Re-Issued for Permit

Drainage Assessment

North Stonington Civil Design

Silicon Ranch Corporation

North Stonington, Connecticut

June 25, 2021

(Revision 3)

Version	Date	Description/Summary of Changes
Revision 0	9-30-20	Issued for Permit
Revision 1	2-19-21	Amended 2.3.1 Wetland Description
Revision 2	5-24-21	
Revision 3	6-25-21	

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Attachments

1. Narrative

1.1. Project Description

Silicon Ranch Corporation intends to develop a photovoltaic solar site consisting of solar panels, racking, inverters, switchgear, and associated infrastructure necessary for a solar farm. The project site is located on portions of 5 contiguous parcels totaling just over 156 acres. The site location is under 2 miles west of the Connecticut and Rhode Island state line and north of I-95. This report summarizes the proposed facilities and impacts to the stormwater runoff.

1.2. Existing Conditions

Of the five parcels utilized for this project, the two parcels on the north are vacant and wooded and the three parcels to the south are hilly and surrounded by fields previously used for farming, wooded areas, and residential properties. For this project, the existing area was divided into four drainage study areas based on areas of developable land for optimal solar panel orientation and placement. Analysis points were chosen for each of these areas to analyze drainage such that existing flow patterns are maintained and offsite flows do not enter the study areas.

The site consists of type A, B, C, and D soils, but primarily consists of soil type “B”. The primary existing land cover is wooded area. The existing site is sparsely covered in trees with forest litter covering the soil; therefore, a fair hydrologic condition was used to compute the curve number. For both existing and proposed conditions, the 2-year (24 hour), 10-year (24 hour), 25-year (24 hour), 50-year (24 hour), and 100-year (24 hour) storms were analyzed and summarized in **Tables 1-5.**

1.3. Proposed Conditions

Under post-developed conditions, the overland drainage pattern will mimic the existing conditions. Within the 4 study areas, a total of 6 stormwater basins were designed for the 6 primary existing drainage areas. Ditch conveyance is proposed to divert runoff into the proposed stormwater BMPs. The ground cover within the limits of disturbance will change from wooded areas to grassed open space in good hydrologic condition, reducing the curve number and impacting the peak flows. The existing site requires minimal grading. Refer to the drainage area map in **Appendix D**.

2. Stormwater Calculations

2.1. Stormwater Peak Flow Calculations

Sub-basins were developed and analyzed based on the existing and proposed land covers and the hydrologic soil groups for the site found in the Soil Survey. Gravel roadways, transformer pads, and solar arrays were accounted for as impervious in the Weighted Curve Numbers (CN) calculation which was based on the TR-55 method. Although the site will be minimally graded, the CN calculations account for soil compaction activities during the construction of the solar array by increasing the hydrologic soil group present on-site by one-half of the next higher group type . The Time of Concentrations were generated by using the velocity factors from the NRCS Part 630 of the National Engineering Handbook, Chapter 15 and limited to 100 feet for sheet flow. The changes in time of concentration for post-developed runoff are due to a lower Manning’s N number due to the change in land cover. The Soil Resource Report for the site can be found in **Appendix A.** The results of the CN and Time of Concentration can be found in **Appendix D and E** respectively. This data,

along with the drainage area, was input into HydroCAD to generate hydrographs. The output of the HydroCAD model can be found in **Appendix C**.

The total rainfall depth was entered into the model and ran utilizing the NRCS Type III rainfall distribution with a 0.05-hour time interval. The HydroCAD results and full storm water peak flow calculations can be found in **Appendix D** of this report. **Tables 1-5** below summarize the peak flows for existing and proposed conditions in different design storms.

Table 1: Pre- and Post-developed peak flows for the 2-yr, 24-hr storm

Name	Area (ac)	Pre-Inflow Q2 (cfs)	Post- Inflow Q2 (cfs)	Pre-Inflow vs. Post-Inflow Q2	Post-Outflow Q2 (cfs)	Pre-Inflow vs. Post-Outflow Q2
1A	4.19	0.71	5.18	4.47	0.83	0.12
1B	4.57	0.99	6.05	5.06	0.77	-0.22
1C	11.85	2.36	16.97	14.61	2.22	-0.14
2	3.66	2.18	5.35	3.17	0.34	-1.84
4	9.02	3.02	10.24	7.22	0.34	-2.68
5	15.22	6.91	26.00	19.09	3.15	-3.76

Table 2: Pre- and Post-developed peak flows for the 10-yr, 24-hr storm

Name	Area (ac)	Pre-Inflow Q10 (cfs)	Post-Inflow Q10 (cfs)	Pre-Inflow vs. Post-Inflow Q10	Post-Outflow Q10 (cfs)	Pre-Inflow vs. Post-Outflow Q10
1A	4.19	2.45	10.38	7.93	1.54	-0.91
1B	4.57	3.45	11.32	7.87	1.38	-2.07
1C	11.85	8.18	30.71	22.53	9.93	1.75
2	3.66	4.97	9.89	4.92	5.24	0.27
4	9.02	9.06	21.38	12.32	1.49	-7.57
5	15.22	16.19	34.49	18.3	12.19	-4.00

Table 3: Pre- and Post-developed peak flows for the 25-yr, 24-hr storm

Name	Area (ac)	Pre-Inflow Q25 (cfs)	Post-Inflow Q25 (cfs)	Pre-Inflow vs. Post-Inflow Q25	Post-Outflow Q25 (cfs)	Pre-Inflow vs. Post-Outflow Q25
1A	4.19	3.80	13.81	10.01	1.82	-1.98
1B	4.57	5.35	14.69	9.34	1.65	-3.70
1C	11.85	12.71	39.43	26.72	12.29	-0.42
2	3.66	6.90	12.76	5.86	6.35	-0.55
4	9.02	13.54	29.01	15.47	4.75	-8.79
5	15.22	22.66	43.82	21.16	19.41	-3.25

Table 4: Pre- and Post-developed peak flows for the 50-yr, 24-hr storm

Name	Area (ac)	Pre-Inflow Q50 (cfs)	Post-Inflow Q50 (cfs)	Pre-Inflow vs. Post-Inflow Q50	Post-Outflow Q50 (cfs)	Pre-Inflow vs. Post-Outflow Q50
1A	4.19	4.91	16.42	11.51	2.10	-2.81
1B	4.57	6.89	17.24	10.35	1.81	-5.08
1C	11.85	16.38	45.97	29.59	13.75	-2.63
2	3.66	8.39	14.93	6.54	6.89	-1.50
4	9.02	17.12	34.74	17.62	10.21	-6.91
5	15.22	27.73	50.80	23.07	24.45	-3.28

Table 5: Pre- and Post-developed peak flows for the 100-yr, 24-hr storm

Name	Area (ac)	Pre-Inflow Q100 (cfs)	Post-Inflow Q100 (cfs)	Pre-Inflow vs. Post-Inflow Q100	Post-Outflow Q100 (cfs)	Pre-Inflow vs. Post-Outflow Q100
1A	4.19	6.15	19.22	13.07	4.84	-1.31
1B	4.57	8.62	19.96	11.34	2.53	-6.09
1C	11.85	20.49	52.94	32.45	18.72	-1.77
2	3.66	10.02	17.23	7.21	9.90	-0.12
4	9.02	21.11	40.93	19.82	16.86	-4.25
5	15.22	33.24	76.83	43.59	29.36	-3.88

2.2. Pond, Culvert, and Ditch Calculations

In every drainage area, the post-development peak discharge was greater than the pre-development peak discharge. To mitigate this increase, ponds are designed to retain water and ensure the post-development flows remain at or below the pre-development flows. These ponds were designed to attenuate the 100-year storm discharge. The pond outlet control consists of an outfall structure with an orifice, culvert, weir and an emergency spillway for 100-year storm discharge. Riprap armoring will be provided at pipe outlets and spillways. Riprap aprons are positioned on slopes less than or equal to fifteen percent. Pond calculations can be found in **Appendix D** of this report.

In addition to the attenuating the peak flows, ponds were designed with consideration for water quality requirements. The orifice invert is set at the water surface elevation for the water quality volume to ensure it's fully retained and treated. Water quality calculations can be found in **Appendix I** of this report.

Access to the site will be from four different driveways, two of which will require culverts for wetland and stream crossings. Three new culverts were designed using AutoCAD Hydraflow Hydrographs Extension. These culverts were designed in accordance with CT DEEP Stream Crossing Guidelines and USACE Openness Ratio Calculations. For additional information on the culvert design calculations see **Appendix I**.

Each drainage area will require permanent ditches to capture and convey flows to the ponds. The ditches were designed using AutoCAD Hydraflow Express using a 100-yr (24 hour) storm event and

CT DEEP conveyance criteria. The flows were calculated as a percentage of the overall subbasin flows per the proposed HydroCAD modeling results. These ditches consist of both trapezoidal and triangular channels. For additional information on ditch design calculations see **Appendix I**.

2.3. Wetlands, FEMA Floodplains, and Coastal Boundaries

2.3.1. Wetlands

Wetlands have been delineated for the site and a map of the wetlands can be found in **Appendix G**. Design has been considered in a way to reduce impacts as much as possible.

2.3.2. FEMA Floodplains

FEMA Floodplains are not located on the site. FEMA Maps of the site can be found in **Appendix B**.

2.3.3. Coastal Boundaries

Coastal Boundaries are not located near the site and were not a necessary consideration for this project. See FEMA Maps located in **Appendix B**.

3. Erosion and Sediment Control

3.1. Erosion and Sediment Control Plans

4. An Erosion and Sediment (E&S) Control Plan has been developed to mitigate the short-term impacts of the site improvements during construction and includes the following information: descriptive specifications concerning land grading, topsoiling, temporary vegetative cover, permanent vegetative cover, vegetative cover selection and mulching, sediment basins, filter rolls, and erosion checks. Details can be found in the E&S plans and have been provided for all erosion controls as necessary. In all cases, the E&S Control Plan shall be implemented in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

4.1. Temporary Stabilization

Temporary stabilization for the site includes silt fence, filter rolls, ditch checks, sediment basins, riprap outlet protection, and construction entrances to reduce vehicular tracking of sediment. Sediment basins are designed to retain the 10-year, 24-hour storm with a retention time of 10 hours. Sediment basins will be constructed in each drainage area that will be converted to a stormwater pond at the end of the project to keep the post-development flows at or below the pre-development flows. All E&S control measures are designed in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. See **Appendix H** for the Erosion and Sediment Control calculations for the sediment basins and traps. These stabilization practices shall be installed and reinforced on the site per the E&S plans before any construction occurs and in accordance with the progressing phases of the project.

4.2. Permanent Stabilization

Permanent stabilization practice on the site will include permanent seeding. Stabilization and permanent seed will be in accordance with the project specifications and plans.

Appendix A

Soil Resource Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for State of Connecticut

August 10, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:8,550 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N 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.

