment 22: PRWS 22 Runoff Area=16,110 sf 78.90% Impervious Runoff Depth>2.39"
Tc=6.0 min CN=90 Runoff=1.10 cfs 0.074 af

Pond 20S: Water Quality Basin Peak Elev=33.80' Storage=7,225 cf Inflow=3.42 cfs 0.248 af
Outflow=0.96 cfs 0.189 af

Pond 21SA: Water Quality Basin Peak Elev=37.43' Storage=1,939 cf Inflow=1.20 cfs 0.066 af
Outflow=1.14 cfs 0.066 af

Pond 22SB: Underground 22 Peak Elev=37.74' Storage=0.024 af Inflow=1.10 cfs 0.074 af
Discarded=0.10 cfs 0.074 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.074 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.321 af Average Runoff Depth = 2.10"
30.48% Pervious = 0.560 ac 69.52% Impervious = 1.278 ac

Summary for Subcatchment 20: PRWS 20

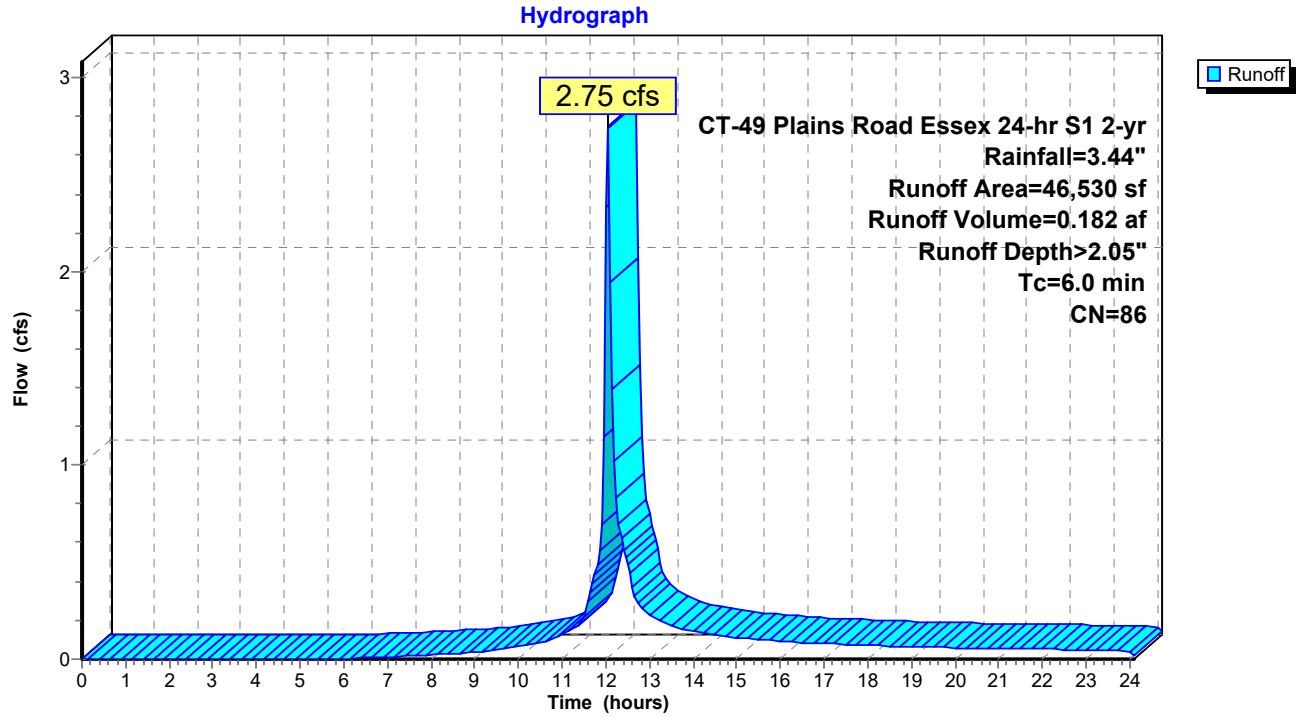
Runoff = 2.75 cfs @ 12.04 hrs, Volume= 0.182 af, Depth> 2.05"
Routed to Pond 20S : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 2-yr Rainfall=3.44"

Area (sf)	CN	Description
14,755	61	>75% Grass cover, Good, HSG B
29,400	98	Paved parking, HSG B
2,375	98	Unconnected roofs, HSG B
46,530	86	Weighted Average
14,755		31.71% Pervious Area
31,775		68.29% Impervious Area
2,375		7.47% Unconnected

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

Subcatchment 20: PRWS 20



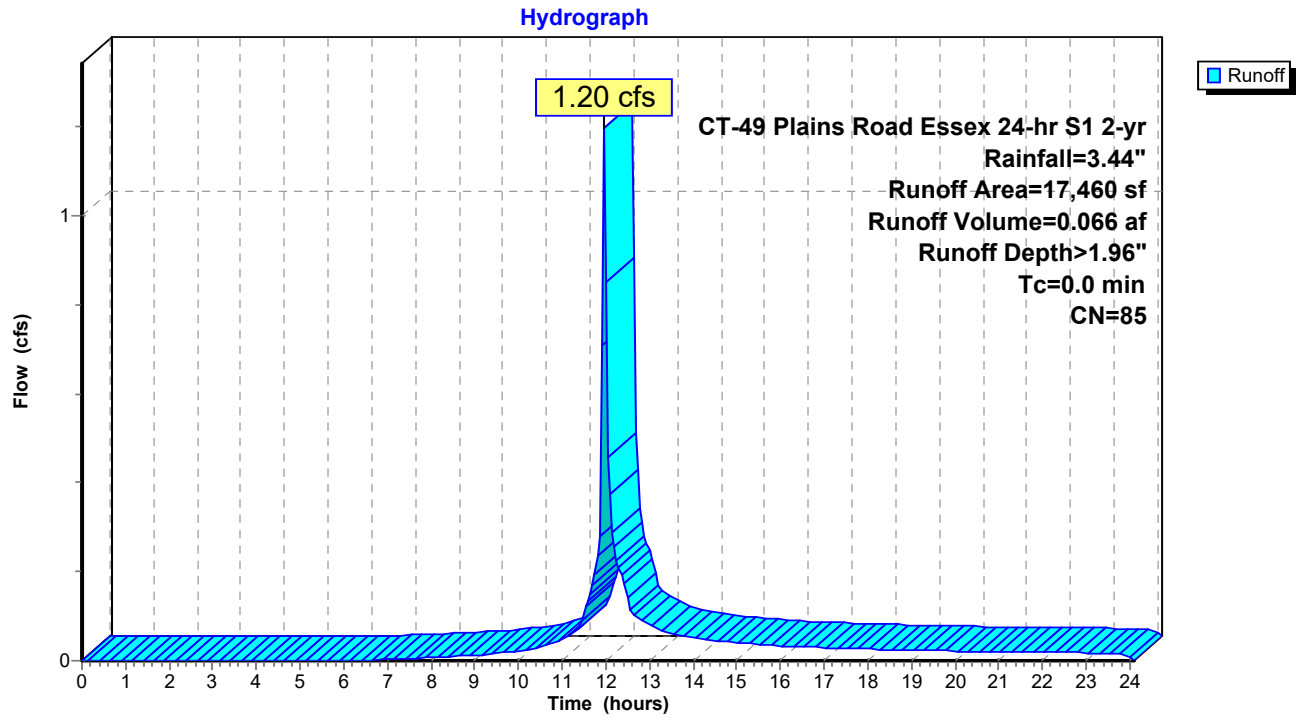
Summary for Subcatchment 21: PRWS 21

Runoff = 1.20 cfs @ 11.95 hrs, Volume= 0.066 af, Depth> 1.96"
Routed to Pond 21SA : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 2-yr Rainfall=3.44"

Area (sf)	CN	Description
6,260	61	>75% Grass cover, Good, HSG B
11,200	98	Paved parking, HSG B
17,460	85	Weighted Average
6,260		35.85% Pervious Area
11,200		64.15% Impervious Area

Subcatchment 21: PRWS 21



Summary for Subcatchment 22: PRWS 22

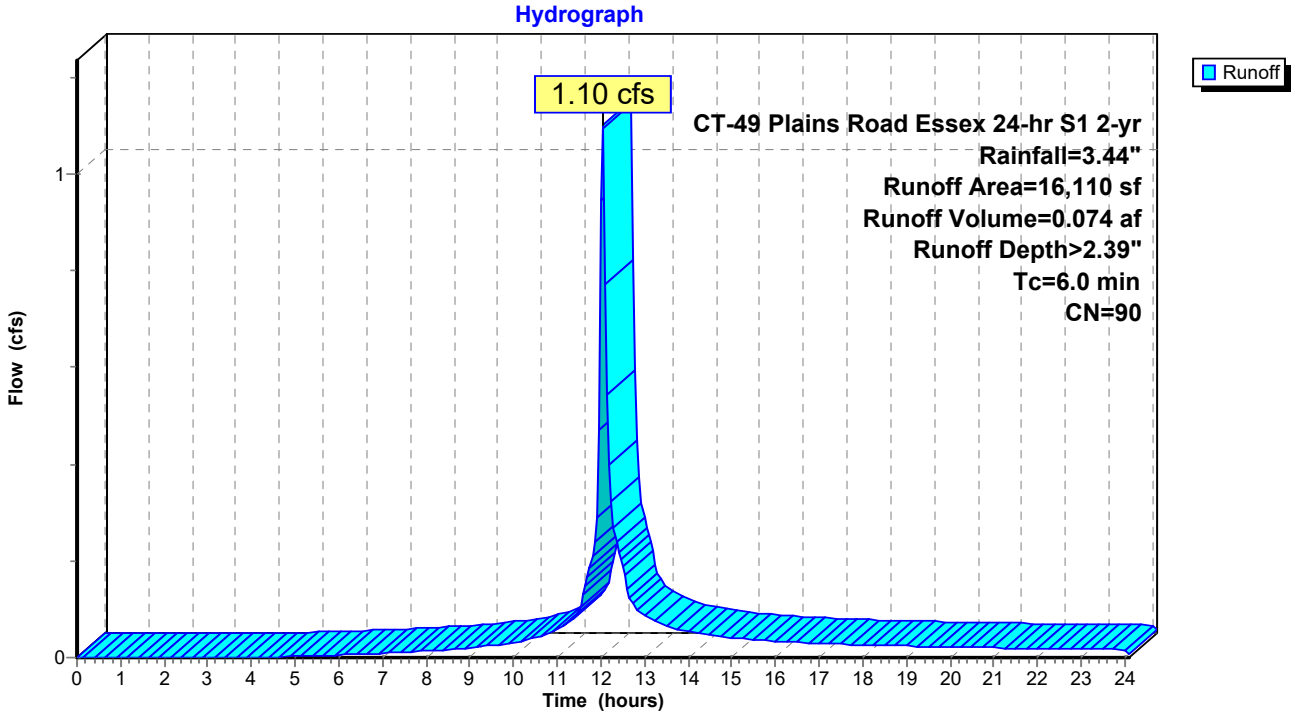
Runoff = 1.10 cfs @ 12.04 hrs, Volume= 0.074 af, Depth> 2.39"
Routed to Pond 22SB : Underground 22

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 2-yr Rainfall=3.44"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
210	98	Paved parking, HSG B
3,400	61	>75% Grass cover, Good, HSG B
16,110	90	Weighted Average
3,400		21.10% Pervious Area
12,710		78.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. TR-55 TC**

Subcatchment 22: PRWS 22



Summary for Pond 20S: Water Quality Basin

Inflow Area = 1.839 ac, 69.52% Impervious, Inflow Depth > 1.62" for 2-yr event
Inflow = 3.42 cfs @ 12.02 hrs, Volume= 0.248 af
Outflow = 0.96 cfs @ 12.29 hrs, Volume= 0.189 af, Atten= 72%, Lag= 16.0 min
Primary = 0.96 cfs @ 12.29 hrs, Volume= 0.189 af
Routed to nonexistent node 30

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 32.80' Surf.Area= 3,942 sf Storage= 2,955 cf
Peak Elev= 33.80' @ 12.29 hrs Surf.Area= 4,572 sf Storage= 7,225 cf (4,270 cf above start)

Plug-Flow detention time= 327.7 min calculated for 0.121 af (49% of inflow)
Center-of-Mass det. time= 85.3 min (923.7 - 838.4)

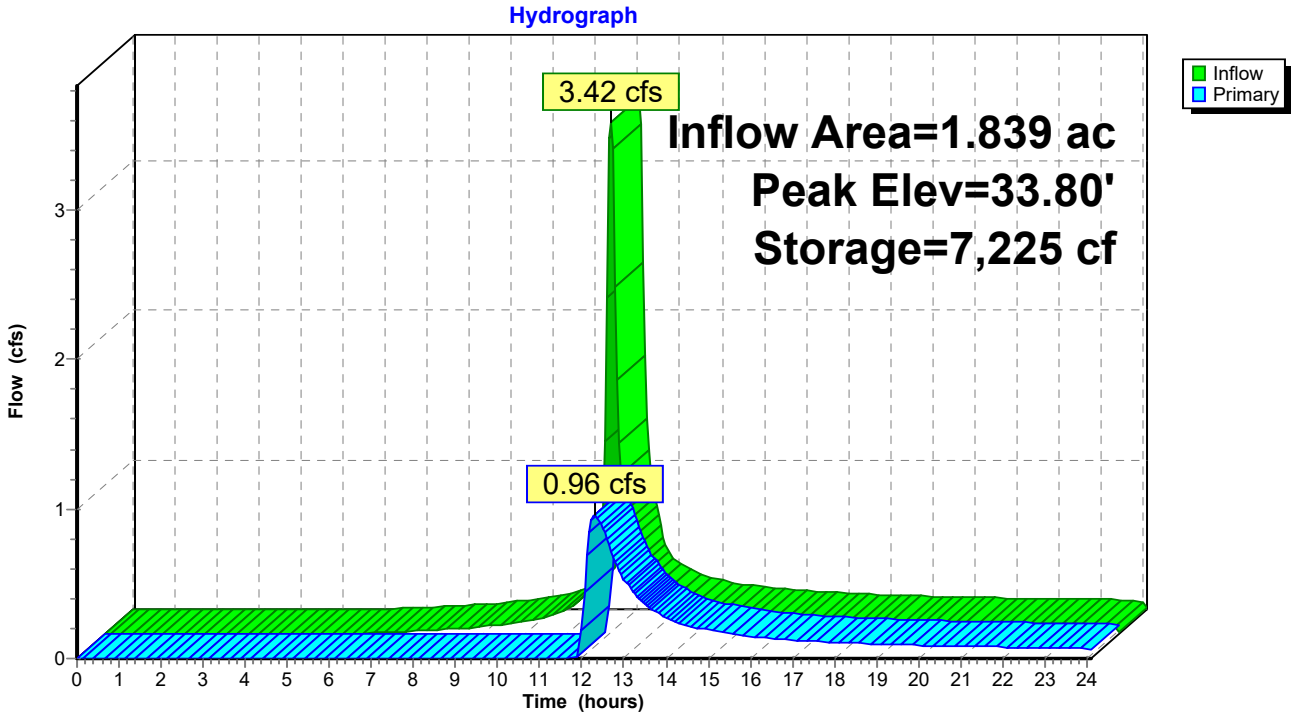
Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	13,158 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
32.00	3,450	299.0	0	0	3,450
33.00	4,070	311.0	3,756	3,756	4,108
34.00	4,700	322.0	4,381	8,137	4,746
35.00	5,350	335.0	5,021	13,158	5,501

Device	Routing	Invert	Outlet Devices
#1	Primary	34.50'	**10.0' long + 0.5 '/' SideZ x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	33.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.96 cfs @ 12.29 hrs HW=33.80' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Orifice/Grate (Orifice Controls 0.96 cfs @ 2.41 fps)

Pond 20S: Water Quality Basin



Summary for Pond 21SA: Water Quality Basin

Inflow Area = 0.401 ac, 64.15% Impervious, Inflow Depth > 1.96" for 2-yr event
Inflow = 1.20 cfs @ 11.95 hrs, Volume= 0.066 af
Outflow = 1.14 cfs @ 11.97 hrs, Volume= 0.066 af, Atten= 5%, Lag= 0.7 min
Primary = 1.14 cfs @ 11.97 hrs, Volume= 0.066 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 37.40' Surf.Area= 1,493 sf Storage= 1,899 cf
Peak Elev= 37.43' @ 11.97 hrs Surf.Area= 1,508 sf Storage= 1,939 cf (39 cf above start)

Plug-Flow detention time= 407.8 min calculated for 0.022 af (34% of inflow)
Center-of-Mass det. time= 0.6 min (838.1 - 837.5)

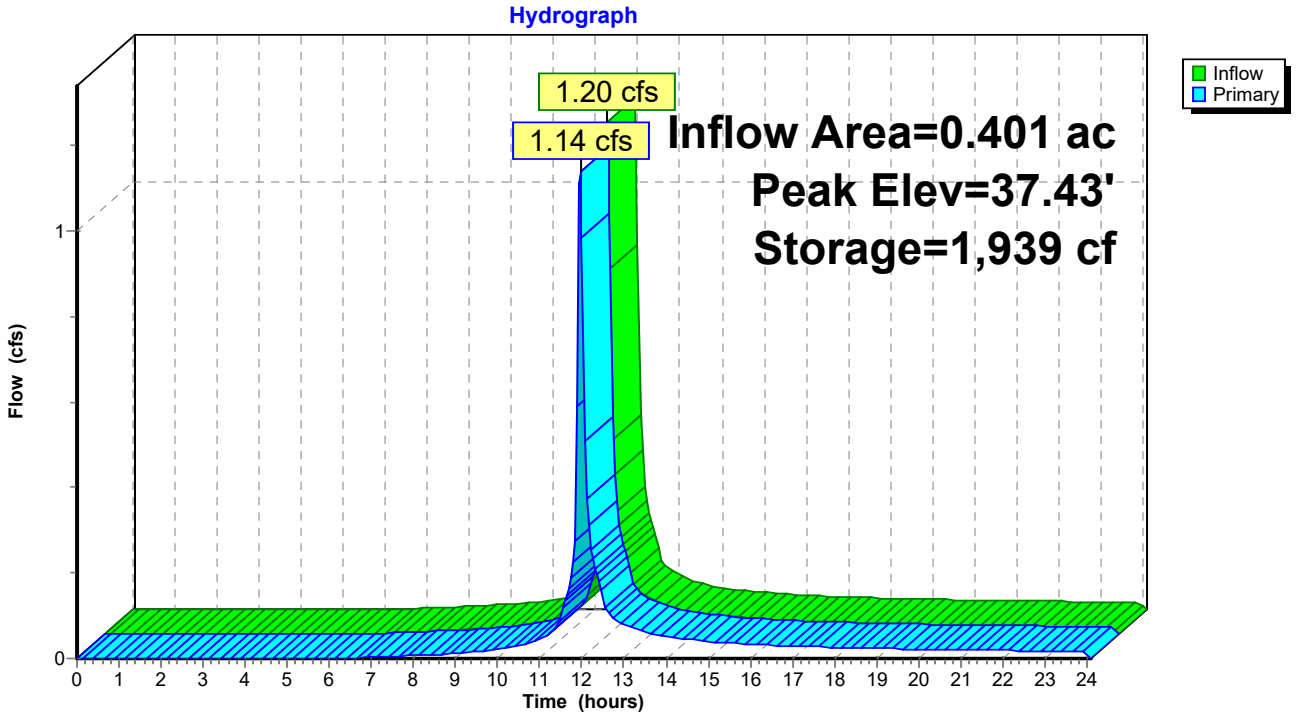
Volume	Invert	Avail.Storage	Storage Description
#1	35.00'	2,903 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
35.00	166	238.0	0	0	166
36.00	681	264.0	394	394	1,235
37.00	1,259	291.0	955	1,350	2,459
37.50	1,554	298.0	702	2,052	2,819
38.00	1,856	304.0	851	2,903	3,143

Device	Routing	Invert	Outlet Devices
#1	Primary	37.40'	**2.4" x 4.0" Horiz. Orifice/Grate X 8.00 columns** X 9 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.97 cfs @ 11.97 hrs HW=37.42' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 0.97 cfs @ 0.51 fps)

Pond 21SA: Water Quality Basin



Summary for Pond 22SB: Underground 22

Inflow Area = 0.370 ac, 78.90% Impervious, Inflow Depth > 2.39" for 2-yr event
Inflow = 1.10 cfs @ 12.04 hrs, Volume= 0.074 af
Outflow = 0.10 cfs @ 12.87 hrs, Volume= 0.074 af, Atten= 91%, Lag= 49.8 min
Discarded = 0.10 cfs @ 12.87 hrs, Volume= 0.074 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Peak Elev= 37.74' @ 12.87 hrs Surf.Area= 0.072 ac Storage= 0.024 af

Plug-Flow detention time= 81.9 min calculated for 0.074 af (100% of inflow)
Center-of-Mass det. time= 81.4 min (900.2 - 818.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	37.00'	0.034 af	**27.00'W x 116.39'L x 2.00'H Field A** 0.144 af Overall - 0.030 af Embedded = 0.114 af x 30.0% Voids
#2A	37.50'	0.030 af	**ADS_StormTech SC-160LP +Cap** x 192 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 192 Chambers in 12 Rows
		0.064 af	Total Available Storage

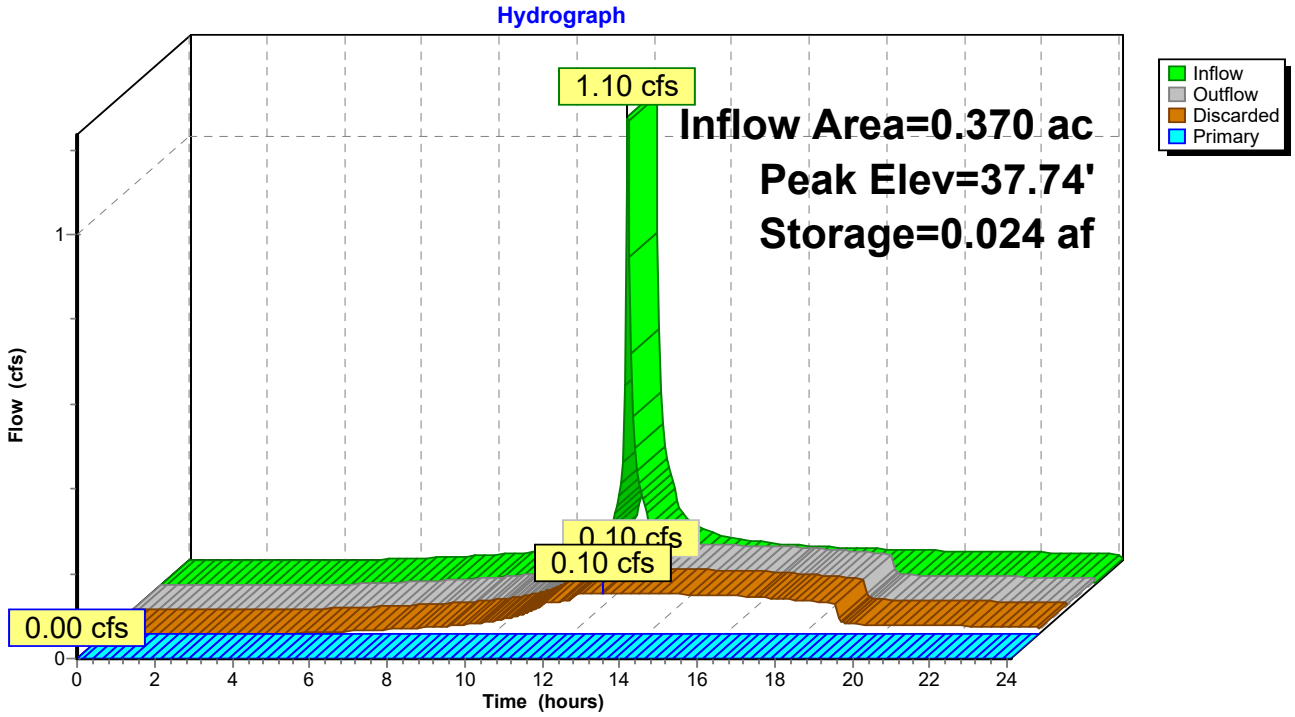
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 34.00'
#2	Primary	38.40'	**4.0' long + 1.0 '/' SideZ x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.10 cfs @ 12.87 hrs HW=37.74' (Free Discharge)
1=Exfiltration (Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=37.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 22SB: Underground 22



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 20: PRWS 20 Runoff Area=46,530 sf 68.29% Impervious Runoff Depth>2.91"
Tc=6.0 min CN=86 Runoff=3.88 cfs 0.259 af

Subcatchment 21: PRWS 21 Runoff Area=17,460 sf 64.15% Impervious Runoff Depth>2.82"
Tc=0.0 min CN=85 Runoff=1.71 cfs 0.094 af

Subcatchment 22: PRWS 22 Runoff Area=16,110 sf 78.90% Impervious Runoff Depth>3.30"
Tc=6.0 min CN=90 Runoff=1.50 cfs 0.102 af

Pond 20S: Water Quality Basin Peak Elev=34.07' Storage=8,479 cf Inflow=4.80 cfs 0.353 af
Outflow=1.95 cfs 0.293 af

Pond 21SA: Water Quality Basin Peak Elev=37.43' Storage=1,952 cf Inflow=1.71 cfs 0.094 af
Outflow=1.65 cfs 0.094 af

Pond 22SB: Underground 22 Peak Elev=38.00' Storage=0.036 af Inflow=1.50 cfs 0.102 af
Discarded=0.10 cfs 0.102 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.102 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.455 af Average Runoff Depth = 2.97"
30.48% Pervious = 0.560 ac 69.52% Impervious = 1.278 ac

Summary for Subcatchment 20: PRWS 20

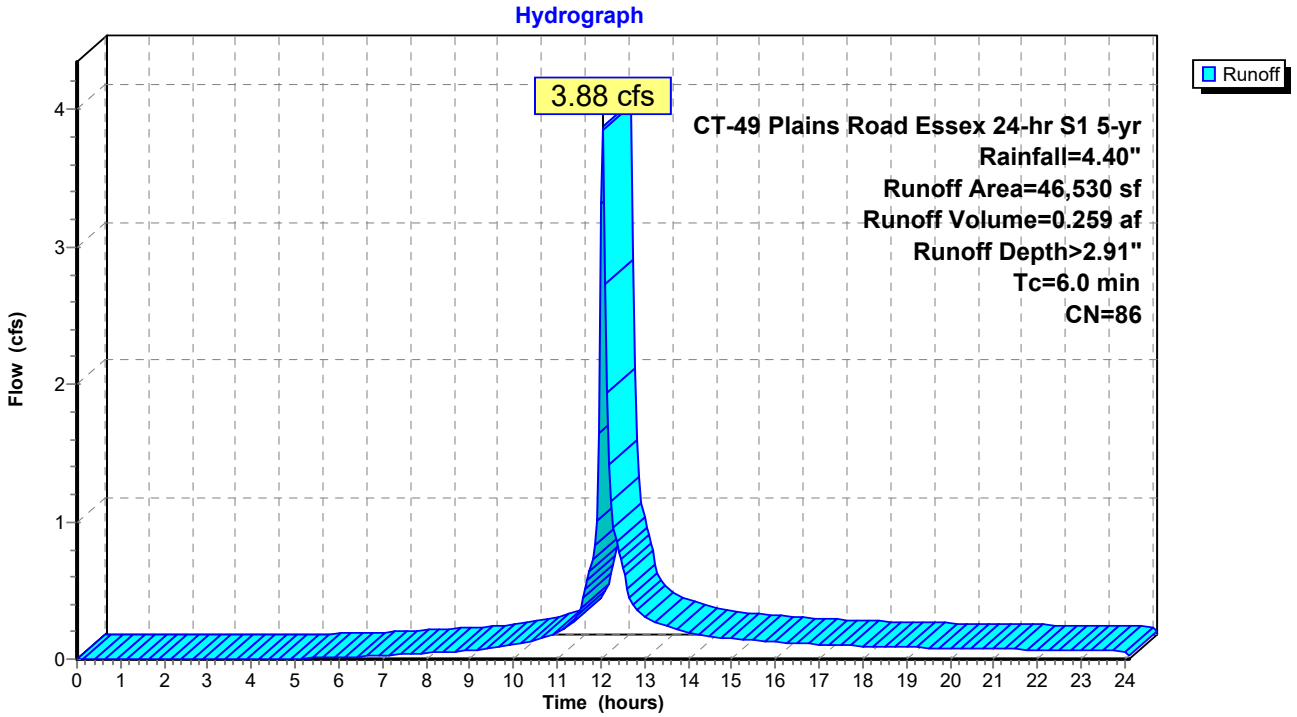
Runoff = 3.88 cfs @ 12.04 hrs, Volume= 0.259 af, Depth> 2.91"
Routed to Pond 20S : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 5-yr Rainfall=4.40"

