DRAINAGE & STORMWATER MANAGEMENT REPORT

Prepared for

PROPOSED RESIDENTIAL DEVELOPMENT COLONEL LEDYARD HIGHWAY (CT ROUTE 117) & IRON STREET (CT ROUTE LEDYARD, CT

January 2026

Prepared for

Ledyard Center, LLC

Prepared by

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Introduction

Ledyard Center, LLC has submitted a proposal to the Town of Ledyard to develop approximately 3 acres of a 41-acre parcel of land to permit construction of a 36-unit residential development. The property is currently vacant and wooded. The property generally slopes down gradient to the east. The design utilizes the same methodology for the site development but incorporates pre-treatment of stormwater runoff which will be retained on site.

Summary

According to the USDA-SCS Soil Survey, the bulk of the soils on site consist predominantly of Woodbridge soils. Canton and Charlton soils typically demonstrate infiltration rates of 4-6 inches per hour and are associated with Hydrologic Soil Group "C". The project will maintain the existing drainage patterns for post development conditions. During construction, the area of disturbance will be isolated with temporary construction fencing and the site will be surrounded with silt fence or staked haybales.

The calculations utilized HydroCAD Stormwater Modeling System, a computer model, to analyze pre-and post-development drainage conditions. The model used the NOAA Type D 24-hour rainfall to calculate the runoff. The 2, 10 and 100-year frequency storms were analyzed to evaluate peak runoff for pre-and post-construction conditions. Tables 1-3 summarize our findings for pre and post construction conditions:

Table 1. Existing & Proposed Peak Flows to Wetlands

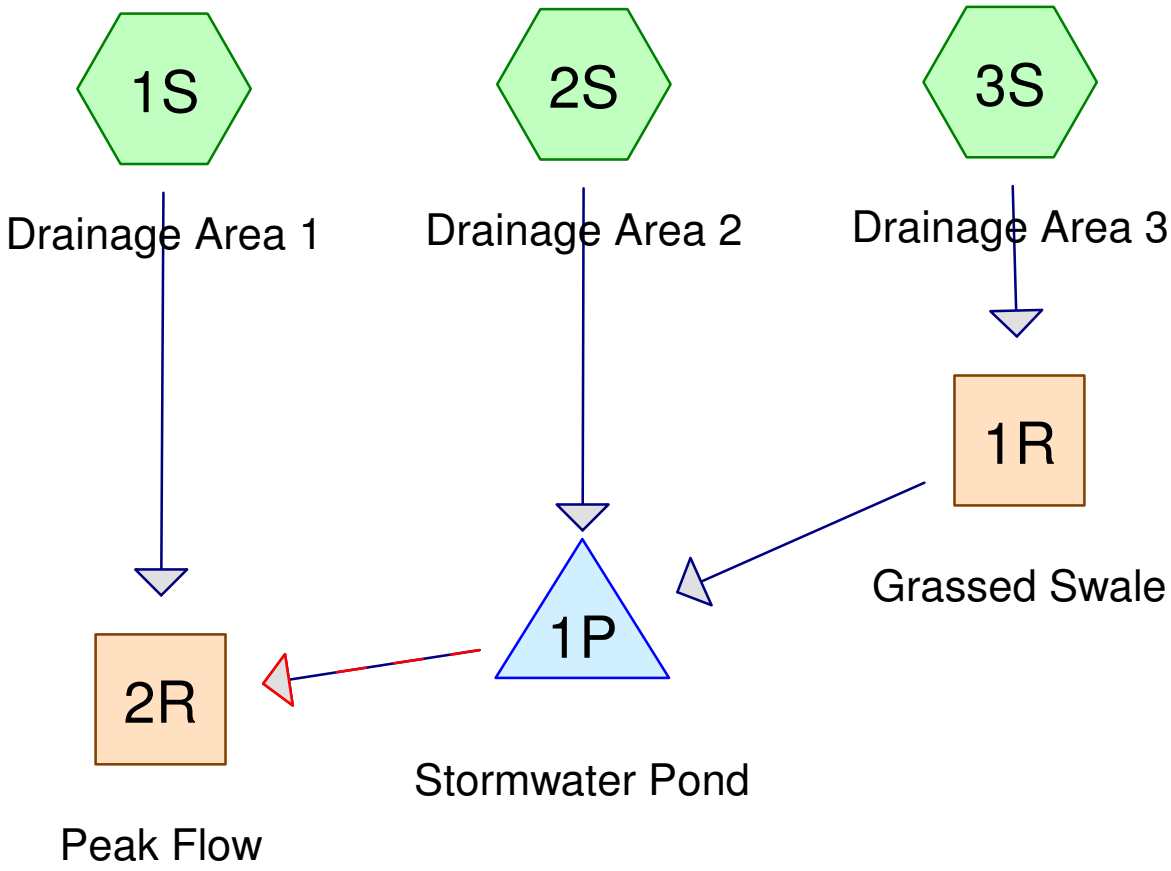
Design Storm	Depth (in)	Existing peak	Proposed peak	Difference
2-Year	3.46	2.90 CFS	2.48 CFS	-0.42 CFS
10-Year	5.11	6.59 CFS	4.45 CFS	-2.14 CFS
100-Year	7.74	13.31 CFS	8.61 CFS	-4.70 CFS

As shown by the computations, the post development peak runoff rates are reduced from pre-construction rates for all design storms. It is important to note that much of the runoff will be via sheet flow and will be maintained on site; they will not detrimentally impact any adjacent properties. A Water Quality Volume (WQV) computation is included in this report, and the proposed stormwater basin will serve to exceed that requirement for the first 1.3" of rainfall per the State of Connecticut Stormwater Quality Manual. The required WQV for the site is 1,578 cubic feet and the stormwater basin provides 2,153 cubic feet below the low-level outlet from the basin.

HYDROCAD CALCULATIONS

EXISTING CONDITIONS

PROPOSED CONDITIONS



Subcat Reach Pond Link

Routing Diagram for Proposed Conditions
Prepared by Killingly Engineering Associates, Printed 3/2/2026

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NOAA 24-hr	D	Default	24.00	1	3.46	2
2	10-Year	NOAA 24-hr	D	Default	24.00	1	5.11	2
3	100-Year	NOAA 24-hr	D	Default	24.00	1	7.74	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.843	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S)
0.545	98	Paved parking & roof, HSG C (1S)
0.650	98	Paved parking/roof, HSG C (3S)
3.038	**83**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.038	HSG C	1S, 2S, 3S
0.000	HSG D	
0.000	Other	
3.038		**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	0.000	1.843	0.000	0.000	1.843	>75% Grass cover, Good	1S, 2S, 3S
0.000	0.000	0.545	0.000	0.000	0.545	Paved parking & roof	1S
0.000	0.000	0.650	0.000	0.000	0.650	Paved parking/roof	3S
0.000	**0.000**	**3.038**	**0.000**	**0.000**	**3.038**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1P	271.00	270.00	32.0	0.0313	0.012	0.0	4.0	0.0	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: Drainage Area 1 Runoff Area=58,942 sf 40.24% Impervious Runoff Depth>1.74"
Flow Length=203' Tc=11.2 min CN=84 Runoff=2.46 cfs 0.196 af

Subcatchment 2S: Drainage Area 2 Runoff Area=19,528 sf 0.00% Impervious Runoff Depth>1.08"
Flow Length=192' Slope=0.0680 '/' Tc=14.4 min CN=74 Runoff=0.46 cfs 0.040 af

Subcatchment 3S: Drainage Area 3 Runoff Area=53,855 sf 52.59% Impervious Runoff Depth>1.98"
Flow Length=320' Slope=0.0190 '/' Tc=7.3 min CN=87 Runoff=2.89 cfs 0.204 af

Reach 1R: Grassed Swale Avg. Flow Depth=0.20' Max Vel=3.19 fps Inflow=2.89 cfs 0.204 af
n=0.035 L=200.0' S=0.0550 '/' Capacity=47.47 cfs Outflow=2.71 cfs 0.204 af

Reach 2R: Peak Flow Inflow=2.46 cfs 0.275 af
Outflow=2.46 cfs 0.275 af

Pond 1P: Stormwater Pond Peak Elev=271.39' Storage=7,744 cf Inflow=3.12 cfs 0.244 af
Primary=0.16 cfs 0.079 af Secondary=0.00 cfs 0.000 af Outflow=0.16 cfs 0.079 af

Total Runoff Area = 3.038 ac Runoff Volume = 0.441 af Average Runoff Depth = 1.74"
60.67% Pervious = 1.843 ac 39.33% Impervious = 1.195 ac

Summary for Subcatchment 1S: Drainage Area 1

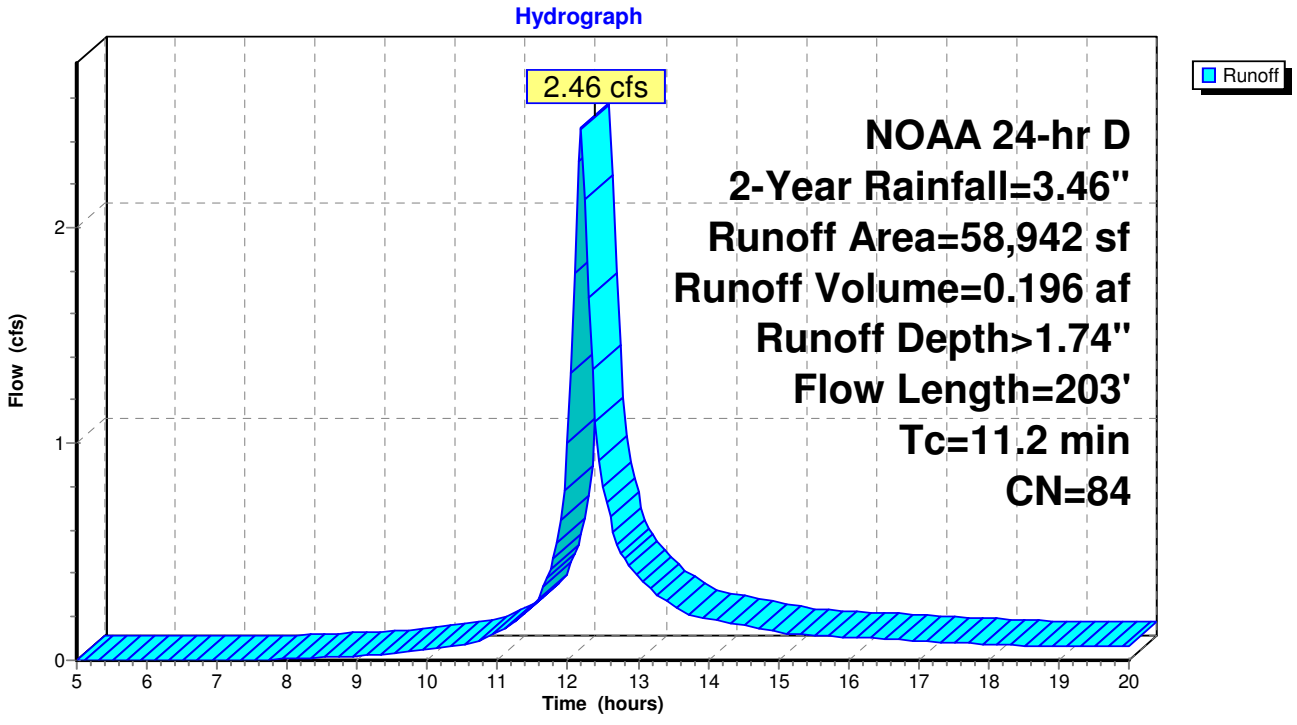
Runoff = 2.46 cfs @ 12.19 hrs, Volume= 0.196 af, Depth> 1.74"
Routed to Reach 2R : Peak Flow

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.46"

	Area (sf)	CN	Description
*	23,721	98	Paved parking & roof, HSG C
	35,221	74	>75% Grass cover, Good, HSG C
	58,942	84	Weighted Average
	35,221		59.76% Pervious Area
	23,721		40.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	73	0.0410	1.76		**Sheet Flow, Tc-DA1a** Smooth surfaces n= 0.011 P2= 3.36"
10.5	130	0.0690	0.21		**Sheet Flow, Tc-AD1b** Grass: Dense n= 0.240 P2= 3.36"
11.2	203	Total			