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 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Mar 20, 2019—Mar 27, 2019

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
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	3.0	1.9%
13	Walpole sandy loam, 0 to 3 percent slopes	2.6	1.6%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	1.2	0.7%
34B	Merrimac fine sandy loam, 3 to 8 percent slopes	5.7	3.5%
38C	Hinckley loamy sand, 3 to 15 percent slopes	2.2	1.3%
38E	Hinckley loamy sand, 15 to 45 percent slopes	0.1	0.1%
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	4.3	2.6%
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	6.1	3.7%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	5.3	3.2%
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	2.0	1.2%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	45.5	27.7%
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	15.8	9.7%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	9.2	5.6%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	2.0	1.2%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	14.2	8.7%
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	2.4	1.5%
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	0.1	0.0%
306	Udorthents-Urban land complex	40.9	24.9%
703A	Haven silt loam, 0 to 3 percent slopes	1.3	0.8%
Totals for Area of Interest		**164.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

State of Connecticut

3—Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2t2qt
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 40 percent
Leicester, extremely stony, and similar soils: 35 percent
Whitman, extremely stony, and similar soils: 17 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Drumlins, depressions, drainageways, hills, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Description of Leicester, Extremely Stony

Setting

Landform: Ground moraines, depressions, drainageways, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 7 inches: fine sandy loam
Bg - 7 to 18 inches: fine sandy loam
BC - 18 to 24 inches: fine sandy loam
C1 - 24 to 39 inches: gravelly fine sandy loam
C2 - 39 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B/D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Description of Whitman, Extremely Stony

Setting

Landform: Depressions, drainageways, hills, ground moraines, drumlins
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 1 inches: peat

A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam
Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 6 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Swansea

Percent of map unit: 2 percent
Landform: Swamps, bogs
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

13—Walpole sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkl
Elevation: 0 to 1,020 feet

Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Walpole and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Walpole

Setting

Landform: Outwash terraces, outwash plains, depressions, deltas, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy glaciofluvial deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Oe - 0 to 1 inches: mucky peat
A - 1 to 7 inches: sandy loam
Bg - 7 to 21 inches: sandy loam
BC - 21 to 25 inches: gravelly sandy loam
C - 25 to 65 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 4 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

Minor Components

Sudbury

Percent of map unit: 10 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear

Hydric soil rating: No

Scarboro

Percent of map unit: 10 percent
Landform: Outwash terraces, deltas, outwash plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

29A—Agawam fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqw
Elevation: 0 to 1,040 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Agawam and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Agawam

Setting

Landform: Outwash plains, kame terraces, kames, moraines, outwash terraces
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise, dip
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 11 inches: fine sandy loam
Bw1 - 11 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C1 - 26 to 39 inches: loamy fine sand
2C2 - 39 to 55 inches: loamy fine sand
2C3 - 55 to 65 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 15 to 35 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Ninigret

Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Windsor

Percent of map unit: 4 percent
Landform: Outwash plains, outwash terraces, deltas, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Walpole

Percent of map unit: 3 percent
Landform: Outwash plains, depressions, outwash terraces, depressions, deltas
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Hinckley

Percent of map unit: 3 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

34B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Kames, eskers, moraines, outwash terraces, outwash plains
Landform position (two-dimensional): Backslope, footslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury
Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley
Percent of map unit: 5 percent
Landform: Deltas, outwash plains, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor
Percent of map unit: 3 percent
Landform: Outwash plains, deltas, dunes, outwash terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Agawam
Percent of map unit: 2 percent
Landform: Outwash terraces, outwash plains, kames, eskers, stream terraces, moraines
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

38C—Hinckley loamy sand, 3 to 15 percent slopes

Map Unit Setting
National map unit symbol: 2svmb
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Moraines, outwash terraces, outwash deltas, kame terraces, outwash plains, kames, eskers
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope, summit
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser, tread
Down-slope shape: Convex, linear, concave
Across-slope shape: Linear, convex, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Outwash plains, kames, eskers, moraines, outwash terraces
Landform position (two-dimensional): Backslope, footslope, shoulder, toeslope, summit

Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Eskers, moraines, kame terraces, outwash plains, outwash terraces, outwash deltas, kames
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope, summit
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser, tread
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Agawam

Percent of map unit: 3 percent
Landform: Outwash deltas, kame terraces, outwash plains, kames, eskers, moraines, outwash terraces
Landform position (two-dimensional): Footslope, backslope, shoulder, toeslope, summit
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 2 percent
Landform: Outwash plains, moraines, outwash deltas, outwash terraces, kame terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

38E—Hinckley loamy sand, 15 to 45 percent slopes

Map Unit Setting

National map unit symbol: 2svmj
Elevation: 0 to 1,280 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Kames, eskers, kame terraces, outwash plains, moraines, outwash terraces, outwash deltas
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 15 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Kames, eskers, moraines, outwash terraces, outwash plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser
Down-slope shape: Convex
Across-slope shape: Convex

Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash deltas, moraines, kames, eskers, kame terraces, outwash plains, outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser
Down-slope shape: Concave, linear, convex
Across-slope shape: Linear, concave, convex
Hydric soil rating: No

Agawam

Percent of map unit: 3 percent
Landform: Kames, moraines, outwash terraces, outwash deltas, kame terraces, eskers, outwash plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 2 percent
Landform: Eskers, kames, moraines, outwash terraces, kame terraces, outwash plains, outwash deltas
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

46B—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2t2qr
Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Woodbridge, very stony, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Very Stony

Setting

Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 9 inches: fine sandy loam
Bw1 - 9 to 20 inches: fine sandy loam
Bw2 - 20 to 32 inches: fine sandy loam
Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 19 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton, very stony

Percent of map unit: 10 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 8 percent
Landform: Ground moraines, depressions, drumlins, drainageways, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave

Across-slope shape: Concave
Hydric soil rating: Yes

51B—Sutton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2xfff
Elevation: 0 to 1,410 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Sutton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sutton, Very Stony

Setting

Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: fine sandy loam
Bw1 - 7 to 19 inches: fine sandy loam
Bw2 - 19 to 27 inches: sandy loam
C1 - 27 to 41 inches: gravelly sandy loam
C2 - 41 to 62 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 12 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B/D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Charlton, very stony

Percent of map unit: 7 percent
Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Canton, very stony

Percent of map unit: 4 percent
Landform: Ridges, hills, moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Leicester, very stony

Percent of map unit: 3 percent
Landform: Hills, drainageways, ground moraines, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman, very stony

Percent of map unit: 1 percent
Landform: Drainageways, hills, ground moraines, drumlins, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

60B—Canton and Charlton fine sandy loams, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w81s
Elevation: 0 to 1,460 feet

Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Canton and similar soils: 50 percent
Charlton and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Ridges, moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, nose slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: gravelly fine sandy loam
2C - 26 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex

Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Sutton

Percent of map unit: 5 percent
Landform: Hills, ridges, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Leicester

Percent of map unit: 5 percent
Landform: Drainageways, ground moraines, hills, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Chatfield

Percent of map unit: 5 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

60C—Canton and Charlton fine sandy loams, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w81z
Elevation: 0 to 1,620 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Canton and similar soils: 50 percent
Charlton and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Ridges, moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, nose slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: gravelly fine sandy loam
2C - 26 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Chatfield

Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester

Percent of map unit: 5 percent
Landform: Hills, depressions, drainageways, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear

Across-slope shape: Concave
Hydric soil rating: Yes

Sutton

Percent of map unit: 5 percent
Landform: Ground moraines, hills, ridges
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

61B—Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w81v
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, very stony, and similar soils: 50 percent
Charlton, very stony, and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Ridges, hills, moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton, Very Stony

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Leicester, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, depressions, drainageways, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Chatfield, very stony

Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Nose slope, crest, side slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Sutton, very stony

Percent of map unit: 5 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

61C—Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w820
Elevation: 0 to 1,540 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, very stony, and similar soils: 50 percent
Charlton, very stony, and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Ridges, hills, moraines
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton, Very Stony

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Chatfield, very stony

Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester, very stony

Percent of map unit: 5 percent
Landform: Hills, ground moraines, depressions, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Sutton, very stony

Percent of map unit: 5 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

73C—Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 2w698
Elevation: 0 to 1,550 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton, very stony, and similar soils: 50 percent
Chatfield, very stony, and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton, Very Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Chatfield, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Sutton, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: No

Hollis, very stony

Percent of map unit: 5 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester, very stony

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

84B—Paxton and Montauk fine sandy loams, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2qn
Elevation: 0 to 1,570 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Paxton and similar soils: 55 percent
Montauk and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Description of Montauk

Setting

Landform: Drumlins, hills
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

A - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 14 inches: fine sandy loam
Bw2 - 14 to 25 inches: sandy loam
2Cd1 - 25 to 39 inches: gravelly loamy coarse sand
2Cd2 - 39 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 38 inches to densic material
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Ridgebury

Percent of map unit: 5 percent
Landform: Hills, ground moraines, depressions, drainageways
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Woodbridge

Percent of map unit: 5 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

85B—Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w679
Elevation: 0 to 1,530 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, very stony, and similar soils: 55 percent
Montauk, very stony, and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Drumlins, ground moraines, hills

Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Description of Montauk, Very Stony

Setting

Landform: Ground moraines, recessionial moraines, drumlins, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 6 inches: fine sandy loam
Bw1 - 6 to 28 inches: fine sandy loam
Bw2 - 28 to 36 inches: sandy loam
2Cd - 36 to 74 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material

Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 8 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, summit, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton, very stony

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 3 percent
Landform: Ground moraines, depressions, drumlins, drainageways, hills
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Stockbridge, very stony

Percent of map unit: 1 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

86C—Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w67d
Elevation: 20 to 1,490 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 55 percent
Montauk, extremely stony, and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Description of Montauk, Extremely Stony

Setting

Landform: Drumlins, hills, ground moraines, recessionial moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 6 inches: fine sandy loam
Bw1 - 6 to 28 inches: fine sandy loam
Bw2 - 28 to 36 inches: sandy loam
2Cd - 36 to 74 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton, extremely stony

Percent of map unit: 6 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge, extremely stony

Percent of map unit: 5 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 3 percent
Landform: Drainageways, hills, ground moraines, depressions, drumlins
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Stockbridge, extremely stony

Percent of map unit: 1 percent
Landform: Hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

86D—Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w67c
Elevation: 0 to 1,400 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 55 percent
Montauk, extremely stony, and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Drumlins, hills, ground moraines

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Description of Montauk, Extremely Stony

Setting

Landform: Drumlins, ground moraines, recessionial moraines, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 6 inches: fine sandy loam
Bw1 - 6 to 28 inches: fine sandy loam
Bw2 - 28 to 36 inches: sandy loam
2Cd - 36 to 74 inches: gravelly loamy sand

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material

Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton, extremely stony

Percent of map unit: 6 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge, extremely stony

Percent of map unit: 5 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 3 percent
Landform: Drainageways, hills, ground moraines, depressions, drumlins
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Stockbridge, extremely stony

Percent of map unit: 1 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

306—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 9lmg
Elevation: 0 to 2,000 feet
Mean annual precipitation: 43 to 56 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 120 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 50 percent
Urban land: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Drift

Typical profile

A - 0 to 5 inches: loam
C1 - 5 to 21 inches: gravelly loam
C2 - 21 to 80 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: About 54 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Urban Land

Typical profile

H - 0 to 6 inches: material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Unnamed, undisturbed soils

Percent of map unit: 8 percent
Hydric soil rating: No

Udorthents, wet substratum

Percent of map unit: 5 percent
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

703A—Haven silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2y07k
Elevation: 0 to 1,200 feet
Mean annual precipitation: 43 to 54 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 185 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Haven and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haven

Setting

Landform: Outwash terraces, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear

Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 7 inches: silt loam
Bw1 - 7 to 14 inches: silt loam
Bw2 - 14 to 20 inches: silt loam
BC - 20 to 24 inches: fine sandy loam
2C - 24 to 60 inches: stratified very gravelly sand to gravelly fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 18 to 36 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F144AY023CT - Well Drained Outwash
Hydric soil rating: No

Minor Components

Enfield

Percent of map unit: 5 percent
Landform: Outwash plains, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Tisbury

Percent of map unit: 5 percent
Landform: Deltas, valley trains, outwash terraces, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Agawam

Percent of map unit: 3 percent
Landform: Moraines, outwash terraces, outwash plains, kame terraces, kames
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope, crest, tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Raypol

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Rating by Map Unit

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Custom Soil Resource Report
Map—Hydric Rating by Map Unit

Map Scale: 1:8,550 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Mar 20, 2019—Mar 27, 2019

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.