Area (sf)	CN	Description
14,755	61	>75% Grass cover, Good, HSG B
29,400	98	Paved parking, HSG B
2,375	98	Unconnected roofs, HSG B
46,530	86	Weighted Average
14,755		31.71% Pervious Area
31,775		68.29% Impervious Area
2,375		7.47% Unconnected

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

Subcatchment 20: PRWS 20



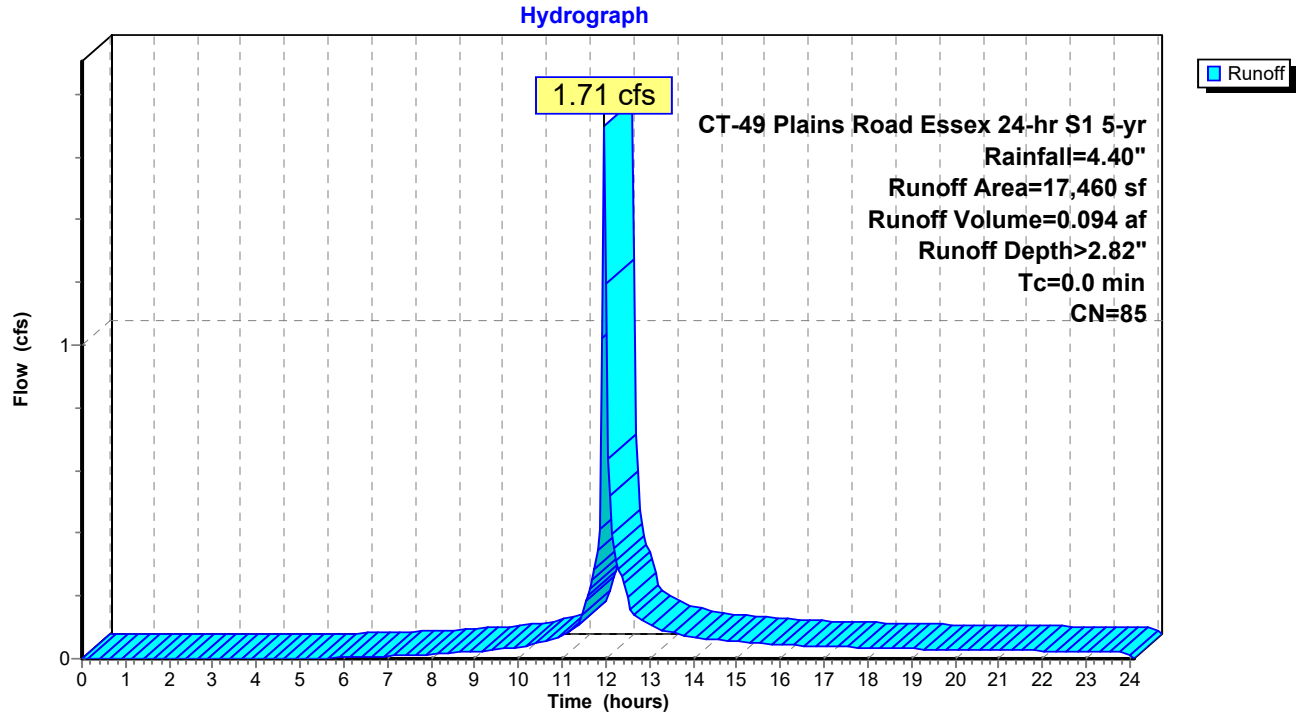
Summary for Subcatchment 21: PRWS 21

Runoff = 1.71 cfs @ 11.95 hrs, Volume= 0.094 af, Depth> 2.82"
Routed to Pond 21SA : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 5-yr Rainfall=4.40"

Area (sf)	CN	Description
6,260	61	>75% Grass cover, Good, HSG B
11,200	98	Paved parking, HSG B
17,460	85	Weighted Average
6,260		35.85% Pervious Area
11,200		64.15% Impervious Area

Subcatchment 21: PRWS 21



Summary for Subcatchment 22: PRWS 22

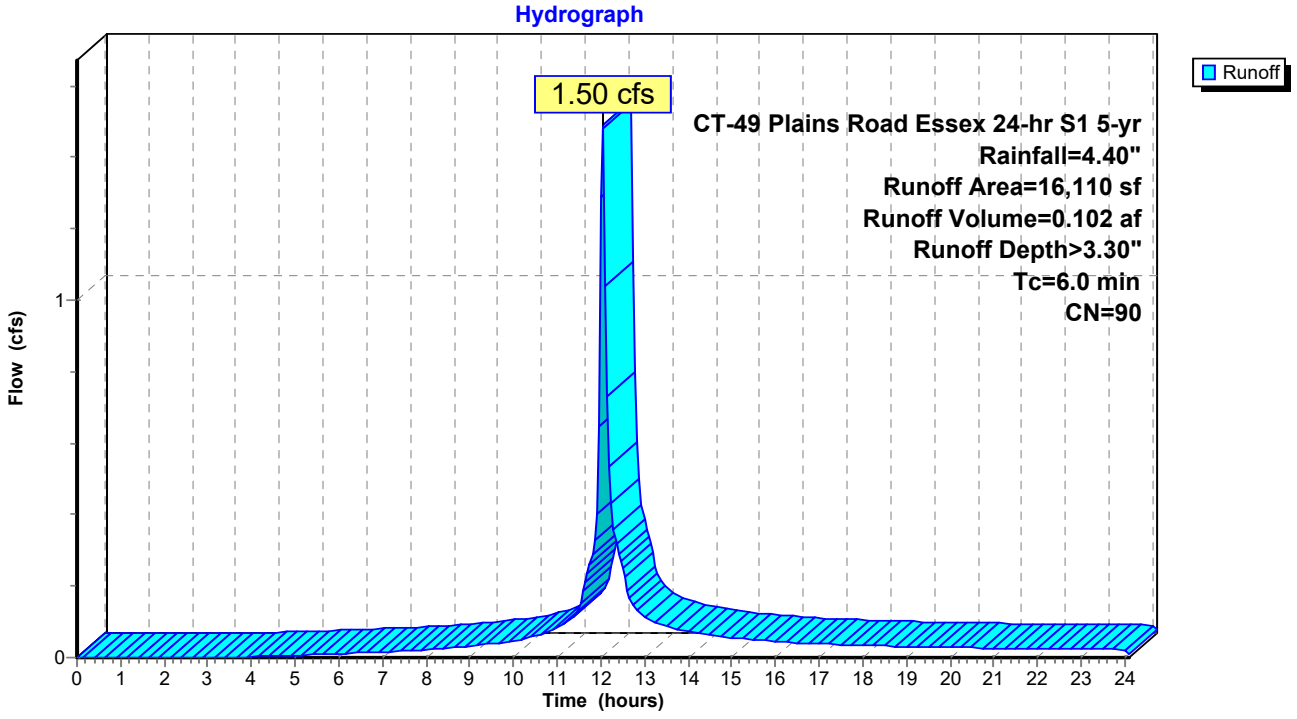
Runoff = 1.50 cfs @ 12.04 hrs, Volume= 0.102 af, Depth> 3.30"
Routed to Pond 22SB : Underground 22

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 5-yr Rainfall=4.40"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
210	98	Paved parking, HSG B
3,400	61	>75% Grass cover, Good, HSG B
16,110	90	Weighted Average
3,400		21.10% Pervious Area
12,710		78.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. TR-55 TC**

Subcatchment 22: PRWS 22



Summary for Pond 20S: Water Quality Basin

Inflow Area = 1.839 ac, 69.52% Impervious, Inflow Depth > 2.31" for 5-yr event
Inflow = 4.80 cfs @ 12.02 hrs, Volume= 0.353 af
Outflow = 1.95 cfs @ 12.19 hrs, Volume= 0.293 af, Atten= 59%, Lag= 10.0 min
Primary = 1.95 cfs @ 12.19 hrs, Volume= 0.293 af
Routed to nonexistent node 30

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 32.80' Surf.Area= 3,942 sf Storage= 2,955 cf
Peak Elev= 34.07' @ 12.19 hrs Surf.Area= 4,746 sf Storage= 8,479 cf (5,525 cf above start)

Plug-Flow detention time= 246.8 min calculated for 0.224 af (64% of inflow)
Center-of-Mass det. time= 70.6 min (896.0 - 825.5)

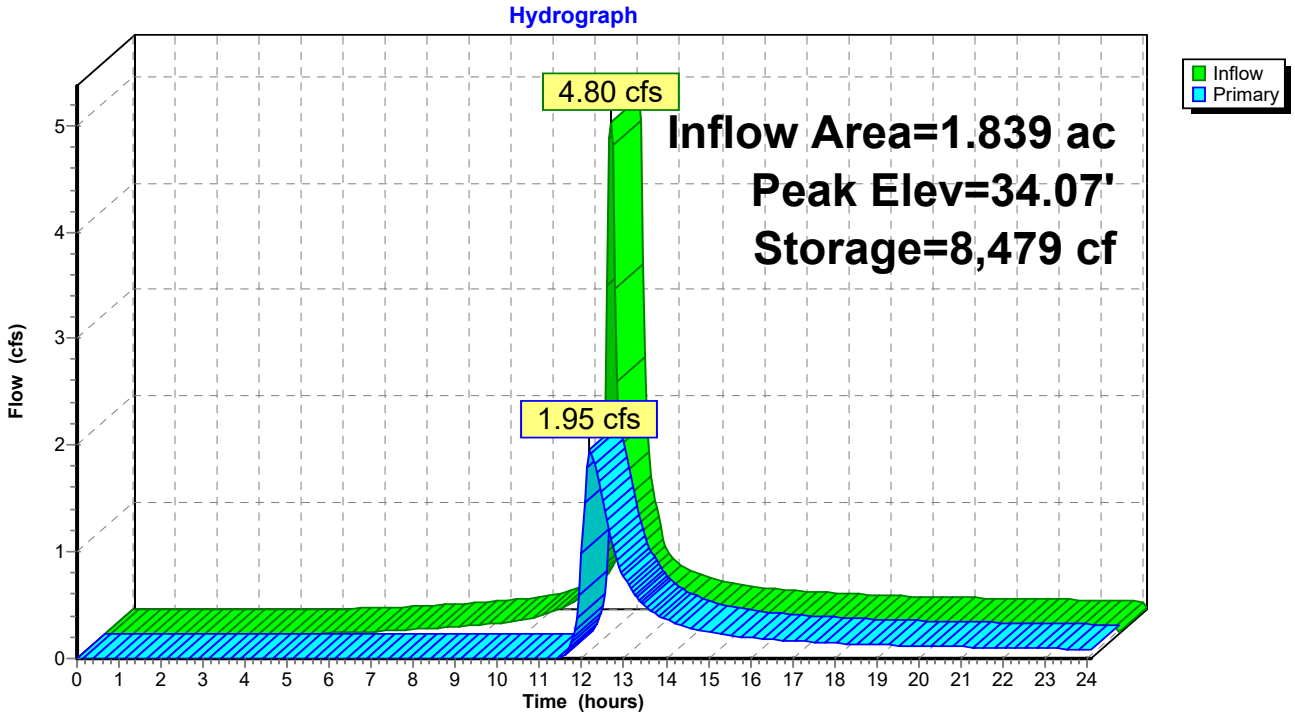
Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	13,158 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
32.00	3,450	299.0	0	0	3,450
33.00	4,070	311.0	3,756	3,756	4,108
34.00	4,700	322.0	4,381	8,137	4,746
35.00	5,350	335.0	5,021	13,158	5,501

Device	Routing	Invert	Outlet Devices
#1	Primary	34.50'	**10.0' long + 0.5 '/' SideZ x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	33.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.94 cfs @ 12.19 hrs HW=34.07' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Orifice/Grate (Orifice Controls 1.94 cfs @ 2.99 fps)

Pond 20S: Water Quality Basin



Summary for Pond 21SA: Water Quality Basin

Inflow Area = 0.401 ac, 64.15% Impervious, Inflow Depth > 2.82" for 5-yr event
Inflow = 1.71 cfs @ 11.95 hrs, Volume= 0.094 af
Outflow = 1.65 cfs @ 11.96 hrs, Volume= 0.094 af, Atten= 3%, Lag= 0.5 min
Primary = 1.65 cfs @ 11.96 hrs, Volume= 0.094 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 37.40' Surf.Area= 1,493 sf Storage= 1,899 cf
Peak Elev= 37.43' @ 11.96 hrs Surf.Area= 1,514 sf Storage= 1,952 cf (52 cf above start)

Plug-Flow detention time= 267.1 min calculated for 0.050 af (54% of inflow)
Center-of-Mass det. time= 0.6 min (824.9 - 824.4)

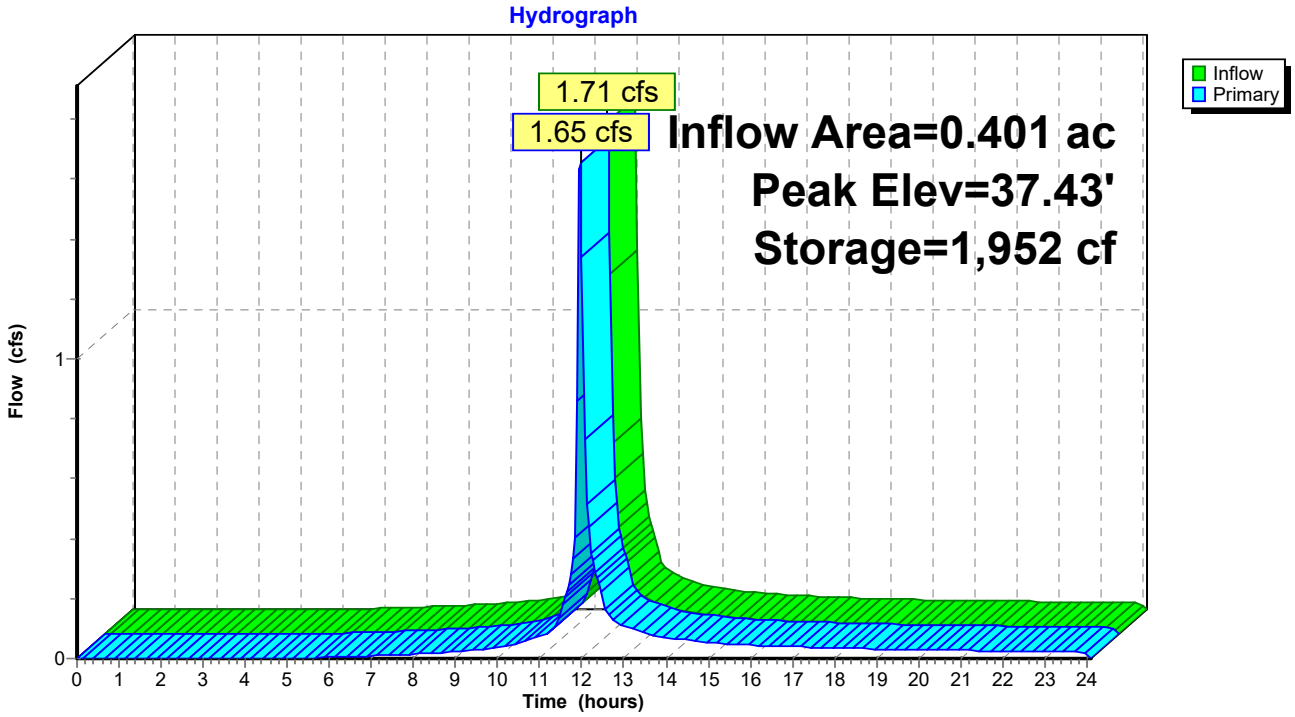
Volume	Invert	Avail.Storage	Storage Description
#1	35.00'	2,903 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
35.00	166	238.0	0	0	166
36.00	681	264.0	394	394	1,235
37.00	1,259	291.0	955	1,350	2,459
37.50	1,554	298.0	702	2,052	2,819
38.00	1,856	304.0	851	2,903	3,143

Device	Routing	Invert	Outlet Devices
#1	Primary	37.40'	**2.4" x 4.0" Horiz. Orifice/Grate X 8.00 columns** X 9 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.52 cfs @ 11.96 hrs HW=37.43' (Free Discharge)
↑**1=Orifice/Grate** (Weir Controls 1.52 cfs @ 0.60 fps)

Pond 21SA: Water Quality Basin



Summary for Pond 22SB: Underground 22

Inflow Area = 0.370 ac, 78.90% Impervious, Inflow Depth > 3.30" for 5-yr event
Inflow = 1.50 cfs @ 12.04 hrs, Volume= 0.102 af
Outflow = 0.10 cfs @ 13.16 hrs, Volume= 0.102 af, Atten= 93%, Lag= 66.9 min
Discarded = 0.10 cfs @ 13.16 hrs, Volume= 0.102 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Peak Elev= 38.00' @ 13.16 hrs Surf.Area= 0.072 ac Storage= 0.036 af

Plug-Flow detention time= 128.2 min calculated for 0.101 af (100% of inflow)
Center-of-Mass det. time= 127.5 min (934.8 - 807.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	37.00'	0.034 af	**27.00'W x 116.39'L x 2.00'H Field A** 0.144 af Overall - 0.030 af Embedded = 0.114 af x 30.0% Voids
#2A	37.50'	0.030 af	**ADS_StormTech SC-160LP +Cap** x 192 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 192 Chambers in 12 Rows
		0.064 af	Total Available Storage

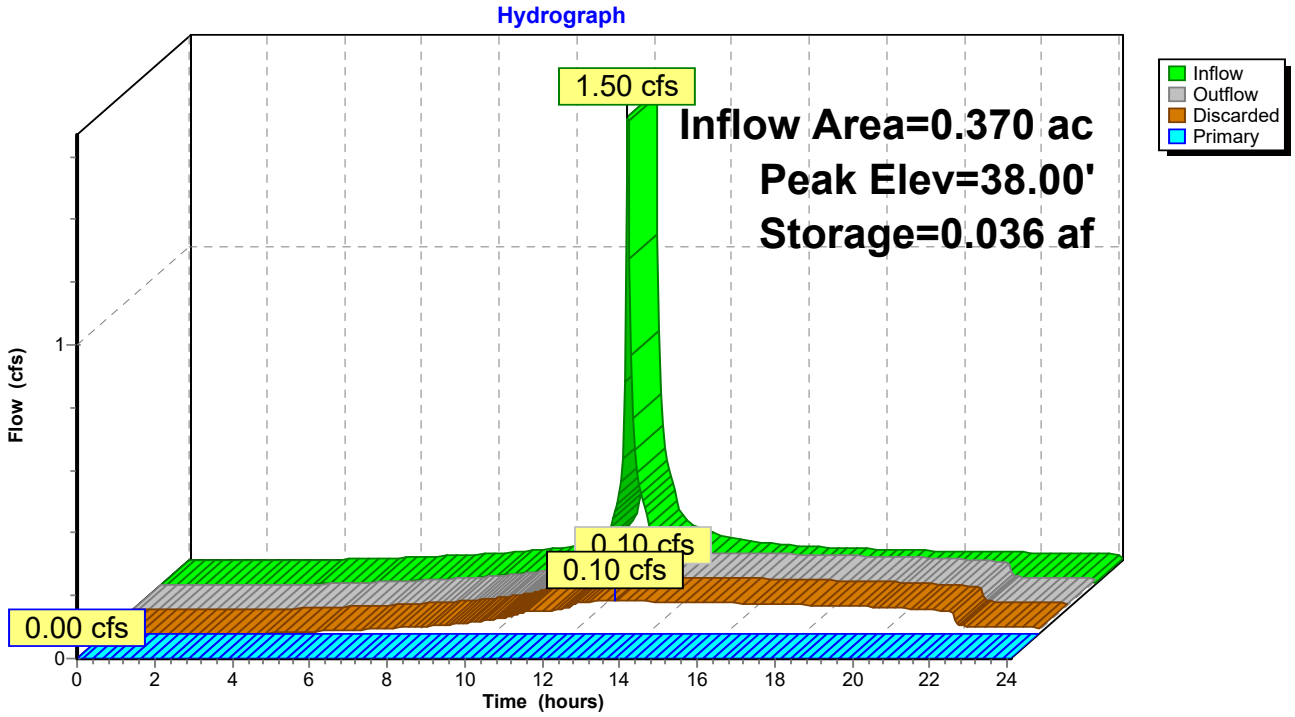
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 34.00'
#2	Primary	38.40'	**4.0' long + 1.0 '/' SideZ x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.10 cfs @ 13.16 hrs HW=38.00' (Free Discharge)
1=Exfiltration (Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=37.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 22SB: Underground 22



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 20: PRWS 20 Runoff Area=46,530 sf 68.29% Impervious Runoff Depth>3.65"
Tc=6.0 min CN=86 Runoff=4.82 cfs 0.325 af

Subcatchment 21: PRWS 21 Runoff Area=17,460 sf 64.15% Impervious Runoff Depth>3.55"
Tc=0.0 min CN=85 Runoff=2.13 cfs 0.119 af

Subcatchment 22: PRWS 22 Runoff Area=16,110 sf 78.90% Impervious Runoff Depth>4.07"
Tc=6.0 min CN=90 Runoff=1.82 cfs 0.125 af

Pond 20S: Water Quality Basin Peak Elev=34.26' Storage=9,383 cf Inflow=5.93 cfs 0.444 af
Outflow=2.59 cfs 0.382 af

Pond 21SA: Water Quality Basin Peak Elev=37.44' Storage=1,960 cf Inflow=2.13 cfs 0.119 af
Outflow=2.11 cfs 0.119 af

Pond 22SB: Underground 22 Peak Elev=38.28' Storage=0.048 af Inflow=1.82 cfs 0.125 af
Discarded=0.11 cfs 0.124 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.124 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.569 af Average Runoff Depth = 3.72"
30.48% Pervious = 0.560 ac 69.52% Impervious = 1.278 ac

Summary for Subcatchment 20: PRWS 20

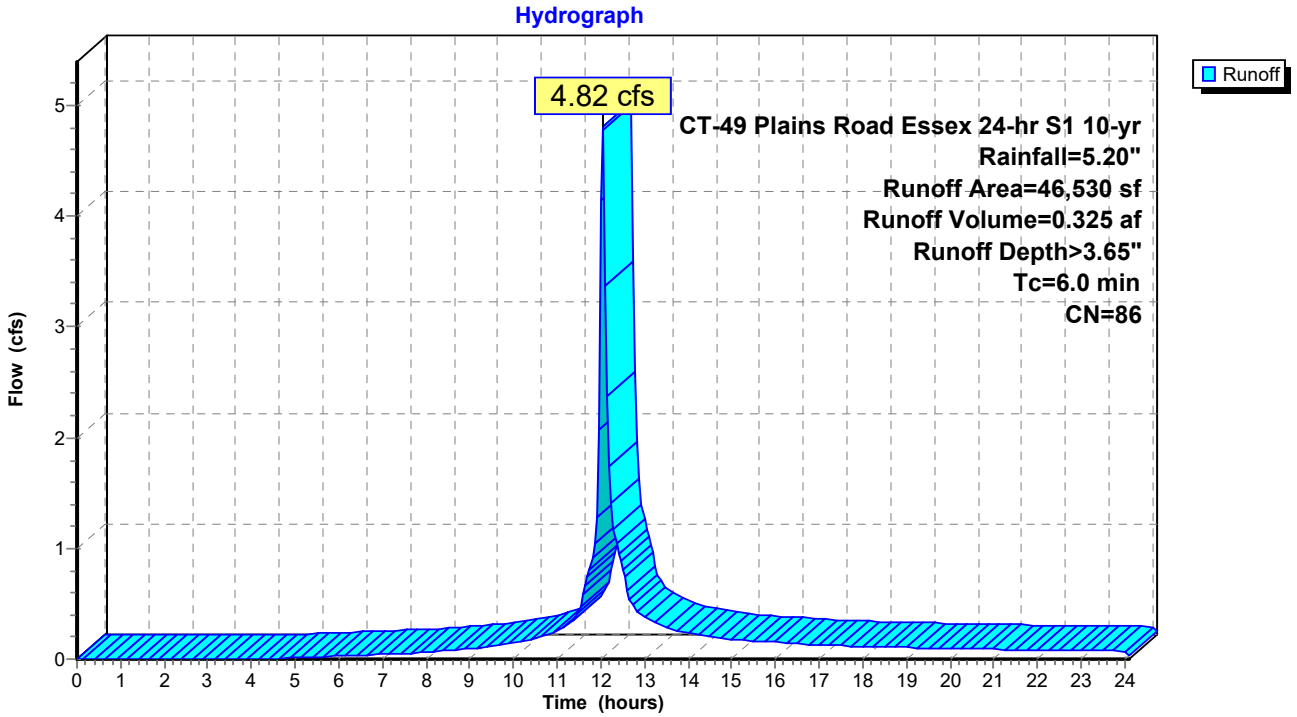
Runoff = 4.82 cfs @ 12.04 hrs, Volume= 0.325 af, Depth> 3.65"
Routed to Pond 20S : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 10-yr Rainfall=5.20"

Area (sf)	CN	Description
14,755	61	>75% Grass cover, Good, HSG B
29,400	98	Paved parking, HSG B
2,375	98	Unconnected roofs, HSG B
46,530	86	Weighted Average
14,755		31.71% Pervious Area
31,775		68.29% Impervious Area
2,375		7.47% Unconnected

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

Subcatchment 20: PRWS 20



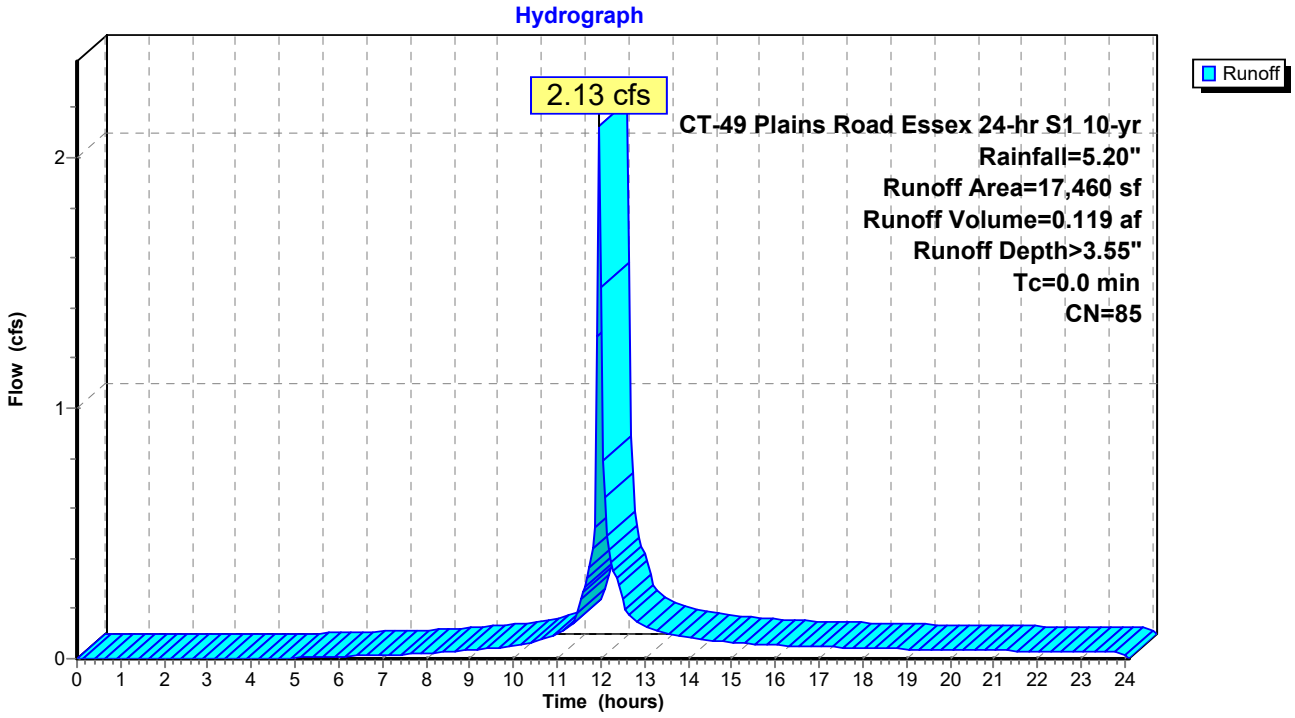
Summary for Subcatchment 21: PRWS 21

Runoff = 2.13 cfs @ 11.95 hrs, Volume= 0.119 af, Depth> 3.55"
Routed to Pond 21SA : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 10-yr Rainfall=5.20"