Subcatchment 1S: Drainage Area 1



Summary for Subcatchment 2S: Drainage Area 2

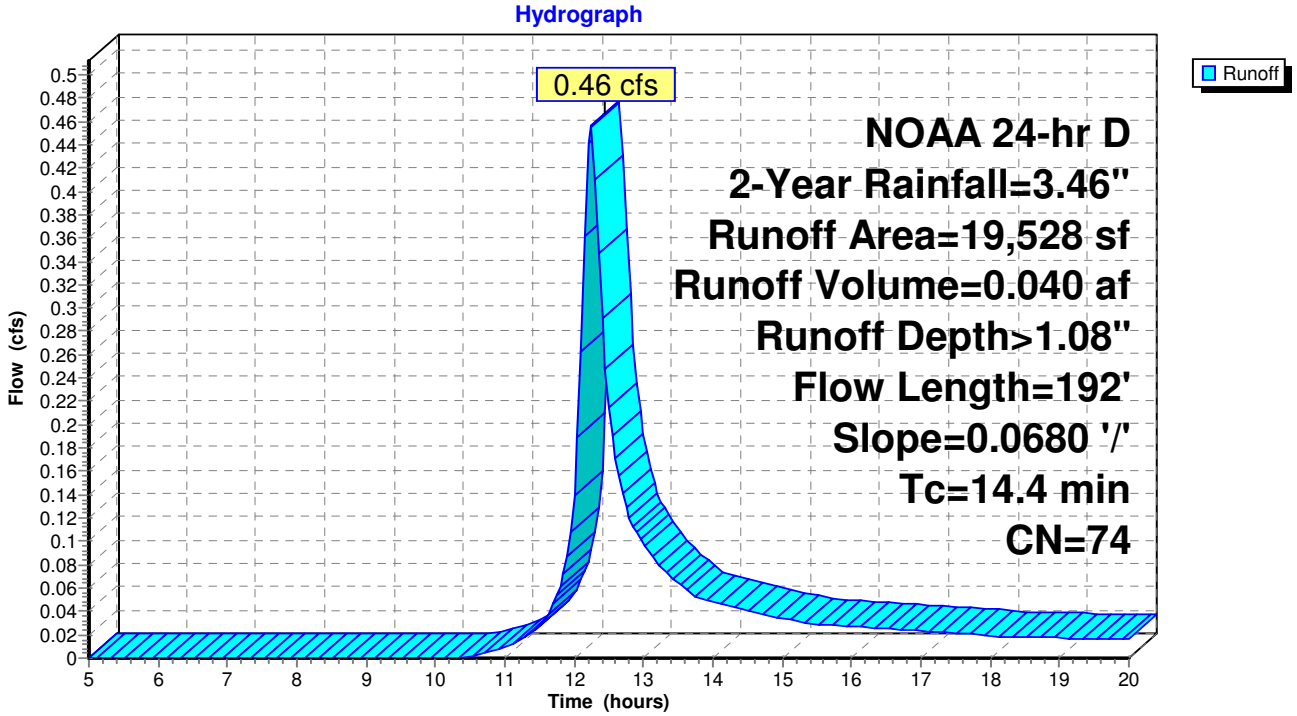
Runoff = 0.46 cfs @ 12.24 hrs, Volume= 0.040 af, Depth> 1.08"
Routed to Pond 1P : Stormwater Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.46"

Area (sf)	CN	Description
19,528	74	>75% Grass cover, Good, HSG C
19,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	192	0.0680	0.22		**Sheet Flow, Tc-DA2** Grass: Dense n= 0.240 P2= 3.36"

Subcatchment 2S: Drainage Area 2



Summary for Subcatchment 3S: Drainage Area 3

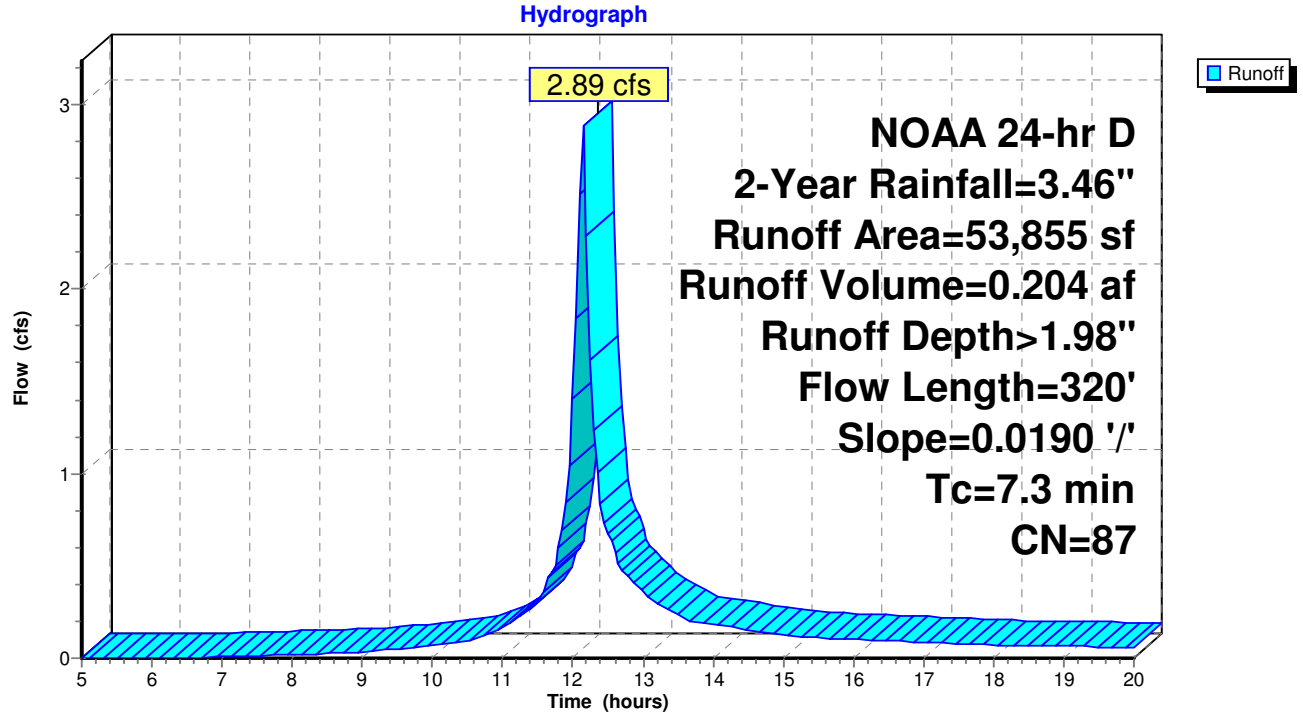
Runoff = 2.89 cfs @ 12.14 hrs, Volume= 0.204 af, Depth> 1.98"
Routed to Reach 1R : Grassed Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.46"

	Area (sf)	CN	Description
*	28,324	98	Paved parking/roof, HSG C
	25,531	74	>75% Grass cover, Good, HSG C
	53,855	87	Weighted Average
	25,531		47.41% Pervious Area
	28,324		52.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	320	0.0190	0.73		**Lag/CN Method, Tc-DA3**

Subcatchment 3S: Drainage Area 3



Summary for Reach 1R: Grassed Swale

Inflow Area = 1.236 ac, 52.59% Impervious, Inflow Depth > 1.98" for 2-Year event
Inflow = 2.89 cfs @ 12.14 hrs, Volume= 0.204 af
Outflow = 2.71 cfs @ 12.17 hrs, Volume= 0.204 af, Atten= 6%, Lag= 1.6 min
Routed to Pond 1P : Stormwater Pond

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.19 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 3.5 min

Peak Storage= 178 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 4.81'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 47.47 cfs

4.00' x 1.00' deep channel, n= 0.035
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 200.0' Slope= 0.0550 '/'
Inlet Invert= 286.00', Outlet Invert= 275.00'

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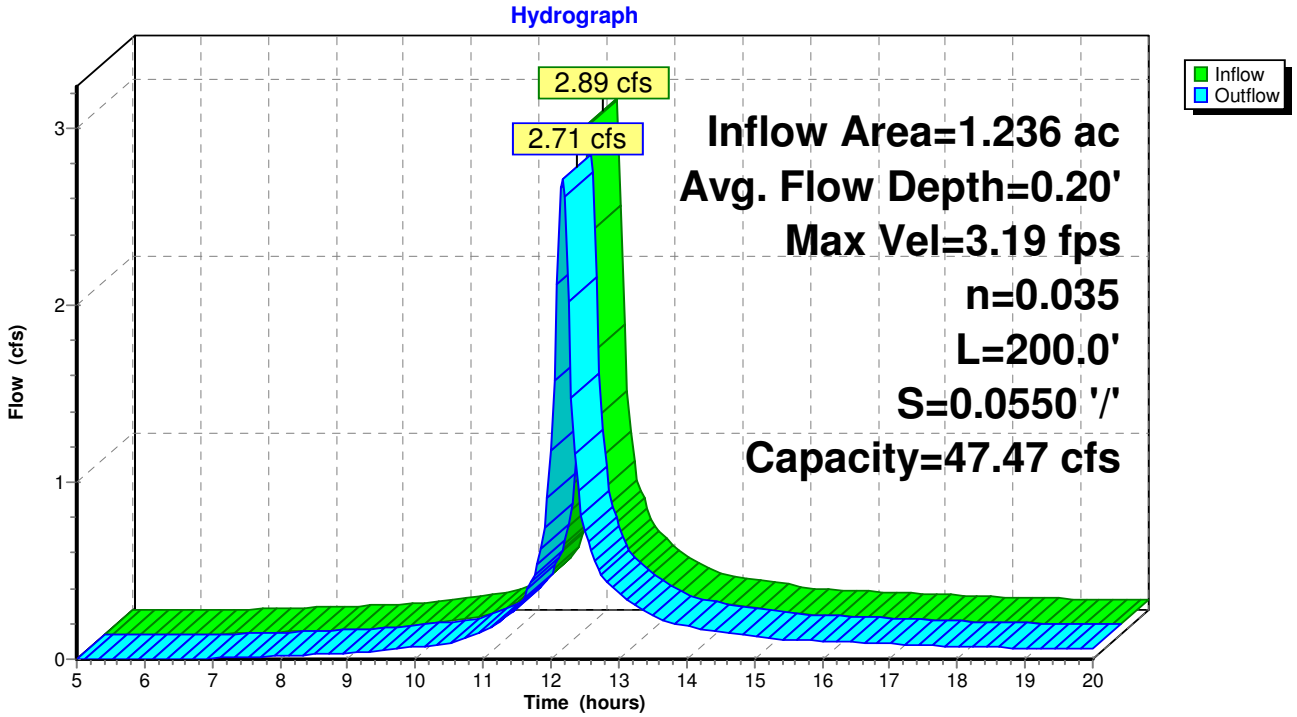


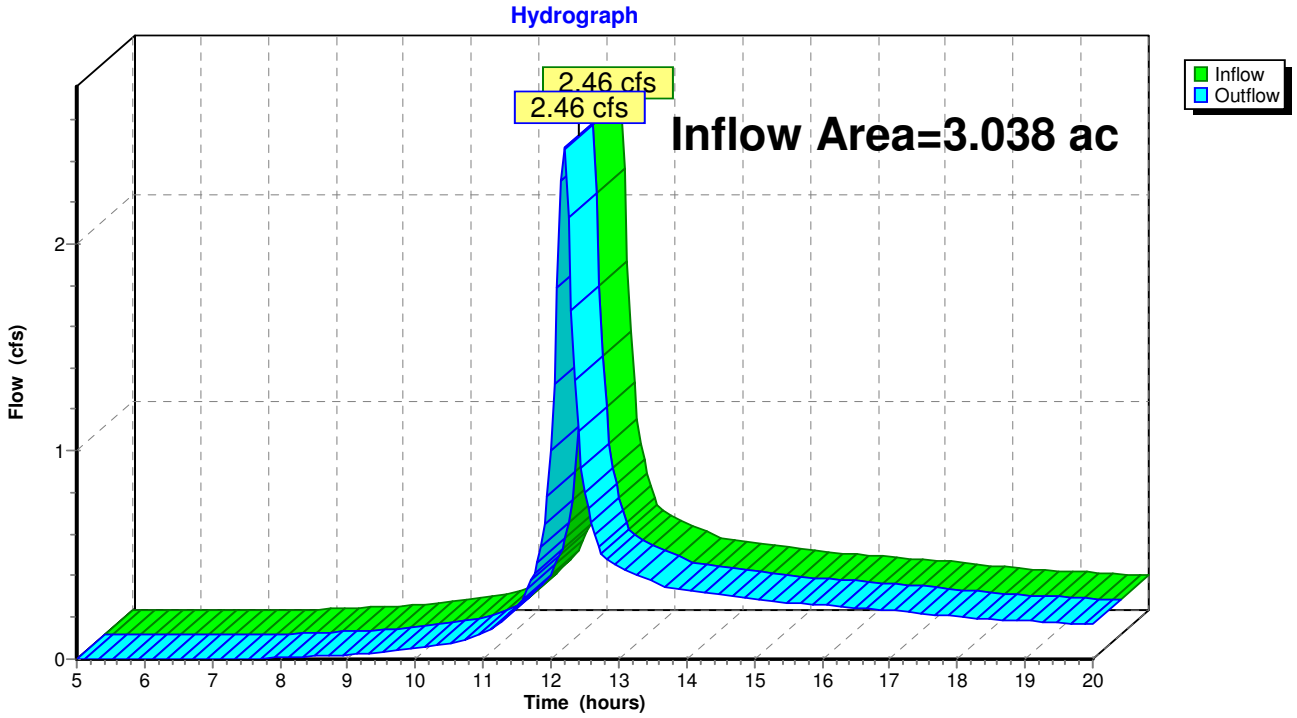
Summary for Reach 2R: Peak Flow

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.038 ac, 39.33% Impervious, Inflow Depth > 1.09" for 2-Year event
Inflow = 2.46 cfs @ 12.19 hrs, Volume= 0.275 af
Outflow = 2.46 cfs @ 12.19 hrs, Volume= 0.275 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 2R: Peak Flow



Summary for Pond 1P: Stormwater Pond

Inflow Area = 1.685 ac, 38.60% Impervious, Inflow Depth > 1.74" for 2-Year event
Inflow = 3.12 cfs @ 12.18 hrs, Volume= 0.244 af
Outflow = 0.16 cfs @ 15.08 hrs, Volume= 0.079 af, Atten= 95%, Lag= 173.9 min
Primary = 0.16 cfs @ 15.08 hrs, Volume= 0.079 af
Routed to Reach 2R : Peak Flow
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Reach 2R : Peak Flow

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 271.39' @ 15.08 hrs Surf.Area= 4,450 sf Storage= 7,744 cf

Plug-Flow detention time= 295.2 min calculated for 0.079 af (32% of inflow)
Center-of-Mass det. time= 190.7 min (983.4 - 792.7)

Volume	Invert	Avail.Storage	Storage Description
#1	269.00'	21,394 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