Table—Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	94	3.0	1.9%
13	Walpole sandy loam, 0 to 3 percent slopes	90	2.6	1.6%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	3	1.2	0.7%
34B	Merrimac fine sandy loam, 3 to 8 percent slopes	0	5.7	3.5%
38C	Hinckley loamy sand, 3 to 15 percent slopes	0	2.2	1.3%
38E	Hinckley loamy sand, 15 to 45 percent slopes	0	0.1	0.1%
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	8	4.3	2.6%
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	4	6.1	3.7%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	5	5.3	3.2%
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	5	2.0	1.2%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	5	45.5	27.7%
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	5	15.8	9.7%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	5	9.2	5.6%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	5	2.0	1.2%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	3	14.2	8.7%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	3	2.4	1.5%
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	3	0.1	0.0%
306	Udorthents-Urban land complex	0	40.9	24.9%
703A	Haven silt loam, 0 to 3 percent slopes	2	1.3	0.8%
Totals for Area of Interest			**164.1**	**100.0%**

Rating Options—Hydric Rating by Map Unit

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

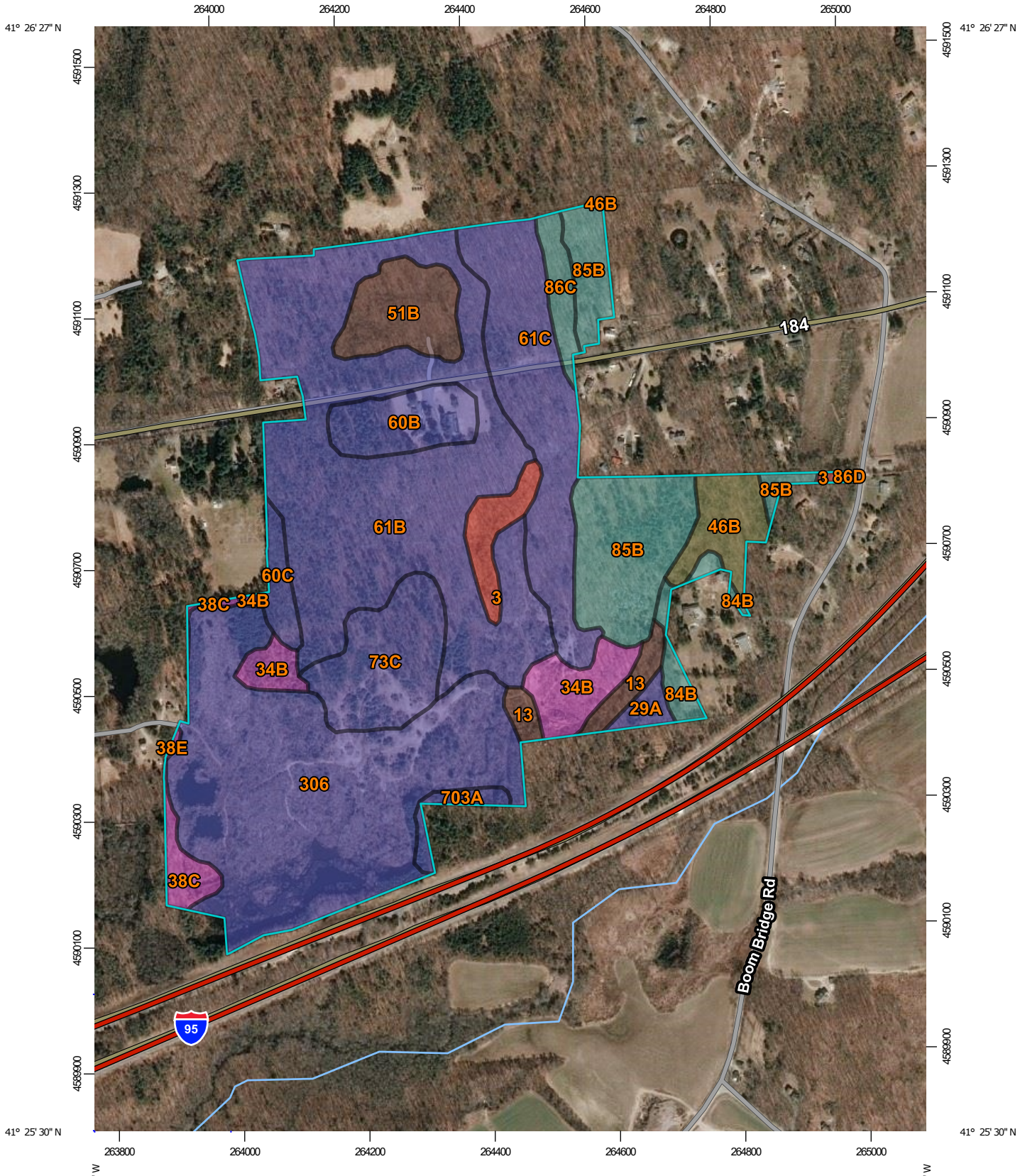
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at

or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:8,550 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Mar 20, 2019—Mar 27, 2019

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	D	3.0	1.9%
13	Walpole sandy loam, 0 to 3 percent slopes	B/D	2.6	1.6%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	B	1.2	0.7%
34B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	5.7	3.5%
38C	Hinckley loamy sand, 3 to 15 percent slopes	A	2.2	1.3%
38E	Hinckley loamy sand, 15 to 45 percent slopes	A	0.1	0.1%
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	C/D	4.3	2.6%
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	B/D	6.1	3.7%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	B	5.3	3.2%
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	B	2.0	1.2%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	B	45.5	27.7%
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	B	15.8	9.7%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	B	9.2	5.6%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	C	2.0	1.2%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	C	14.2	8.7%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	C	2.4	1.5%
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	C	0.1	0.0%
306	Udorthents-Urban land complex	B	40.9	24.9%
703A	Haven silt loam, 0 to 3 percent slopes	B	1.3	0.8%
Totals for Area of Interest			**164.1**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

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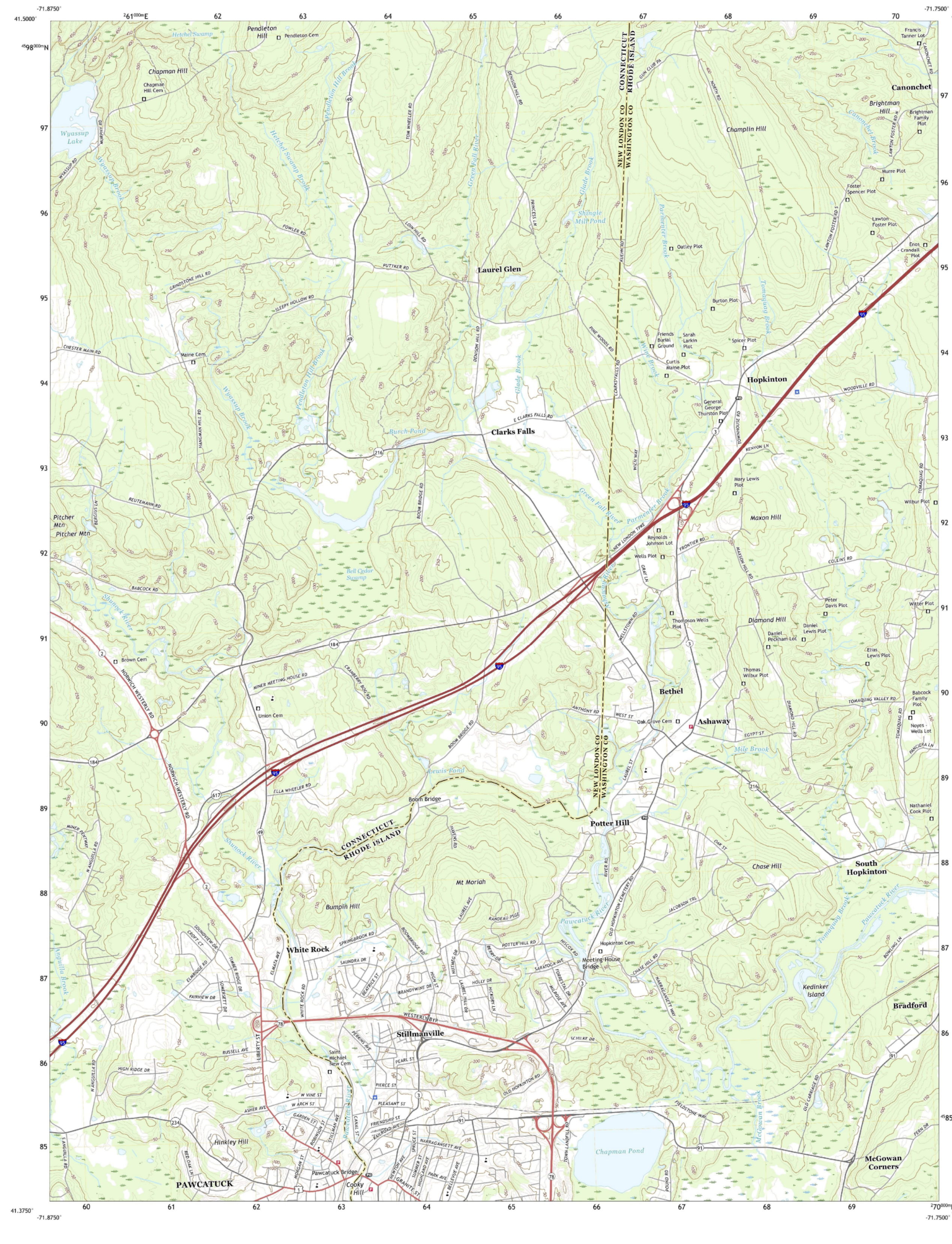
Appendix B

USGS & FEMA Firm Maps

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

ASHAWAY QUADRANGLE
RHODE ISLAND - CONNECTICUT
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 19T

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery....NAIP, July 2016 - September 2016
Roads....U.S. Census Bureau, 2016
Names....GNIS, 1976 - 2018
Hydrography....National Hydrography Dataset, 2004 - 2017
Contours....National Elevation Dataset, 2004 - 2012
Boundaries....Multiple sources; see metadata file 2016 - 2017
Wetlands....FWS National Wetlands Inventory 2010

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
BF
Grid Zone Designation
19T