Area (sf)	CN	Description
6,260	61	>75% Grass cover, Good, HSG B
11,200	98	Paved parking, HSG B
17,460	85	Weighted Average
6,260		35.85% Pervious Area
11,200		64.15% Impervious Area

Subcatchment 21: PRWS 21



Summary for Subcatchment 22: PRWS 22

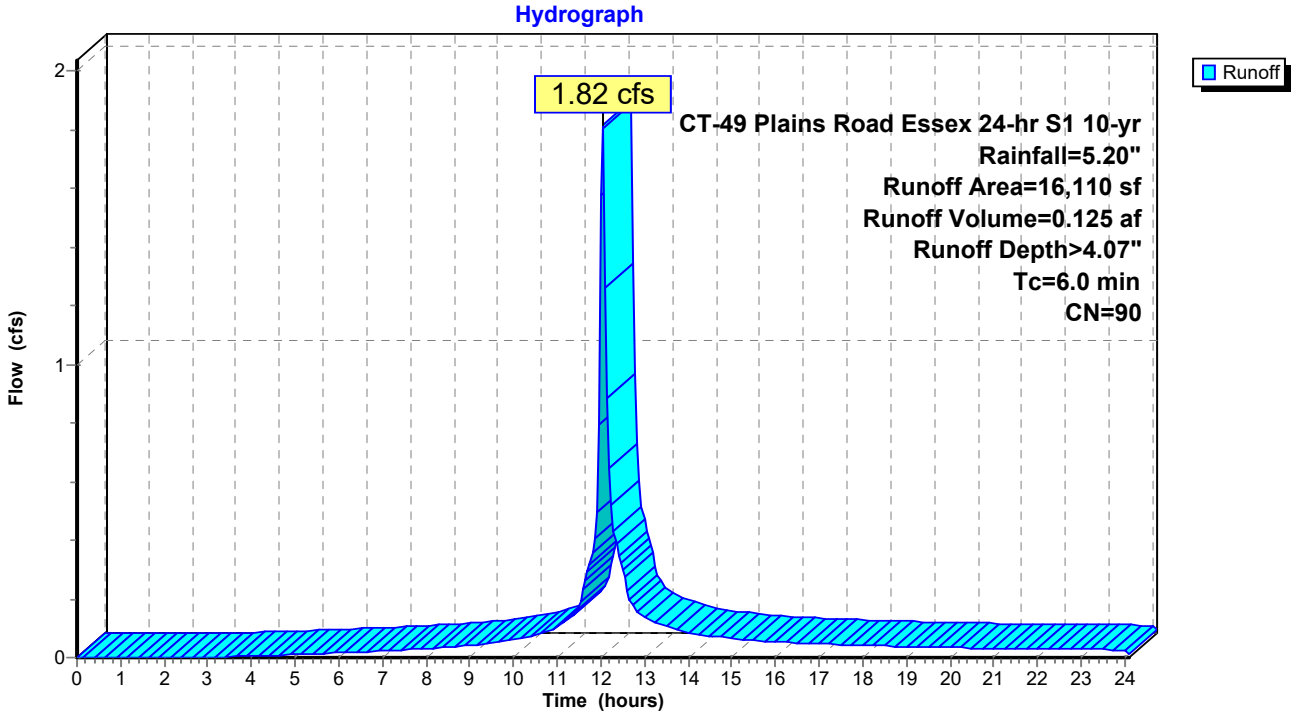
Runoff = 1.82 cfs @ 12.04 hrs, Volume= 0.125 af, Depth> 4.07"
Routed to Pond 22SB : Underground 22

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 10-yr Rainfall=5.20"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
210	98	Paved parking, HSG B
3,400	61	>75% Grass cover, Good, HSG B
16,110	90	Weighted Average
3,400		21.10% Pervious Area
12,710		78.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. TR-55 TC**

Subcatchment 22: PRWS 22



Summary for Pond 20S: Water Quality Basin

Inflow Area = 1.839 ac, 69.52% Impervious, Inflow Depth > 2.90" for 10-yr event
Inflow = 5.93 cfs @ 12.02 hrs, Volume= 0.444 af
Outflow = 2.59 cfs @ 12.17 hrs, Volume= 0.382 af, Atten= 56%, Lag= 9.1 min
Primary = 2.59 cfs @ 12.17 hrs, Volume= 0.382 af
Routed to nonexistent node 30

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 32.80' Surf.Area= 3,942 sf Storage= 2,955 cf
Peak Elev= 34.26' @ 12.17 hrs Surf.Area= 4,865 sf Storage= 9,383 cf (6,428 cf above start)

Plug-Flow detention time= 214.4 min calculated for 0.314 af (71% of inflow)
Center-of-Mass det. time= 64.8 min (882.2 - 817.3)

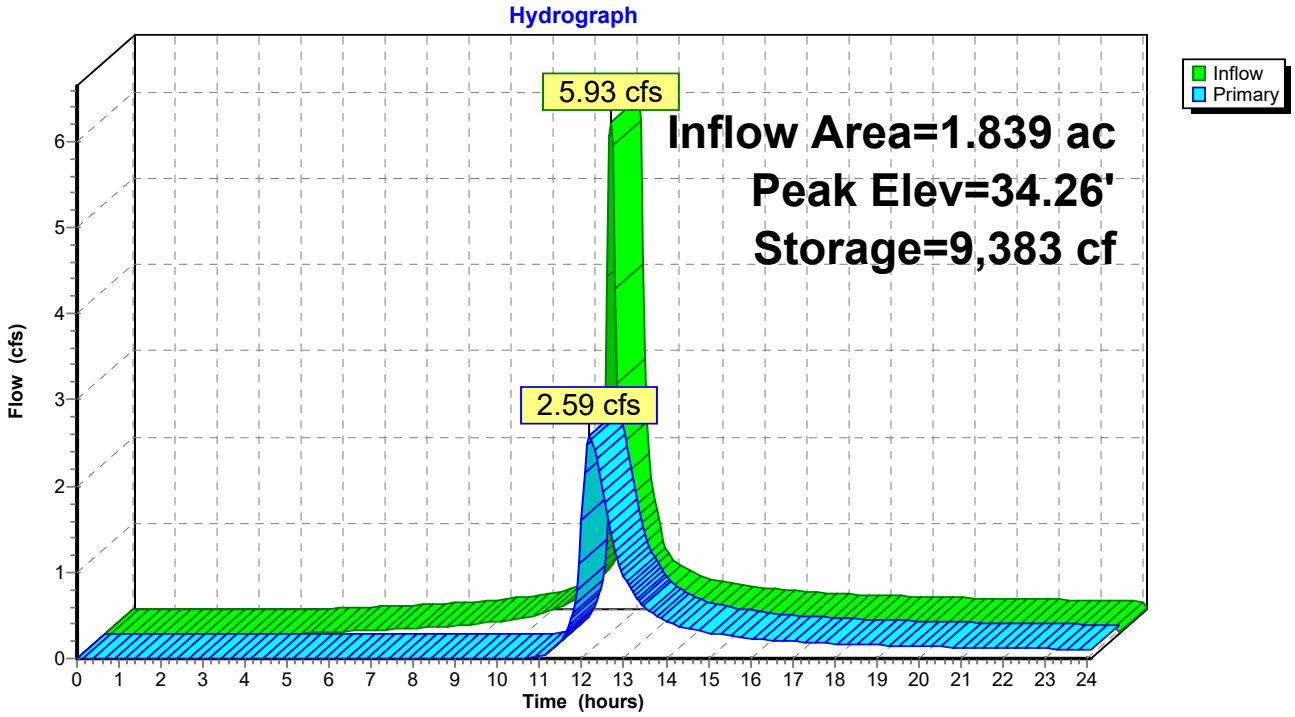
Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	13,158 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
32.00	3,450	299.0	0	0	3,450
33.00	4,070	311.0	3,756	3,756	4,108
34.00	4,700	322.0	4,381	8,137	4,746
35.00	5,350	335.0	5,021	13,158	5,501

Device	Routing	Invert	Outlet Devices
#1	Primary	34.50'	**10.0' long + 0.5 '/' SideZ x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	33.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.57 cfs @ 12.17 hrs HW=34.26' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Orifice/Grate (Orifice Controls 2.57 cfs @ 3.33 fps)

Pond 20S: Water Quality Basin



Summary for Pond 21SA: Water Quality Basin

Inflow Area = 0.401 ac, 64.15% Impervious, Inflow Depth > 3.55" for 10-yr event
Inflow = 2.13 cfs @ 11.95 hrs, Volume= 0.119 af
Outflow = 2.11 cfs @ 11.96 hrs, Volume= 0.119 af, Atten= 1%, Lag= 0.4 min
Primary = 2.11 cfs @ 11.96 hrs, Volume= 0.119 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 37.40' Surf.Area= 1,493 sf Storage= 1,899 cf
Peak Elev= 37.44' @ 11.96 hrs Surf.Area= 1,517 sf Storage= 1,960 cf (61 cf above start)

Plug-Flow detention time= 221.4 min calculated for 0.075 af (63% of inflow)
Center-of-Mass det. time= 0.6 min (816.7 - 816.1)

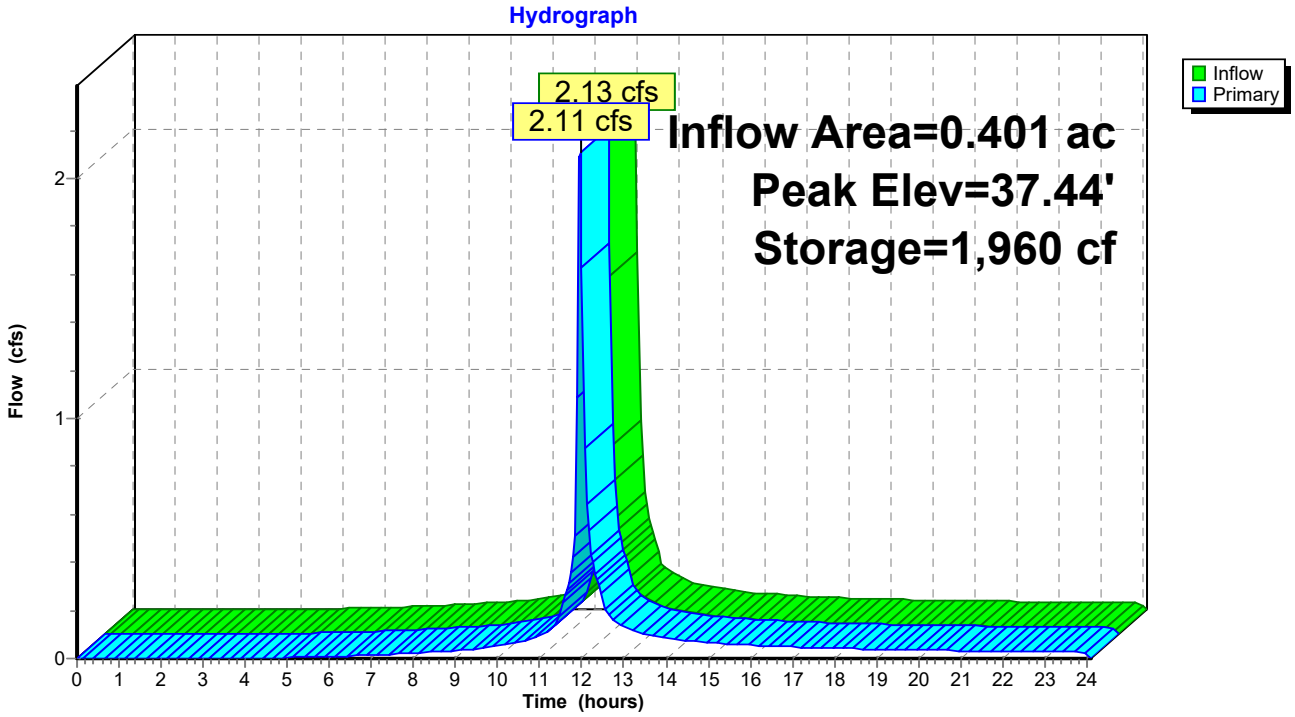
Volume	Invert	Avail.Storage	Storage Description
#1	35.00'	2,903 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
35.00	166	238.0	0	0	166
36.00	681	264.0	394	394	1,235
37.00	1,259	291.0	955	1,350	2,459
37.50	1,554	298.0	702	2,052	2,819
38.00	1,856	304.0	851	2,903	3,143

Device	Routing	Invert	Outlet Devices
#1	Primary	37.40'	**2.4" x 4.0" Horiz. Orifice/Grate X 8.00 columns** X 9 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.92 cfs @ 11.96 hrs HW=37.44' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 1.92 cfs @ 0.64 fps)

Pond 21SA: Water Quality Basin



Summary for Pond 22SB: Underground 22

Inflow Area = 0.370 ac, 78.90% Impervious, Inflow Depth > 4.07" for 10-yr event
Inflow = 1.82 cfs @ 12.04 hrs, Volume= 0.125 af
Outflow = 0.11 cfs @ 13.34 hrs, Volume= 0.124 af, Atten= 94%, Lag= 77.9 min
Discarded = 0.11 cfs @ 13.34 hrs, Volume= 0.124 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Peak Elev= 38.28' @ 13.34 hrs Surf.Area= 0.072 ac Storage= 0.048 af

Plug-Flow detention time= 167.3 min calculated for 0.124 af (99% of inflow)
Center-of-Mass det. time= 161.4 min (961.4 - 800.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	37.00'	0.034 af	**27.00'W x 116.39'L x 2.00'H Field A** 0.144 af Overall - 0.030 af Embedded = 0.114 af x 30.0% Voids
#2A	37.50'	0.030 af	**ADS_StormTech SC-160LP +Cap** x 192 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 192 Chambers in 12 Rows
		0.064 af	Total Available Storage

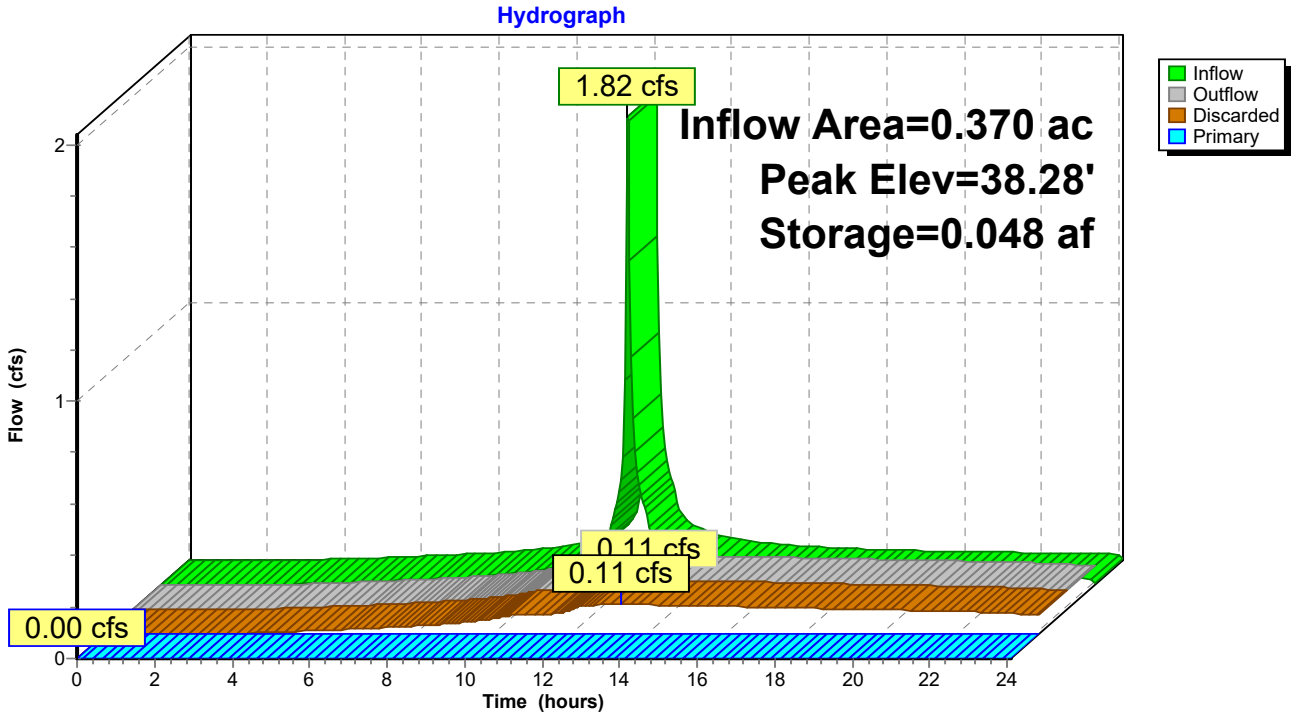
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 34.00'
#2	Primary	38.40'	**4.0' long + 1.0 '/' SideZ x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.11 cfs @ 13.34 hrs HW=38.28' (Free Discharge)
1=Exfiltration (Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=37.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 22SB: Underground 22



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 20: PRWS 20 Runoff Area=46,530 sf 68.29% Impervious Runoff Depth>4.70"
Tc=6.0 min CN=86 Runoff=6.12 cfs 0.419 af

Subcatchment 21: PRWS 21 Runoff Area=17,460 sf 64.15% Impervious Runoff Depth>4.60"
Tc=0.0 min CN=85 Runoff=2.72 cfs 0.154 af

Subcatchment 22: PRWS 22 Runoff Area=16,110 sf 78.90% Impervious Runoff Depth>5.15"
Tc=6.0 min CN=90 Runoff=2.26 cfs 0.159 af

Pond 20S: Water Quality Basin Peak Elev=34.49' Storage=10,533 cf Inflow=7.51 cfs 0.586 af
Outflow=3.15 cfs 0.522 af

Pond 21SA: Water Quality Basin Peak Elev=37.45' Storage=1,971 cf Inflow=2.72 cfs 0.154 af
Outflow=2.72 cfs 0.154 af

Pond 22SB: Underground 22 Peak Elev=38.50' Storage=0.053 af Inflow=2.26 cfs 0.159 af
Discarded=0.12 cfs 0.136 af Primary=0.32 cfs 0.013 af Outflow=0.45 cfs 0.150 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.731 af Average Runoff Depth = 4.77"
30.48% Pervious = 0.560 ac 69.52% Impervious = 1.278 ac

Summary for Subcatchment 20: PRWS 20

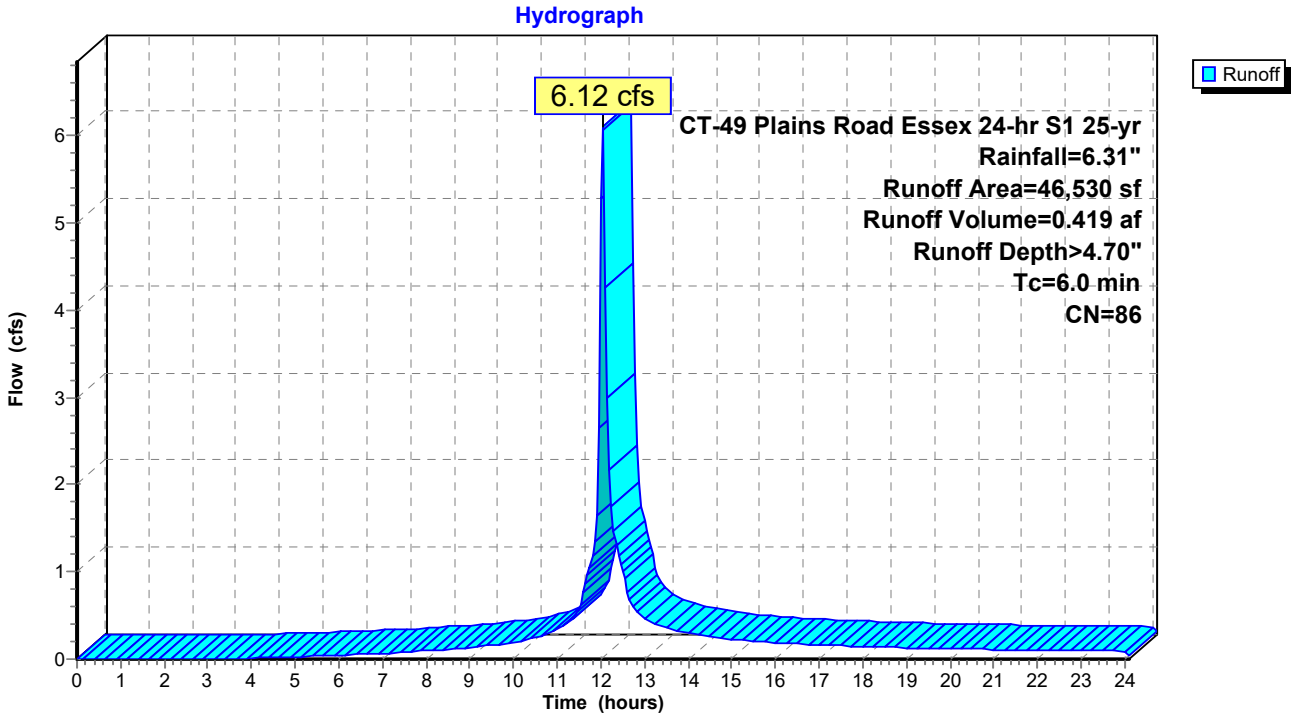
Runoff = 6.12 cfs @ 12.04 hrs, Volume= 0.419 af, Depth> 4.70"
Routed to Pond 20S : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 25-yr Rainfall=6.31"

Area (sf)	CN	Description
14,755	61	>75% Grass cover, Good, HSG B
29,400	98	Paved parking, HSG B
2,375	98	Unconnected roofs, HSG B
46,530	86	Weighted Average
14,755		31.71% Pervious Area
31,775		68.29% Impervious Area
2,375		7.47% Unconnected

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

Subcatchment 20: PRWS 20



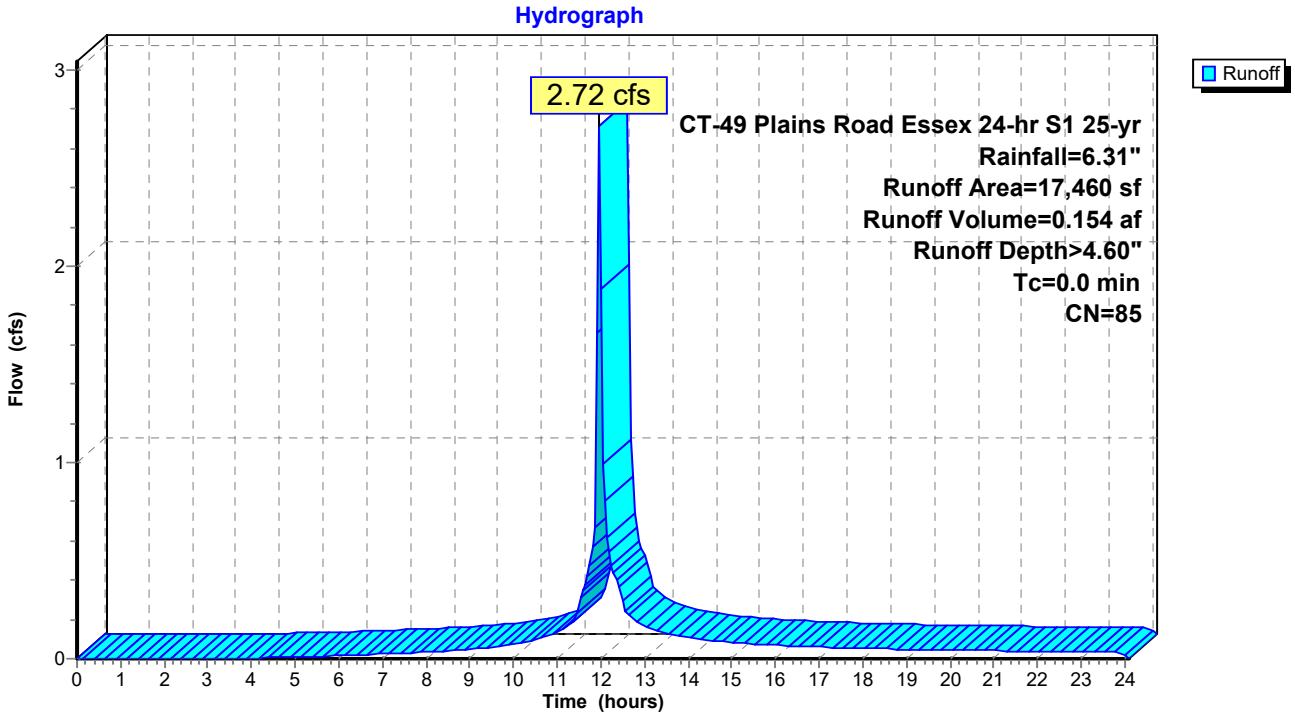
Summary for Subcatchment 21: PRWS 21

Runoff = 2.72 cfs @ 11.95 hrs, Volume= 0.154 af, Depth> 4.60"
Routed to Pond 21SA : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 25-yr Rainfall=6.31"

Area (sf)	CN	Description
6,260	61	>75% Grass cover, Good, HSG B
11,200	98	Paved parking, HSG B
17,460	85	Weighted Average
6,260		35.85% Pervious Area
11,200		64.15% Impervious Area

Subcatchment 21: PRWS 21



Summary for Subcatchment 22: PRWS 22

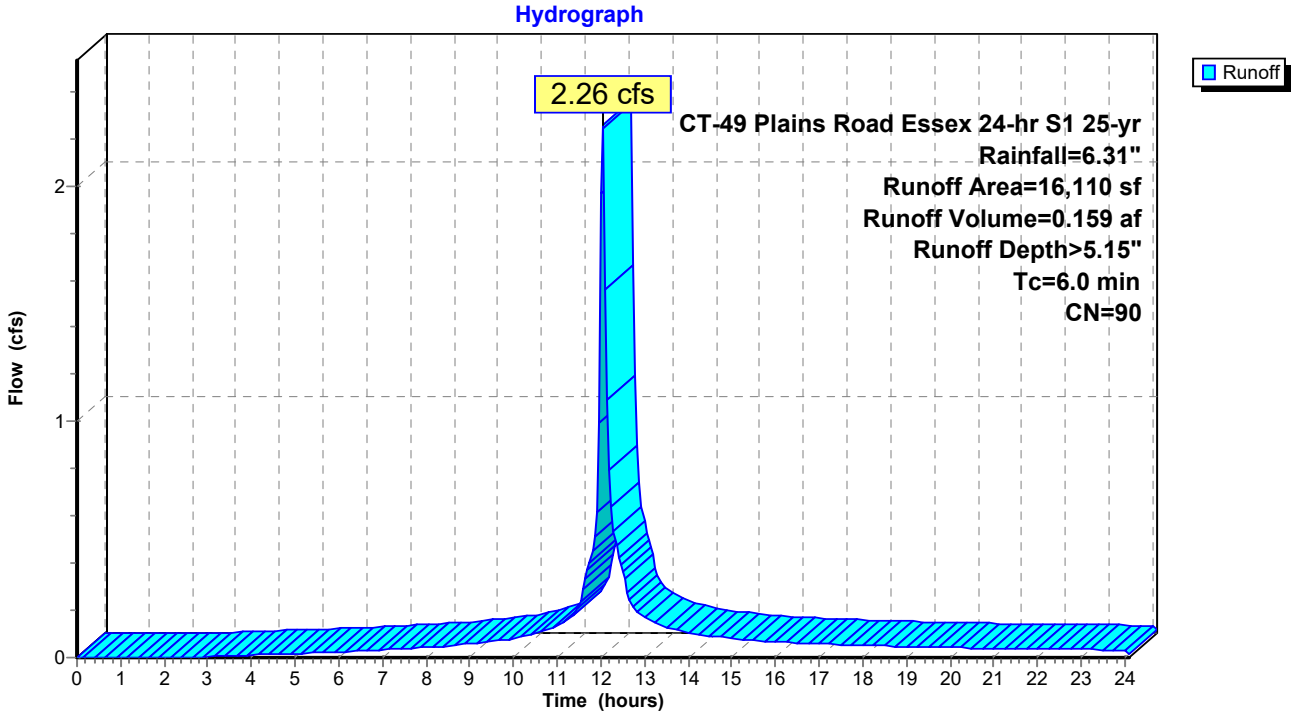
Runoff = 2.26 cfs @ 12.04 hrs, Volume= 0.159 af, Depth> 5.15"
Routed to Pond 22SB : Underground 22