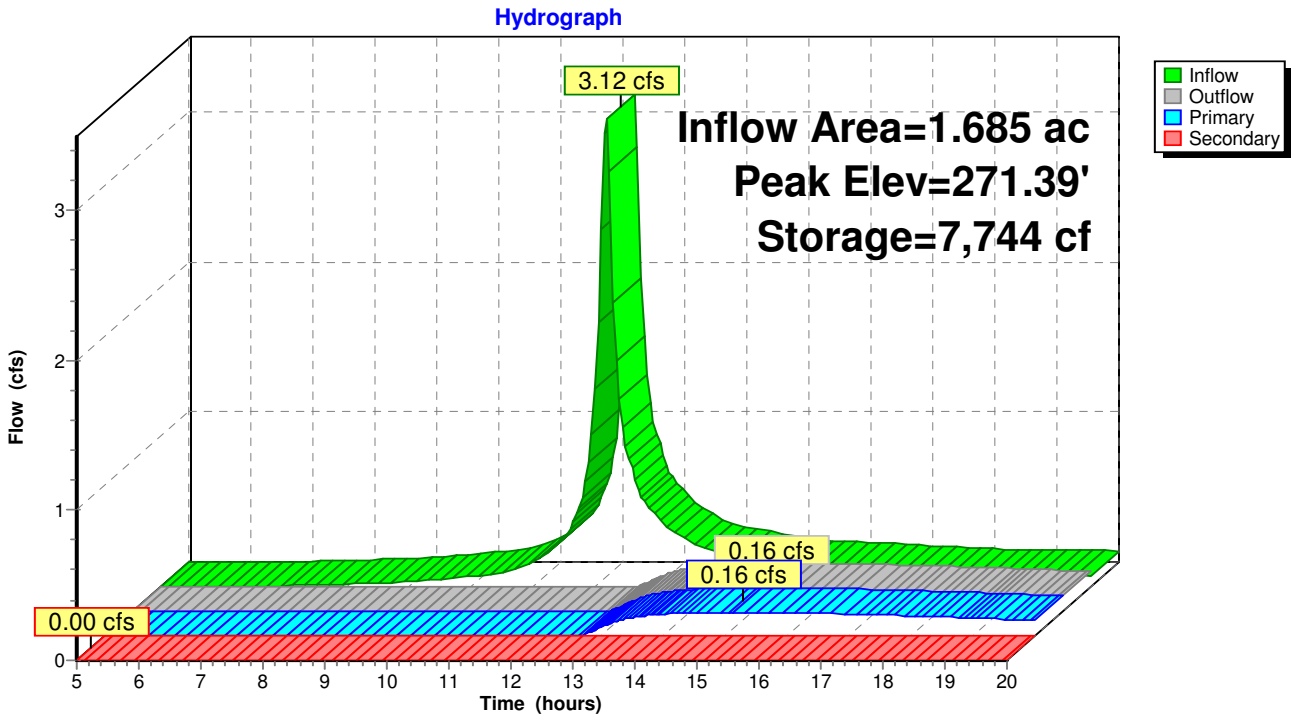
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
269.00	710	0	0
270.00	3,595	2,153	2,153
272.00	4,825	8,420	10,573
273.00	5,426	5,126	15,698
274.00	5,965	5,696	21,394

Device	Routing	Invert	Outlet Devices
#1	Primary	271.00'	**4.0" Round Culvert** L= 32.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 271.00' / 270.00' S= 0.0313 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#2	Secondary	273.00'	**25.0' long + 2.0 '/' SideZ x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.16 cfs @ 15.08 hrs HW=271.39' (Free Discharge)
1=Culvert (Inlet Controls 0.16 cfs @ 1.80 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=269.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Stormwater Pond



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: Drainage Area 1 Runoff Area=58,942 sf 40.24% Impervious Runoff Depth>3.12"
Flow Length=203' Tc=11.2 min CN=84 Runoff=4.31 cfs 0.351 af

Subcatchment 2S: Drainage Area 2 Runoff Area=19,528 sf 0.00% Impervious Runoff Depth>2.23"
Flow Length=192' Slope=0.0680 '/' Tc=14.4 min CN=74 Runoff=0.95 cfs 0.083 af

Subcatchment 3S: Drainage Area 3 Runoff Area=53,855 sf 52.59% Impervious Runoff Depth>3.41"
Flow Length=320' Slope=0.0190 '/' Tc=7.3 min CN=87 Runoff=4.83 cfs 0.351 af

Reach 1R: Grassed Swale Avg. Flow Depth=0.27' Max Vel=3.83 fps Inflow=4.83 cfs 0.351 af
n=0.035 L=200.0' S=0.0550 '/' Capacity=47.47 cfs Outflow=4.58 cfs 0.351 af

Reach 2R: Peak Flow Inflow=4.45 cfs 0.564 af
Outflow=4.45 cfs 0.564 af

Pond 1P: Stormwater Pond Peak Elev=272.39' Storage=12,504 cf Inflow=5.42 cfs 0.434 af
Primary=0.37 cfs 0.213 af Secondary=0.00 cfs 0.000 af Outflow=0.37 cfs 0.213 af

Total Runoff Area = 3.038 ac Runoff Volume = 0.786 af Average Runoff Depth = 3.10"
60.67% Pervious = 1.843 ac 39.33% Impervious = 1.195 ac

Summary for Subcatchment 1S: Drainage Area 1

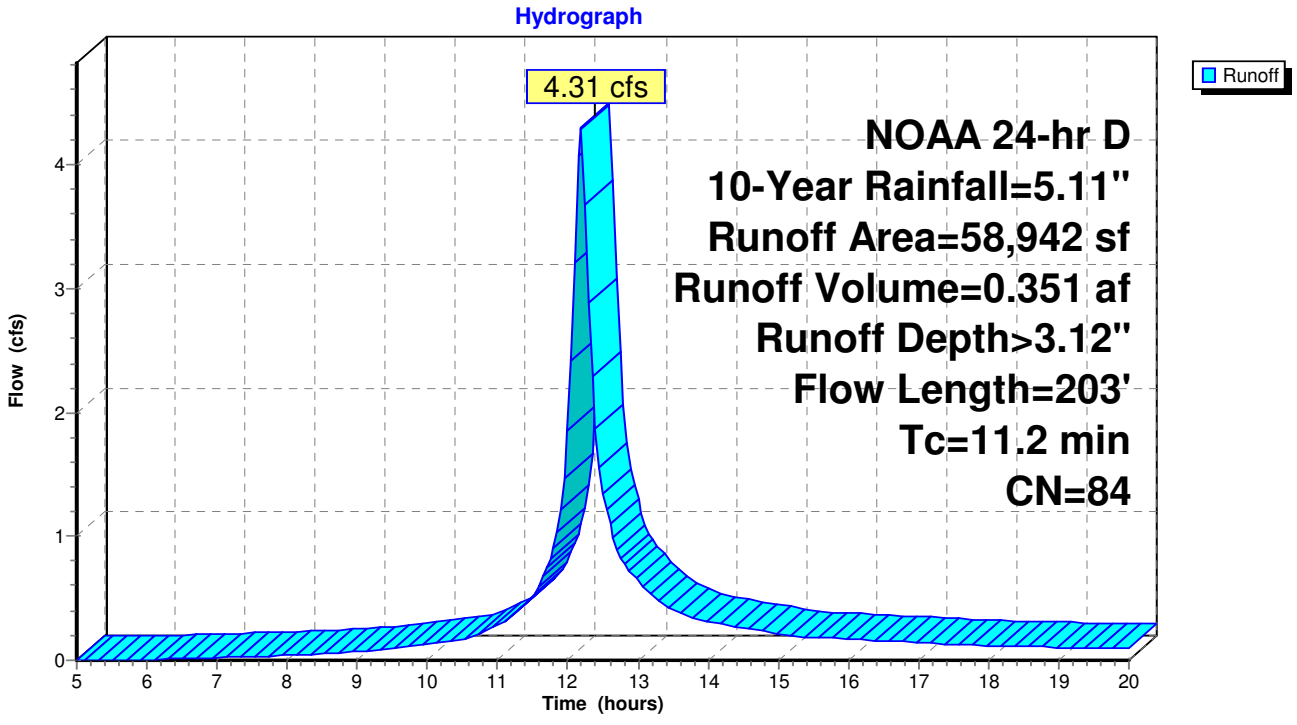
Runoff = 4.31 cfs @ 12.19 hrs, Volume= 0.351 af, Depth> 3.12"
Routed to Reach 2R : Peak Flow

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.11"

	Area (sf)	CN	Description
*	23,721	98	Paved parking & roof, HSG C
	35,221	74	>75% Grass cover, Good, HSG C
	58,942	84	Weighted Average
	35,221		59.76% Pervious Area
	23,721		40.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	73	0.0410	1.76		**Sheet Flow, Tc-DA1a** Smooth surfaces n= 0.011 P2= 3.36"
10.5	130	0.0690	0.21		**Sheet Flow, Tc-AD1b** Grass: Dense n= 0.240 P2= 3.36"
11.2	203	Total			

Subcatchment 1S: Drainage Area 1



Summary for Subcatchment 2S: Drainage Area 2

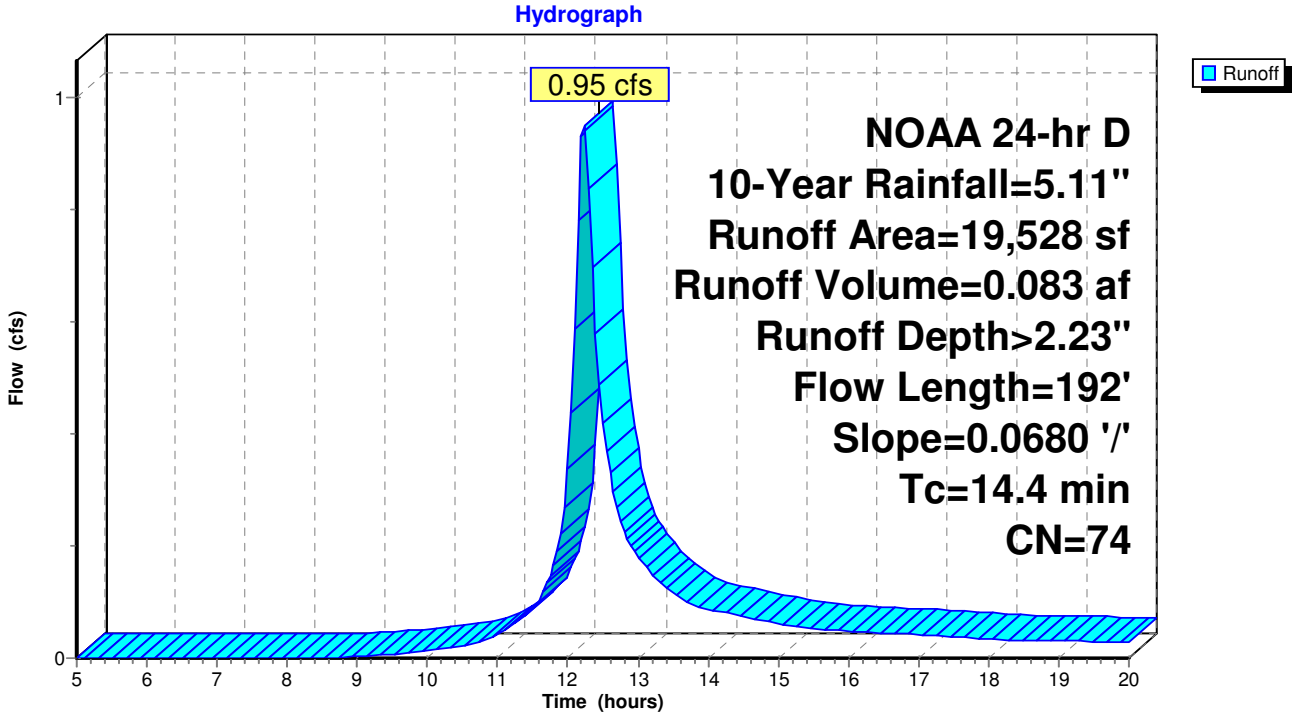
Runoff = 0.95 cfs @ 12.23 hrs, Volume= 0.083 af, Depth> 2.23"
Routed to Pond 1P : Stormwater Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.11"

Area (sf)	CN	Description
19,528	74	>75% Grass cover, Good, HSG C
19,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	192	0.0680	0.22		**Sheet Flow, Tc-DA2** Grass: Dense n= 0.240 P2= 3.36"

Subcatchment 2S: Drainage Area 2



Summary for Subcatchment 3S: Drainage Area 3

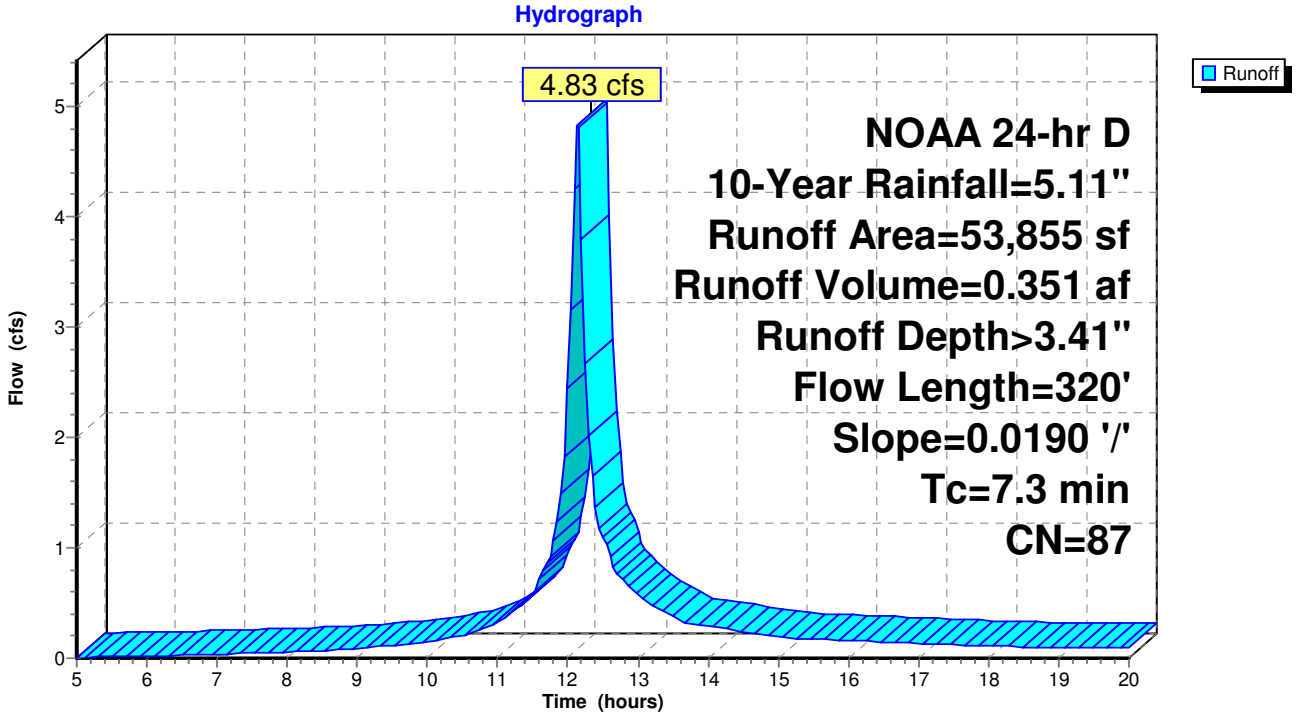
Runoff = 4.83 cfs @ 12.14 hrs, Volume= 0.351 af, Depth> 3.41"
Routed to Reach 1R : Grassed Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.11"