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

QUADRANGLE LOCATION

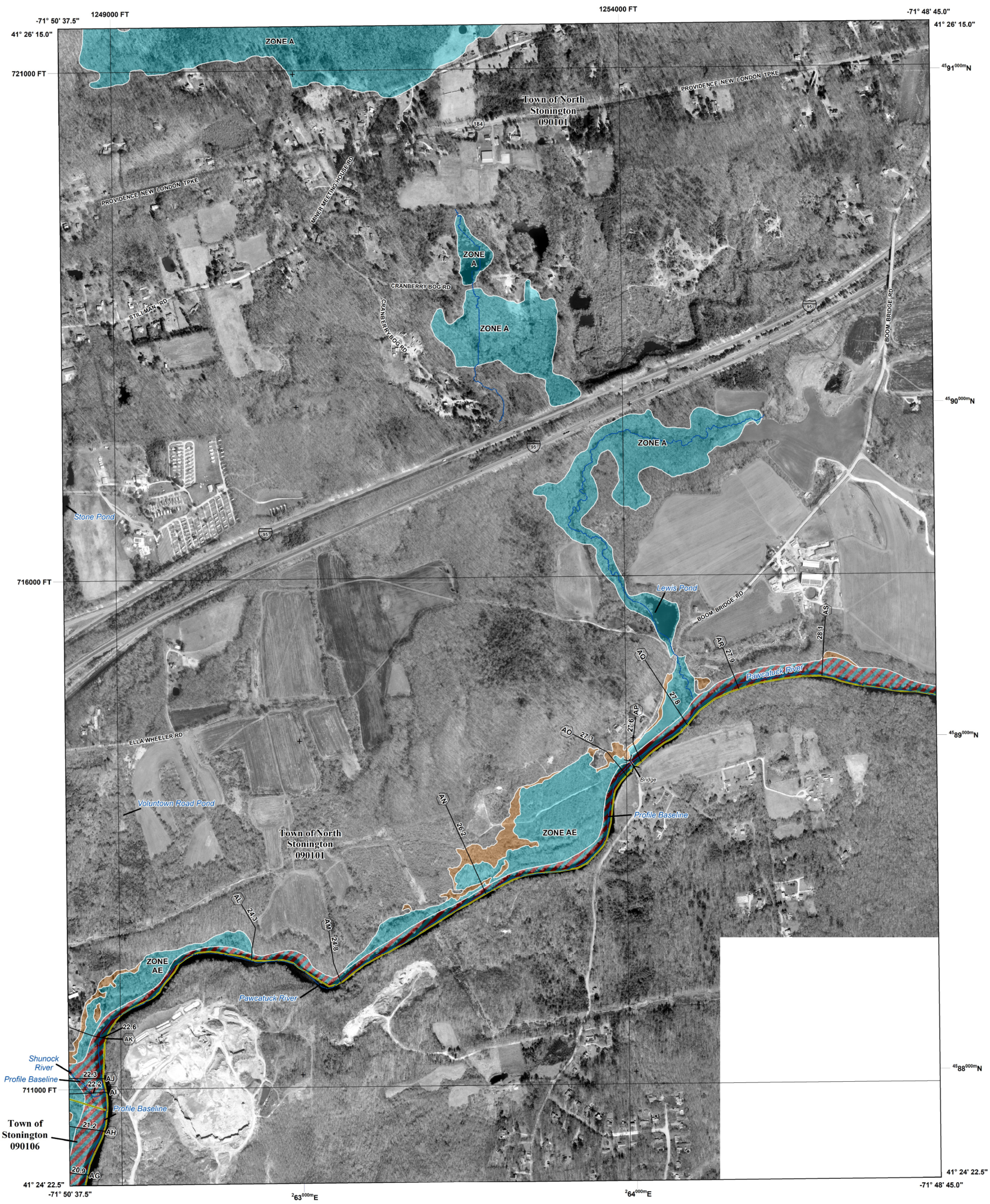
ROAD CLASSIFICATION
Expressway — Local Connector
Secondary Hwy — Local Road
Ramp — 4WD
Interstate Route — US Route — State Route

1 Jewett City
2 Voluntown
3 Hope Valley
4 Old Mystic
5 Carolina
6 Mystic
7 Watch Hill
8 Quonochontaug

ADJOINING QUADRANGLES

ASHAWAY, RI, CT
2018

NSN. 7643016392064
NGA REF NO. USGSX24K1625



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99* With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
	Non-accredited Levee, Dike, or Floodwall
OTHER FEATURES	E 18.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format in 2016 by the Capitol Region Council of Governments of Connecticut at a 0.25-foot resolution.

SCALE

N

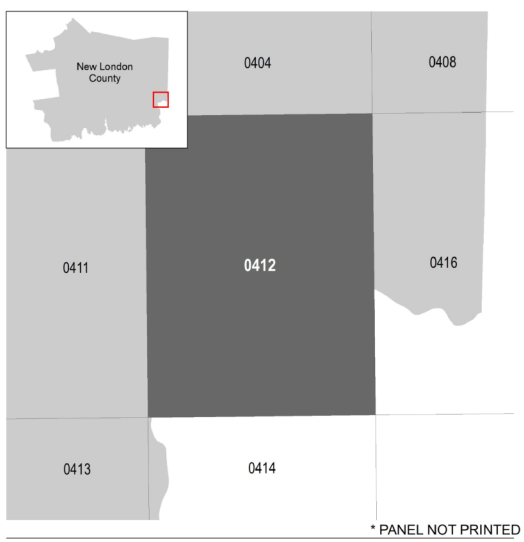
Map Projection:
Connecticut State Plane (FIPSZONE 0600); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 125 250 500 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

NEW LONDON COUNTY, CT
(ALL JURISDICTIONS)

PANEL 412 OF 554

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
NORTH STONINGTON , TOWN OF	090101	0412	H
STONINGTON , TOWN OF	090106	0412	H

VERSION NUMBER
2.3.3.2

MAP NUMBER
09011C0412H

MAP REVISED
April 3, 2020

Appendix C

NOAA Precipitation Data

NOAA Atlas 14, Volume 10, Version 3
Location name: North Stonington, Connecticut, USA*
Latitude: 41.4343°, Longitude: -71.8216°
Elevation: 137.53 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	**0.331** (0.255-0.430)	**0.399** (0.307-0.518)	**0.511** (0.391-0.665)	**0.603** (0.460-0.789)	**0.731** (0.541-0.987)	**0.826** (0.600-1.13)	**0.927** (0.656-1.31)	**1.04** (0.699-1.49)	**1.21** (0.782-1.77)	**1.35** (0.853-2.00)
10-min	**0.469** (0.361-0.609)	**0.566** (0.435-0.735)	**0.724** (0.554-0.942)	**0.855** (0.651-1.12)	**1.03** (0.766-1.40)	**1.17** (0.850-1.61)	**1.31** (0.930-1.86)	**1.48** (0.990-2.11)	**1.71** (1.11-2.51)	**1.91** (1.21-2.84)
15-min	**0.552** (0.424-0.716)	**0.666** (0.511-0.864)	**0.852** (0.652-1.11)	**1.01** (0.766-1.31)	**1.22** (0.901-1.65)	**1.38** (0.999-1.89)	**1.55** (1.09-2.18)	**1.74** (1.17-2.48)	**2.02** (1.30-2.95)	**2.25** (1.42-3.34)
30-min	**0.764** (0.588-0.992)	**0.924** (0.710-1.20)	**1.19** (0.908-1.54)	**1.40** (1.07-1.83)	**1.70** (1.26-2.30)	**1.92** (1.40-2.64)	**2.16** (1.53-3.05)	**2.43** (1.63-3.47)	**2.82** (1.82-4.13)	**3.14** (1.99-4.66)
60-min	**0.977** (0.751-1.27)	**1.18** (0.909-1.54)	**1.52** (1.16-1.98)	**1.80** (1.37-2.35)	**2.18** (1.61-2.95)	**2.47** (1.79-3.39)	**2.78** (1.96-3.92)	**3.12** (2.09-4.45)	**3.62** (2.34-5.30)	**4.03** (2.55-5.99)
2-hr	**1.28** (0.993-1.66)	**1.55** (1.20-2.01)	**1.99** (1.53-2.58)	**2.36** (1.80-3.06)	**2.86** (2.12-3.84)	**3.23** (2.36-4.41)	**3.63** (2.58-5.10)	**4.08** (2.75-5.79)	**4.74** (3.08-6.90)	**5.29** (3.36-7.80)
3-hr	**1.50** (1.16-1.93)	**1.81** (1.40-2.33)	**2.31** (1.79-2.98)	**2.73** (2.10-3.54)	**3.31** (2.47-4.43)	**3.74** (2.74-5.09)	**4.20** (2.99-5.88)	**4.72** (3.19-6.67)	**5.49** (3.57-7.94)	**6.12** (3.90-8.99)
6-hr	**1.93** (1.50-2.47)	**2.31** (1.80-2.96)	**2.94** (2.28-3.77)	**3.46** (2.67-4.46)	**4.18** (3.13-5.56)	**4.71** (3.46-6.37)	**5.28** (3.78-7.35)	**5.93** (4.02-8.32)	**6.89** (4.50-9.90)	**7.69** (4.91-11.2)
12-hr	**2.42** (1.90-3.09)	**2.89** (2.26-3.68)	**3.65** (2.84-4.66)	**4.28** (3.32-5.48)	**5.14** (3.87-6.81)	**5.79** (4.28-7.78)	**6.48** (4.66-8.95)	**7.27** (4.95-10.1)	**8.43** (5.53-12.0)	**9.39** (6.03-13.6)
24-hr	**2.87** (2.26-3.63)	**3.42** (2.69-4.34)	**4.33** (3.39-5.49)	**5.08** (3.96-6.47)	**6.11** (4.62-8.04)	**6.88** (5.11-9.19)	**7.70** (5.57-10.6)	**8.65** (5.91-12.0)	**10.0** (6.61-14.2)	**11.2** (7.21-16.1)
2-day	**3.21** (2.54-4.04)	**3.86** (3.05-4.86)	**4.92** (3.87-6.21)	**5.79** (4.54-7.34)	**7.00** (5.32-9.16)	**7.90** (5.89-10.5)	**8.86** (6.44-12.1)	**9.97** (6.85-13.7)	**11.6** (7.67-16.3)	**12.9** (8.37-18.4)
3-day	**3.48** (2.76-4.36)	**4.17** (3.30-5.24)	**5.30** (4.19-6.67)	**6.24** (4.90-7.88)	**7.54** (5.74-9.82)	**8.50** (6.36-11.2)	**9.53** (6.94-12.9)	**10.7** (7.37-14.7)	**12.4** (8.25-17.4)	**13.9** (8.99-19.7)
4-day	**3.72** (2.96-4.66)	**4.44** (3.53-5.57)	**5.63** (4.45-7.07)	**6.61** (5.20-8.33)	**7.96** (6.08-10.3)	**8.97** (6.72-11.8)	**10.0** (7.32-13.6)	**11.3** (7.77-15.4)	**13.1** (8.68-18.2)	**14.5** (9.44-20.6)
7-day	**4.41** (3.52-5.50)	**5.20** (4.14-6.48)	**6.48** (5.15-8.10)	**7.54** (5.96-9.46)	**9.00** (6.90-11.6)	**10.1** (7.59-13.2)	**11.3** (8.23-15.1)	**12.6** (8.70-17.0)	**14.5** (9.64-20.1)	**16.0** (10.4-22.5)
10-day	**5.10** (4.08-6.34)	**5.92** (4.73-7.37)	**7.26** (5.79-9.05)	**8.37** (6.63-10.5)	**9.90** (7.60-12.7)	**11.1** (8.32-14.4)	**12.3** (8.96-16.4)	**13.6** (9.44-18.4)	**15.5** (10.4-21.4)	**17.0** (11.1-23.9)
20-day	**7.23** (5.81-8.94)	**8.12** (6.52-10.0)	**9.57** (7.66-11.9)	**10.8** (8.58-13.4)	**12.4** (9.57-15.8)	**13.7** (10.3-17.6)	**15.0** (10.9-19.7)	**16.3** (11.4-21.8)	**18.0** (12.1-24.7)	**19.3** (12.6-26.8)
30-day	**9.00** (7.26-11.1)	**9.94** (8.01-12.3)	**11.5** (9.22-14.2)	**12.8** (10.2-15.8)	**14.5** (11.2-18.3)	**15.9** (12.0-20.3)	**17.2** (12.5-22.3)	**18.5** (12.9-24.6)	**20.0** (13.5-27.3)	**21.1** (13.9-29.2)
45-day	**11.2** (9.06-13.8)	**12.2** (9.87-15.0)	**13.9** (11.2-17.1)	**15.2** (12.2-18.8)	**17.1** (13.2-21.5)	**18.6** (14.1-23.6)	**20.0** (14.5-25.8)	**21.2** (15.0-28.2)	**22.7** (15.4-30.8)	**23.6** (15.5-32.5)
60-day	**13.0** (10.6-16.0)	**14.1** (11.4-17.3)	**15.9** (12.8-19.5)	**17.3** (13.9-21.4)	**19.3** (15.0-24.2)	**21.0** (15.8-26.5)	**22.5** (16.3-28.7)	**23.7** (16.7-31.3)	**25.1** (17.0-33.9)	**25.9** (17.1-35.5)