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 25-yr Rainfall=6.31"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
210	98	Paved parking, HSG B
3,400	61	>75% Grass cover, Good, HSG B
16,110	90	Weighted Average
3,400		21.10% Pervious Area
12,710		78.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. TR-55 TC**

Subcatchment 22: PRWS 22



Summary for Pond 20S: Water Quality Basin

Inflow Area = 1.839 ac, 69.52% Impervious, Inflow Depth > 3.82" for 25-yr event
Inflow = 7.51 cfs @ 12.02 hrs, Volume= 0.586 af
Outflow = 3.15 cfs @ 12.18 hrs, Volume= 0.522 af, Atten= 58%, Lag= 9.4 min
Primary = 3.15 cfs @ 12.18 hrs, Volume= 0.522 af
Routed to nonexistent node 30

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 32.80' Surf.Area= 3,942 sf Storage= 2,955 cf
Peak Elev= 34.49' @ 12.18 hrs Surf.Area= 5,015 sf Storage= 10,533 cf (7,578 cf above start)

Plug-Flow detention time= 181.9 min calculated for 0.454 af (78% of inflow)
Center-of-Mass det. time= 59.0 min (866.2 - 807.3)

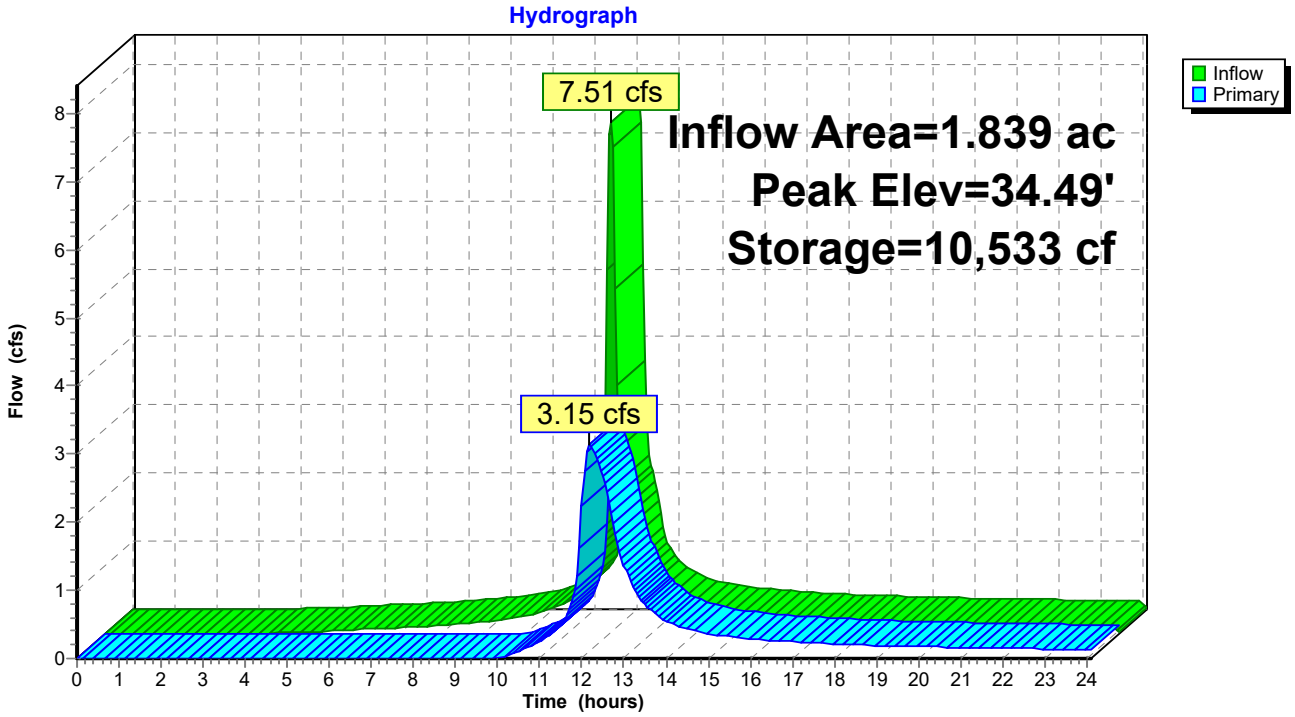
Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	13,158 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
32.00	3,450	299.0	0	0	3,450
33.00	4,070	311.0	3,756	3,756	4,108
34.00	4,700	322.0	4,381	8,137	4,746
35.00	5,350	335.0	5,021	13,158	5,501

Device	Routing	Invert	Outlet Devices
#1	Primary	34.50'	**10.0' long + 0.5 '/' SideZ x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	33.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.14 cfs @ 12.18 hrs HW=34.49' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Orifice/Grate (Orifice Controls 3.14 cfs @ 4.00 fps)

Pond 20S: Water Quality Basin



Summary for Pond 21SA: Water Quality Basin

Inflow Area = 0.401 ac, 64.15% Impervious, Inflow Depth > 4.60" for 25-yr event
Inflow = 2.72 cfs @ 11.95 hrs, Volume= 0.154 af
Outflow = 2.72 cfs @ 11.96 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.3 min
Primary = 2.72 cfs @ 11.96 hrs, Volume= 0.154 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 37.40' Surf.Area= 1,493 sf Storage= 1,899 cf
Peak Elev= 37.45' @ 11.96 hrs Surf.Area= 1,522 sf Storage= 1,971 cf (72 cf above start)

Plug-Flow detention time= 187.9 min calculated for 0.110 af (72% of inflow)
Center-of-Mass det. time= 0.6 min (807.6 - 807.0)

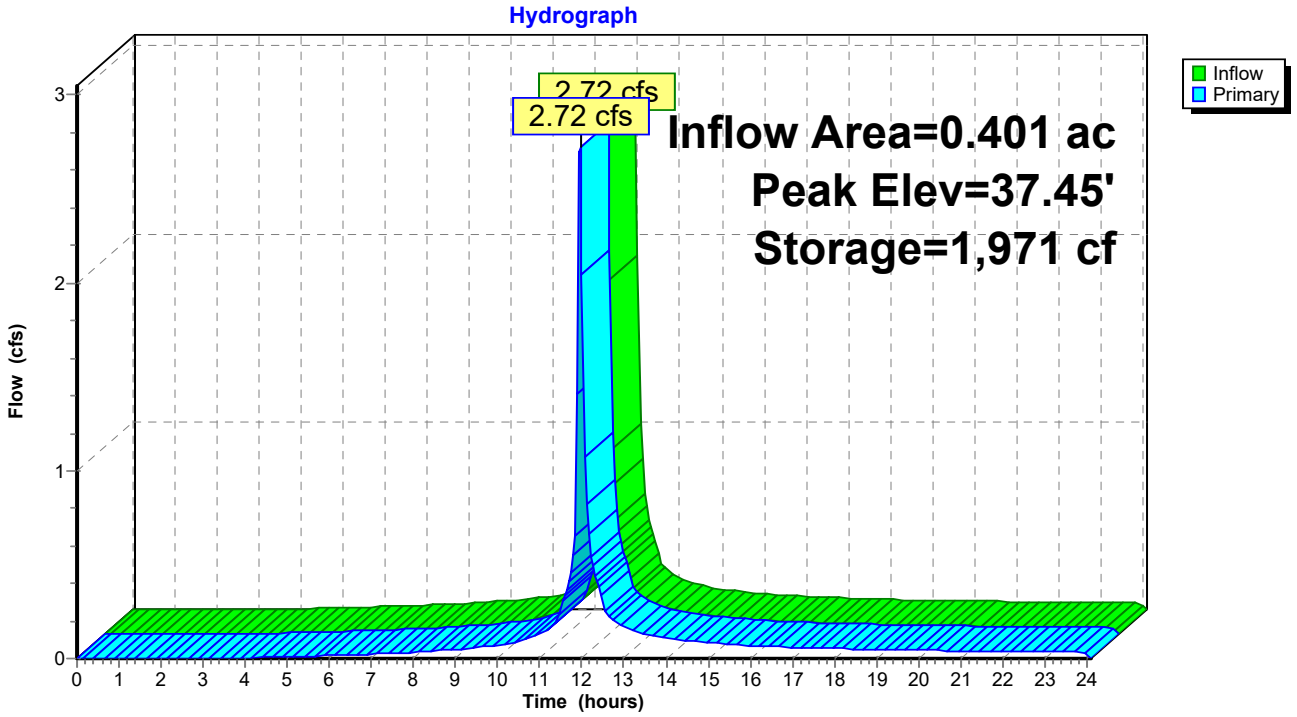
Volume	Invert	Avail.Storage	Storage Description
#1	35.00'	2,903 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
35.00	166	238.0	0	0	166
36.00	681	264.0	394	394	1,235
37.00	1,259	291.0	955	1,350	2,459
37.50	1,554	298.0	702	2,052	2,819
38.00	1,856	304.0	851	2,903	3,143

Device	Routing	Invert	Outlet Devices
#1	Primary	37.40'	**2.4" x 4.0" Horiz. Orifice/Grate X 8.00 columns** X 9 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.49 cfs @ 11.96 hrs HW=37.45' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 2.49 cfs @ 0.70 fps)

Pond 21SA: Water Quality Basin



Summary for Pond 22SB: Underground 22

Inflow Area = 0.370 ac, 78.90% Impervious, Inflow Depth > 5.15" for 25-yr event
Inflow = 2.26 cfs @ 12.04 hrs, Volume= 0.159 af
Outflow = 0.45 cfs @ 12.39 hrs, Volume= 0.150 af, Atten= 80%, Lag= 21.0 min
Discarded = 0.12 cfs @ 12.39 hrs, Volume= 0.136 af
Primary = 0.32 cfs @ 12.39 hrs, Volume= 0.013 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Peak Elev= 38.50' @ 12.39 hrs Surf.Area= 0.072 ac Storage= 0.053 af

Plug-Flow detention time= 168.8 min calculated for 0.149 af (94% of inflow)
Center-of-Mass det. time= 135.8 min (928.1 - 792.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	37.00'	0.034 af	**27.00'W x 116.39'L x 2.00'H Field A** 0.144 af Overall - 0.030 af Embedded = 0.114 af x 30.0% Voids
#2A	37.50'	0.030 af	**ADS_StormTech SC-160LP +Cap** x 192 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 192 Chambers in 12 Rows
		0.064 af	Total Available Storage

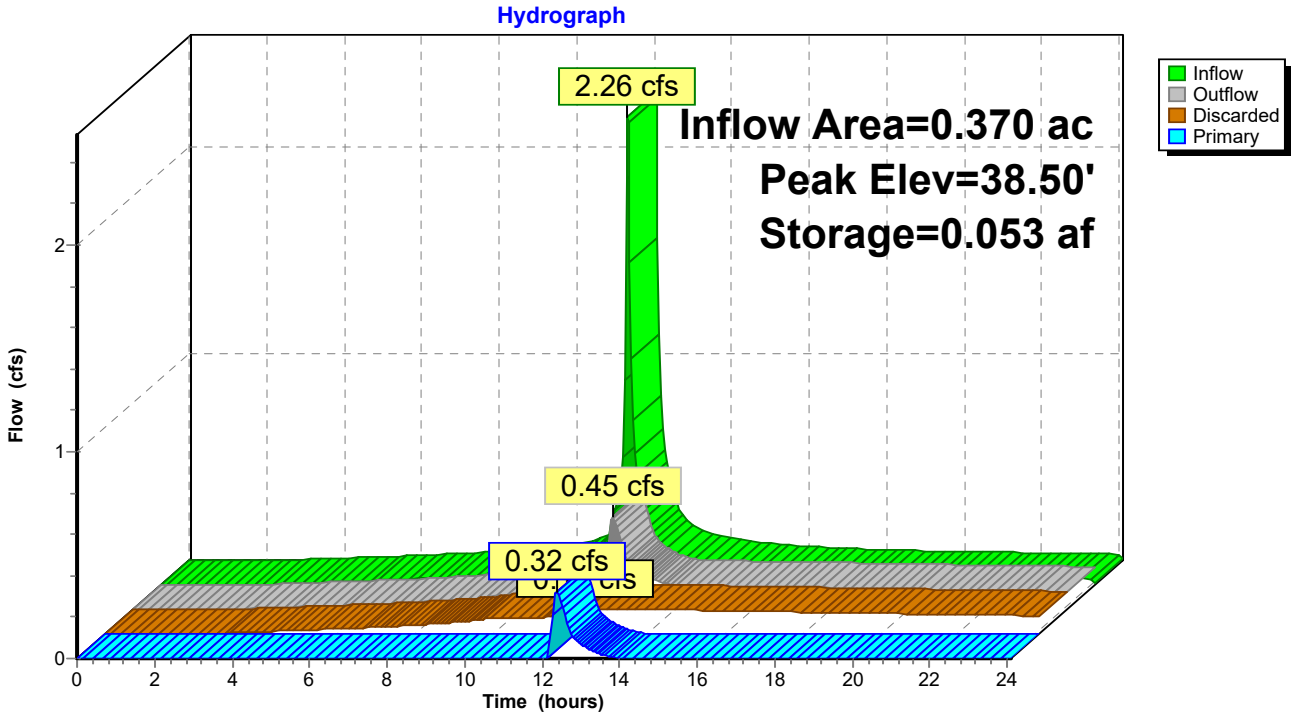
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 34.00'
#2	Primary	38.40'	**4.0' long + 1.0 '/' SideZ x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.12 cfs @ 12.39 hrs HW=38.49' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=0.32 cfs @ 12.39 hrs HW=38.49' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.32 cfs @ 0.83 fps)

Pond 22SB: Underground 22



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 20: PRWS 20 Runoff Area=46,530 sf 68.29% Impervious Runoff Depth>5.49"
Tc=6.0 min CN=86 Runoff=7.09 cfs 0.489 af

Subcatchment 21: PRWS 21 Runoff Area=17,460 sf 64.15% Impervious Runoff Depth>5.38"
Tc=0.0 min CN=85 Runoff=3.16 cfs 0.180 af

Subcatchment 22: PRWS 22 Runoff Area=16,110 sf 78.90% Impervious Runoff Depth>5.95"
Tc=6.0 min CN=90 Runoff=2.60 cfs 0.183 af

Pond 20S: Water Quality Basin Peak Elev=34.63' Storage=11,215 cf Inflow=8.71 cfs 0.696 af
Outflow=4.57 cfs 0.631 af

Pond 21SA: Water Quality Basin Peak Elev=37.45' Storage=1,980 cf Inflow=3.16 cfs 0.180 af
Outflow=3.15 cfs 0.180 af

Pond 22SB: Underground 22 Peak Elev=38.58' Storage=0.055 af Inflow=2.60 cfs 0.183 af
Discarded=0.12 cfs 0.143 af Primary=0.86 cfs 0.028 af Outflow=0.99 cfs 0.170 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.852 af Average Runoff Depth = 5.56"
30.48% Pervious = 0.560 ac 69.52% Impervious = 1.278 ac

Summary for Subcatchment 20: PRWS 20

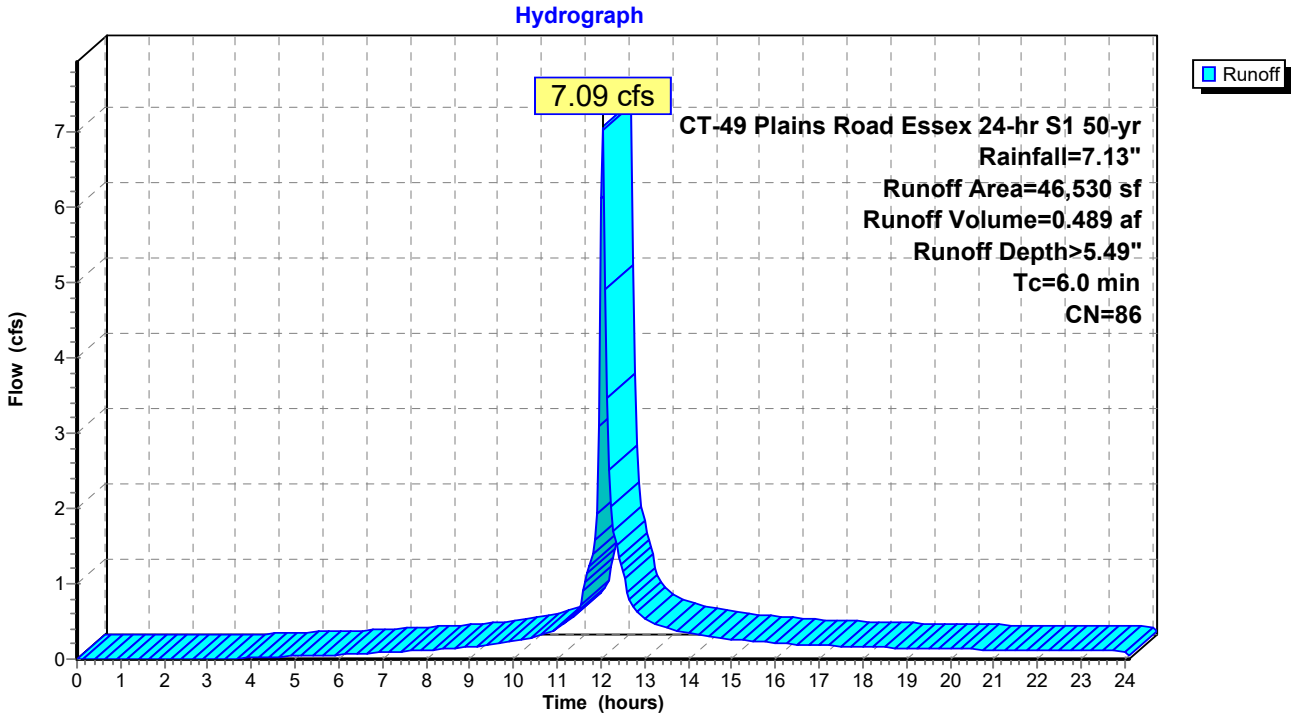
Runoff = 7.09 cfs @ 12.04 hrs, Volume= 0.489 af, Depth> 5.49"
Routed to Pond 20S : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 50-yr Rainfall=7.13"

Area (sf)	CN	Description
14,755	61	>75% Grass cover, Good, HSG B
29,400	98	Paved parking, HSG B
2,375	98	Unconnected roofs, HSG B
46,530	86	Weighted Average
14,755		31.71% Pervious Area
31,775		68.29% Impervious Area
2,375		7.47% Unconnected

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

Subcatchment 20: PRWS 20



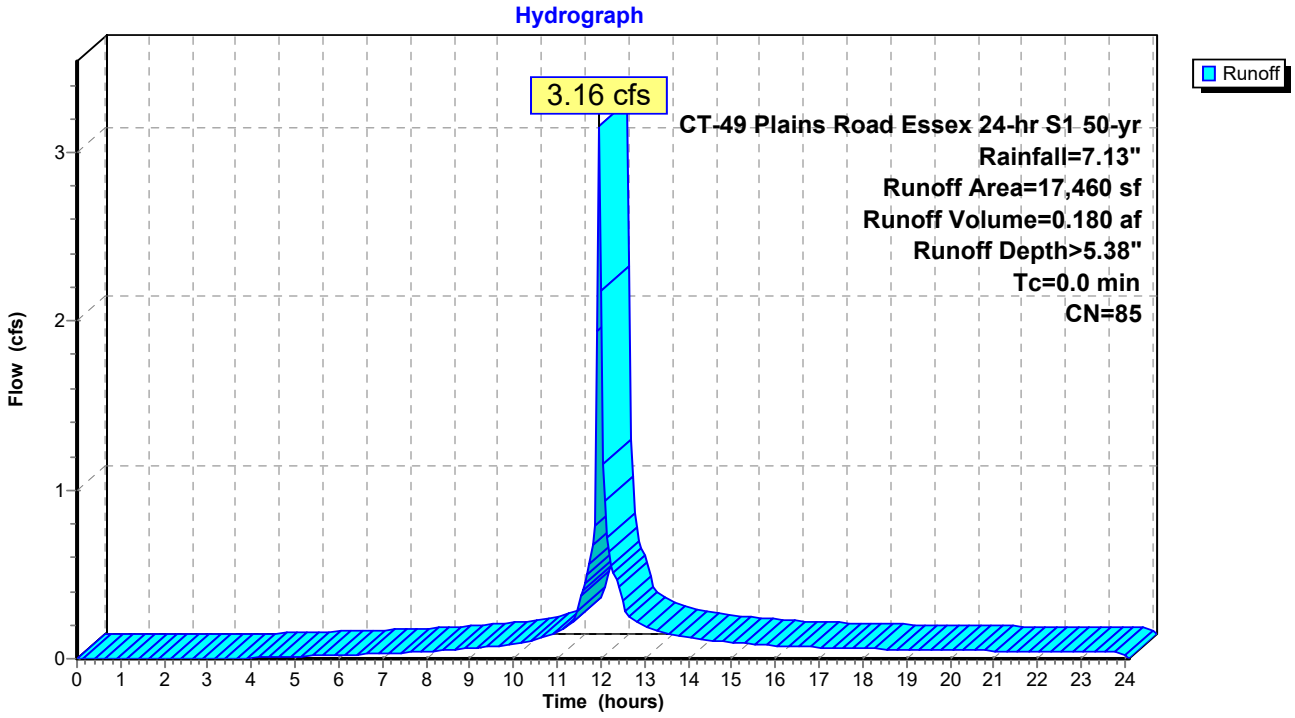
Summary for Subcatchment 21: PRWS 21

Runoff = 3.16 cfs @ 11.95 hrs, Volume= 0.180 af, Depth> 5.38"
Routed to Pond 21SA : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 50-yr Rainfall=7.13"

Area (sf)	CN	Description
6,260	61	>75% Grass cover, Good, HSG B
11,200	98	Paved parking, HSG B
17,460	85	Weighted Average
6,260		35.85% Pervious Area
11,200		64.15% Impervious Area

Subcatchment 21: PRWS 21



Summary for Subcatchment 22: PRWS 22

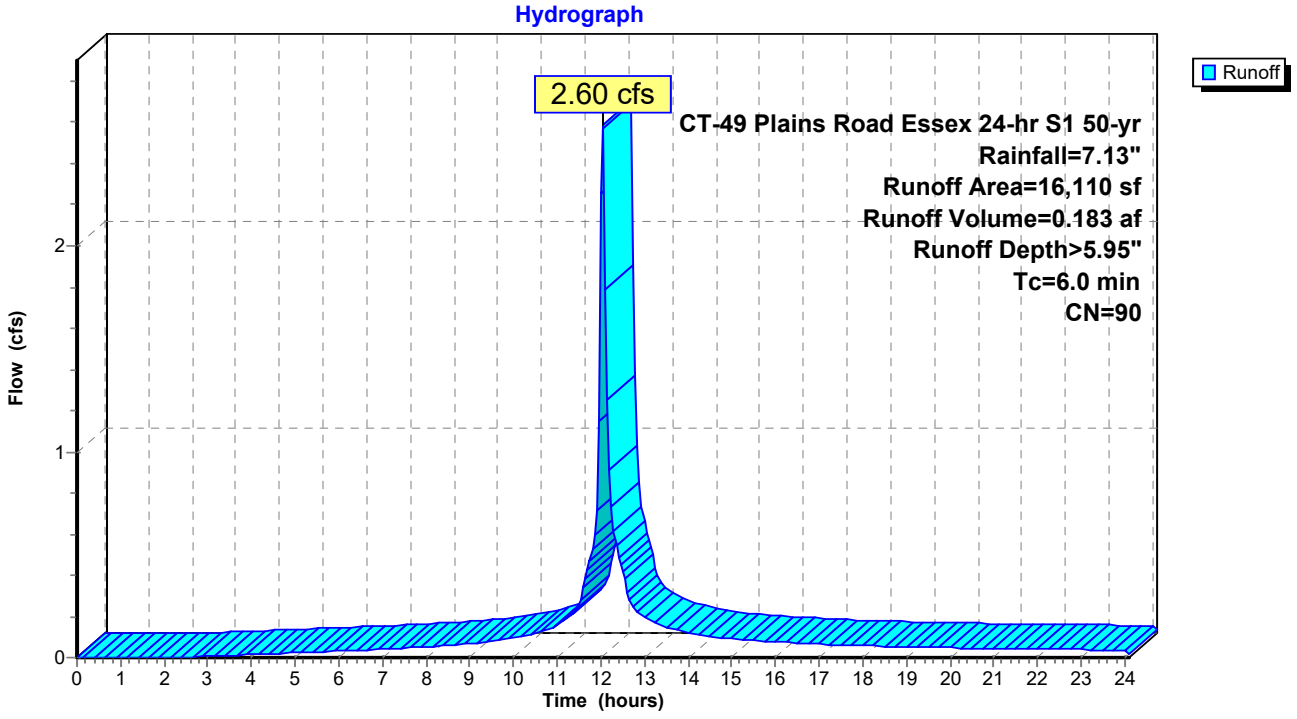
Runoff = 2.60 cfs @ 12.04 hrs, Volume= 0.183 af, Depth> 5.95"
Routed to Pond 22SB : Underground 22

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 50-yr Rainfall=7.13"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
210	98	Paved parking, HSG B
3,400	61	>75% Grass cover, Good, HSG B
16,110	90	Weighted Average
3,400		21.10% Pervious Area
12,710		78.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. TR-55 TC**

Subcatchment 22: PRWS 22



Summary for Pond 20S: Water Quality Basin

Inflow Area = 1.839 ac, 69.52% Impervious, Inflow Depth > 4.54" for 50-yr event
Inflow = 8.71 cfs @ 12.02 hrs, Volume= 0.696 af
Outflow = 4.57 cfs @ 12.17 hrs, Volume= 0.631 af, Atten= 48%, Lag= 8.9 min
Primary = 4.57 cfs @ 12.17 hrs, Volume= 0.631 af
Routed to nonexistent node 30

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 32.80' Surf.Area= 3,942 sf Storage= 2,955 cf
Peak Elev= 34.63' @ 12.17 hrs Surf.Area= 5,103 sf Storage= 11,215 cf (8,260 cf above start)

Plug-Flow detention time= 163.5 min calculated for 0.562 af (81% of inflow)
Center-of-Mass det. time= 54.9 min (855.6 - 800.7)