	Area (sf)	CN	Description
*	28,324	98	Paved parking/roof, HSG C
	25,531	74	>75% Grass cover, Good, HSG C
	53,855	87	Weighted Average
	25,531		47.41% Pervious Area
	28,324		52.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	320	0.0190	0.73		**Lag/CN Method, Tc-DA3**

Subcatchment 3S: Drainage Area 3



Summary for Reach 1R: Grassed Swale

[82] Warning: Early inflow requires earlier time span

Inflow Area = 1.236 ac, 52.59% Impervious, Inflow Depth > 3.41" for 10-Year event
Inflow = 4.83 cfs @ 12.14 hrs, Volume= 0.351 af
Outflow = 4.58 cfs @ 12.16 hrs, Volume= 0.351 af, Atten= 5%, Lag= 1.2 min
Routed to Pond 1P : Stormwater Pond

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.83 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.12 fps, Avg. Travel Time= 3.0 min

Peak Storage= 249 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 5.10'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 47.47 cfs

4.00' x 1.00' deep channel, n= 0.035
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 200.0' Slope= 0.0550 '/'
Inlet Invert= 286.00', Outlet Invert= 275.00'

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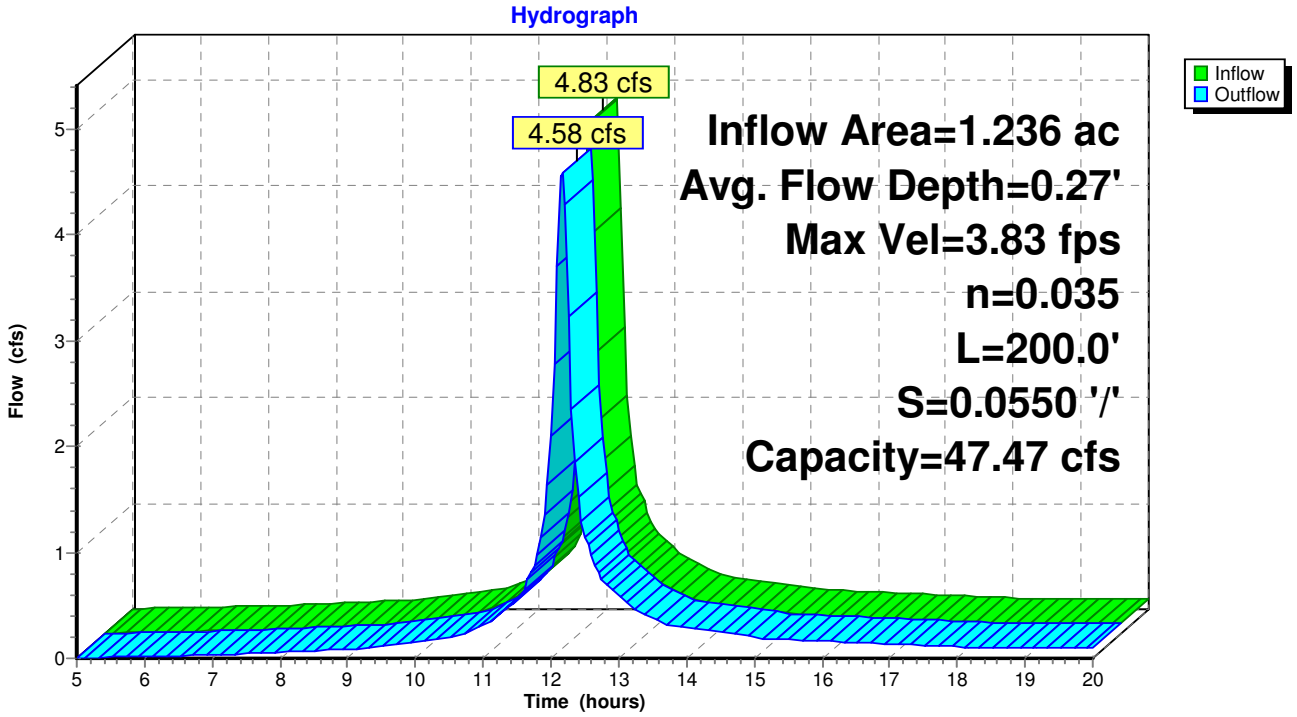
Reach 1R: Grassed Swale



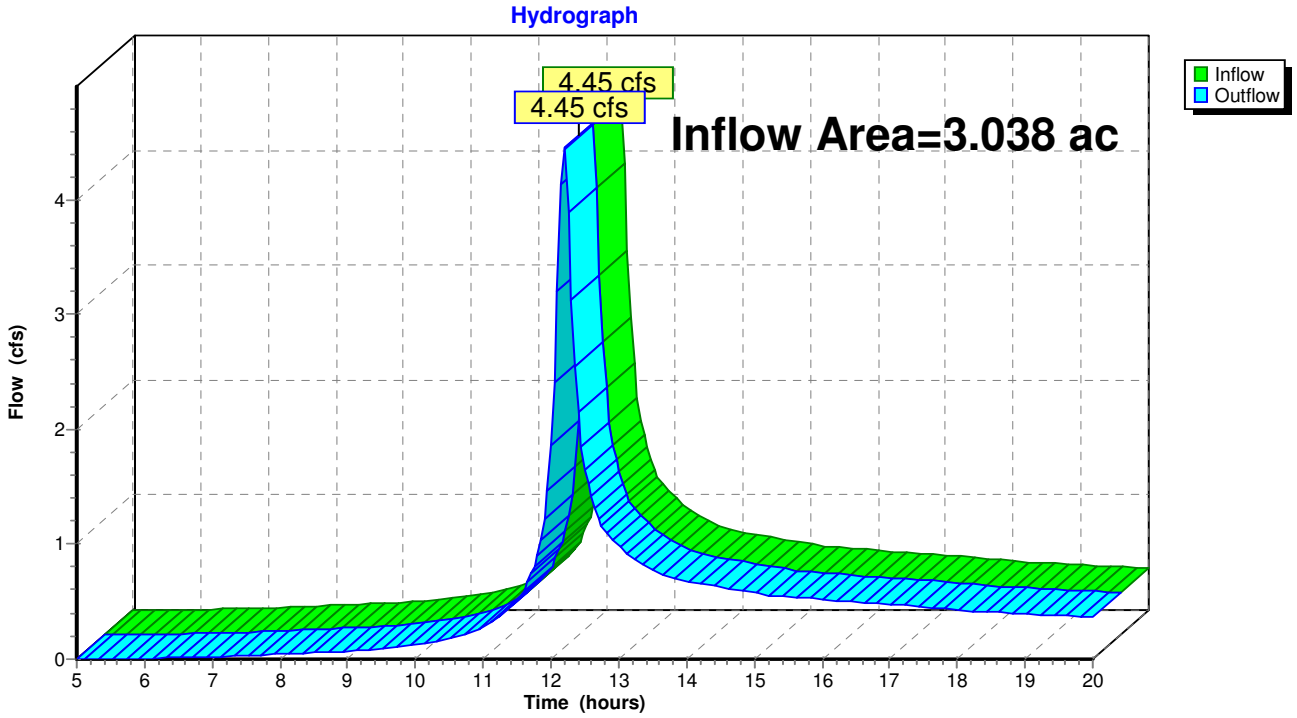
Summary for Reach 2R: Peak Flow

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.038 ac, 39.33% Impervious, Inflow Depth > 2.23" for 10-Year event
Inflow = 4.45 cfs @ 12.19 hrs, Volume= 0.564 af
Outflow = 4.45 cfs @ 12.19 hrs, Volume= 0.564 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 2R: Peak Flow



Summary for Pond 1P: Stormwater Pond

Inflow Area = 1.685 ac, 38.60% Impervious, Inflow Depth > 3.09" for 10-Year event
Inflow = 5.42 cfs @ 12.17 hrs, Volume= 0.434 af
Outflow = 0.37 cfs @ 14.10 hrs, Volume= 0.213 af, Atten= 93%, Lag= 116.0 min
Primary = 0.37 cfs @ 14.10 hrs, Volume= 0.213 af
Routed to Reach 2R : Peak Flow
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Reach 2R : Peak Flow

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 272.39' @ 14.10 hrs Surf.Area= 5,060 sf Storage= 12,504 cf

Plug-Flow detention time= 268.1 min calculated for 0.212 af (49% of inflow)
Center-of-Mass det. time= 179.2 min (958.0 - 778.8)

Volume	Invert	Avail.Storage	Storage Description
#1	269.00'	21,394 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

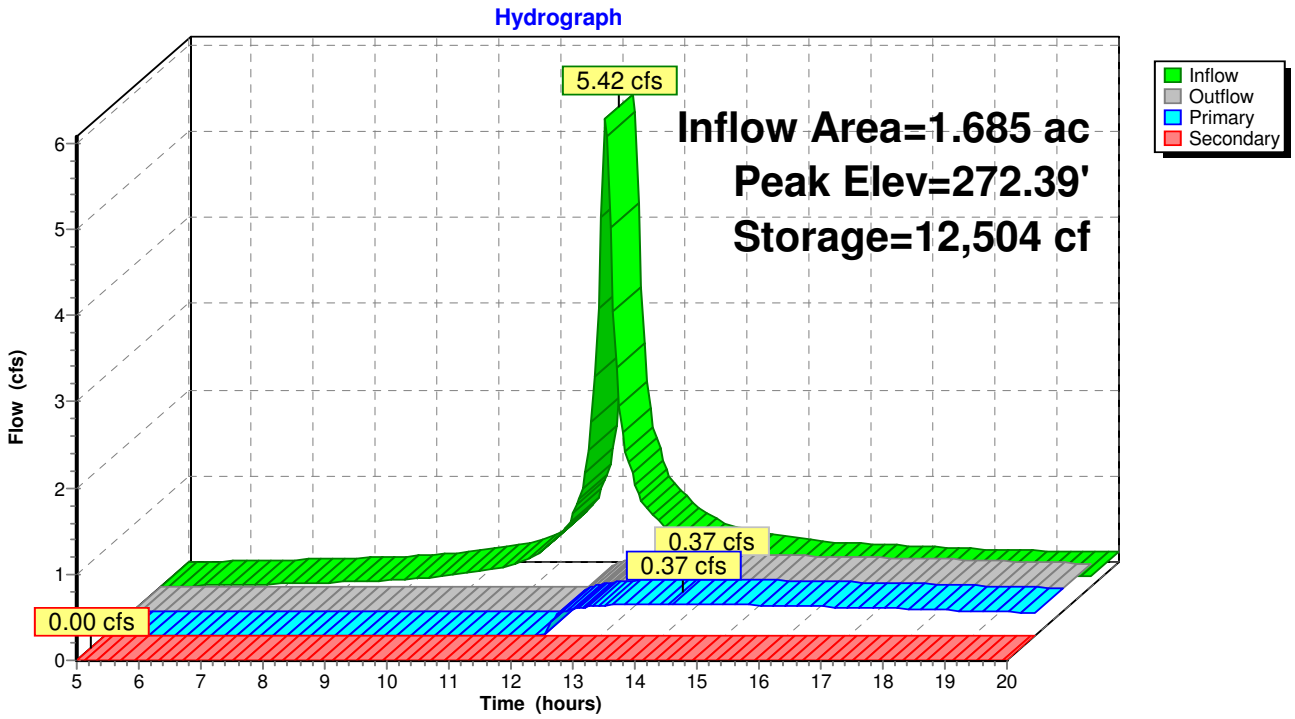
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
269.00	710	0	0
270.00	3,595	2,153	2,153
272.00	4,825	8,420	10,573
273.00	5,426	5,126	15,698
274.00	5,965	5,696	21,394

Device	Routing	Invert	Outlet Devices
#1	Primary	271.00'	**4.0" Round Culvert** L= 32.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 271.00' / 270.00' S= 0.0313 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#2	Secondary	273.00'	**25.0' long + 2.0 '/' SideZ x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.37 cfs @ 14.10 hrs HW=272.39' (Free Discharge)
1=Culvert (Inlet Controls 0.37 cfs @ 4.21 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=269.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Stormwater Pond



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: Drainage Area 1 Runoff Area=58,942 sf 40.24% Impervious Runoff Depth>5.43"
Flow Length=203' Tc=11.2 min CN=84 Runoff=7.28 cfs 0.613 af