[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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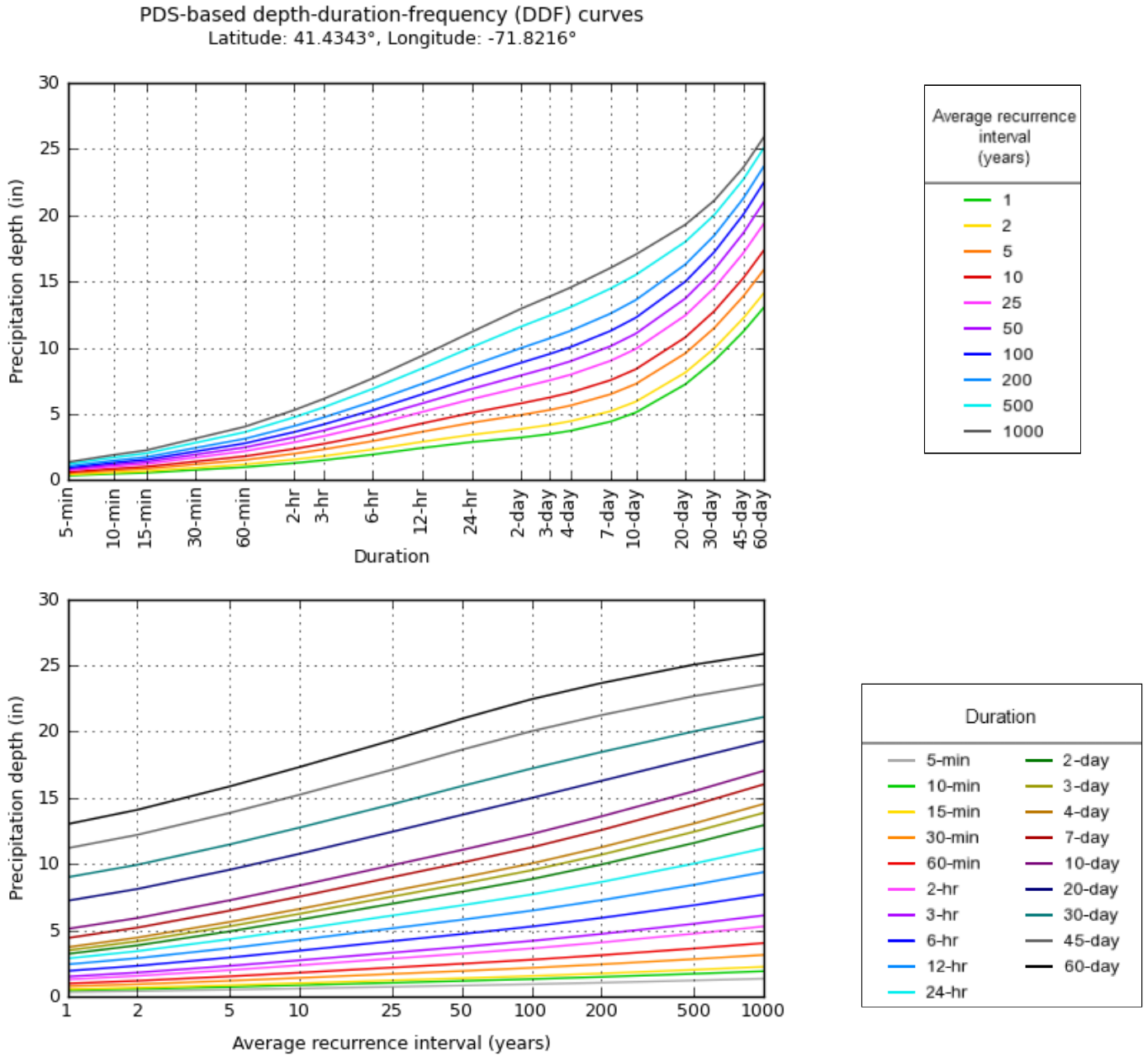
PF graphical



NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Mon Aug 10 17:45:31 2020

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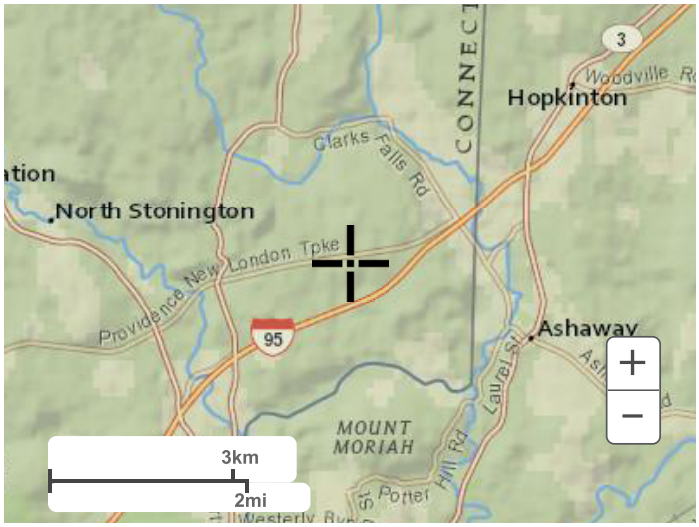
Maps & aerials

Small scale terrain



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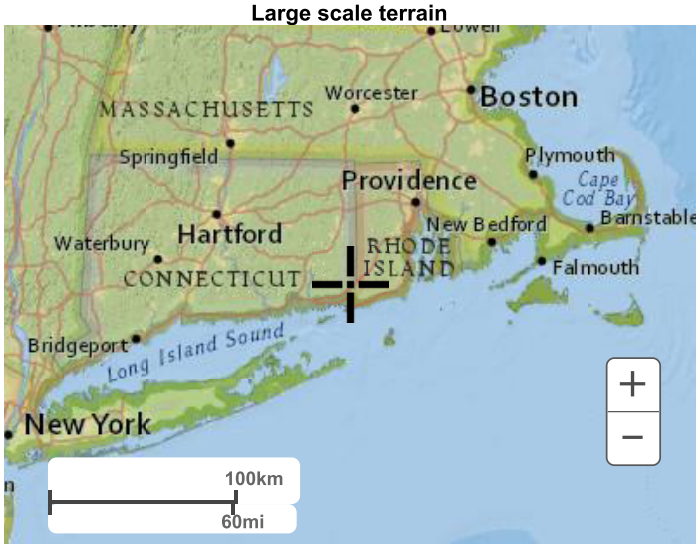
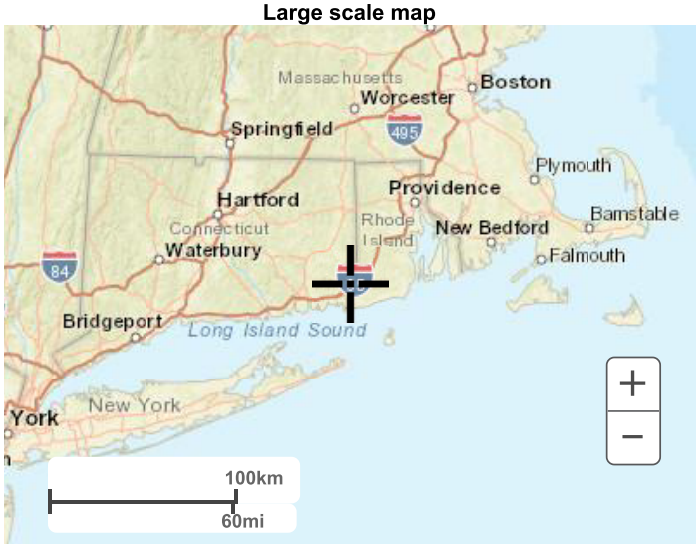
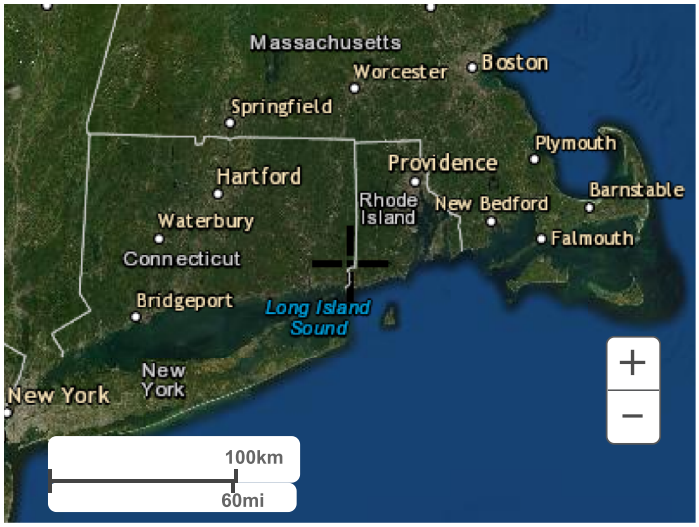


Large scale map



Large scale aerial



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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 D

Stormwater Drainage Area Map, Peak Flow Calculations, and Pond Design

HDR

SILICON RANCH

NOT FOR CONSTRUCTION

STONINGTON SOLAR

428, PROVIDENCE-NEW LONDON TURNPIKE
NORTH STONINGTON, CT 06359, USA

LAT: 41.431830°N
LON: 71.821514°W

STONINGTON, CT

REV. NO	DESCRIPTION	DATE
3	RE-ISSUED FOR PERMIT	06/25/21
2	RE-ISSUED FOR PERMIT	05/28/21
1	RE-ISSUED FOR PERMIT	02/19/21
0	ISSUED FOR PERMIT	09/30/20

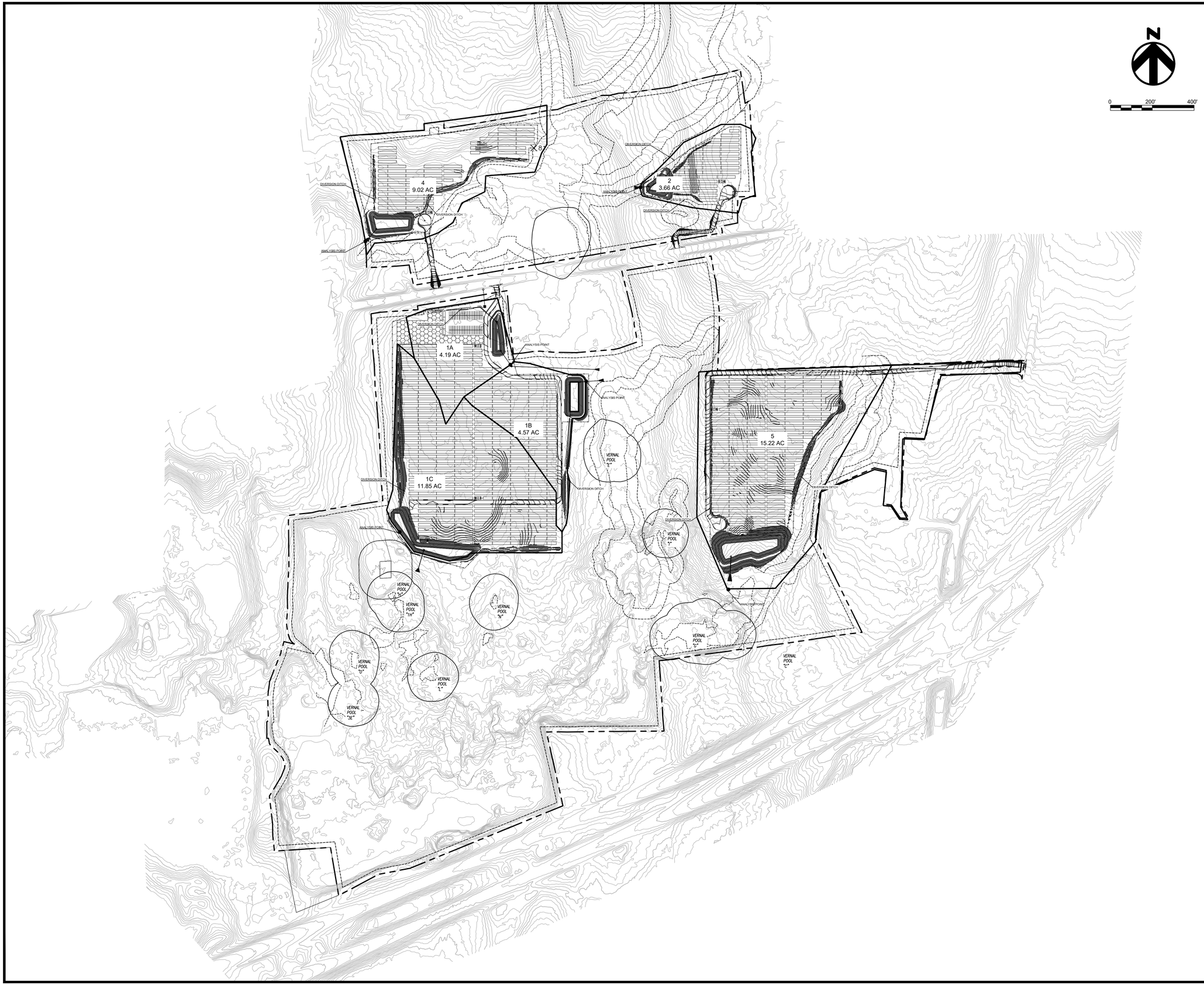
SHEET TITLE:

DRAINAGE AREA EXHIBIT PRE-DEVELOPMENT

PROJ. MGR.	PROJ. ENGR.	DATE:
WK	MB	5/28/21
DRAWN BY:	CHECKED BY:	SCALE:
NC	CP	1:200

DRAWING NO.

EXHIBIT



HDR

SILICON RANCH

NOT FOR CONSTRUCTION

STONINGTON SOLAR

428, PROVIDENCE-NEW LONDON TURNPIKE
NORTH STONINGTON, CT 06359, USA

LAT: 41.431830°N
LON: 71.821514°W

STONINGTON, CT

REV. NO	DESCRIPTION	DATE
3	RE-ISSUED FOR PERMIT	06/25/21
2	RE-ISSUED FOR PERMIT	05/28/21
1	RE-ISSUED FOR PERMIT	02/19/21
0	ISSUED FOR PERMIT	09/30/20

SHEET TITLE:

DRAINAGE AREA EXHIBIT POST-DEVELOPMENT

PROJ. MGR.	PROJ. ENGR.	DATE:
WK	MB	5/28/21
DRAWN BY:	CHECKED BY:	SCALE:
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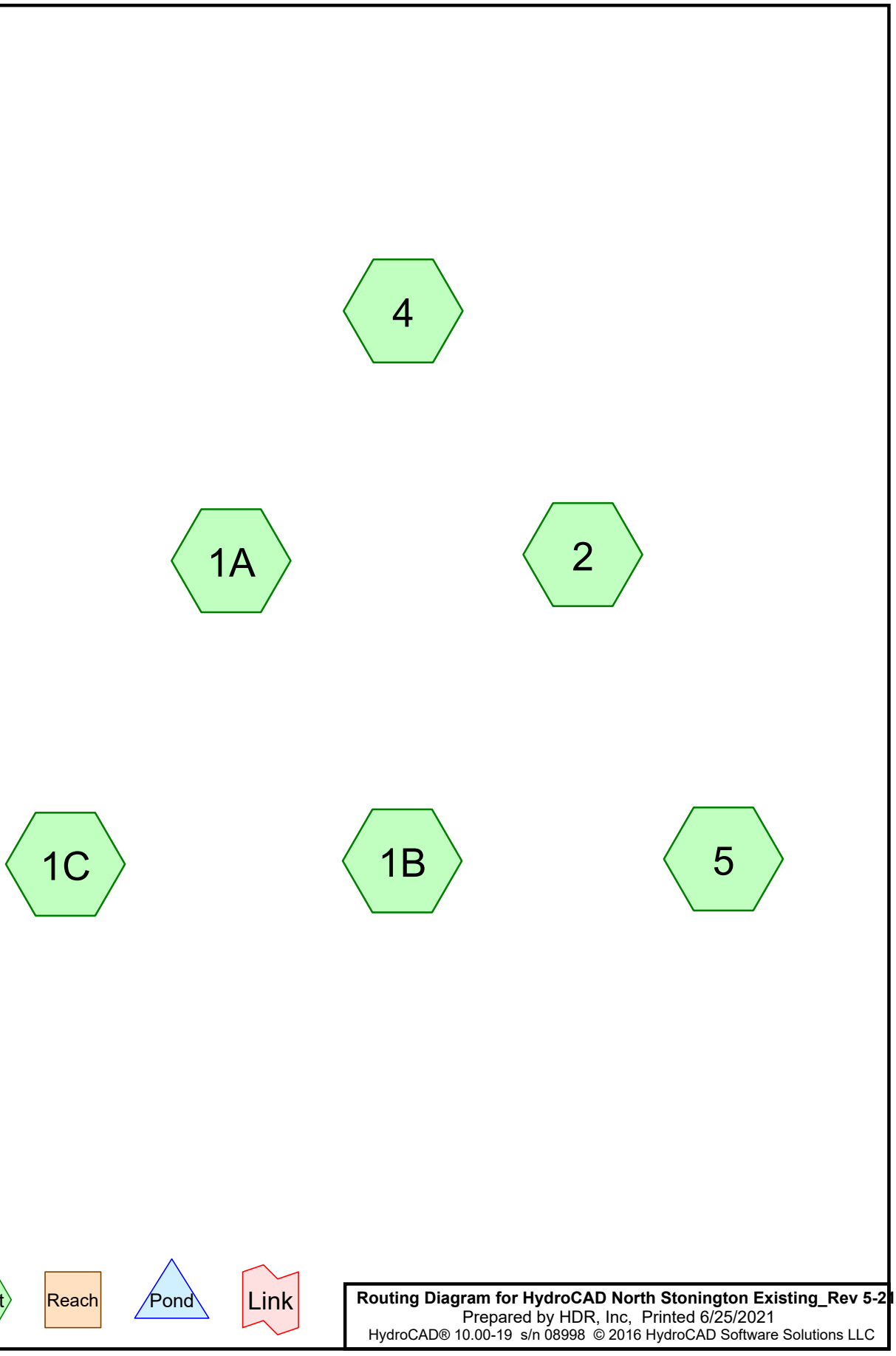


Routing Diagram for HydroCAD North Stonington Existing_Rev 5-21
Prepared by HDR, Inc, Printed 6/25/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
20.610	60	(1A, 1B, 1C)
3.660	71	(2)
9.020	63	(4)
15.220	70	(5)
48.510	**65**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
48.510	Other	1A, 1B, 1C, 2, 4, 5
48.510		**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	0.000	0.000	48.510	48.510		1A, 1B, 1C, 2, 4, 5
0.000	**0.000**	**0.000**	**0.000**	**48.510**	**48.510**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: Runoff Area=4.190 ac Runoff Depth>0.49"
Tc=55.2 min CN=60 Runoff=0.71 cfs 0.170 af

Subcatchment1B: Runoff Area=4.570 ac Runoff Depth>0.49"
Tc=34.5 min CN=60 Runoff=0.99 cfs 0.187 af

Subcatchment1C: Runoff Area=11.850 ac Runoff Depth>0.49"
Tc=41.2 min CN=60 Runoff=2.36 cfs 0.483 af

Subcatchment2: Runoff Area=3.660 ac Runoff Depth>1.00"
Tc=33.0 min CN=71 Runoff=2.18 cfs 0.306 af

Subcatchment4: Runoff Area=9.020 ac Runoff Depth>0.62"
Tc=27.4 min CN=63 Runoff=3.02 cfs 0.463 af

Subcatchment5: Runoff Area=15.220 ac Runoff Depth>0.95"
Tc=48.8 min CN=70 Runoff=6.91 cfs 1.199 af

Total Runoff Area = 48.510 ac Runoff Volume = 2.808 af Average Runoff Depth = 0.69"

Summary for Subcatchment 1A:

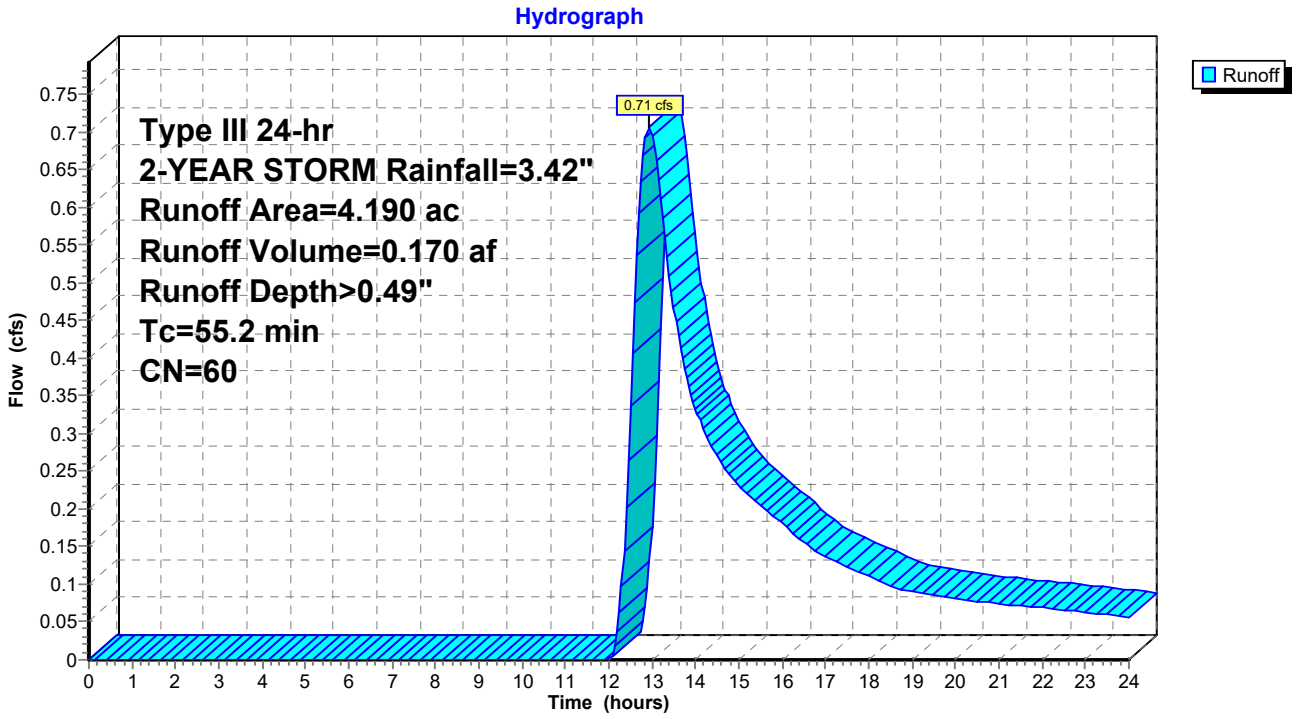
Runoff = 0.71 cfs @ 12.94 hrs, Volume= 0.170 af, Depth> 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	4.190	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.2					**Direct Entry, NRCS Part 630**

Subcatchment 1A:



Summary for Subcatchment 1B:

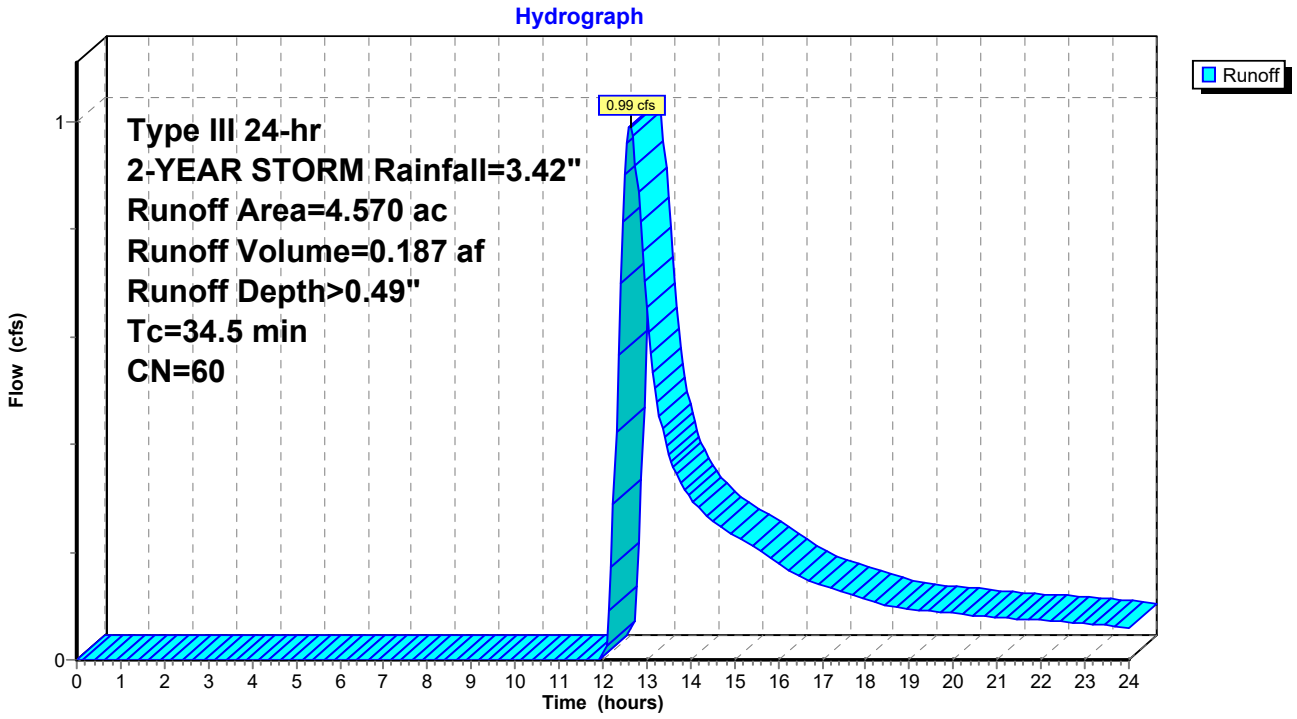
Runoff = 0.99 cfs @ 12.62 hrs, Volume= 0.187 af, Depth> 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	4.570	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.5					**Direct Entry, NRCS Part 630**

Subcatchment 1B:



Summary for Subcatchment 1C:

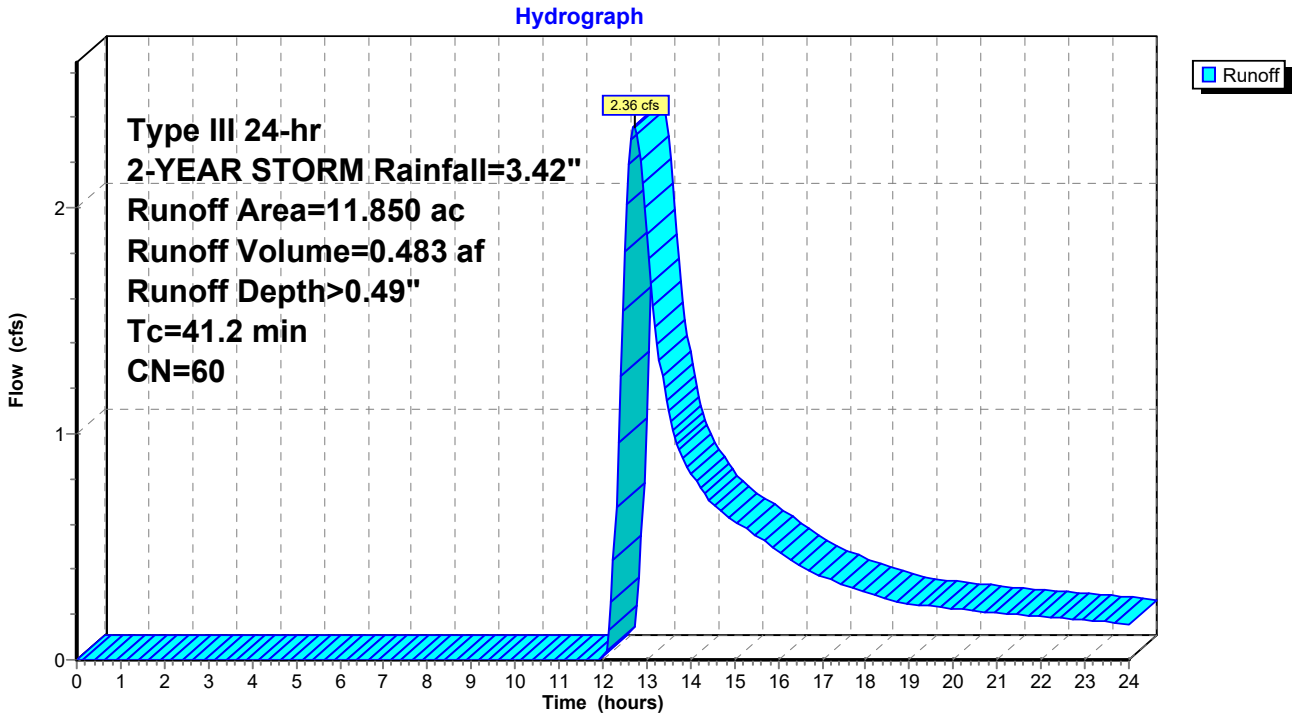
Runoff = 2.36 cfs @ 12.72 hrs, Volume= 0.483 af, Depth> 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	11.850	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2					**Direct Entry, NRCS Part 630**

Subcatchment 1C:



Summary for Subcatchment 2:

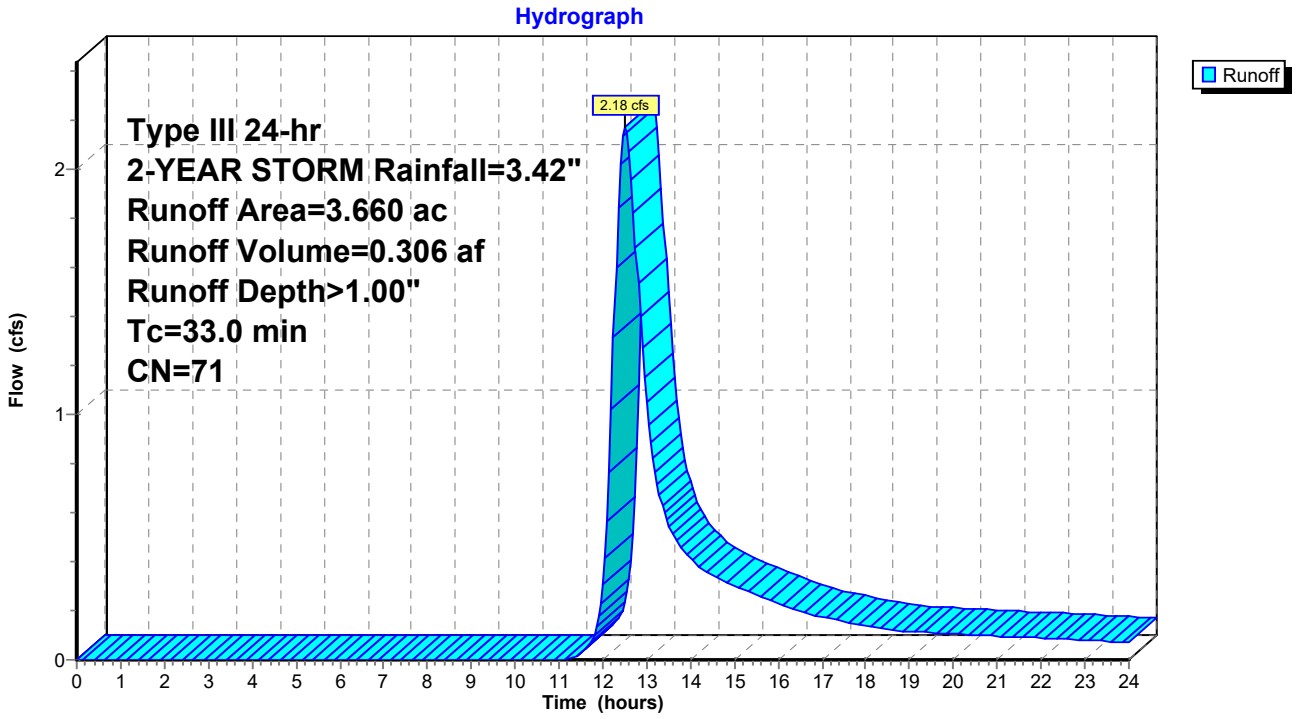
Runoff = 2.18 cfs @ 12.51 hrs, Volume= 0.306 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	3.660	71	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.0					**Direct Entry, NRCS Part 630**

Subcatchment 2:



Summary for Subcatchment 4:

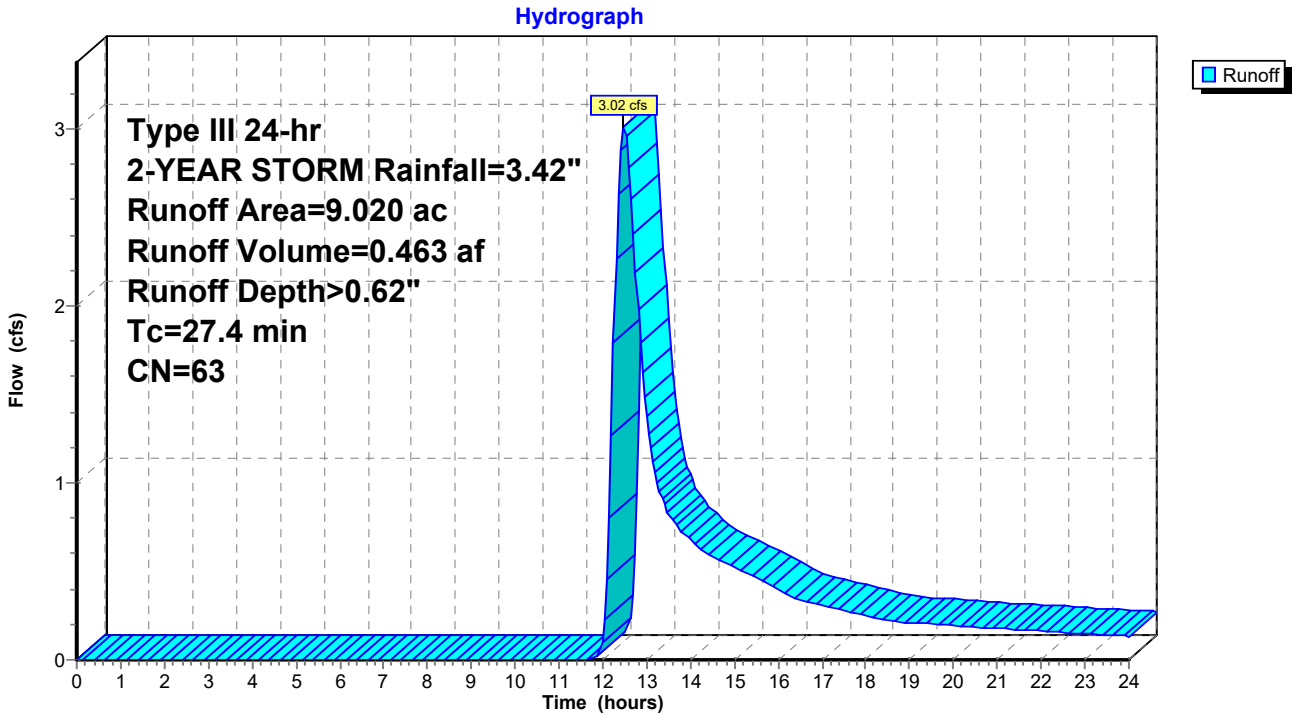
Runoff = 3.02 cfs @ 12.48 hrs, Volume= 0.463 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	9.020	63	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4					**Direct Entry, NRCS Part 630**