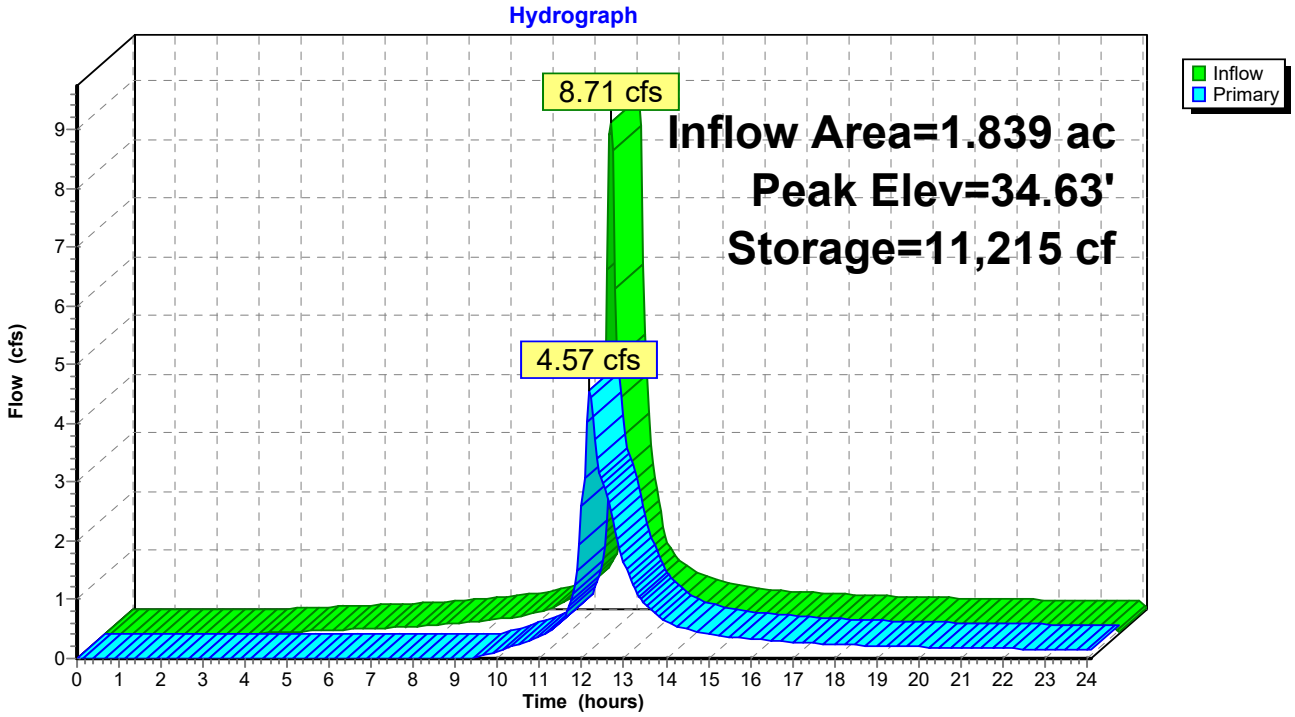
Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	13,158 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
32.00	3,450	299.0	0	0	3,450
33.00	4,070	311.0	3,756	3,756	4,108
34.00	4,700	322.0	4,381	8,137	4,746
35.00	5,350	335.0	5,021	13,158	5,501

Device	Routing	Invert	Outlet Devices
#1	Primary	34.50'	**10.0' long + 0.5 '/' SideZ x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	33.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.49 cfs @ 12.17 hrs HW=34.62' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.06 cfs @ 0.86 fps)
2=Orifice/Grate (Orifice Controls 3.43 cfs @ 4.37 fps)

Pond 20S: Water Quality Basin



Summary for Pond 21SA: Water Quality Basin

Inflow Area = 0.401 ac, 64.15% Impervious, Inflow Depth > 5.38" for 50-yr event
Inflow = 3.16 cfs @ 11.95 hrs, Volume= 0.180 af
Outflow = 3.15 cfs @ 11.96 hrs, Volume= 0.180 af, Atten= 1%, Lag= 0.3 min
Primary = 3.15 cfs @ 11.96 hrs, Volume= 0.180 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 37.40' Surf.Area= 1,493 sf Storage= 1,899 cf
Peak Elev= 37.45' @ 11.96 hrs Surf.Area= 1,525 sf Storage= 1,980 cf (80 cf above start)

Plug-Flow detention time= 169.8 min calculated for 0.136 af (76% of inflow)
Center-of-Mass det. time= 0.6 min (801.8 - 801.2)

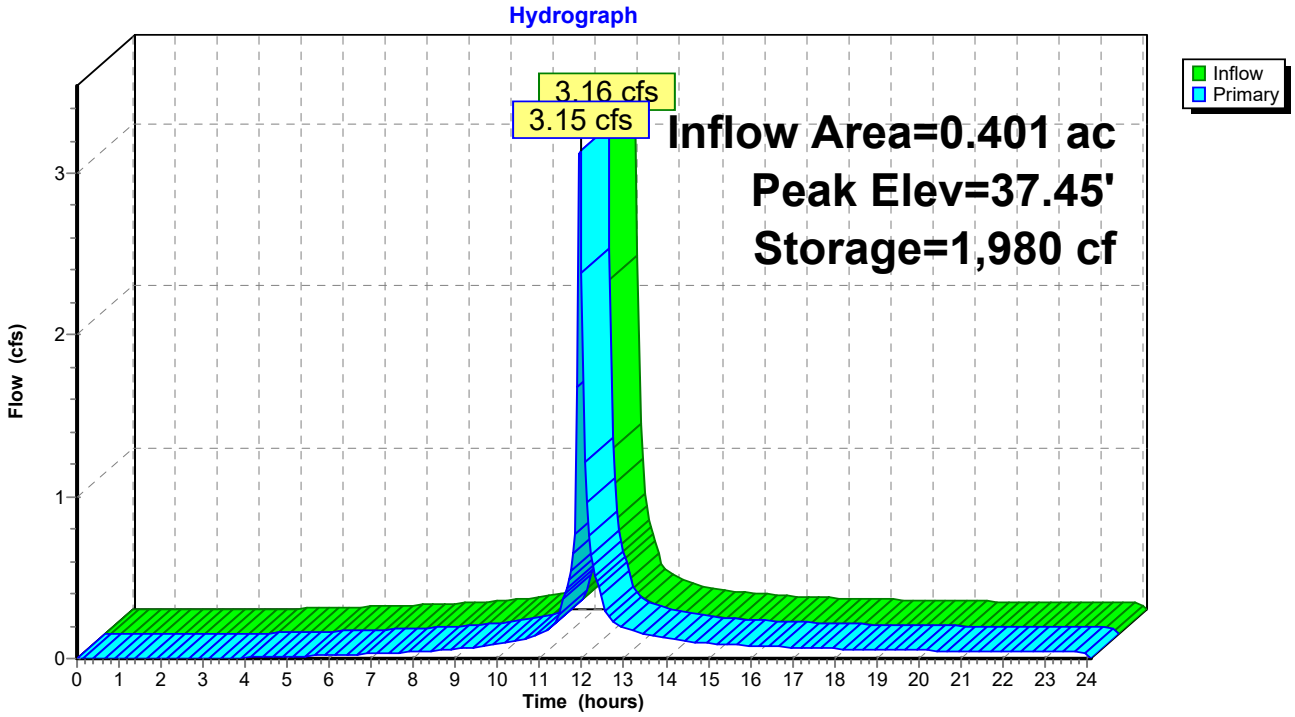
Volume	Invert	Avail.Storage	Storage Description
#1	35.00'	2,903 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
35.00	166	238.0	0	0	166
36.00	681	264.0	394	394	1,235
37.00	1,259	291.0	955	1,350	2,459
37.50	1,554	298.0	702	2,052	2,819
38.00	1,856	304.0	851	2,903	3,143

Device	Routing	Invert	Outlet Devices
#1	Primary	37.40'	**2.4" x 4.0" Horiz. Orifice/Grate X 8.00 columns** X 9 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.92 cfs @ 11.96 hrs HW=37.45' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 2.92 cfs @ 0.74 fps)

Pond 21SA: Water Quality Basin



Summary for Pond 22SB: Underground 22

Inflow Area = 0.370 ac, 78.90% Impervious, Inflow Depth > 5.95" for 50-yr event
Inflow = 2.60 cfs @ 12.04 hrs, Volume= 0.183 af
Outflow = 0.99 cfs @ 12.21 hrs, Volume= 0.170 af, Atten= 62%, Lag= 10.5 min
Discarded = 0.12 cfs @ 12.21 hrs, Volume= 0.143 af
Primary = 0.86 cfs @ 12.21 hrs, Volume= 0.028 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Peak Elev= 38.58' @ 12.21 hrs Surf.Area= 0.072 ac Storage= 0.055 af

Plug-Flow detention time= 156.6 min calculated for 0.170 af (93% of inflow)
Center-of-Mass det. time= 115.6 min (902.9 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	37.00'	0.034 af	**27.00'W x 116.39'L x 2.00'H Field A** 0.144 af Overall - 0.030 af Embedded = 0.114 af x 30.0% Voids
#2A	37.50'	0.030 af	**ADS_StormTech SC-160LP +Cap** x 192 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 192 Chambers in 12 Rows
		0.064 af	Total Available Storage

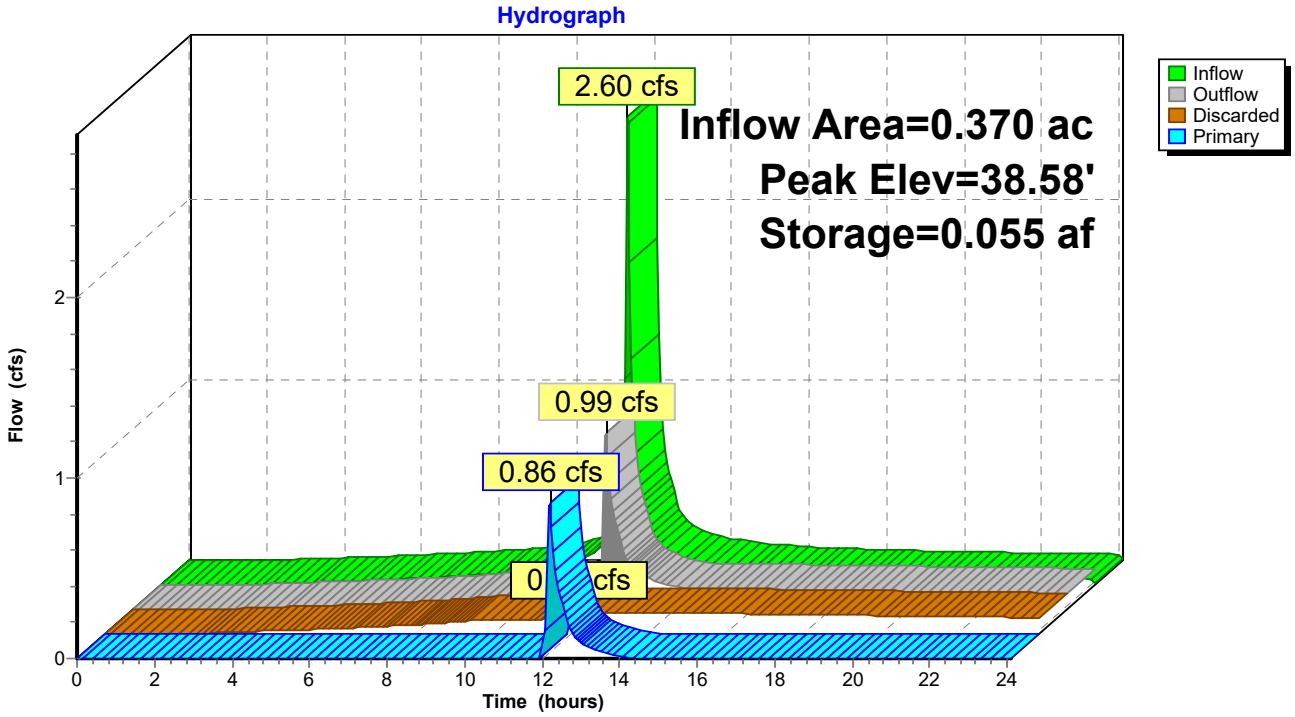
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 34.00'
#2	Primary	38.40'	**4.0' long + 1.0 '/' SideZ x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.12 cfs @ 12.21 hrs HW=38.57' (Free Discharge)
1=Exfiltration (Controls 0.12 cfs)

Primary OutFlow Max=0.81 cfs @ 12.21 hrs HW=38.57' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 0.81 cfs @ 1.11 fps)

Pond 22SB: Underground 22



Time span=0.00-24.10 hrs, dt=0.05 hrs, 483 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 20: PRWS 20 Runoff Area=46,530 sf 68.29% Impervious Runoff Depth>6.34"
Tc=6.0 min CN=86 Runoff=8.10 cfs 0.564 af

Subcatchment 21: PRWS 21 Runoff Area=17,460 sf 64.15% Impervious Runoff Depth>6.22"
Tc=0.0 min CN=85 Runoff=3.63 cfs 0.208 af

Subcatchment 22: PRWS 22 Runoff Area=16,110 sf 78.90% Impervious Runoff Depth>6.81"
Tc=6.0 min CN=90 Runoff=2.94 cfs 0.210 af

Pond 20S: Water Quality Basin Peak Elev=34.74' Storage=11,800 cf Inflow=9.97 cfs 0.816 af
Outflow=6.64 cfs 0.750 af

Pond 21SA: Water Quality Basin Peak Elev=37.46' Storage=1,988 cf Inflow=3.63 cfs 0.208 af
Outflow=3.59 cfs 0.208 af

Pond 22SB: Underground 22 Peak Elev=38.67' Storage=0.057 af Inflow=2.94 cfs 0.210 af
Discarded=0.13 cfs 0.149 af Primary=1.55 cfs 0.044 af Outflow=1.68 cfs 0.193 af

Total Runoff Area = 1.839 ac Runoff Volume = 0.982 af Average Runoff Depth = 6.41"
30.48% Pervious = 0.560 ac 69.52% Impervious = 1.278 ac

Summary for Subcatchment 20: PRWS 20

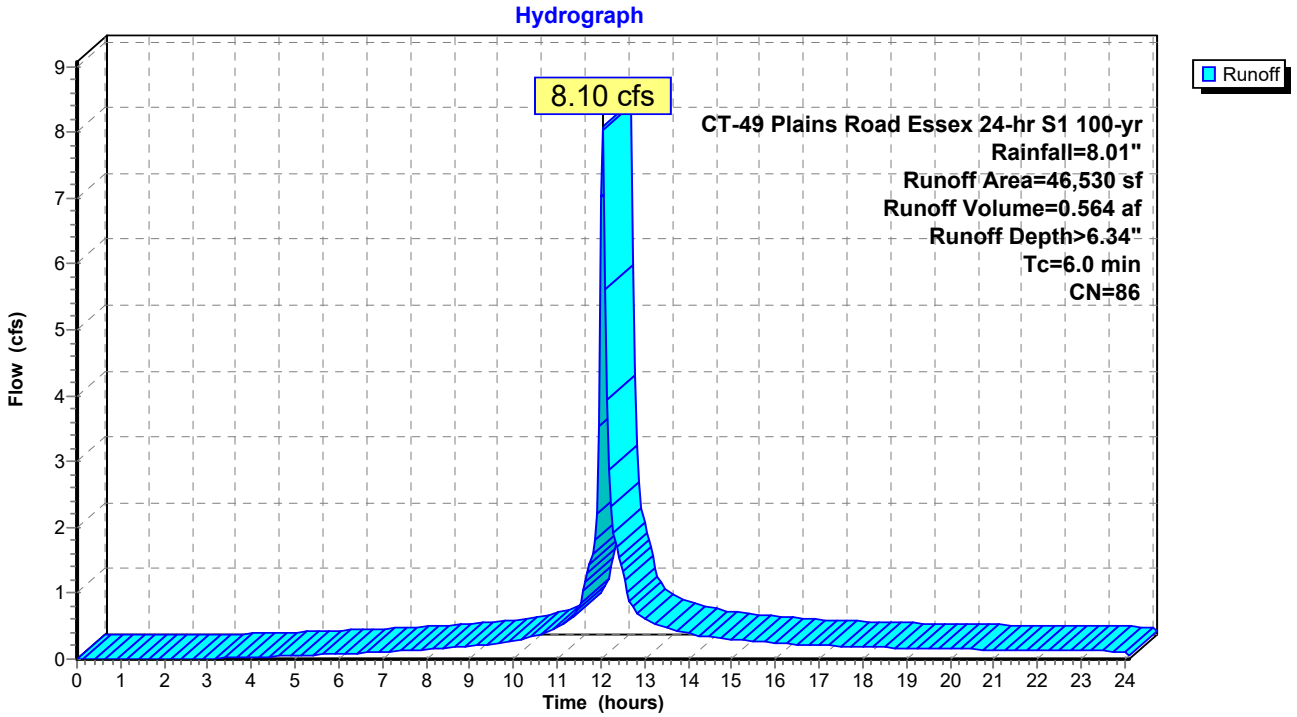
Runoff = 8.10 cfs @ 12.04 hrs, Volume= 0.564 af, Depth> 6.34"
Routed to Pond 20S : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 100-yr Rainfall=8.01"

Area (sf)	CN	Description
14,755	61	>75% Grass cover, Good, HSG B
29,400	98	Paved parking, HSG B
2,375	98	Unconnected roofs, HSG B
46,530	86	Weighted Average
14,755		31.71% Pervious Area
31,775		68.29% Impervious Area
2,375		7.47% Unconnected

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

Subcatchment 20: PRWS 20



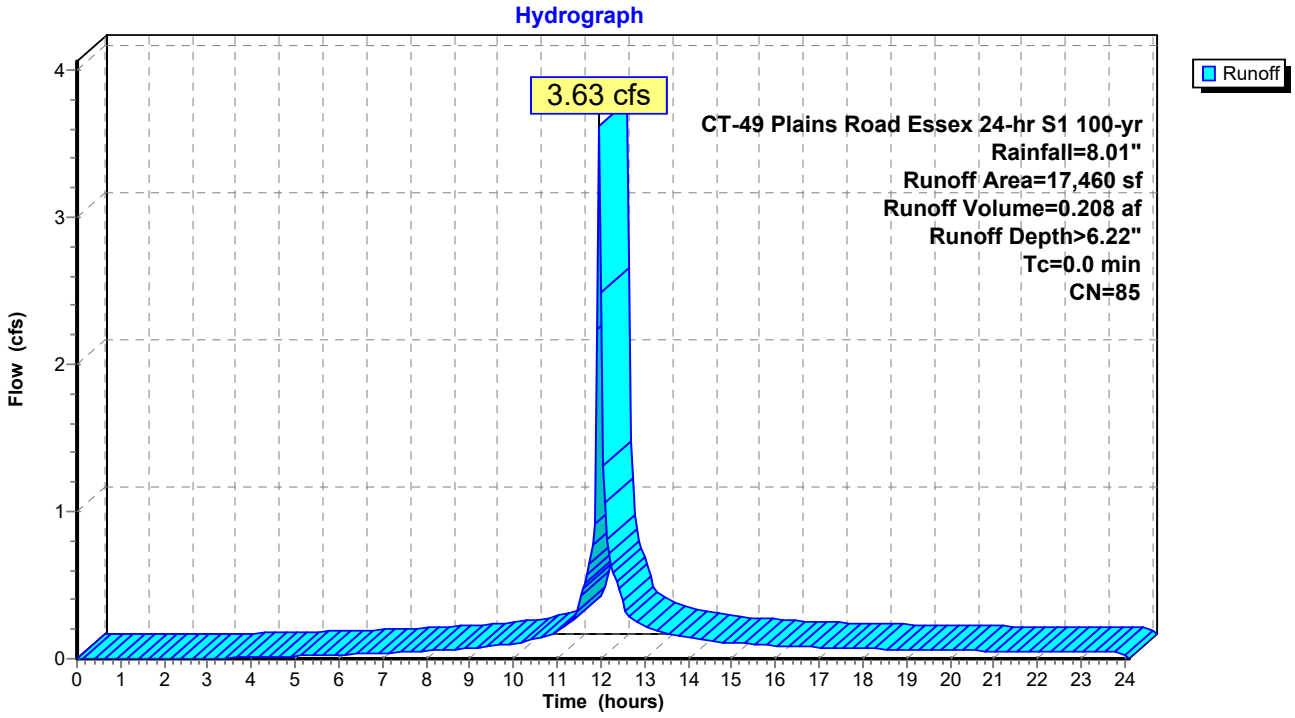
Summary for Subcatchment 21: PRWS 21

Runoff = 3.63 cfs @ 11.95 hrs, Volume= 0.208 af, Depth> 6.22"
Routed to Pond 21SA : Water Quality Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 100-yr Rainfall=8.01"

Area (sf)	CN	Description
6,260	61	>75% Grass cover, Good, HSG B
11,200	98	Paved parking, HSG B
17,460	85	Weighted Average
6,260		35.85% Pervious Area
11,200		64.15% Impervious Area

Subcatchment 21: PRWS 21



Summary for Subcatchment 22: PRWS 22

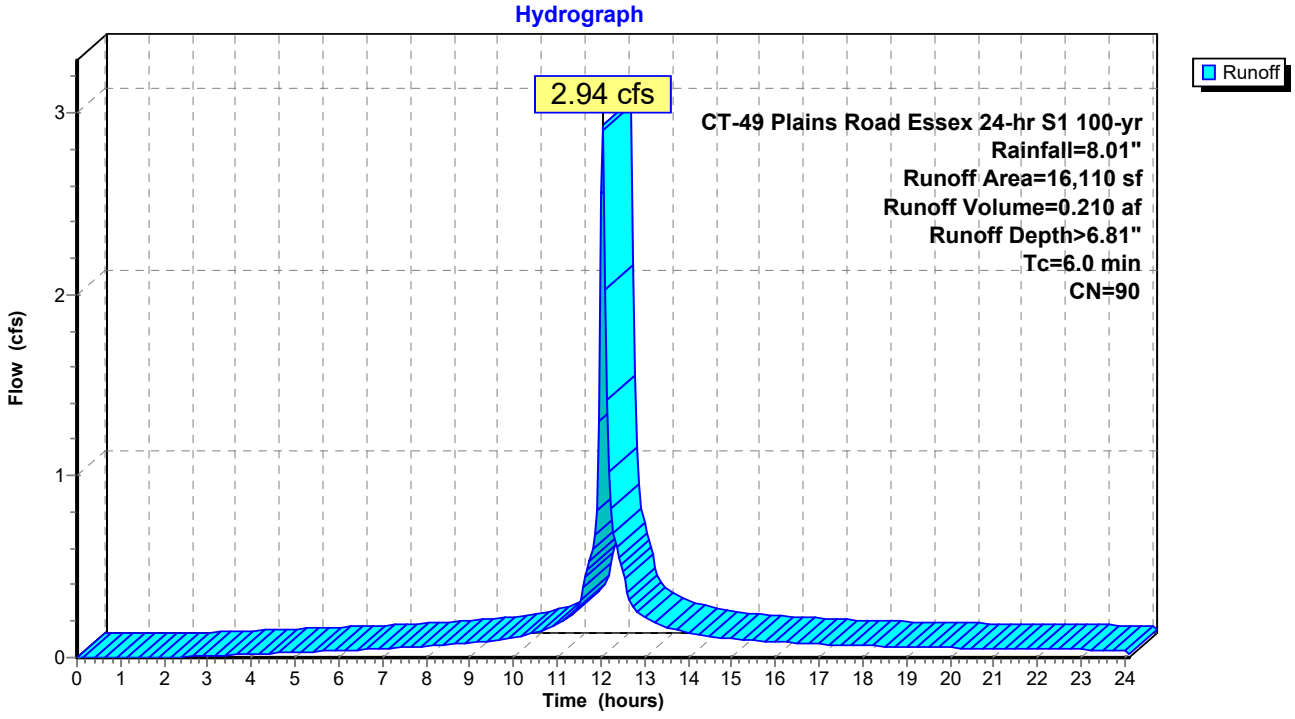
Runoff = 2.94 cfs @ 12.04 hrs, Volume= 0.210 af, Depth> 6.81"
Routed to Pond 22SB : Underground 22

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
CT-49 Plains Road Essex 24-hr S1 100-yr Rainfall=8.01"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
210	98	Paved parking, HSG B
3,400	61	>75% Grass cover, Good, HSG B
16,110	90	Weighted Average
3,400		21.10% Pervious Area
12,710		78.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. TR-55 TC**

Subcatchment 22: PRWS 22



Summary for Pond 20S: Water Quality Basin

Inflow Area = 1.839 ac, 69.52% Impervious, Inflow Depth > 5.32" for 100-yr event
Inflow = 9.97 cfs @ 12.02 hrs, Volume= 0.816 af
Outflow = 6.64 cfs @ 12.15 hrs, Volume= 0.750 af, Atten= 33%, Lag= 7.8 min
Primary = 6.64 cfs @ 12.15 hrs, Volume= 0.750 af
Routed to nonexistent node 30

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 32.80' Surf.Area= 3,942 sf Storage= 2,955 cf
Peak Elev= 34.74' @ 12.15 hrs Surf.Area= 5,178 sf Storage= 11,800 cf (8,846 cf above start)

Plug-Flow detention time= 150.1 min calculated for 0.682 af (84% of inflow)
Center-of-Mass det. time= 51.2 min (846.4 - 795.3)

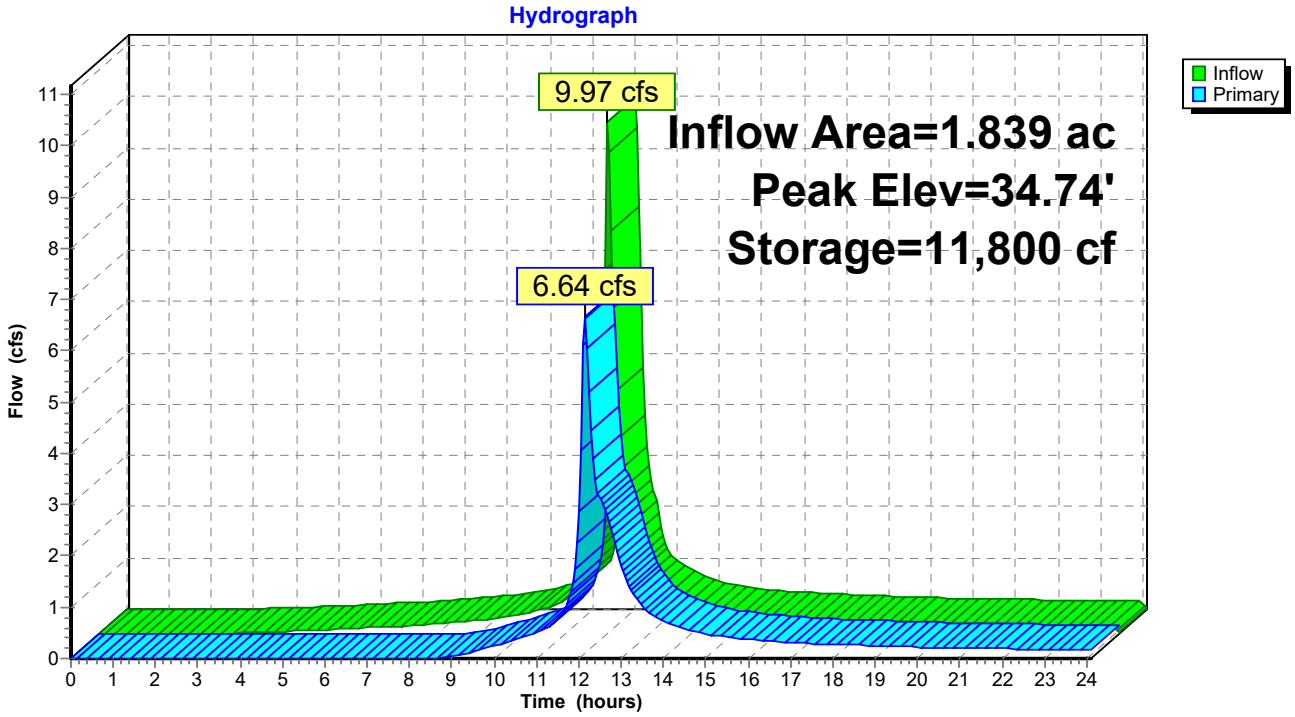
Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	13,158 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
32.00	3,450	299.0	0	0	3,450
33.00	4,070	311.0	3,756	3,756	4,108
34.00	4,700	322.0	4,381	8,137	4,746
35.00	5,350	335.0	5,021	13,158	5,501

Device	Routing	Invert	Outlet Devices
#1	Primary	34.50'	**10.0' long + 0.5 '/' SideZ x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	33.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.62 cfs @ 12.15 hrs HW=34.74' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 2.95 cfs @ 1.21 fps)
2=Orifice/Grate (Orifice Controls 3.67 cfs @ 4.67 fps)

Pond 20S: Water Quality Basin



Summary for Pond 21SA: Water Quality Basin

Inflow Area = 0.401 ac, 64.15% Impervious, Inflow Depth > 6.22" for 100-yr event
Inflow = 3.63 cfs @ 11.95 hrs, Volume= 0.208 af
Outflow = 3.59 cfs @ 11.96 hrs, Volume= 0.208 af, Atten= 1%, Lag= 0.3 min
Primary = 3.59 cfs @ 11.96 hrs, Volume= 0.208 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Starting Elev= 37.40' Surf.Area= 1,493 sf Storage= 1,899 cf
Peak Elev= 37.46' @ 11.96 hrs Surf.Area= 1,528 sf Storage= 1,988 cf (89 cf above start)