Subcatchment 2S: Drainage Area 2 Runoff Area=19,528 sf 0.00% Impervious Runoff Depth>4.31"
Flow Length=192' Slope=0.0680 '/' Tc=14.4 min CN=74 Runoff=1.83 cfs 0.161 af

Subcatchment 3S: Drainage Area 3 Runoff Area=53,855 sf 52.59% Impervious Runoff Depth>5.77"
Flow Length=320' Slope=0.0190 '/' Tc=7.3 min CN=87 Runoff=7.91 cfs 0.594 af

Reach 1R: Grassed Swale Avg. Flow Depth=0.37' Max Vel=4.53 fps Inflow=7.91 cfs 0.594 af
n=0.035 L=200.0' S=0.0550 '/' Capacity=47.47 cfs Outflow=7.58 cfs 0.593 af

Reach 2R: Peak Flow Inflow=8.61 cfs 1.070 af
Outflow=8.61 cfs 1.070 af

Pond 1P: Stormwater Pond Peak Elev=273.16' Storage=16,552 cf Inflow=9.18 cfs 0.754 af
Primary=0.47 cfs 0.290 af Secondary=4.02 cfs 0.167 af Outflow=4.49 cfs 0.457 af

Total Runoff Area = 3.038 ac Runoff Volume = 1.368 af Average Runoff Depth = 5.40"
60.67% Pervious = 1.843 ac 39.33% Impervious = 1.195 ac

Summary for Subcatchment 1S: Drainage Area 1

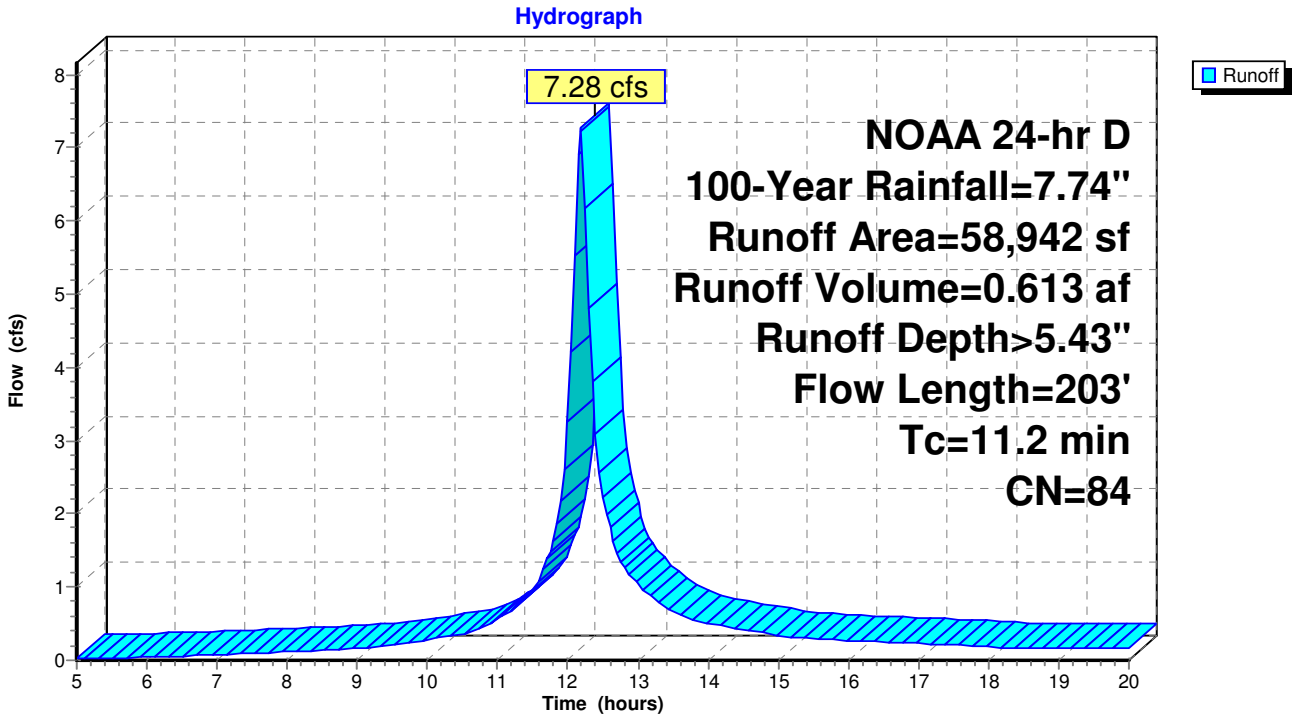
Runoff = 7.28 cfs @ 12.19 hrs, Volume= 0.613 af, Depth> 5.43"
Routed to Reach 2R : Peak Flow

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=7.74"

	Area (sf)	CN	Description
*	23,721	98	Paved parking & roof, HSG C
	35,221	74	>75% Grass cover, Good, HSG C
	58,942	84	Weighted Average
	35,221		59.76% Pervious Area
	23,721		40.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	73	0.0410	1.76		**Sheet Flow, Tc-DA1a** Smooth surfaces n= 0.011 P2= 3.36"
10.5	130	0.0690	0.21		**Sheet Flow, Tc-AD1b** Grass: Dense n= 0.240 P2= 3.36"
11.2	203	Total			

Subcatchment 1S: Drainage Area 1



Summary for Subcatchment 2S: Drainage Area 2

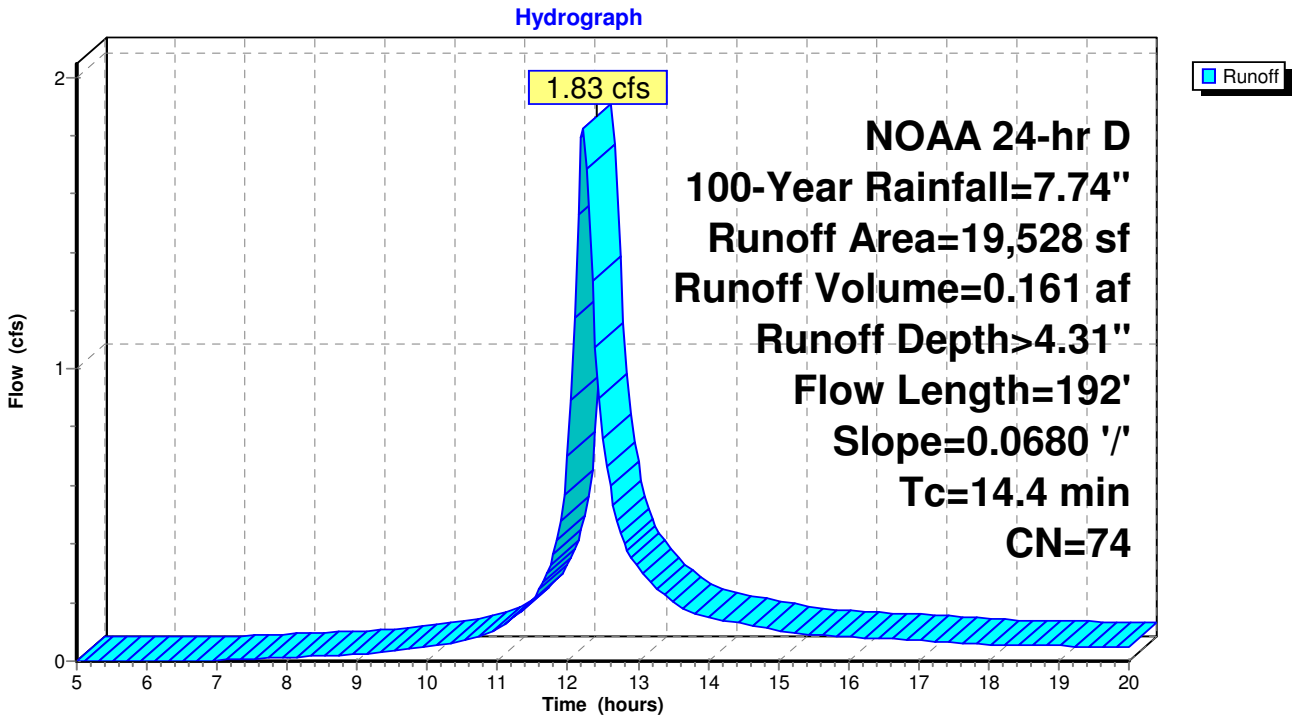
Runoff = 1.83 cfs @ 12.22 hrs, Volume= 0.161 af, Depth> 4.31"
Routed to Pond 1P : Stormwater Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=7.74"

Area (sf)	CN	Description
19,528	74	>75% Grass cover, Good, HSG C
19,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	192	0.0680	0.22		**Sheet Flow, Tc-DA2** Grass: Dense n= 0.240 P2= 3.36"

Subcatchment 2S: Drainage Area 2



Summary for Subcatchment 3S: Drainage Area 3

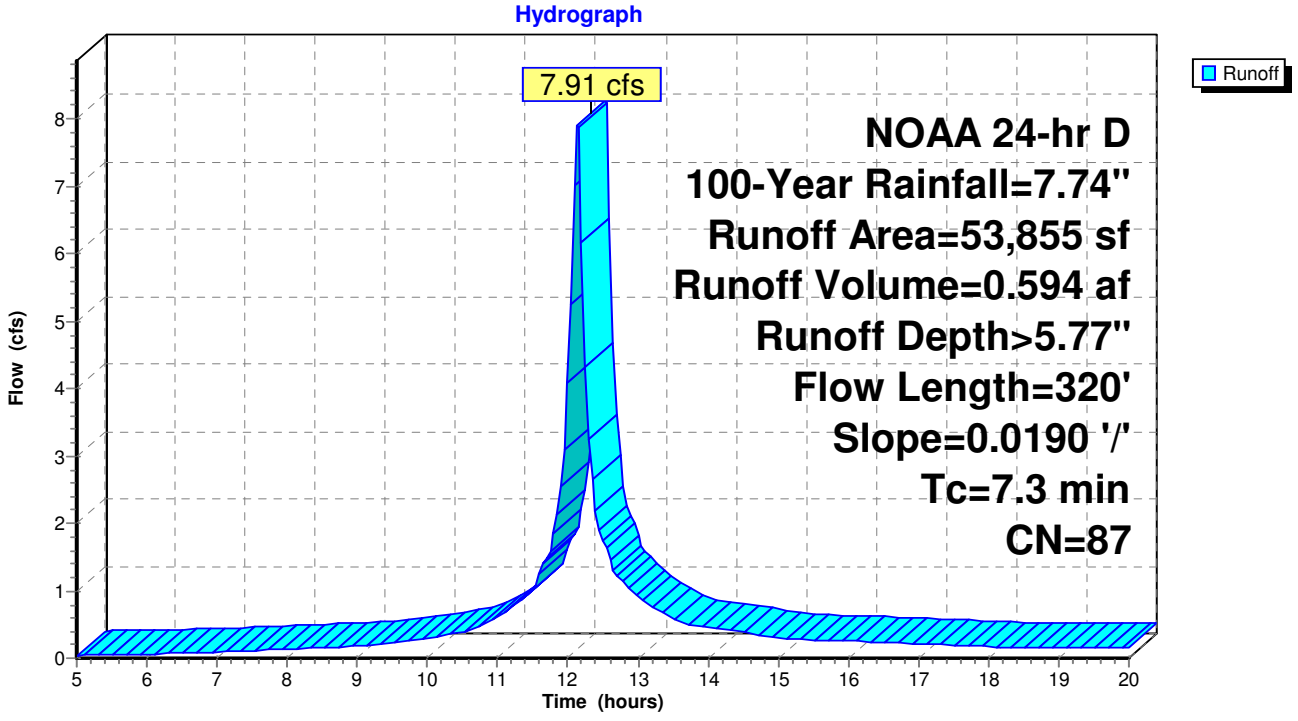
Runoff = 7.91 cfs @ 12.14 hrs, Volume= 0.594 af, Depth> 5.77"
Routed to Reach 1R : Grassed Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=7.74"

	Area (sf)	CN	Description
*	28,324	98	Paved parking/roof, HSG C
	25,531	74	>75% Grass cover, Good, HSG C
	53,855	87	Weighted Average
	25,531		47.41% Pervious Area
	28,324		52.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	320	0.0190	0.73		**Lag/CN Method, Tc-DA3**

Subcatchment 3S: Drainage Area 3



Summary for Reach 1R: Grassed Swale

[82] Warning: Early inflow requires earlier time span

Inflow Area = 1.236 ac, 52.59% Impervious, Inflow Depth > 5.77" for 100-Year event
Inflow = 7.91 cfs @ 12.14 hrs, Volume= 0.594 af
Outflow = 7.58 cfs @ 12.16 hrs, Volume= 0.593 af, Atten= 4%, Lag= 1.0 min
Routed to Pond 1P : Stormwater Pond

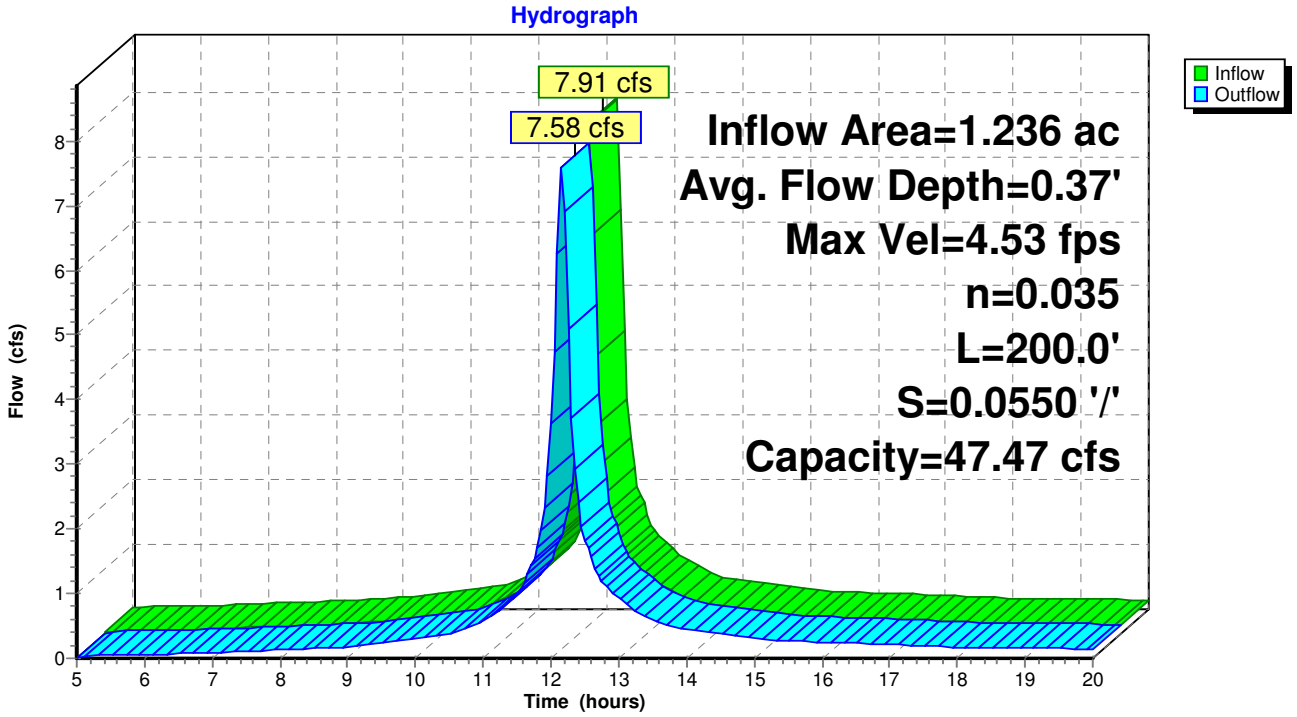
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.53 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.39 fps, Avg. Travel Time= 2.4 min

Peak Storage= 346 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.37' , Surface Width= 5.46'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 47.47 cfs

4.00' x 1.00' deep channel, n= 0.035
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 200.0' Slope= 0.0550 '/'
Inlet Invert= 286.00', Outlet Invert= 275.00'

‡

Reach 1R: Grassed Swale



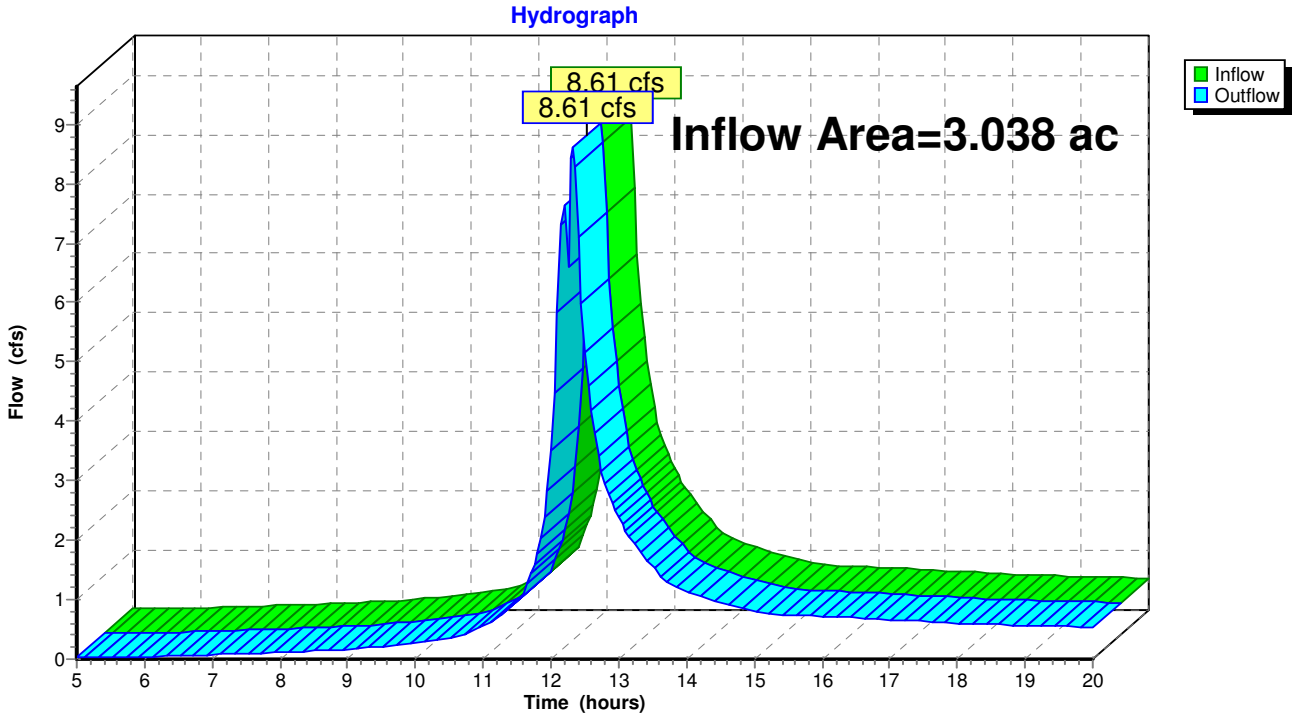
Summary for Reach 2R: Peak Flow

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.038 ac, 39.33% Impervious, Inflow Depth > 4.23" for 100-Year event
Inflow = 8.61 cfs @ 12.32 hrs, Volume= 1.070 af
Outflow = 8.61 cfs @ 12.32 hrs, Volume= 1.070 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 2R: Peak Flow



Summary for Pond 1P: Stormwater Pond

Inflow Area = 1.685 ac, 38.60% Impervious, Inflow Depth > 5.37" for 100-Year event
Inflow = 9.18 cfs @ 12.17 hrs, Volume= 0.754 af
Outflow = 4.49 cfs @ 12.36 hrs, Volume= 0.457 af, Atten= 51%, Lag= 11.5 min
Primary = 0.47 cfs @ 12.36 hrs, Volume= 0.290 af
Routed to Reach 2R : Peak Flow
Secondary = 4.02 cfs @ 12.36 hrs, Volume= 0.167 af
Routed to Reach 2R : Peak Flow

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 273.16' @ 12.36 hrs Surf.Area= 5,510 sf Storage= 16,552 cf

Plug-Flow detention time= 197.3 min calculated for 0.457 af (61% of inflow)
Center-of-Mass det. time= 118.2 min (884.7 - 766.5)

Volume	Invert	Avail.Storage	Storage Description
#1	269.00'	21,394 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

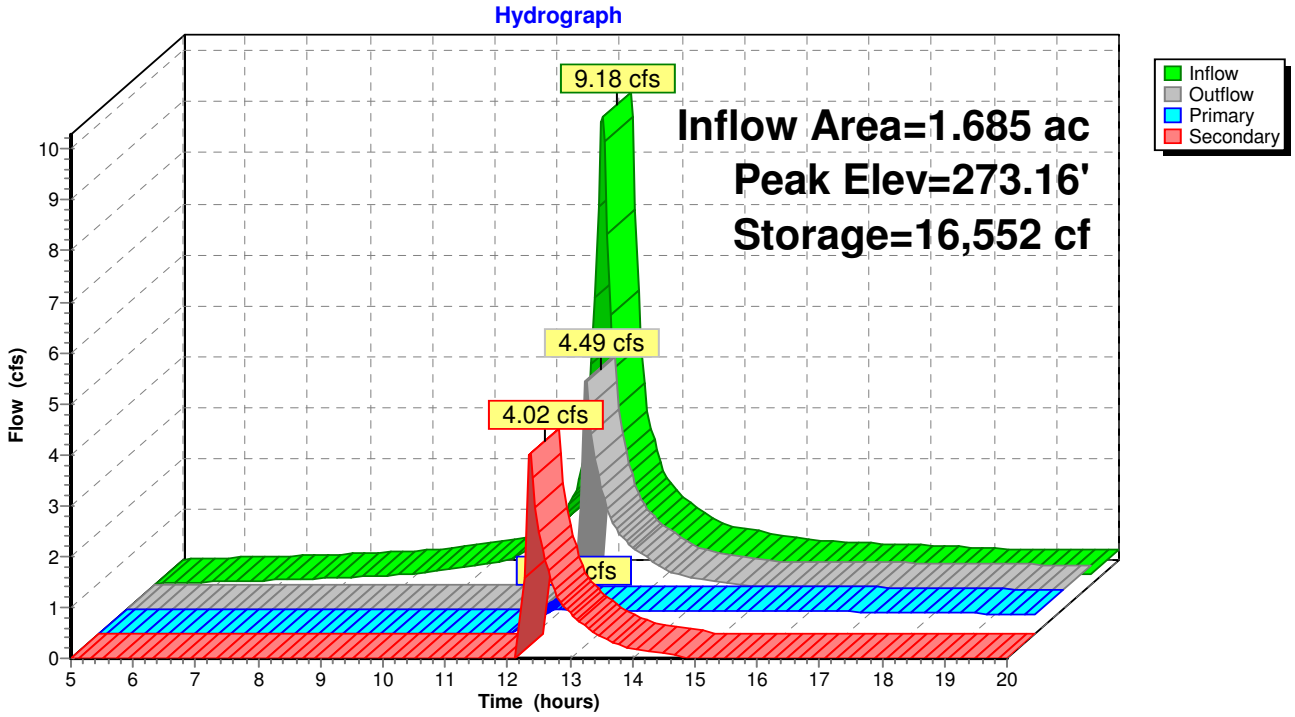
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
269.00	710	0	0
270.00	3,595	2,153	2,153
272.00	4,825	8,420	10,573
273.00	5,426	5,126	15,698
274.00	5,965	5,696	21,394

Device	Routing	Invert	Outlet Devices
#1	Primary	271.00'	**4.0" Round Culvert** L= 32.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 271.00' / 270.00' S= 0.0313 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#2	Secondary	273.00'	**25.0' long + 2.0 '/' SideZ x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.47 cfs @ 12.36 hrs HW=273.15' (Free Discharge)
1=Culvert (Inlet Controls 0.47 cfs @ 5.36 fps)

Secondary OutFlow Max=3.92 cfs @ 12.36 hrs HW=273.15' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 3.92 cfs @ 1.01 fps)