Plug-Flow detention time= 157.3 min calculated for 0.164 af (79% of inflow)
Center-of-Mass det. time= 0.6 min (796.8 - 796.2)

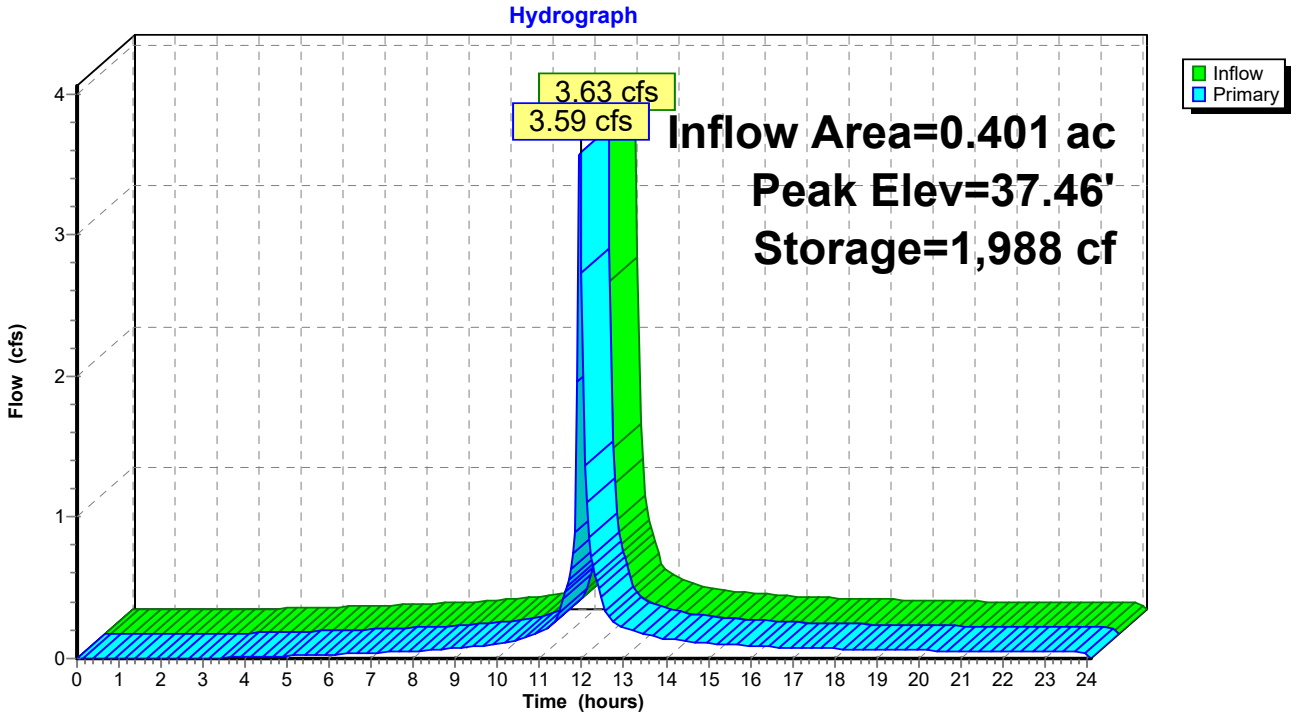
Volume	Invert	Avail.Storage	Storage Description
#1	35.00'	2,903 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
35.00	166	238.0	0	0	166
36.00	681	264.0	394	394	1,235
37.00	1,259	291.0	955	1,350	2,459
37.50	1,554	298.0	702	2,052	2,819
38.00	1,856	304.0	851	2,903	3,143

Device	Routing	Invert	Outlet Devices
#1	Primary	37.40'	**2.4" x 4.0" Horiz. Orifice/Grate X 8.00 columns** X 9 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.39 cfs @ 11.96 hrs HW=37.46' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 3.39 cfs @ 0.78 fps)

Pond 21SA: Water Quality Basin



Summary for Pond 22SB: Underground 22

Inflow Area = 0.370 ac, 78.90% Impervious, Inflow Depth > 6.81" for 100-yr event
Inflow = 2.94 cfs @ 12.04 hrs, Volume= 0.210 af
Outflow = 1.68 cfs @ 12.15 hrs, Volume= 0.193 af, Atten= 43%, Lag= 6.6 min
Discarded = 0.13 cfs @ 12.15 hrs, Volume= 0.149 af
Primary = 1.55 cfs @ 12.15 hrs, Volume= 0.044 af
Routed to Pond 20S : Water Quality Basin

Routing by Stor-Ind method, Time Span= 0.00-24.10 hrs, dt= 0.05 hrs
Peak Elev= 38.67' @ 12.15 hrs Surf.Area= 0.072 ac Storage= 0.057 af

Plug-Flow detention time= 145.2 min calculated for 0.192 af (91% of inflow)
Center-of-Mass det. time= 98.0 min (881.1 - 783.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	37.00'	0.034 af	**27.00'W x 116.39'L x 2.00'H Field A** 0.144 af Overall - 0.030 af Embedded = 0.114 af x 30.0% Voids
#2A	37.50'	0.030 af	**ADS_StormTech SC-160LP +Cap** x 192 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 192 Chambers in 12 Rows
		0.064 af	Total Available Storage

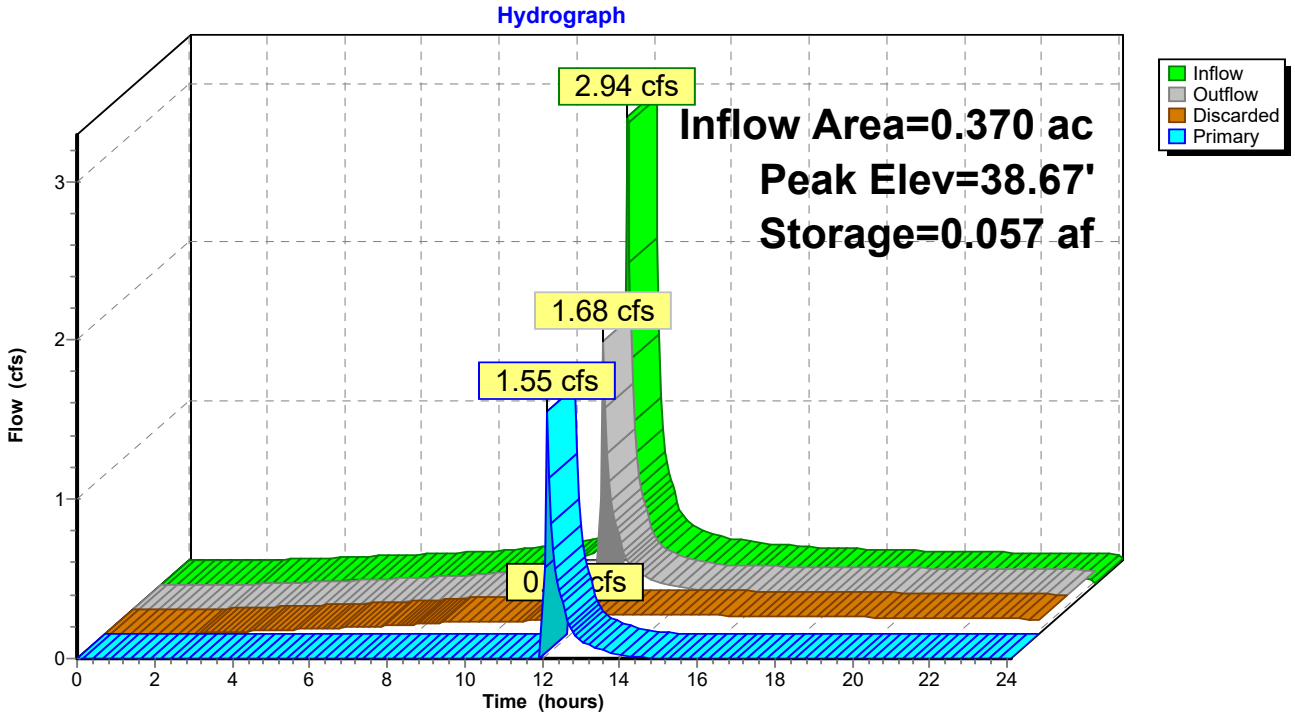
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 34.00'
#2	Primary	38.40'	**4.0' long + 1.0 '/' SideZ x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.13 cfs @ 12.15 hrs HW=38.66' (Free Discharge)
1=Exfiltration (Controls 0.13 cfs)

Primary OutFlow Max=1.55 cfs @ 12.15 hrs HW=38.66' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 1.55 cfs @ 1.37 fps)

Pond 22SB: Underground 22



Appendix C
Pipe Capacity Calculations

DATE	REVISION	CK.
12/12/22	TOWN COMMENTS	
01/06/23	TOWN COMMENTS	
02/06/23	TOWN COMMENTS	

PROPOSED WATERSHED BOUNDARY

WS 21

WS 20

WS 22

WS 22

37.17

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

DOANE ENGINEERING

CIVIL ENGINEERING AND LAND SURVEYING

P.O. BOX 113 CENTERBROOK, CONNECTICUT 06409

TEL: (860)767-0138, FAX: (860)767-9104

CATCH BASIN CATCHMENT AREAS

PREPARED FOR

PIAGE MANAGEMENT CORP

#49 PLAINS ROAD ,ESSEX , CONNECTICUT

SCALE:	DATE:	SHEET NO.:	IDENT. NO.:
1"=40'	11/29/22	1 OF 1	

FILE:R:\DRAWINGS\TOWNS\ESSEX\ESSEX\PLAINS ROAD\PIAGENTINI-2008\Hydro CB Areas.dwg

Rational Method Individual Basin Calculations

Catch Basin and Area Drain Runoff Coefficients

Basin Name	Impervious Area C=0.9 (sf)	Grass Area C=0.3 (sf)	Wooded Area C=0.2 (sf)	Total Area (sf)	Total Area (ac)	Weighted C	Tc to Inlet (min)
CCB 3	9,950	0	0	9,950	0.23	0.90	5.0
CCB 4	2,610	250	0	2,860	0.07	0.85	5.0
CLCB 5	19,000	0	0	19,000	0.44	0.90	5.0
CCB 9	1,176	175	0	1,351	0.03	0.82	5.0
CCB 15	1,275	175	0	1,450	0.03	0.83	5.0
CCB 16	7,088	0	0	7,088	0.16	0.90	5.0
CCB 17	1,668	175	0	1,843	0.04	0.84	5.0
YD 17A	0	1500	0	1,500	0.03	0.30	5.0
YD 11A	2,660	3320	0	5,980	0.14	0.57	5.0

Roof Drainage Pipe Calculations

Q = C x I x A, Where:

C = Runoff Coefficient

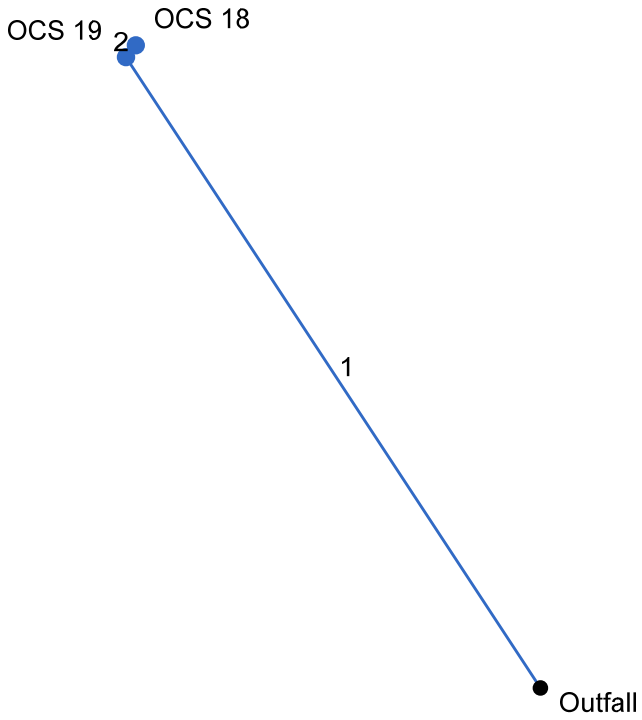
I = Rainfall Intensity (in/hr)

A = Area (acres)

Q = Flow (cfs)

	MH 9	MH 10	MH 11	MH 12
C	0.90	0.90	0.90	0.90
I	8.83	8.83	8.83	8.83
A	0.06	0.06	0.06	0.06
Q	0.48	0.48	0.48	0.48

System 20 OCS 100 YR



Project File: System 20 Outlet.stm	Number of lines: 2	Date: 2/9/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	196.000	-123.199	MH	1.55	0.00	0.00	0.0	32.50	0.77	34.00	15	Cir	0.013	0.96	39.90	OCS 19-FES 20
2	1	4.000	72.809	MH	3.59	0.00	0.00	0.0	34.00	5.00	34.20	15	Cir	0.013	1.00	37.40	OCS 18-OCS 19

System 20 OCS 100 YR | Number of lines: 2 | Date: 2/9/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	196.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.14	5.65	4.19	15	0.77	32.50	34.00	34.74	35.98	33.75	39.90	OCS 19-FES 20
2	1	4.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.59	14.44	2.93	15	5.00	34.00	34.20	36.24	36.26	39.90	37.40	OCS 18-OCS 19

System 20 OCS 100 YR | Number of lines: 2 | Run Date: 2/9/2023

NOTES:Intensity = 50.44 / (Inlet time + 3.60) ^ 0.70; Return period =Yrs. 100 ; c = cir e = ellip b = box

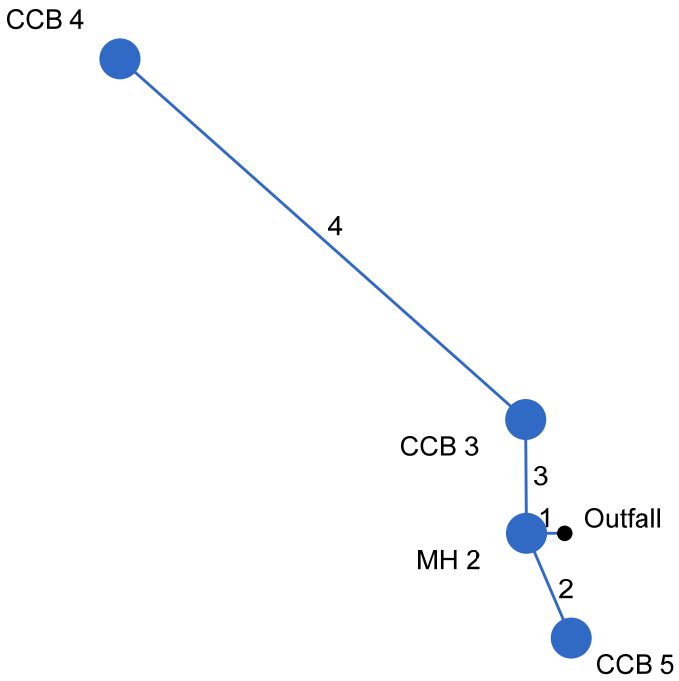
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	5.14	32.50	34.74	1.25	1.23	4.19	0.27	35.01	0.634	196.000	34.00	35.98	1.25	1.23	4.19	0.27	36.25	0.634	0.634	1.242	0.96	0.26
2	15	3.59	34.00	36.24	1.25	1.23	2.93	0.13	36.38	0.309	4.000	34.20	36.26	1.25	1.23	2.93	0.13	36.39	0.309	0.309	0.012	1.00	0.13

System 20 OCS 100 YR | Number of lines: 2 | Run Date: 2/9/2023

; c = cir e = ellip b = box

System 20 25 YR



Project File: System 20.stm	Number of lines: 4	Date: 2/9/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	4.000	180.000	MH	0.00	0.00	0.00	0.0	32.30	5.00	32.50	15	Cir	0.013	1.00	35.80	MH2-FES1
2	1	12.000	-112.962	Comb	0.00	0.44	0.90	5.0	32.50	1.67	32.70	15	Cir	0.013	1.00	35.40	CCB 5-MH 2
3	1	12.000	89.593	Comb	0.00	0.23	0.90	5.0	32.50	1.67	32.70	15	Cir	0.013	1.17	35.80	CCB 3-MH 2
4	3	57.000	-47.735	Comb	0.00	0.07	0.85	5.0	32.70	1.93	33.80	15	Cir	0.013	1.00	36.10	CCB 4-CCB 3

System 20 25 YR | Number of lines: 4 | Date: 2/9/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	4.000	0.00	0.74	0.00	0.00	0.66	0.0	7.2	7.5	4.98	14.44	4.06	15	5.00	32.30	32.50	34.49	34.51	33.25	35.80	MH2-FES1
2	1	12.000	0.44	0.44	0.90	0.40	0.40	5.0	5.0	8.8	3.49	8.34	2.84	15	1.67	32.50	32.70	34.77	34.80	35.80	35.40	CCB 5-MH 2
3	1	12.000	0.23	0.30	0.90	0.21	0.27	5.0	7.1	7.6	2.02	8.34	1.64	15	1.67	32.50	32.70	34.77	34.78	35.80	35.80	CCB 3-MH 2
4	3	57.000	0.07	0.07	0.85	0.06	0.06	5.0	5.0	8.8	0.52	8.97	0.45	15	1.93	32.70	33.80	34.83	34.83	35.80	36.10	CCB 4-CCB 3

System 20 25 YR | Number of lines: 4 | Run Date: 2/9/2023

NOTES:Intensity = 40.94 / (Inlet time + 3.80) ^ 0.71; Return period =Yrs. 25 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	MH 2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	CCB 5	3.49	0.00	3.49	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.00	0.010	0.010	0.000	0.37	36.70	0.37	36.70	0.0	Off
3	CCB 3	1.82	0.26	2.09	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.00	0.010	0.010	0.000	0.26	26.32	0.26	26.32	0.0	Off
4	CCB 4	0.52	0.00	0.26	0.26	Comb	4.0	2.73	0.00	2.31	1.35	0.010	2.00	0.010	0.010	0.013	0.08	8.07	0.06	6.24	0.0	3

System 20 25 YR | Number of lines: 4 | Run Date: 2/9/2023

NOTES: Inlet N-Values = 0.016; Intensity = 40.94 / (Inlet time + 3.80) ^ 0.71; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

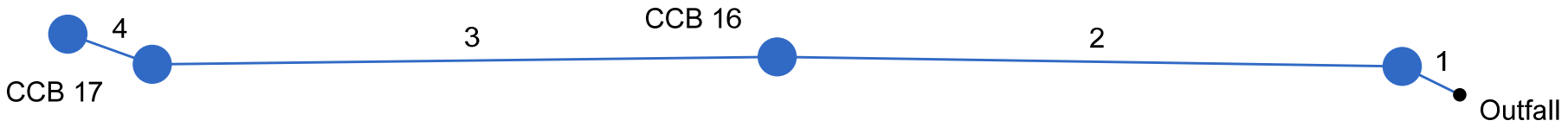
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	15	4.98	32.30	34.49	1.25	1.23	4.06	0.26	34.75	0.595	4.000	32.50	34.51	1.25	1.23	4.06	0.26	34.77	0.594	0.594	0.024	1.00	0.26
2	15	3.49	32.50	34.77	1.25	1.23	2.84	0.13	34.90	0.291	12.000	32.70	34.80	1.25	1.23	2.84	0.13	34.93	0.291	0.291	0.035	1.00	0.13
3	15	2.02	32.50	34.77	1.25	1.23	1.65	0.04	34.81	0.098	12.000	32.70	34.78	1.25	1.23	1.64	0.04	34.82	0.098	0.098	0.012	1.17	0.05
4	15	0.52	32.70	34.83	1.25	1.23	0.43	0.00	34.83	0.007	57.000	33.80	34.83	1.03	1.09	0.48	0.00	34.84	0.006	0.007	0.004	1.00	0.00

System 20 25 YR | Number of lines: 4 | Run Date: 2/9/2023

; c = cir e = ellip b = box

System 21A 25 YR



Project File: System 21A.stm	Number of lines: 4	Date: 2/9/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	7.000	-153.538	MH	0.00	0.03	0.83	5.0	35.10	1.43	35.20	12	Cir	0.013	0.49	38.40	CCB 15-FES 14
2	1	68.000	-25.581	Comb	0.00	0.16	0.90	5.0	35.20	0.59	35.60	12	Cir	0.013	0.50	38.40	CCB 16-CCB 15
3	2	68.000	-1.565	Comb	0.00	0.04	0.84	5.0	35.60	0.59	36.00	12	Cir	0.013	0.61	38.40	CCB 17-CCB 16
4	3	9.768	20.530	DrGrt	0.00	0.03	0.30	5.0	36.00	1.02	36.10	6	Cir	0.011	1.00	36.80	YD 17A-CCB 17

System 21A 25 YR | Number of lines: 4 | Date: 2/9/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	7.000	0.03	0.26	0.83	0.02	0.21	5.0	8.5	6.9	1.47	4.26	1.87	12	1.43	35.10	35.20	37.45	37.46	36.10	38.40	CCB 15-FES 14
2	1	68.000	0.16	0.23	0.90	0.14	0.19	5.0	7.9	7.2	1.35	2.73	1.71	12	0.59	35.20	35.60	37.49	37.59	38.40	38.40	CCB 16-CCB 15
3	2	68.000	0.04	0.07	0.84	0.03	0.04	5.0	5.4	8.5	0.36	2.73	0.46	12	0.59	35.60	36.00	37.61	37.62	38.40	38.40	CCB 17-CCB 16
4	3	9.768	0.03	0.03	0.30	0.01	0.01	5.0	5.0	8.8	0.08	0.67	0.40	6	1.02	36.00	36.10	37.62	37.62	38.40	36.80	YD 17A-CCB 17

System 21A 25 YR | Number of lines: 4 | Run Date: 2/9/2023

NOTES:Intensity = 40.94 / (Inlet time + 3.80) ^ 0.71; Return period =Yrs. 25 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1		0.22	0.00	0.00	0.22	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	CCB 16	1.27	0.00	1.27	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.00	0.028	0.028	0.000	0.21	7.43	0.21	7.43	0.0	Off
3	CCB 17	0.30	0.00	0.30	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.00	0.028	0.028	0.000	0.09	3.39	0.09	3.39	0.0	Off
4		0.08	0.00	0.08	0.00	DrGrt	4.0	4.00	2.00	2.00	2.00	Sag	2.00	0.050	0.020	0.013	0.02	4.21	0.02	4.21	0.0	3

System 21A 25 YR | Number of lines: 4 | Run Date: 2/9/2023

NOTES: Inlet N-Values = 0.016; Intensity = 40.94 / (Inlet time + 3.80) ^ 0.71; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

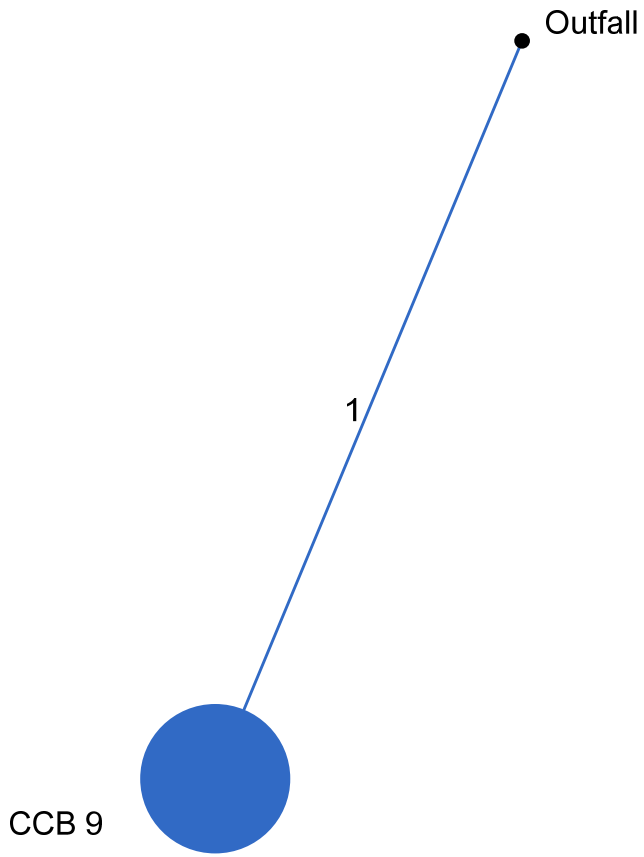
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	12	1.47	35.10	37.45	1.00	0.79	1.87	0.05	37.50	0.170	7.000	35.20	37.46	1.00	0.79	1.87	0.05	37.52	0.170	0.170	0.012	0.49	0.03
2	12	1.35	35.20	37.49	1.00	0.79	1.72	0.05	37.53	0.143	68.000	35.60	37.59	1.00	0.79	1.71	0.05	37.63	0.143	0.143	0.097	0.50	0.02
3	12	0.36	35.60	37.61	1.00	0.79	0.46	0.00	37.61	0.010	68.000	36.00	37.62	1.00	0.79	0.46	0.00	37.62	0.010	0.010	0.007	0.61	0.00
4	6	0.08	36.00	37.62	0.50	0.20	0.40	0.00	37.62	0.014	9.768	36.10	37.62	0.50	0.20	0.40	0.00	37.62	0.014	0.014	0.001	1.00	0.00

System 21A 25 YR | Number of lines: 4 | Run Date: 2/9/2023

; c = cir e = ellip b = box

System 21B 25 YR



Project File: System 21B.stm	Number of lines: 1	Date: 2/6/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	22.000	112.279	Comb	0.00	0.90	0.44	5.0	35.20	1.82	35.60	12	Cir	0.013	1.00	37.80	CCB 9-FES 8

System 21B 25 YR | Number of lines: 1 | Date: 2/6/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	22.000	0.90	0.90	0.44	0.40	0.40	5.0	5.0	8.8	3.49	4.80	4.44	12	1.82	35.20	35.60	37.45	37.66	36.20	37.80	CCB 9-FES 8

System 21B 25 YR | Number of lines: 1 | Run Date: 2/6/2023

NOTES:Intensity = 40.94 / (Inlet time + 3.80) ^ 0.71; Return period =Yrs. 25 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CCB 9	3.49	0.00	1.38	2.10	Comb	4.0	2.73	0.00	1.35	2.31	0.040	2.00	0.010	0.010	0.013	0.13	12.67	0.10	10.49	0.0	Off

System 21B 25 YR | Number of lines: 1 | Run Date: 2/6/2023

NOTES: Inlet N-Values = 0.016; Intensity = 40.94 / (Inlet time + 3.80) ^ 0.71; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

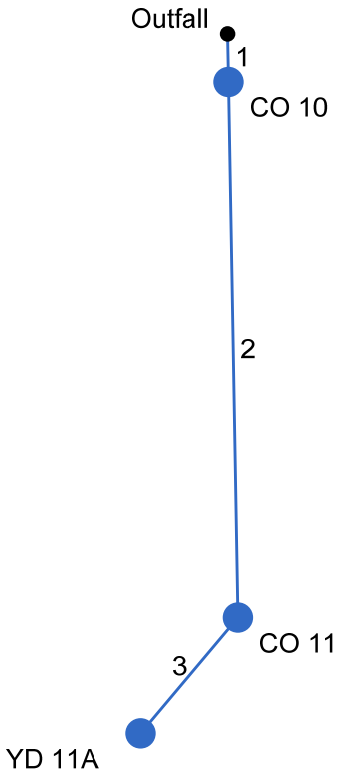
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	12	3.49	35.20	37.45	1.00	0.79	4.44	0.31	37.76	0.958	22.000	35.60	37.66	1.00	0.79	4.44	0.31	37.97	0.958	0.958	0.211	1.00	0.31

System 21B 25 YR | Number of lines: 1 | Run Date: 2/6/2023

; c = cir e = ellip b = box

System 22A 25 YR



Project File: System 22A.stm	Number of lines: 3	Date: 2/9/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	7.000	88.960	MH	0.48	0.00	0.00	0.0	37.50	1.43	37.60	8	Cir	0.010	0.15	40.00	CO 10-UG 22SB
2	1	78.000	0.034	MH	0.48	0.00	0.00	0.0	37.60	0.51	38.00	8	Cir	0.010	0.70	40.00	CO 11-CO 10
3	2	22.000	40.954	Grate	0.00	0.14	0.57	5.0	38.00	0.91	38.20	8	Cir	0.010	1.00	39.50	YD 11A-CO 11

System 22A 25 YR | Number of lines: 3 | Date: 2/9/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	7.000	0.00	0.14	0.00	0.00	0.08	0.0	5.6	8.4	1.63	1.88	4.68	8	1.43	37.50	37.60	38.50	38.58	38.50	40.00	CO 10-UG 22SB
2	1	78.000	0.00	0.14	0.00	0.00	0.08	0.0	5.2	8.7	1.17	1.12	3.36	8	0.51	37.60	38.00	38.63	39.06	40.00	40.00	CO 11-CO 10
3	2	22.000	0.14	0.14	0.57	0.08	0.08	5.0	5.0	8.8	0.70	1.50	2.01	8	0.91	38.00	38.20	39.18	39.23	40.00	39.50	YD 11A-CO 11

System 22A 25 YR | Number of lines: 3 | Run Date: 2/9/2023

NOTES:Intensity = 40.94 / (Inlet time + 3.80) ^ 0.71; Return period =Yrs. 25 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CO 10	0.48*	0.48	0.00	0.96	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
2	CO 11	0.48*	0.00	0.00	0.48	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	1
3	YD 11A	0.70	0.00	0.70	0.00	Grate	0.0	0.00	2.00	2.00	2.00	Sag	2.00	0.050	0.020	0.013	0.16	5.25	0.16	5.25	0.0	2

System 22A 25 YR | Number of lines: 3 | Run Date: 2/9/2023

NOTES: Inlet N-Values = 0.016; Intensity = 40.94 / (Inlet time + 3.80) ^ 0.71; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

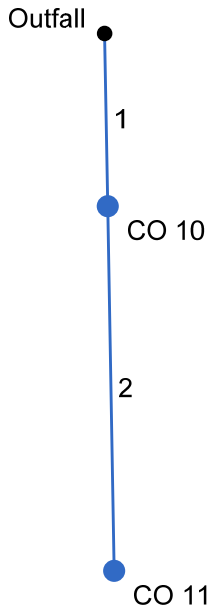
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	8	1.63	37.50	38.50	0.67	0.35	4.68	0.34	38.84	1.081	7.000	37.60	38.58	0.67	0.35	4.68	0.34	38.92	1.080	1.081	0.076	0.15	0.05
2	8	1.17	37.60	38.63	0.67	0.35	3.36	0.18	38.80	0.558	78.000	38.00	39.06	0.67	0.35	3.36	0.18	39.24	0.558	0.558	0.435	0.70	0.12
3	8	0.70	38.00	39.18	0.67	0.35	2.01	0.06	39.25	0.200	22.000	38.20	39.23	0.67	0.35	2.01	0.06	39.29	0.200	0.200	0.044	1.00	0.06

System 22A 25 YR | Number of lines: 3 | Run Date: 2/9/2023

; c = cir e = ellip b = box

System 22B 25 YR



Project File: System 22B.stm	Number of lines: 2	Date: 2/9/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	36.000	88.960	MH	0.48	0.00	0.00	0.0	37.50	0.56	37.70	8	Cir	0.010	0.15	40.00	CO 12-UG 22SB
2	1	76.000	0.034	MH	0.48	0.00	0.00	0.0	37.70	0.66	38.20	8	Cir	0.010	1.00	40.00	CO 13-CO 12

System 22B 25 YR | Number of lines: 2 | Date: 2/9/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	36.000	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	0.96	1.17	2.75	8	0.56	37.50	37.70	38.50	38.63	38.50	40.00	CO 12-UG 22SB
2	1	76.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.48	1.27	1.52	8	0.66	37.70	38.20	38.65	38.71	40.00	40.00	CO 13-CO 12

System 22B 25 YR | Number of lines: 2 | Run Date: 2/9/2023

NOTES:Intensity = 40.94 / (Inlet time + 3.80) ^ 0.71; Return period =Yrs. 25 ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	8	0.96	37.50	38.50	0.67	0.35	2.75	0.12	38.62	0.374	36.000	37.70	38.63	0.67	0.35	2.75	0.12	38.75	0.374	0.374	0.135	0.15	0.02
2	8	0.48	37.70	38.65	0.67	0.35	1.38	0.03	38.68	0.094	76.000	38.20	38.71	0.51	0.29	1.66	0.04	38.76	0.105	0.099	0.076	1.00	0.04

System 22B 25 YR | Number of lines: 2 | Run Date: 2/9/2023

; c = cir e = ellip b = box

Outlet Protection Calculations

Outlet I.D. **FES 1**

*Based on Connecticut DOT Drainage Manual, Section 11.13

Description:

FES 1

Design Criteria (25-yr Storm Event):

Q (cfs) =	4.98	R_p (ft)=	1.25
D (in) =	15	S_p (ft) =	1.25
V (fps) =	4.06	Tw (ft)=	2.19

Q= Flow rate at discharge point in cubic feet per second (cfs)

D= Outlet pipe diameter (in)

V= Flow velocity at discharge point (ft/s)

R_p= Maximum inside pipe rise (ft)

S_p= inside diametere for circular sections of maximum inside pipe span for non-circular sections (ft)

T_w= Tailwater depth (ft)

Based on **Table 11-13.1** use Type 'B' ---> TW≥ 0.5 Rp

Rip Rap Stone Size:

Velocity	Rip Rap Specification	D_{50} Stone Size
0-8 fps	Modified	5 inches

Preformed Scour Hole Dimensions:

F(ft)=0.5(R_p)	=	n/a
C(ft)=3.0(S_p)+6.0(F)	=	n/a
B(ft)=2.0(S_p)+6.0(F)	=	n/a

Rip Rap Splash Pad Dimensions:

L_a	=	10	ft
W1 = 3.0(S_p) min.	=	4	ft
W2 = 3.0(Sp)+0.4(La) min.	=	8	ft
d (Depth of Stone)	=	12	inches

Outlet Protection Calculations

Outlet I.D. **FES 8**

*Based on Connecticut DOT Drainage Manual, Section 11.13

Description:

FES 8

Design Criteria (25-yr Storm Event):

Q (cfs) =	3.49	R_p (ft)=	1
D (in) =	12	S_p (ft) =	1
V (fps) =	4.44	Tw (ft)=	2.25

Q= Flow rate at discharge point in cubic feet per second (cfs)
D= Outlet pipe diameter (in)
V= Flow velocity at discharge point (ft/s)
R_p= Maximum inside pipe rise (ft)
S_p= inside diametere for circular sections of maximum inside pipe span for non-circular sections (ft)
T_w= Tailwater depth (ft)

Based on **Table 11-13.1** use Type 'B' ---> TW≥ 0.5 Rp

Rip Rap Stone Size:

Velocity	Rip Rap Specification	D_{50} Stone Size
0-8 fps	Modified	5 inches

Preformed Scour Hole Dimensions:

F(ft)=0.5(R_p)	=	n/a
C(ft)=3.0(S_p)+6.0(F)	=	n/a
B(ft)=2.0(S_p)+6.0(F)	=	n/a

Rip Rap Splash Pad Dimensions:

L_a	=	10	ft
W1 = 3.0(S_p) min.	=	3	ft
W2 = 3.0(Sp)+0.4(La) min.	=	7	ft
d (Depth of Stone)	=	12	inches

Outlet Protection Calculations

Outlet I.D. **FES 14**

*Based on Connecticut DOT Drainage Manual, Section 11.13

Description:

FES 14

Design Criteria (25-yr Storm Event):

Q (cfs) =	1.47	R_p (ft)=	1
D (in) =	12	S_p (ft) =	1
V (fps) =	1.87	Tw (ft)=	2.35

Q= Flow rate at discharge point in cubic feet per second (cfs)
D= Outlet pipe diameter (in)
V= Flow velocity at discharge point (ft/s)
R_p= Maximum inside pipe rise (ft)
S_p= inside diametere for circular sections of maximum inside pipe span for non-circular sections (ft)
T_w= Tailwater depth (ft)

Based on **Table 11-13.1** use Type 'B' ---> TW≥ 0.5 Rp

Rip Rap Stone Size:

Velocity	Rip Rap Specification	D_{50} Stone Size
0-8 fps	Modified	5 inches

Preformed Scour Hole Dimensions:

F(ft)=0.5(R_p)	=	n/a
C(ft)=3.0(S_p)+6.0(F)	=	n/a
B(ft)=2.0(S_p)+6.0(F)	=	n/a

Rip Rap Splash Pad Dimensions:

L_a	=	10	ft
W1 = 3.0(S_p) min.	=	3	ft
W2 = 3.0(Sp)+0.4(La) min.	=	7	ft
d (Depth of Stone)	=	12	inches

Outlet Protection Calculations

Outlet I.D. **FES 20**

*Based on Connecticut DOT Drainage Manual, Section 11.13

Description:

FES 20

Design Criteria (100-yr Storm Event):

Q (cfs) =	5.14	R_p (ft)=	1.25
D (in) =	15	S_p (ft) =	1.25
V (fps) =	4.19	Tw (ft)=	2.24

Q= Flow rate at discharge point in cubic feet per second (cfs)
D= Outlet pipe diameter (in)
V= Flow velocity at discharge point (ft/s)
R_p= Maximum inside pipe rise (ft)
S_p= inside diametere for circular sections of maximum inside pipe span for non-circular sections (ft)
T_w= Tailwater depth (ft)

Based on **Table 11-13.1** use Type 'B' ---> TW≥ 0.5 Rp

Rip Rap Stone Size:

Velocity	Rip Rap Specification	D_{50} Stone Size
0-8 fps	Modified	5 inches

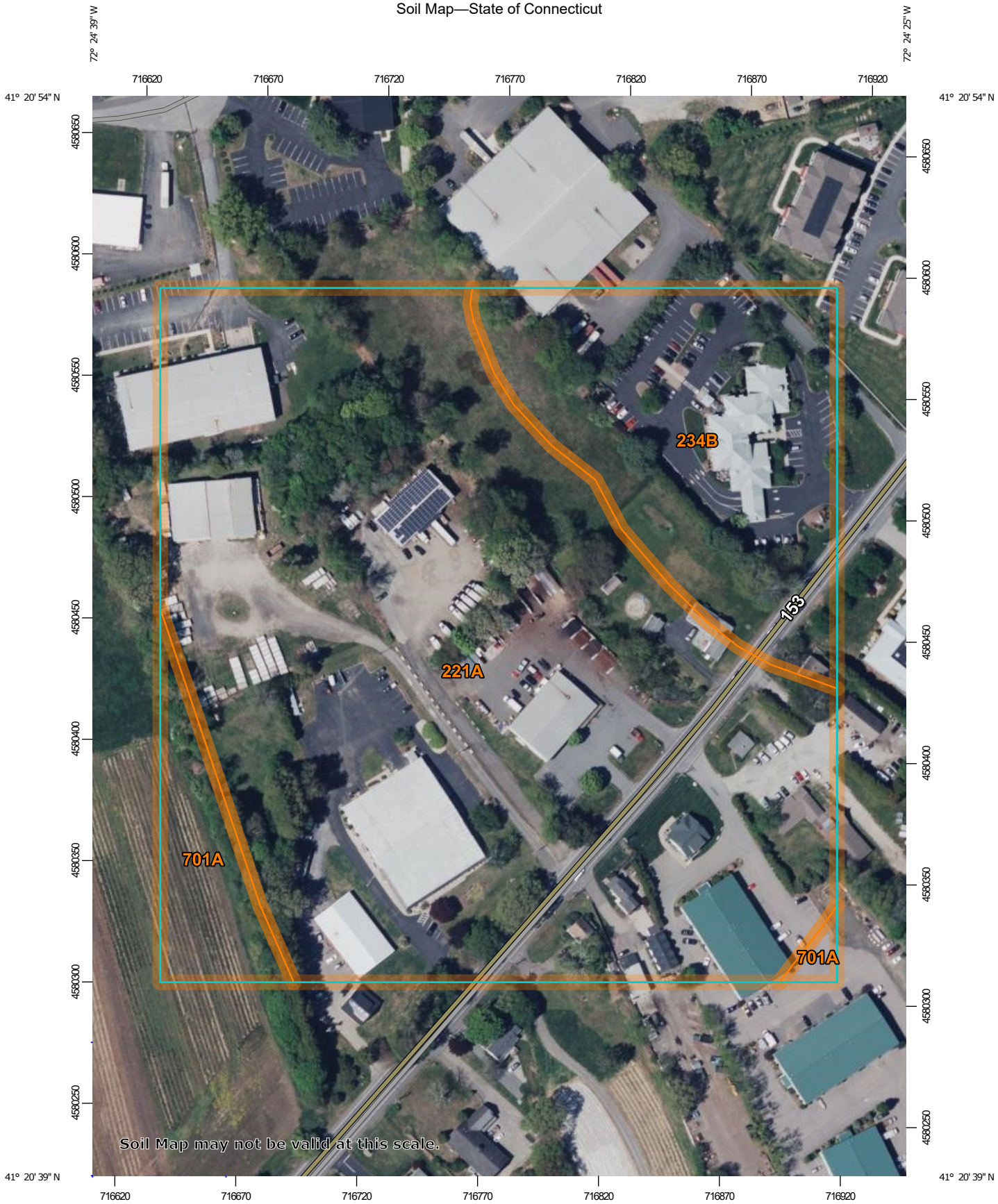
Preformed Scour Hole Dimensions:

F(ft)=0.5(R_p)	=	n/a
C(ft)=3.0(S_p)+6.0(F)	=	n/a
B(ft)=2.0(S_p)+6.0(F)	=	n/a

Rip Rap Splash Pad Dimensions:

L_a	=	10	ft
W1 = 3.0(S_p) min.	=	4	ft
W2 = 3.0(Sp)+0.4(La) min.	=	8	ft
d (Depth of Stone)	=	12	inches

Appendix D
NCRS Soils Information



Map Scale: 1:2,170 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 22, Sep 12, 2022

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

Date(s) aerial images were photographed: Data not available.

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
221A	Ninigret-Urban land complex, 0 to 5 percent slopes	14.7	74.3%
234B	Merrimac-Urban land complex, 0 to 8 percent slopes	4.0	20.2%
701A	Ninigret fine sandy loam, 0 to 3 percent slopes	1.1	5.5%
Totals for Area of Interest		**19.9**	**100.0%**

Appendix E
NOAA Atlas 14 Precipitation Information

NOAA Atlas 14, Volume 10, Version 3
Location name: Essex, Connecticut, USA*
Latitude: 41.3468°, Longitude: -72.4094°
Elevation: 35.92 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)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.338** (0.259-0.433)	**0.406** (0.310-0.520)	**0.517** (0.394-0.665)	**0.609** (0.462-0.787)	**0.736** (0.542-0.984)	**0.831** (0.602-1.13)	**0.931** (0.656-1.31)	**1.04** (0.700-1.48)	**1.21** (0.779-1.76)	**1.34** (0.846-1.98)
10-min	**0.478** (0.366-0.613)	**0.575** (0.440-0.737)	**0.733** (0.558-0.943)	**0.863** (0.655-1.12)	**1.04** (0.768-1.39)	**1.18** (0.851-1.60)	**1.32** (0.930-1.85)	**1.48** (0.991-2.10)	**1.71** (1.11-2.49)	**1.90** (1.20-2.81)
15-min	**0.563** (0.431-0.722)	**0.676** (0.517-0.867)	**0.861** (0.657-1.11)	**1.01** (0.770-1.31)	**1.23** (0.904-1.64)	**1.39** (1.00-1.88)	**1.55** (1.09-2.17)	**1.74** (1.17-2.47)	**2.01** (1.30-2.93)	**2.23** (1.41-3.31)
30-min	**0.781** (0.599-1.00)	**0.938** (0.718-1.20)	**1.20** (0.911-1.54)	**1.41** (1.07-1.82)	**1.70** (1.25-2.27)	**1.92** (1.39-2.61)	**2.15** (1.52-3.01)	**2.41** (1.62-3.43)	**2.78** (1.80-4.06)	**3.09** (1.95-4.58)
60-min	**1.00** (0.766-1.28)	**1.20** (0.919-1.54)	**1.53** (1.17-1.97)	**1.80** (1.37-2.32)	**2.17** (1.60-2.91)	**2.46** (1.78-3.34)	**2.75** (1.94-3.85)	**3.08** (2.07-4.38)	**3.56** (2.30-5.19)	**3.94** (2.50-5.85)
2-hr	**1.31** (1.01-1.67)	**1.57** (1.21-2.00)	**2.00** (1.53-2.56)	**2.35** (1.80-3.02)	**2.84** (2.11-3.78)	**3.20** (2.34-4.34)	**3.59** (2.55-5.01)	**4.04** (2.72-5.70)	**4.70** (3.05-6.81)	**5.26** (3.34-7.73)
3-hr	**1.52** (1.18-1.93)	**1.83** (1.41-2.32)	**2.32** (1.79-2.95)	**2.73** (2.09-3.49)	**3.29** (2.46-4.37)	**3.71** (2.72-5.01)	**4.16** (2.98-5.80)	**4.69** (3.17-6.59)	**5.48** (3.56-7.90)	**6.14** (3.91-9.00)
6-hr	**1.95** (1.52-2.45)	**2.33** (1.81-2.94)	**2.96** (2.29-3.74)	**3.48** (2.68-4.41)	**4.19** (3.15-5.52)	**4.73** (3.48-6.34)	**5.30** (3.81-7.33)	**5.98** (4.05-8.32)	**6.99** (4.56-9.99)	**7.84** (5.00-11.4)
12-hr	**2.42** (1.90-3.03)	**2.90** (2.28-3.64)	**3.69** (2.88-4.63)	**4.34** (3.37-5.47)	**5.24** (3.95-6.84)	**5.90** (4.37-7.85)	**6.62** (4.77-9.07)	**7.45** (5.07-10.3)	**8.70** (5.70-12.3)	**9.75** (6.24-14.0)
24-hr	**2.85** (2.25-3.54)	**3.44** (2.71-4.28)	**4.40** (3.46-5.49)	**5.20** (4.07-6.51)	**6.31** (4.79-8.19)	**7.13** (5.31-9.42)	**8.01** (5.82-10.9)	**9.06** (6.18-12.4)	**10.6** (7.00-15.0)	**12.0** (7.71-17.1)
2-day	**3.18** (2.53-3.92)	**3.88** (3.09-4.80)	**5.04** (3.99-6.24)	**6.00** (4.72-7.46)	**7.32** (5.60-9.47)	**8.30** (6.24-10.9)	**9.36** (6.87-12.8)	**10.7** (7.32-14.5)	**12.7** (8.39-17.8)	**14.5** (9.34-20.5)
3-day	**3.44** (2.75-4.23)	**4.21** (3.36-5.18)	**5.46** (4.34-6.74)	**6.50** (5.14-8.05)	**7.94** (6.10-10.2)	**8.99** (6.78-11.8)	**10.1** (7.47-13.8)	**11.6** (7.95-15.7)	**13.8** (9.12-19.2)	**15.8** (10.2-22.2)
4-day	**3.70** (2.96-4.53)	**4.50** (3.60-5.52)	**5.82** (4.64-7.15)	**6.91** (5.47-8.53)	**8.41** (6.47-10.8)	**9.52** (7.19-12.4)	**10.7** (7.91-14.5)	**12.2** (8.41-16.5)	**14.5** (9.62-20.1)	**16.6** (10.7-23.2)
7-day	**4.41** (3.55-5.38)	**5.29** (4.25-6.45)	**6.71** (5.38-8.21)	**7.90** (6.29-9.69)	**9.53** (7.36-12.1)	**10.7** (8.13-13.9)	**12.0** (8.89-16.1)	**13.6** (9.41-18.2)	**16.0** (10.6-22.0)	**18.1** (11.7-25.2)
10-day	**5.12** (4.14-6.21)	**6.03** (4.87-7.33)	**7.52** (6.05-9.16)	**8.76** (7.01-10.7)	**10.5** (8.11-13.2)	**11.7** (8.90-15.1)	**13.1** (9.66-17.4)	**14.7** (10.2-19.6)	**17.1** (11.4-23.4)	**19.1** (12.4-26.5)
20-day	**7.27** (5.92-8.76)	**8.26** (6.71-9.96)	**9.87** (8.00-11.9)	**11.2** (9.03-13.6)	**13.1** (10.2-16.3)	**14.5** (11.0-18.3)	**15.9** (11.7-20.7)	**17.5** (12.2-23.1)	**19.7** (13.2-26.7)	**21.5** (14.0-29.5)
30-day	**9.08** (7.42-10.9)	**10.1** (8.26-12.1)	**11.8** (9.60-14.2)	**13.2** (10.7-16.0)	**15.1** (11.8-18.7)	**16.6** (12.6-20.9)	**18.1** (13.3-23.2)	**19.6** (13.7-25.8)	**21.7** (14.6-29.2)	**23.3** (15.2-31.8)
45-day	**11.3** (9.31-13.5)	**12.4** (10.2-14.9)	**14.2** (11.6-17.0)	**15.7** (12.7-18.8)	**17.7** (13.8-21.8)	**19.3** (14.7-24.0)	**20.8** (15.2-26.4)	**22.3** (15.6-29.1)	**24.1** (16.2-32.3)	**25.4** (16.6-34.6)
60-day	**13.2** (10.9-15.8)	**14.4** (11.8-17.1)	**16.2** (13.3-19.3)	**17.7** (14.4-21.2)	**19.8** (15.5-24.3)	**21.5** (16.4-26.6)	**23.0** (16.9-29.0)	**24.5** (17.2-31.8)	**26.2** (17.7-34.9)	**27.3** (17.9-37.0)

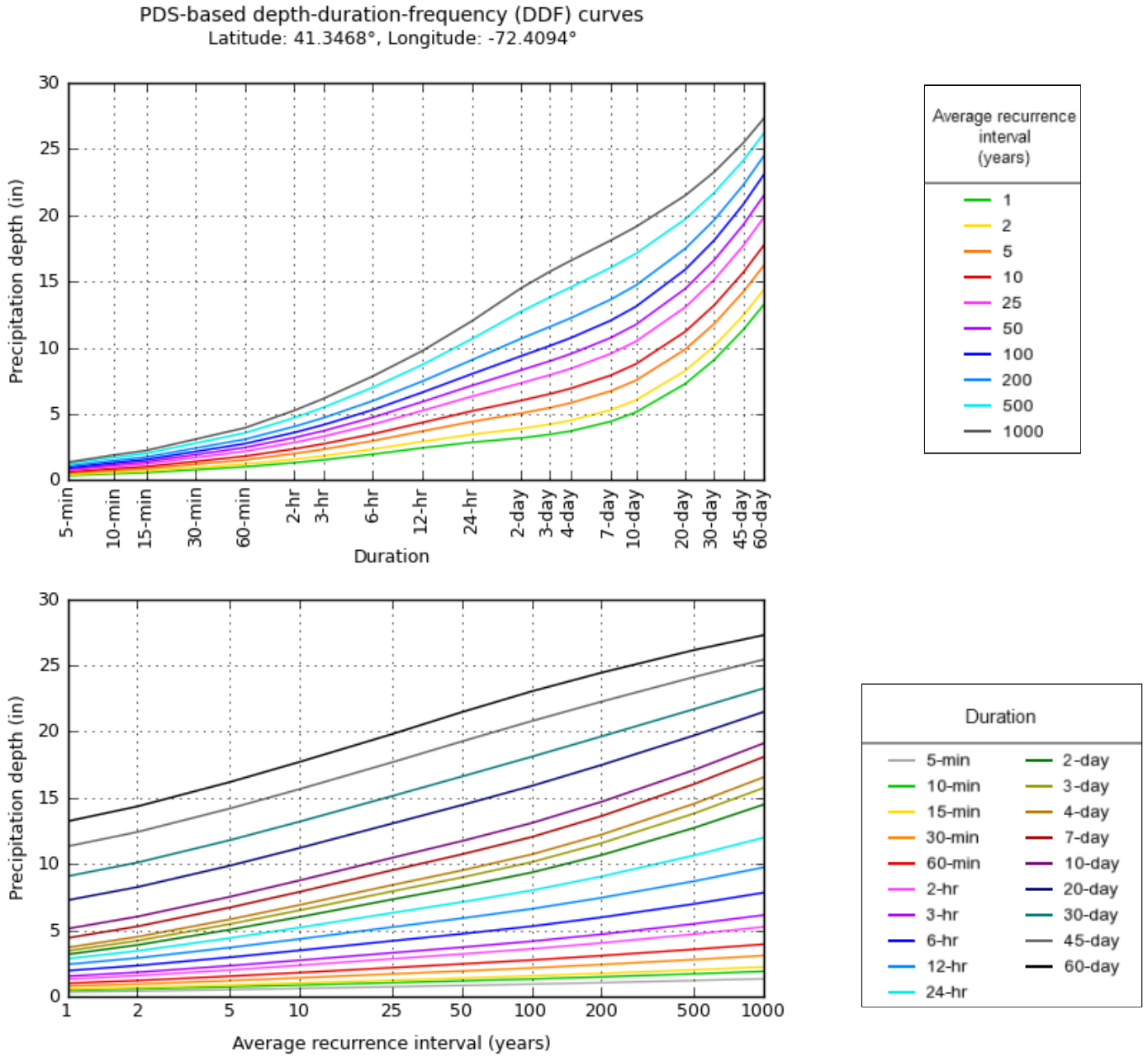
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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.