Pond 1P: Stormwater Pond



SUPPORTING DOCUMENTATION

NOAA Point Precipitation Estimates
Web Soil Survey

NOAA Atlas 14, Volume 10, Version 3
Location name: Ledyard, Connecticut, USA*
Latitude: 41.442°, Longitude: -72.0164°
Elevation: 314 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	**0.341** (0.265-0.437)	**0.408** (0.316-0.523)	**0.517** (0.399-0.664)	**0.608** (0.467-0.782)	**0.732** (0.545-0.973)	**0.826** (0.603-1.11)	**0.924** (0.656-1.28)	**1.04** (0.697-1.45)	**1.20** (0.775-1.72)	**1.33** (0.841-1.93)
10-min	**0.483** (0.375-0.619)	**0.578** (0.448-0.740)	**0.733** (0.566-0.942)	**0.861** (0.661-1.11)	**1.04** (0.772-1.38)	**1.17** (0.854-1.58)	**1.31** (0.930-1.82)	**1.47** (0.988-2.06)	**1.70** (1.10-2.43)	**1.88** (1.19-2.74)
15-min	**0.569** (0.441-0.728)	**0.680** (0.527-0.871)	**0.862** (0.665-1.11)	**1.01** (0.777-1.30)	**1.22** (0.909-1.62)	**1.38** (1.00-1.86)	**1.54** (1.09-2.14)	**1.73** (1.16-2.42)	**2.00** (1.29-2.86)	**2.22** (1.40-3.22)
30-min	**0.802** (0.622-1.03)	**0.959** (0.743-1.23)	**1.22** (0.937-1.56)	**1.43** (1.10-1.84)	**1.72** (1.28-2.28)	**1.94** (1.41-2.61)	**2.17** (1.54-3.00)	**2.43** (1.63-3.40)	**2.80** (1.82-4.02)	**3.12** (1.97-4.53)
60-min	**1.04** (0.804-1.33)	**1.24** (0.958-1.58)	**1.57** (1.21-2.01)	**1.84** (1.41-2.37)	**2.21** (1.65-2.94)	**2.50** (1.82-3.37)	**2.79** (1.98-3.87)	**3.13** (2.10-4.38)	**3.62** (2.34-5.18)	**4.02** (2.54-5.84)
2-hr	**1.36** (1.06-1.73)	**1.62** (1.27-2.06)	**2.05** (1.60-2.61)	**2.41** (1.87-3.08)	**2.90** (2.18-3.83)	**3.27** (2.41-4.38)	**3.66** (2.62-5.04)	**4.10** (2.78-5.70)	**4.74** (3.09-6.75)	**5.27** (3.35-7.60)
3-hr	**1.58** (1.24-2.00)	**1.88** (1.48-2.38)	**2.38** (1.86-3.02)	**2.79** (2.17-3.55)	**3.36** (2.53-4.41)	**3.79** (2.80-5.04)	**4.24** (3.04-5.80)	**4.75** (3.22-6.56)	**5.49** (3.58-7.77)	**6.10** (3.89-8.76)
6-hr	**2.01** (1.59-2.51)	**2.38** (1.89-2.99)	**3.00** (2.37-3.77)	**3.52** (2.76-4.43)	**4.23** (3.21-5.50)	**4.76** (3.54-6.28)	**5.32** (3.84-7.22)	**5.96** (4.07-8.17)	**6.88** (4.52-9.68)	**7.65** (4.90-10.9)
12-hr	**2.48** (1.98-3.07)	**2.94** (2.35-3.65)	**3.69** (2.94-4.59)	**4.32** (3.42-5.39)	**5.18** (3.97-6.68)	**5.82** (4.37-7.63)	**6.50** (4.74-8.76)	**7.28** (5.00-9.91)	**8.42** (5.56-11.7)	**9.36** (6.03-13.2)
24-hr	**2.90** (2.34-3.56)	**3.46** (2.79-4.25)	**4.36** (3.50-5.37)	**5.11** (4.08-6.33)	**6.15** (4.75-7.87)	**6.92** (5.24-9.00)	**7.74** (5.69-10.4)	**8.70** (6.01-11.7)	**10.1** (6.70-14.0)	**11.3** (7.30-15.9)
2-day	**3.24** (2.64-3.95)	**3.90** (3.18-4.75)	**4.97** (4.03-6.07)	**5.86** (4.73-7.19)	**7.09** (5.53-9.01)	**8.00** (6.11-10.3)	**8.98** (6.66-12.0)	**10.1** (7.04-13.6)	**11.9** (7.92-16.3)	**13.4** (8.68-18.6)
3-day	**3.52** (2.88-4.26)	**4.22** (3.46-5.12)	**5.38** (4.39-6.54)	**6.34** (5.14-7.73)	**7.66** (6.00-9.68)	**8.65** (6.63-11.1)	**9.70** (7.22-12.9)	**11.0** (7.64-14.6)	**12.8** (8.58-17.6)	**14.4** (9.41-20.0)
4-day	**3.77** (3.10-4.55)	**4.52** (3.71-5.45)	**5.73** (4.69-6.93)	**6.73** (5.48-8.18)	**8.12** (6.38-10.2)	**9.15** (7.04-11.7)	**10.3** (7.66-13.5)	**11.6** (8.08-15.4)	**13.5** (9.06-18.4)	**15.2** (9.92-21.0)
7-day	**4.49** (3.72-5.38)	**5.30** (4.39-6.35)	**6.62** (5.46-7.95)	**7.72** (6.32-9.31)	**9.23** (7.30-11.5)	**10.4** (8.01-13.1)	**11.6** (8.66-15.1)	**13.0** (9.11-17.1)	**15.0** (10.1-20.4)	**16.8** (11.0-23.0)
10-day	**5.20** (4.33-6.20)	**6.05** (5.03-7.21)	**7.44** (6.16-8.88)	**8.59** (7.07-10.3)	**10.2** (8.07-12.6)	**11.4** (8.80-14.3)	**12.6** (9.45-16.3)	**14.0** (9.90-18.4)	**16.1** (10.9-21.7)	**17.8** (11.7-24.3)
20-day	**7.39** (6.22-8.72)	**8.30** (6.97-9.80)	**9.78** (8.18-11.6)	**11.0** (9.15-13.1)	**12.7** (10.1-15.5)	**14.0** (10.9-17.4)	**15.3** (11.5-19.4)	**16.7** (11.9-21.7)	**18.5** (12.6-24.7)	**19.9** (13.1-27.0)
30-day	**9.21** (7.79-10.8)	**10.2** (8.58-11.9)	**11.7** (9.85-13.8)	**13.0** (10.9-15.4)	**14.8** (11.8-17.9)	**16.2** (12.6-19.8)	**17.5** (13.1-21.9)	**18.8** (13.4-24.3)	**20.4** (13.9-27.1)	**21.6** (14.3-29.2)
45-day	**11.5** (9.74-13.4)	**12.5** (10.6-14.5)	**14.1** (11.9-16.5)	**15.5** (13.0-18.2)	**17.4** (14.0-20.9)	**18.9** (14.8-22.9)	**20.3** (15.2-25.1)	**21.5** (15.4-27.6)	**23.0** (15.8-30.3)	**23.9** (15.9-32.2)
60-day	**13.3** (11.4-15.5)	**14.4** (12.3-16.7)	**16.1** (13.7-18.8)	**17.6** (14.8-20.6)	**19.6** (15.8-23.4)	**21.2** (16.6-25.6)	**22.6** (17.0-27.9)	**23.8** (17.2-30.5)	**25.2** (17.4-33.2)	**26.1** (17.5-35.0)

[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.

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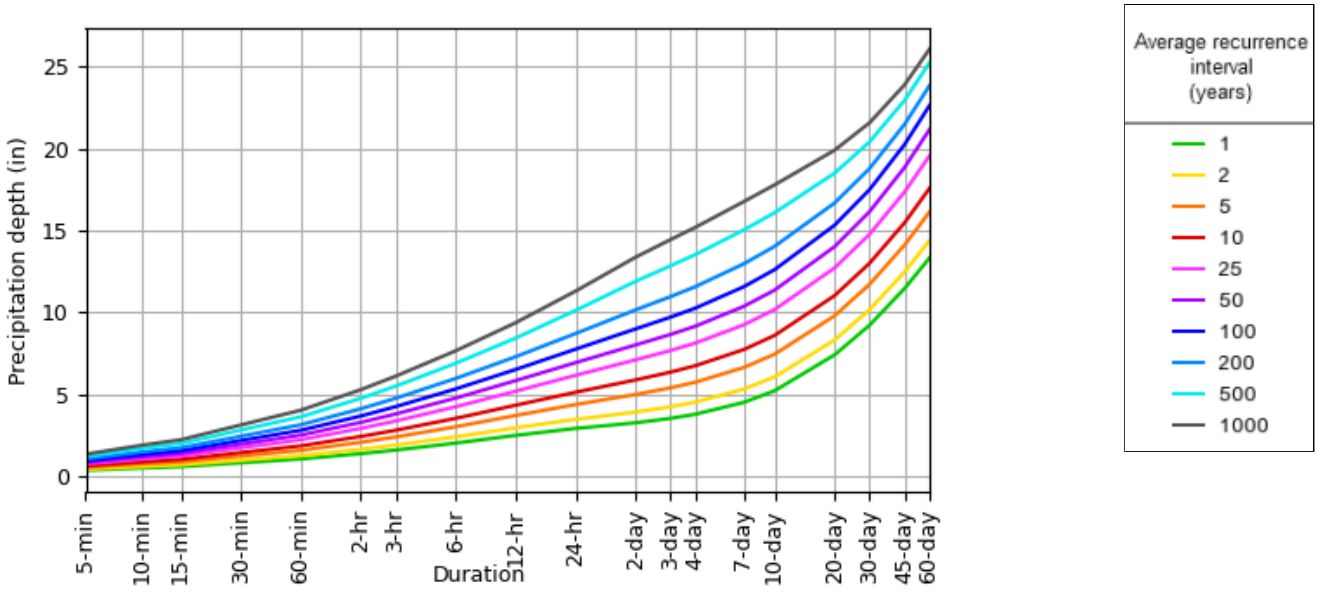
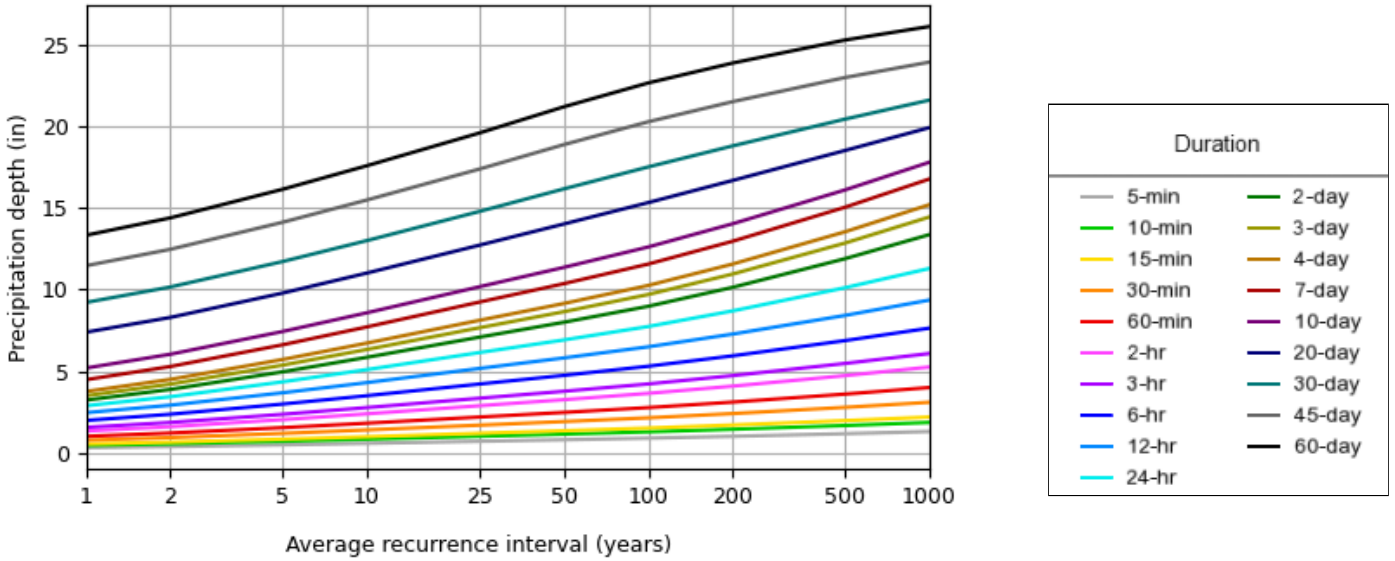
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.4420°, Longitude: -72.0164°





NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Mon Feb 9 19:05:12 2026

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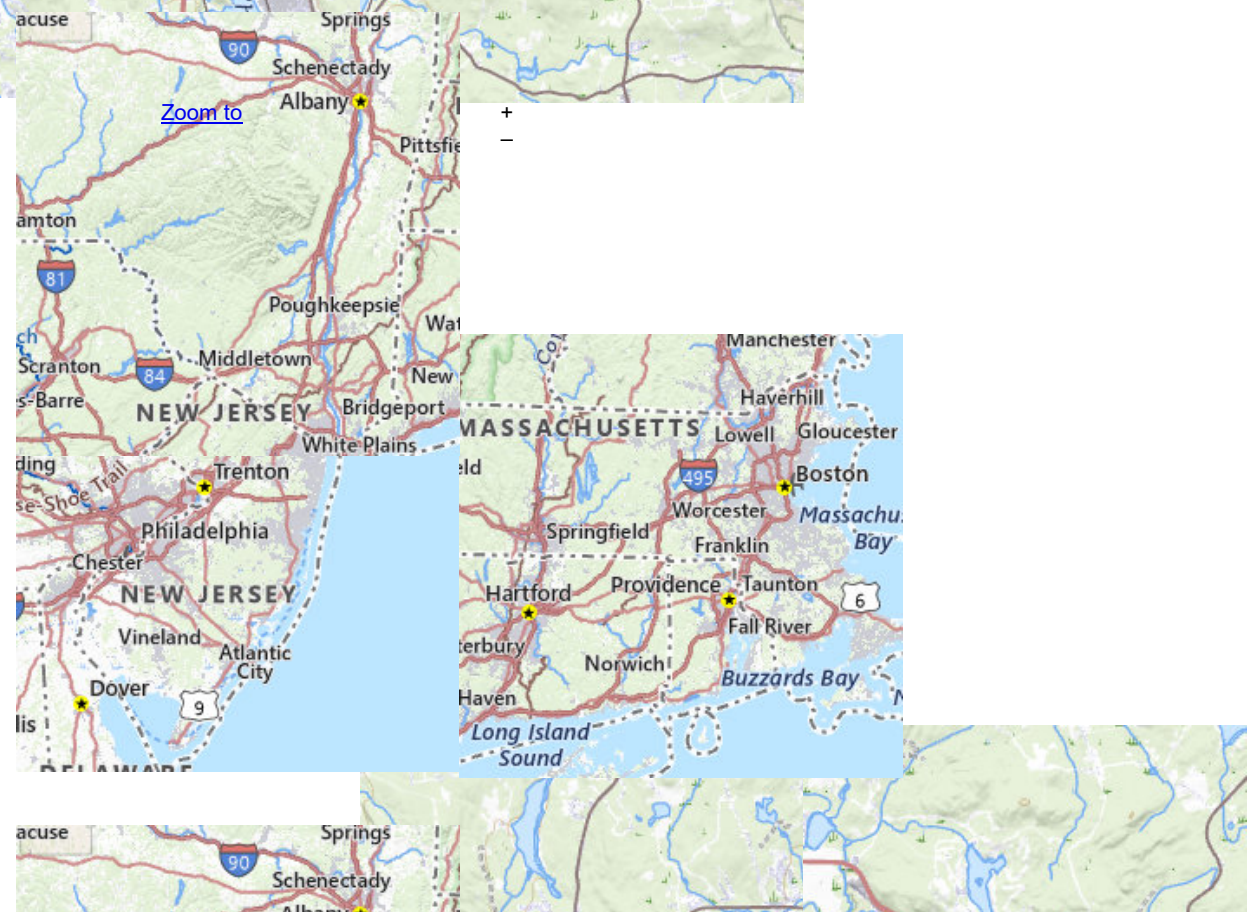
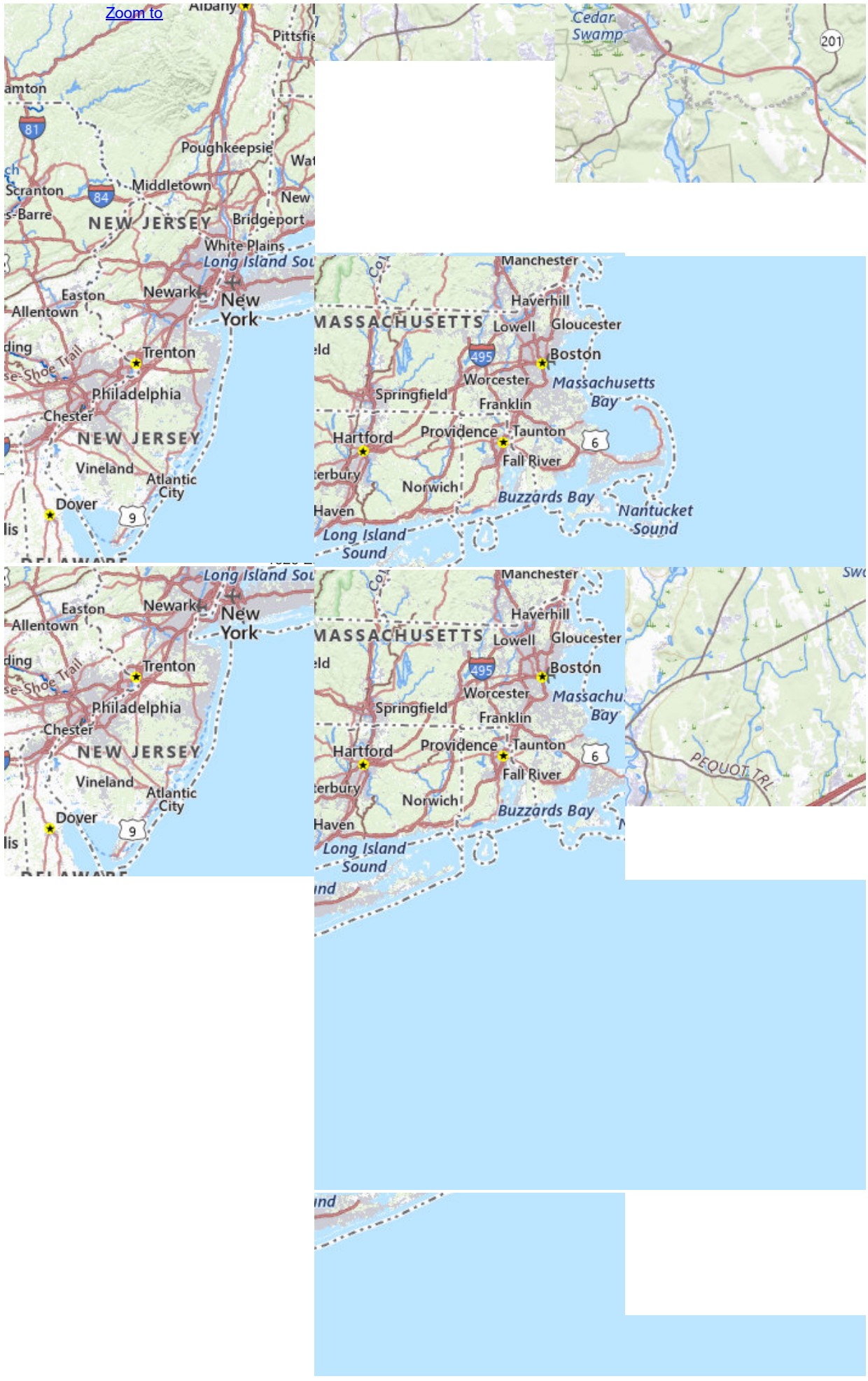
Maps & aerials