Back to Top

PF graphical



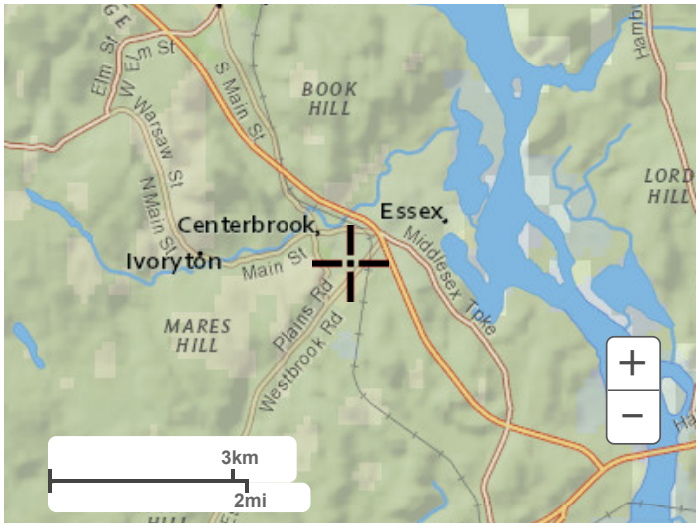
NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Fri Apr 15 18:54:18 2022

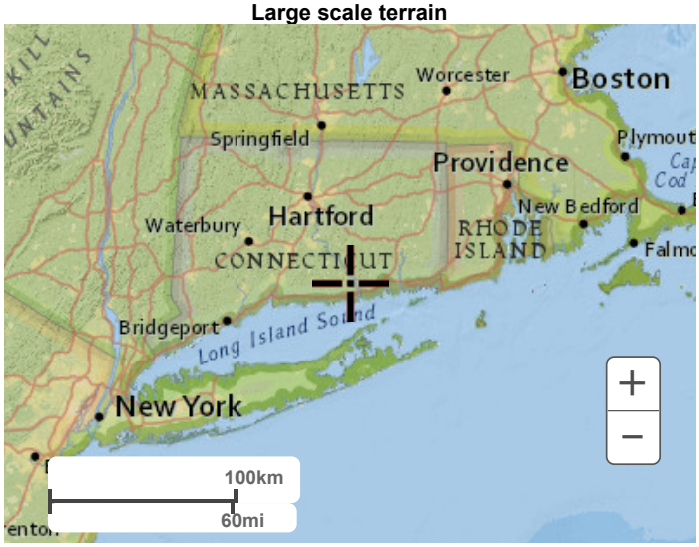
Back to Top

Maps & aerials

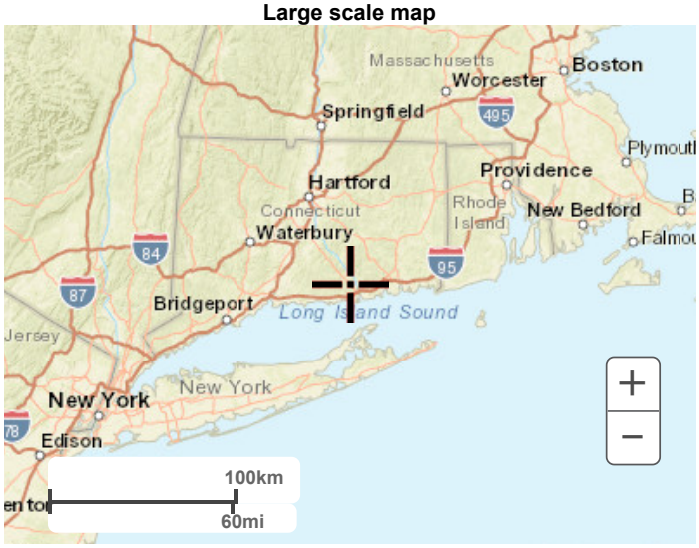
Small scale terrain



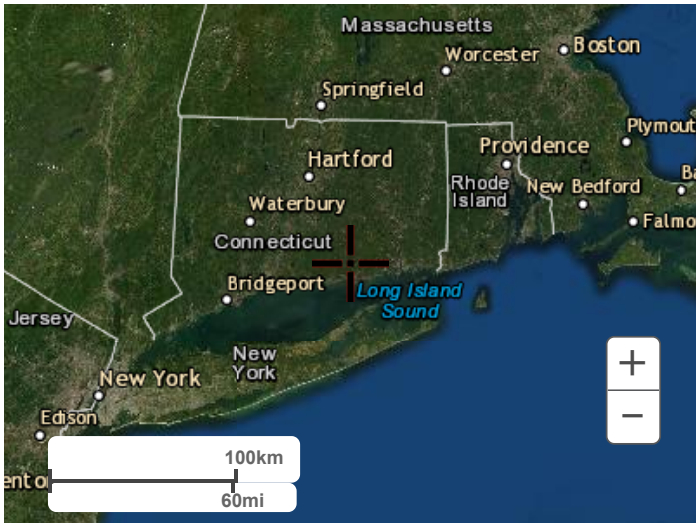
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 10, Version 3
Location name: Essex, Connecticut, USA*
Latitude: 41.3468°, Longitude: -72.4094°
Elevation: 35.92 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	**4.06** (3.11-5.20)	**4.87** (3.72-6.24)	**6.20** (4.73-7.98)	**7.31** (5.54-9.44)	**8.83** (6.50-11.8)	**9.97** (7.22-13.6)	**11.2** (7.87-15.7)	**12.5** (8.40-17.8)	**14.5** (9.35-21.1)	**16.0** (10.2-23.8)
10-min	**2.87** (2.20-3.68)	**3.45** (2.64-4.42)	**4.40** (3.35-5.66)	**5.18** (3.93-6.69)	**6.25** (4.61-8.36)	**7.06** (5.11-9.61)	**7.91** (5.58-11.1)	**8.87** (5.95-12.6)	**10.2** (6.63-15.0)	**11.4** (7.19-16.9)
15-min	**2.25** (1.72-2.89)	**2.70** (2.07-3.47)	**3.44** (2.63-4.43)	**4.06** (3.08-5.24)	**4.90** (3.62-6.56)	**5.54** (4.01-7.54)	**6.21** (4.38-8.70)	**6.96** (4.66-9.89)	**8.04** (5.20-11.7)	**8.92** (5.64-13.2)
30-min	**1.56** (1.20-2.00)	**1.88** (1.44-2.41)	**2.39** (1.82-3.08)	**2.81** (2.14-3.64)	**3.40** (2.51-4.55)	**3.84** (2.78-5.22)	**4.30** (3.03-6.03)	**4.82** (3.23-6.85)	**5.56** (3.60-8.13)	**6.17** (3.91-9.16)
60-min	**1.00** (0.766-1.28)	**1.20** (0.919-1.54)	**1.53** (1.17-1.97)	**1.80** (1.37-2.32)	**2.17** (1.60-2.91)	**2.46** (1.78-3.34)	**2.75** (1.94-3.85)	**3.08** (2.07-4.38)	**3.56** (2.30-5.19)	**3.94** (2.50-5.85)
2-hr	**0.656** (0.506-0.835)	**0.786** (0.606-1.00)	**0.999** (0.767-1.28)	**1.18** (0.898-1.51)	**1.42** (1.05-1.89)	**1.60** (1.17-2.17)	**1.80** (1.28-2.51)	**2.02** (1.36-2.85)	**2.35** (1.53-3.41)	**2.63** (1.67-3.87)
3-hr	**0.507** (0.393-0.644)	**0.608** (0.470-0.772)	**0.773** (0.595-0.983)	**0.909** (0.697-1.16)	**1.10** (0.818-1.46)	**1.24** (0.905-1.67)	**1.39** (0.991-1.93)	**1.56** (1.05-2.19)	**1.83** (1.19-2.63)	**2.05** (1.30-3.00)
6-hr	**0.325** (0.253-0.410)	**0.389** (0.303-0.491)	**0.494** (0.383-0.624)	**0.581** (0.448-0.737)	**0.700** (0.525-0.922)	**0.789** (0.581-1.06)	**0.885** (0.636-1.22)	**0.998** (0.676-1.39)	**1.17** (0.761-1.67)	**1.31** (0.835-1.90)
12-hr	**0.201** (0.158-0.252)	**0.241** (0.189-0.302)	**0.306** (0.239-0.384)	**0.360** (0.280-0.454)	**0.435** (0.328-0.568)	**0.490** (0.363-0.651)	**0.549** (0.396-0.753)	**0.619** (0.421-0.855)	**0.722** (0.473-1.02)	**0.809** (0.518-1.17)
24-hr	**0.119** (0.094-0.147)	**0.143** (0.113-0.178)	**0.183** (0.144-0.229)	**0.217** (0.170-0.271)	**0.263** (0.200-0.341)	**0.297** (0.221-0.392)	**0.334** (0.242-0.455)	**0.377** (0.258-0.518)	**0.444** (0.291-0.624)	**0.500** (0.321-0.713)
2-day	**0.066** (0.053-0.082)	**0.081** (0.064-0.100)	**0.105** (0.083-0.130)	**0.125** (0.098-0.155)	**0.153** (0.117-0.197)	**0.173** (0.130-0.228)	**0.195** (0.143-0.266)	**0.222** (0.152-0.303)	**0.265** (0.175-0.370)	**0.302** (0.195-0.427)
3-day	**0.048** (0.038-0.059)	**0.058** (0.047-0.072)	**0.076** (0.060-0.094)	**0.090** (0.071-0.112)	**0.110** (0.085-0.142)	**0.125** (0.094-0.164)	**0.141** (0.104-0.191)	**0.161** (0.110-0.218)	**0.192** (0.127-0.266)	**0.219** (0.141-0.308)
4-day	**0.039** (0.031-0.047)	**0.047** (0.038-0.058)	**0.061** (0.048-0.074)	**0.072** (0.057-0.089)	**0.088** (0.067-0.112)	**0.099** (0.075-0.130)	**0.112** (0.082-0.151)	**0.127** (0.088-0.172)	**0.152** (0.100-0.210)	**0.172** (0.112-0.242)
7-day	**0.026** (0.021-0.032)	**0.031** (0.025-0.038)	**0.040** (0.032-0.049)	**0.047** (0.037-0.058)	**0.057** (0.044-0.072)	**0.064** (0.048-0.083)	**0.072** (0.053-0.096)	**0.081** (0.056-0.109)	**0.095** (0.063-0.131)	**0.108** (0.070-0.150)
10-day	**0.021** (0.017-0.026)	**0.025** (0.020-0.031)	**0.031** (0.025-0.038)	**0.037** (0.029-0.045)	**0.044** (0.034-0.055)	**0.049** (0.037-0.063)	**0.055** (0.040-0.072)	**0.061** (0.042-0.082)	**0.071** (0.047-0.097)	**0.080** (0.052-0.110)
20-day	**0.015** (0.012-0.018)	**0.017** (0.014-0.021)	**0.021** (0.017-0.025)	**0.023** (0.019-0.028)	**0.027** (0.021-0.034)	**0.030** (0.023-0.038)	**0.033** (0.024-0.043)	**0.036** (0.025-0.048)	**0.041** (0.027-0.056)	**0.045** (0.029-0.062)
30-day	**0.013** (0.010-0.015)	**0.014** (0.011-0.017)	**0.016** (0.013-0.020)	**0.018** (0.015-0.022)	**0.021** (0.016-0.026)	**0.023** (0.018-0.029)	**0.025** (0.018-0.032)	**0.027** (0.019-0.036)	**0.030** (0.020-0.041)	**0.032** (0.021-0.044)
45-day	**0.010** (0.009-0.013)	**0.011** (0.009-0.014)	**0.013** (0.011-0.016)	**0.014** (0.012-0.017)	**0.016** (0.013-0.020)	**0.018** (0.014-0.022)	**0.019** (0.014-0.024)	**0.021** (0.014-0.027)	**0.022** (0.015-0.030)	**0.024** (0.015-0.032)
60-day	**0.009** (0.008-0.011)	**0.010** (0.008-0.012)	**0.011** (0.009-0.013)	**0.012** (0.010-0.015)	**0.014** (0.011-0.017)	**0.015** (0.011-0.018)	**0.016** (0.012-0.020)	**0.017** (0.012-0.022)	**0.018** (0.012-0.024)	**0.019** (0.012-0.026)

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

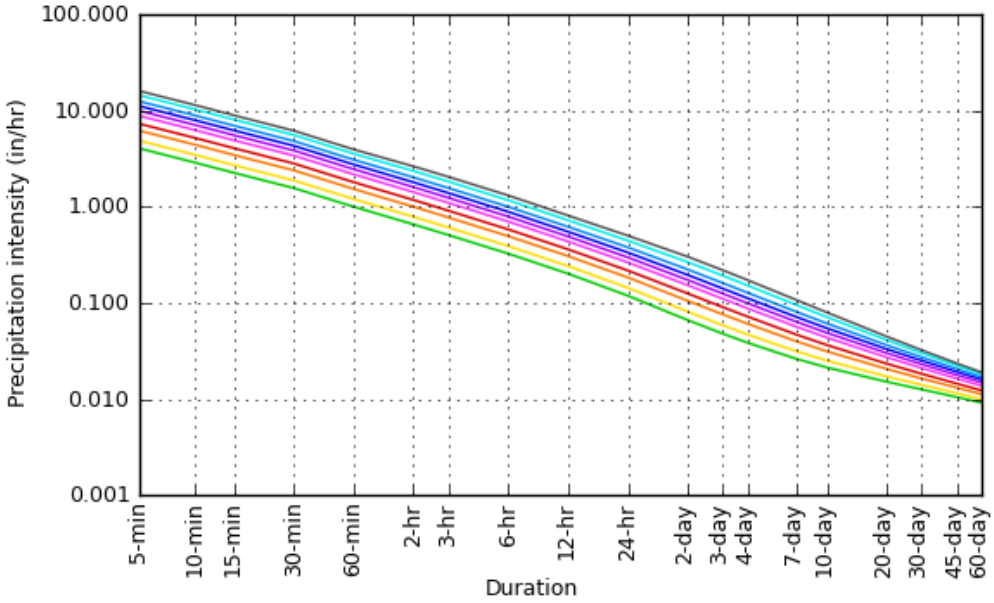
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

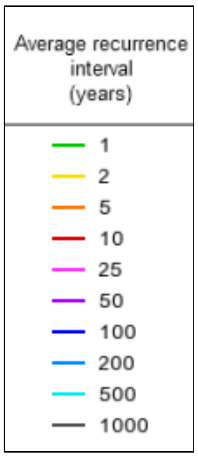
Please refer to NOAA Atlas 14 document for more information.

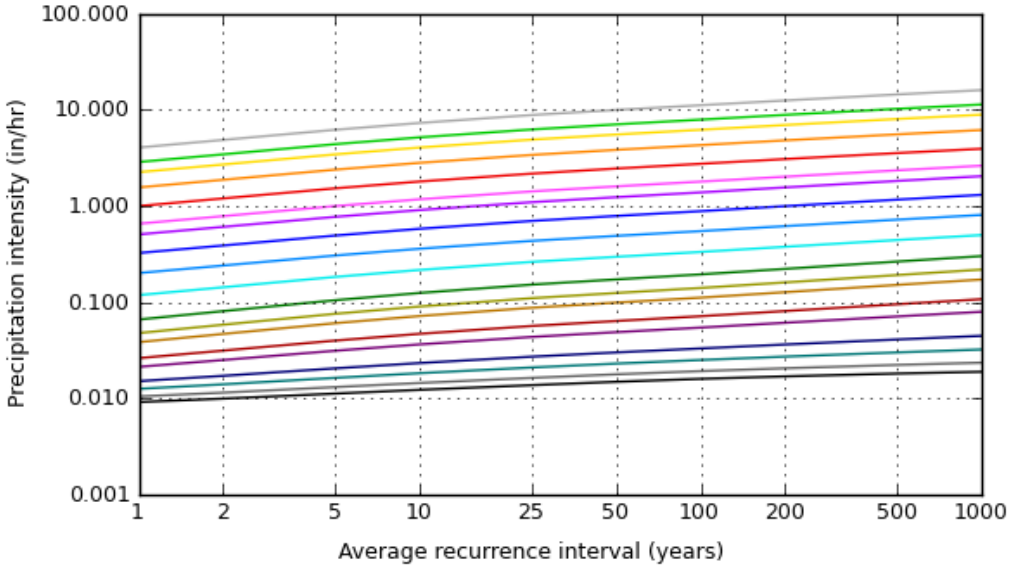
Back to Top

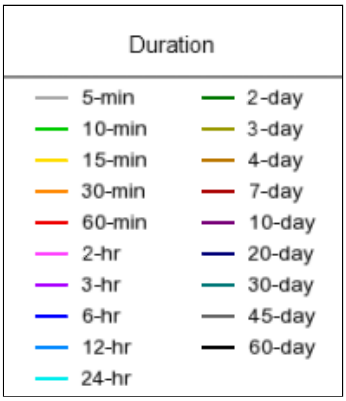
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 41.3468°, Longitude: -72.4094°









NOAA Atlas 14, Volume 10, Version 3

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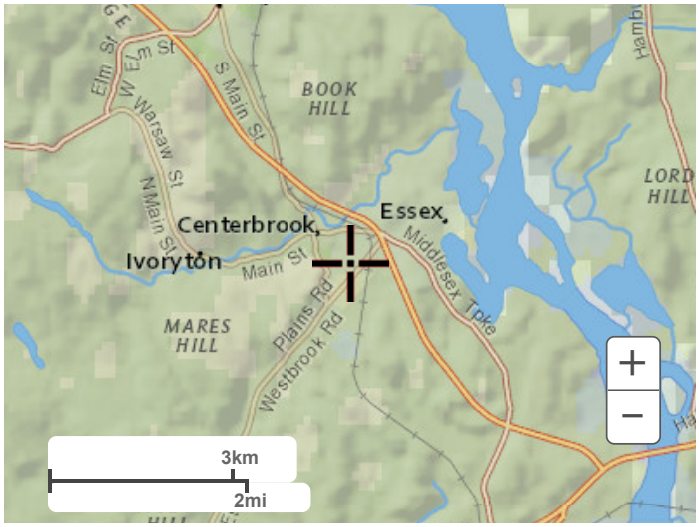
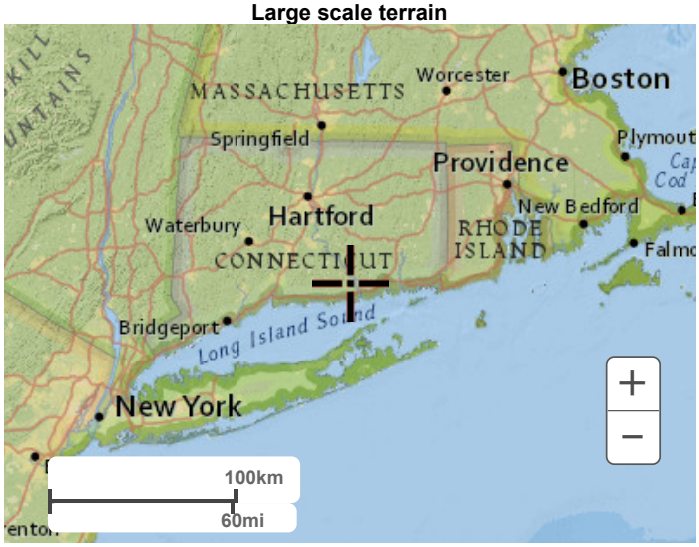
Back to Top

Maps & aerials

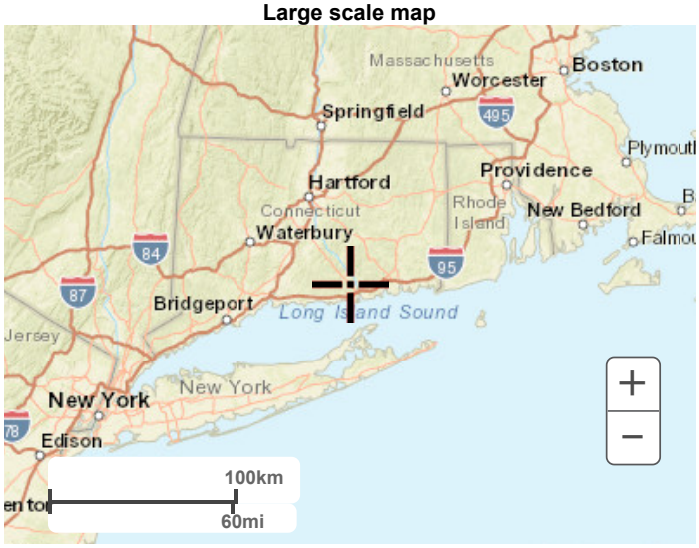
Small scale terrain



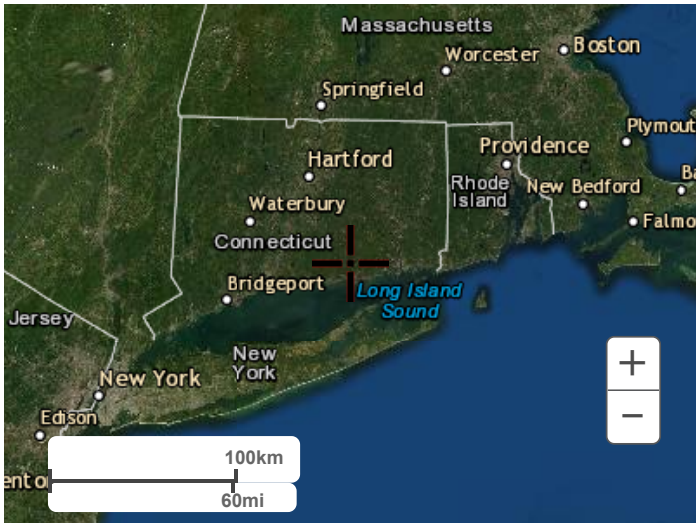
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix F
Domestic Water Usage Data

Water Data Usage 49 Plains Road

Date	Meter Reading Gallons Used	Number of Days	Gallons Per Day
6/6/2019	7000	97	72
9/6/2019	13000	92	141
10/23/2019	5000	47	106
12/6/2019	3000	44	68
3/4/2020	7000	89	79
6/2/2020	8000	90	89
9/4/2020	11000	94	117
12/8/2020	10000	95	105
3/4/2021	13000	86	151
6/4/2021	44000	92	478
9/9/2021	40000	97	412
12/9/2021	7000	91	77
3/7/2022	157000	88	1784
3/9/2022	4000	2	2000
6/7/2022	29000	90	322
9/7/2022	8000	92	87
Average Gallons Per Day			144

Appendix G
Ground Water Monitoring Data

GROUNDWATER MONITORING
Prepared for
49 PLAINS ROAD
ESSEX, CT.

TEST HOLE	**#4**		
ELEVATION TOP OF PIPE =		**40.77'(-3.65')**	
ELEVATION OF GROUND =		**37.12'**	
DATE	**TOP OF PIPE TO GROUNDWATER**	**SURFACE TO GROUNDWATER**	**WATER ELEV.**
1/21/22	7.80'	4.15'	32.97'
2/2/22	8.20'	4.55'	32.57'
2/11/22	7.80'	4.15'	32.97'
2/22/22	6.80'	3.15'	33.97'
3/4/22	6.70'	3.05'	34.07'
3/15/22	6.70'	3.05'	34.07'
3/29/22	7.00'	3.35'	33.77'
4/18/22	7.20'	3.55'	33.57
5/17/22	7.30'	3.65'	33.47'

TEST HOLE	**#3**		
ELEVATION TOP OF PIPE =		**40.52'(3.57')**	
ELEVATION OF GROUND =		**36.95**	
DATE	**TOP OF PIPE TO GROUNDWATER**	**SURFACE TO GROUNDWATER**	**WATER ELEV.**
1/21/22	7.60'	4.03'	32.92'
2/2/22	8.00'	4.43'	32.52'
2/11/22	7.70'	4.13'	32.82
2/22/22	6.80'	3.23'	33.72'
3/4/22	6.90'	3.33'	33.62'
3/15/22	6.60'	3.03'	33.92'
3/29/22	6.90'	3.33'	33.62'
4/18/22	7.10'	3.53'	33.42'
5/17/22	7.30'	3.73'	33.22'

GROUNDWATER MONITORING
Prepared for
49 PLAINS ROAD
ESSEX, CT.

TEST HOLE	#1		
ELEVATION TOP OF PIPE =		40.48'(3.43')	
ELEVATION OF GROUND =		37.05	
DATE	TOP OF PIPE TO GROUNDWATER	SURFACE TO GROUNDWATER	WATER ELEV.
1/21/22	7.80'	4.37'	32.68'
2/2/22	8.30'	4.87'	32.18'
2/11/22	7.10'	3.67'	33.38'
2/22/22	7.00'	3.57'	33.48'
3/4/22	6.90'	3.47'	33.58'
3/15/22	6.90'	3.47'	33.58'
3/29/22	7.10'	3.67'	33.38'
4/18/22	7.30'	3.87'	33.18'
5/17/22	7.40'	3.97'	33.08'

TEST HOLE	#10		
ELEVATION TOP OF PIPE =		39.26(-3.40')	
ELEVATION OF GROUND =		35.86	
DATE	TOP OF PIPE TO GROUNDWATER	SURFACE TO GROUNDWATER	WATER ELEV.
1/21/22	7.60'	4.20'	31.66'
2/2/22	8.00'	4.60'	31.26'
2/11/22	7.00'	3.60'	32.26'
2/22/22	6.60'	3.20'	32.66'
3/4/22	6.70'	3.30'	32.56'
3/15/22	6.60'	3.20'	32.66'
3/29/22	6.90'	3.50'	32.36'
4/18/22	7.00'	3.60'	32.26'
5/17/22	7.00'	3.60'	32.26'

GROUNDWATER MONITORING
Prepared for
49 PLAINS ROAD
ESSEX, CT.

TEST HOLE	**#9**		
ELEVATION TOP OF PIPE =		**38.09'(-1.40')**	
ELEVATION OF GROUND =		**37.09**	
DATE	**TOP OF PIPE TO GROUNDWATER**	**SURFACE TO GROUNDWATER**	**WATER ELEV.**
1/21/22	6.50'	5.10'	31.99'
2/2/22	6.80'	5.40'	31.69'
2/11/22	6.00'	4.60'	32.49'
2/22/22	6.00'	4.60'	32.49'
3/4/22	6.10'	4.70'	32.39'
3/15/22	5.90'	4.50'	32.59'
3/29/22	6.20'	4.80'	32.29'
4/18/22	6.30'	4.90'	32.19'
5/17/22	6.20'	4.80'	32.29'

Appendix H
Soil Infiltration Rates

Permeability Rates

Sample A

No infiltration rate was determined soil was not suitable for Infiltration

Sample B

No infiltration rate was determined soil was not suitable for Infiltration

Sample C

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
C TP 13 Depth 38" Trial 1	1	4	16	14.7	1.00	0.017	20.33	40.651
	2	4	14.7	13.5	1.00	0.017	20.43	40.851
	3	4	13.5	12.4	1.00	0.017	20.39	40.772
	4	4	12.4	11.5	1.00	0.017	18.08	36.151
	5	4	11.5	10.6	1.00	0.017	19.55	39.095
	6	4	10.6	9.8	1.00	0.017	18.82	37.647
	7	4	9.8	9.1	1.00	0.017	17.78	35.556
	8	4	9.1	8.5	1.00	0.017	16.36	32.727
	9	4	8.5	7.8	1.00	0.017	20.61	41.227
	10	4	7.8	7.3	1.00	0.017	15.89	31.788
	10	4	7.3	6.7	1.00	0.017	20.57	41.143
	10	4	6.7	6.3	1.00	0.017	14.77	29.538
	sample average						**18.631**	**37.262**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
C TP 13 Depth 38" Trial 2	1	4	16	13	2.00	0.033	24.83	49.655
	2	4	13	11	2.00	0.033	20.00	40.000
	3	4	11	9.2	2.00	0.033	21.39	42.772
	4	4	9.2	7.7	2.00	0.033	21.30	42.604
	5	4	7.7	6.4	2.00	0.033	22.13	44.255
	sample average						**21.929**	**43.857**

Sample D

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
D TP 13 Depth 38" Trial 1	1	5	16	15.1	1.00	0.017	17.36	34.727
	2	5	15.1	14.1	1.00	0.017	20.55	41.096
	3	5	14.1	13.2	1.00	0.017	19.78	39.560
	4	5	13.2	12.4	1.00	0.017	18.75	37.500
	5	5	12.4	11.6	1.00	0.017	20.00	40.000
	6	5	11.6	10.9	1.00	0.017	18.67	37.333
	7	5	10.9	10.2	1.00	0.017	19.91	39.810
	8	5	10.2	9	2.00	0.033	18.75	37.500
	9	5	9	7.9	2.00	0.033	19.53	39.053
	10	5	7.9	7	2.00	0.033	18.12	36.242
	sample average						**19.141**	**38.282**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
D TP 13 Depth 38" Trial 2	1	5	16	13.3	2.00	0.033	27.65	55.290
	2	5	13.3	12.9	2.00	0.033	4.58	9.160
	3	5	12.9	11.6	2.00	0.033	15.92	31.837
	4	5	11.6	10.3	2.00	0.033	17.81	35.616
	5	5	10.3	9.3	2.00	0.033	15.31	30.612
	6	5	9.3	8.4	2.00	0.033	15.25	30.508
	7	5	8.4	7.4	2.00	0.033	18.99	37.975
	8	5	7.4	6.6	2.00	0.033	17.14	34.286
	sample average						**16.580**	**33.161**

Sample E

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
E TP 14 Depth 30"	1	5	16	15.6	30.00	0.500	0.25	0.506
	2	5	15.6	15.2	30.00	0.500	0.26	0.519
	3	5	15.2	14.7	30.00	0.500	0.33	0.669
	4	5	14.7	14.2	30.00	0.500	0.35	0.692
	5	5	14.2	13.8	30.00	0.500	0.29	0.571
	6	5	13.8	13.5	30.00	0.500	0.22	0.440
	7	5	13.5	13	30.00	0.500	0.38	0.755
	8	5	13	12.3	60.00	1.000	0.28	0.553
	9	5	12.3	10.8	120.00	2.000	0.32	0.649
	sample average						**0.298**	**0.595**

Sample F

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
F TP 14 Depth 30"	1	5.25	16	15.1	30.00	0.500	0.61	1.215
	2	5.25	15.1	14.2	30.00	0.500	0.65	1.290
	3	5.25	14.2	13.4	30.00	0.500	0.61	1.217
	4	5.25	13.4	12.5	30.00	0.500	0.73	1.459
	5	5.25	12.5	11.8	30.00	0.500	0.60	1.210
	6	5.25	11.8	11.2	30.00	0.500	0.55	1.096
	7	5.25	11.2	10.5	30.00	0.500	0.68	1.355
	8	5.25	10.5	9.4	60.00	1.000	0.58	1.161
	9	5.25	9.4	7.4	120.00	2.000	0.63	1.250
	sample average						**0.625**	**1.250**