Small scale terrain

e scale terrain




Zoom to
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Poughkeepsie
Wat
Scranton
84
Middletown
New
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NEW JERSEY
Bridgeport
White Plains
Long Island Sou
Easton
Newark
New
York
Allentown
ding
Trenton
se-Shoe Trail
Philadelphia
Chester
NEW JERSEY
Vineland
Atlantic
City
Dover
9
lis
Cedar
Swamp
201
Manchester
Haverhill
MASSACHUSETTS
Lowell
Gloucester
eld
495
Boston
Worcester
Massachusetts
Bay
Springfield
Franklin
Hartford
Providence
Taunton
6
Fall River
erbury
Norwich
Buzzards Bay
Haven
Nantucket
Sound
Long Island
Sound
Co
Long Island Sou
Easton
Newark
New
York
Allentown
ding
Trenton
se-Shoe Trail
Philadelphia
Chester
NEW JERSEY
Vineland
Atlantic
City
Dover
9
lis
Manchester
Haverhill
MASSACHUSETTS
Lowell
Gloucester
eld
495
Boston
Worcester
Massachu
Bay
Springfield
Franklin
Hartford
Providence
Taunton
6
Fall River
erbury
Norwich
Buzzards Bay
Haven
Long Island
Sound
nd
PEQUOT TRL
nd


setts
Nantucket
Sound

Soil Map—State of Connecticut, Eastern Part
(740 Colonel Ledyard)

Map Scale: 1:1,560 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

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, Eastern Part
Survey Area Data: Version 6, Sep 16, 2025

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

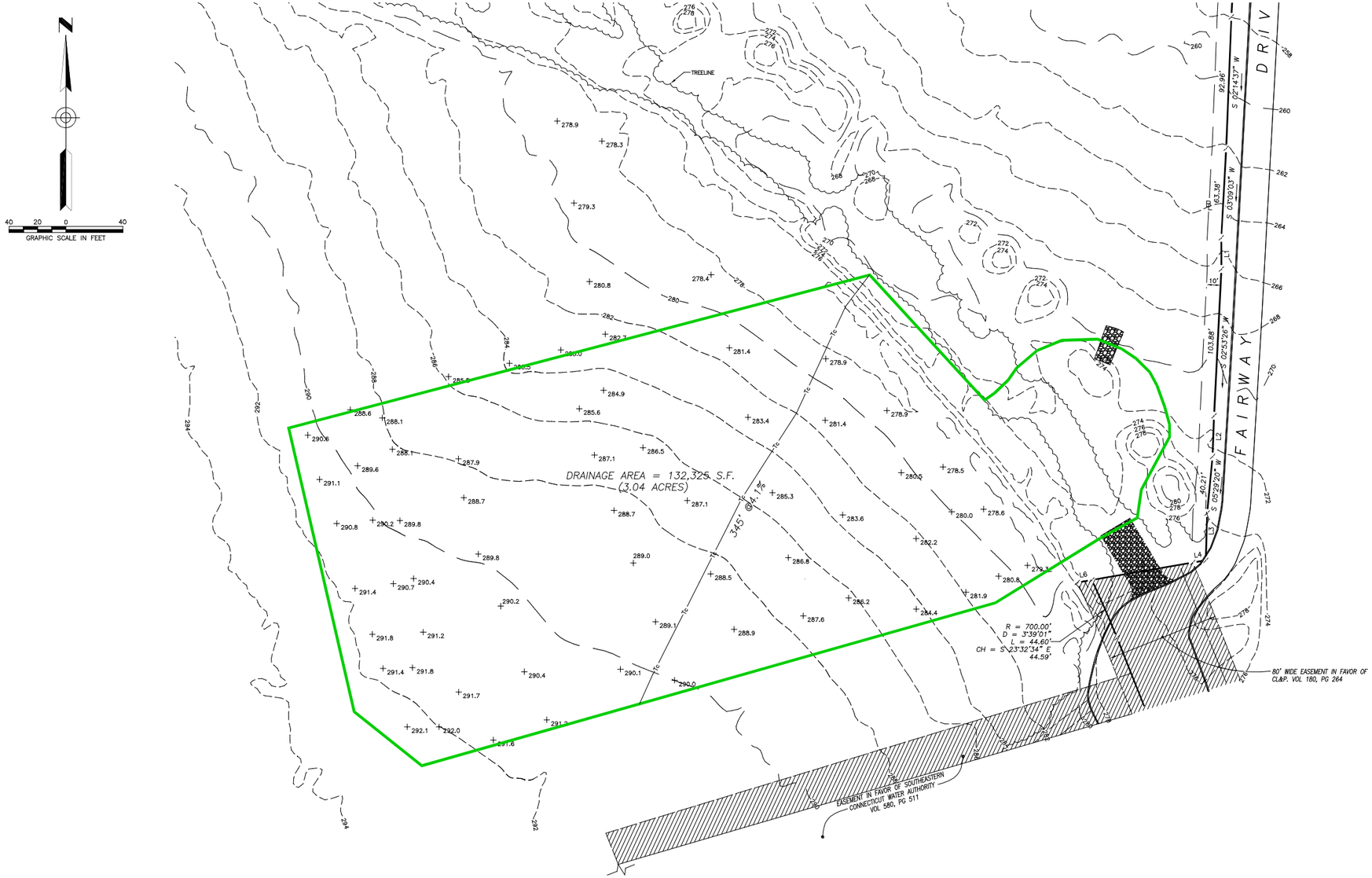
Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	3.4	60.4%
47C	Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	2.2	39.4%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	0.0	0.2%
Totals for Area of Interest		**5.6**	**100.0%**

DRAINAGE AREA PLANS



LEGEND

F.F.	FINISHED FLOOR
---100---	EXISTING CONTOURS
(100)	PROPOSED CONTOURS
℄	BUILDING SETBACK LINE
	SILT FILE

DATE	DESCRIPTION

REVISIONS

EXISTING CONDITIONS DRAINAGE AREA PLAN

PREPARED FOR

LEDYARD CENTER, LLC

COLONEL LEDYARD HIGHWAY (RTE 117) & IRON STREET (RTE 214)
LEDYARD, CONNECTICUT

Killingly Engineering Associates
Civil Engineering & Surveying
114 Westcott Road
P.O. Box 421
Killingly, Connecticut 06241
(860) 779-7299
www.killinglyengineering.com

DATE: 1/17/2026	DRAWN: RGS
SCALE: 1" = 40'	DESIGN: NET
SHEET: 1 OF 2	CHK BY: --
DWG. No: CLIENT FILE	JOB No: 23038

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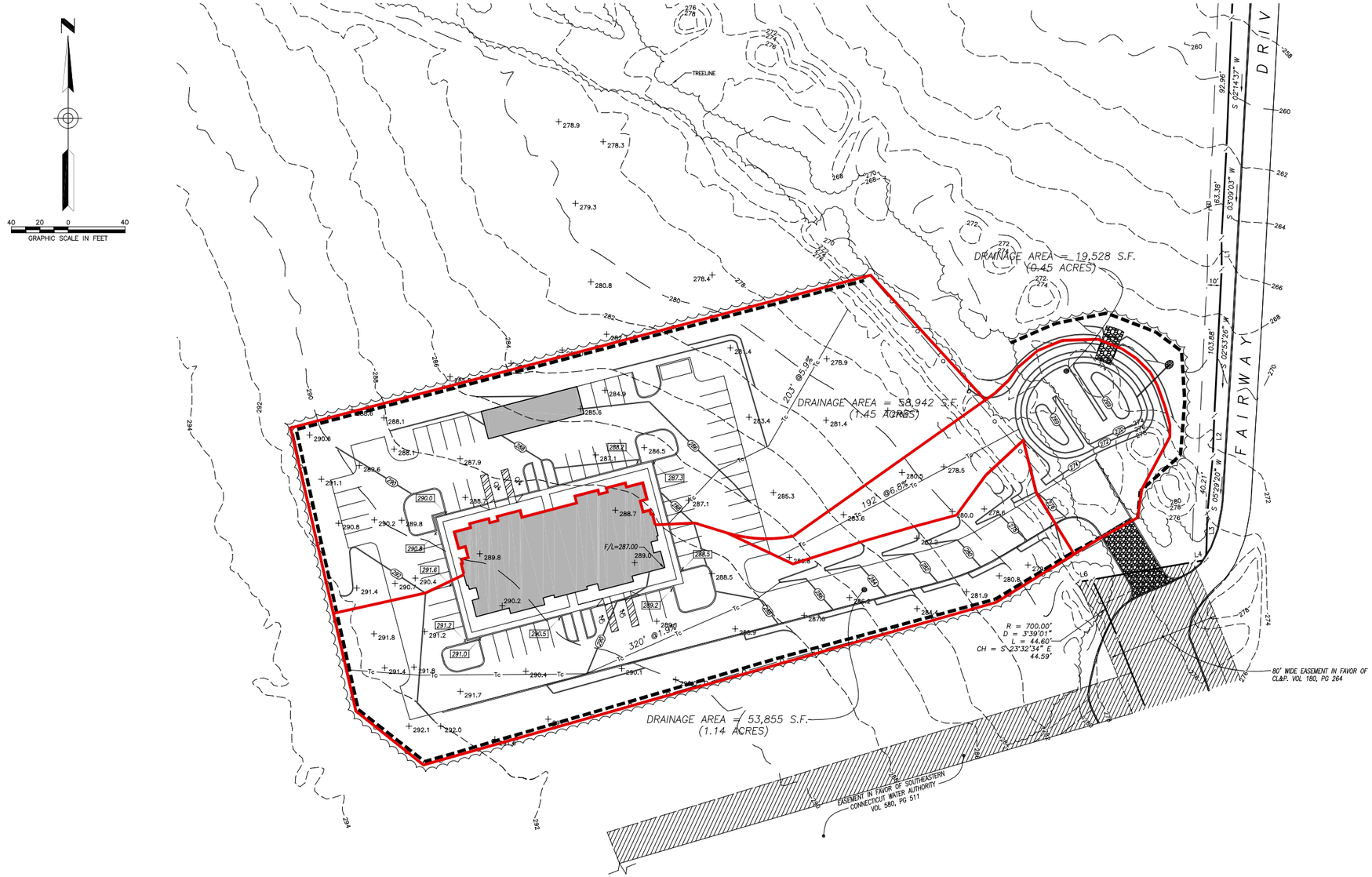

LEGEND

F.F.	FINISHED FLOOR
100	EXISTING CONTOURS
100	PROPOSED CONTOURS
BL	BUILDING SETBACK LINE
	SILT FENCE

DATE	DESCRIPTION

REVISIONS

PROPOSED DRAINAGE AREA PLAN

PREPARED FOR

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DATE: 1/17/2026	DRAWN: RGS
SCALE: 1" = 40'	DESIGN: NET
SHEET: 2 OF 2	CHK BY: --
DWG. No: CLIENT FILE	JOB No: 23038

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