Subcatchment 4:



Summary for Subcatchment 5:

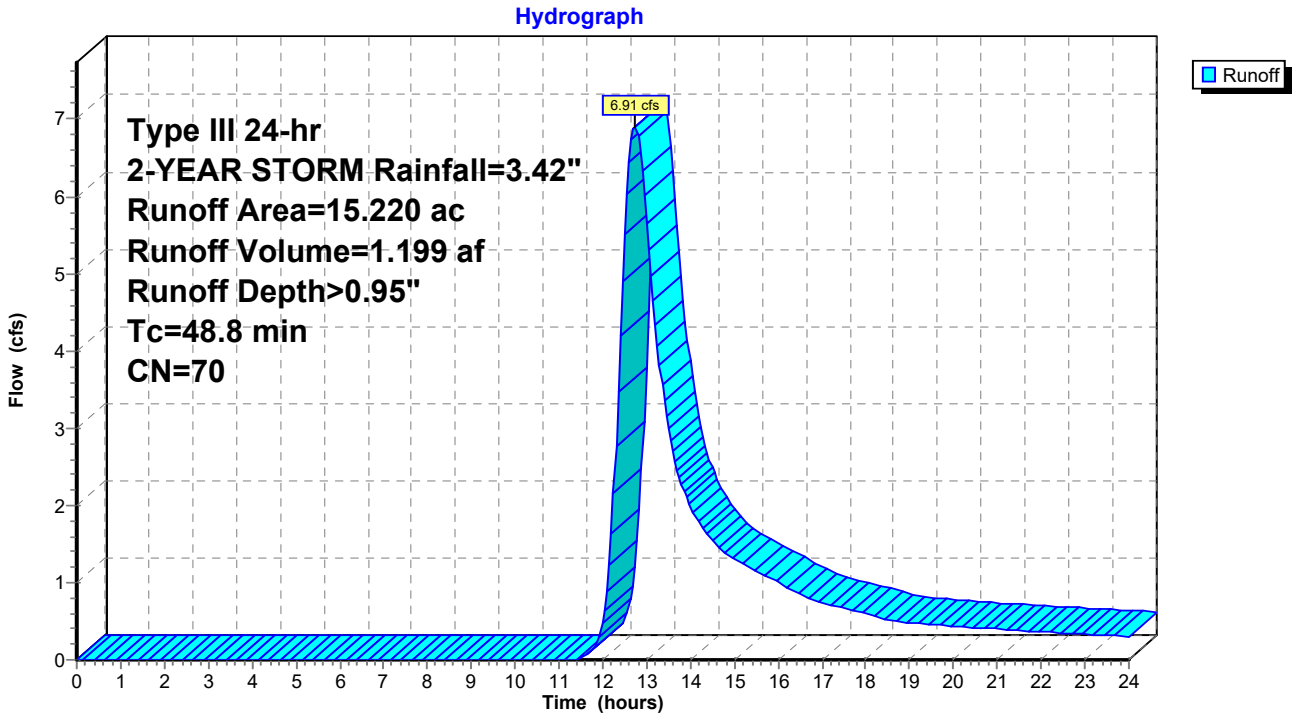
Runoff = 6.91 cfs @ 12.74 hrs, Volume= 1.199 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	15.220	70	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
48.8					**Direct Entry, NRCS Part 630**

Subcatchment 5:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: Runoff Area=4.190 ac Runoff Depth>1.33"
Tc=55.2 min CN=60 Runoff=2.45 cfs 0.463 af

Subcatchment1B: Runoff Area=4.570 ac Runoff Depth>1.33"
Tc=34.5 min CN=60 Runoff=3.45 cfs 0.508 af

Subcatchment1C: Runoff Area=11.850 ac Runoff Depth>1.33"
Tc=41.2 min CN=60 Runoff=8.18 cfs 1.315 af

Subcatchment2: Runoff Area=3.660 ac Runoff Depth>2.16"
Tc=33.0 min CN=71 Runoff=4.97 cfs 0.659 af

Subcatchment4: Runoff Area=9.020 ac Runoff Depth>1.55"
Tc=27.4 min CN=63 Runoff=9.06 cfs 1.164 af

Subcatchment5: Runoff Area=15.220 ac Runoff Depth>2.07"
Tc=48.8 min CN=70 Runoff=16.19 cfs 2.627 af

Total Runoff Area = 48.510 ac Runoff Volume = 6.736 af Average Runoff Depth = 1.67"

Summary for Subcatchment 1A:

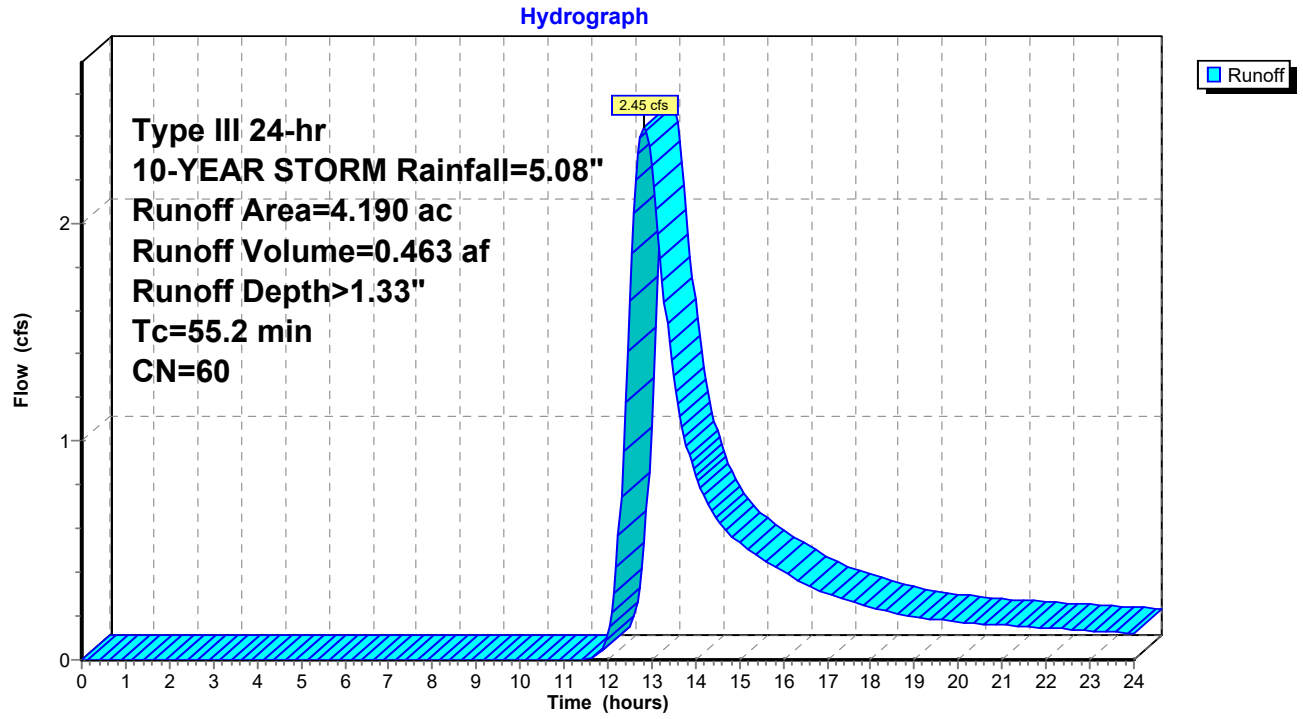
Runoff = 2.45 cfs @ 12.83 hrs, Volume= 0.463 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	4.190	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.2					**Direct Entry, NRCS Part 630**

Subcatchment 1A:



Summary for Subcatchment 1B:

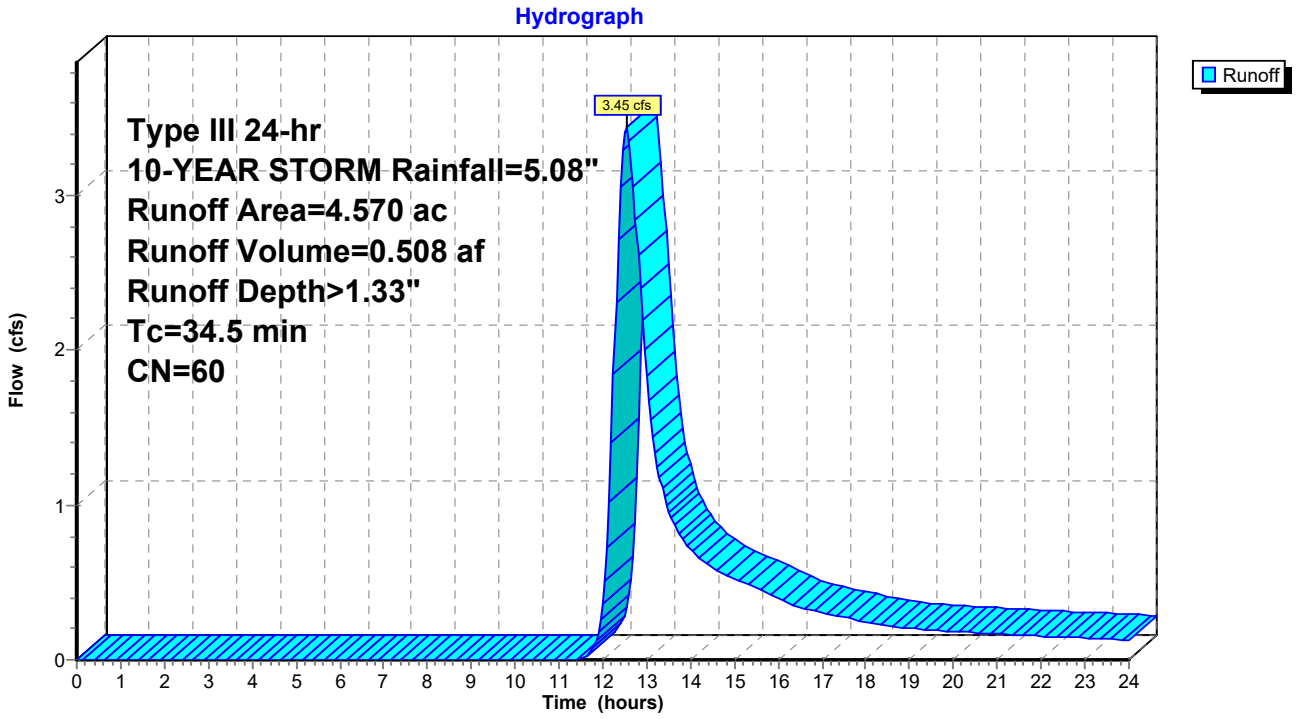
Runoff = 3.45 cfs @ 12.54 hrs, Volume= 0.508 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	4.570	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.5					**Direct Entry, NRCS Part 630**

Subcatchment 1B:



Summary for Subcatchment 1C:

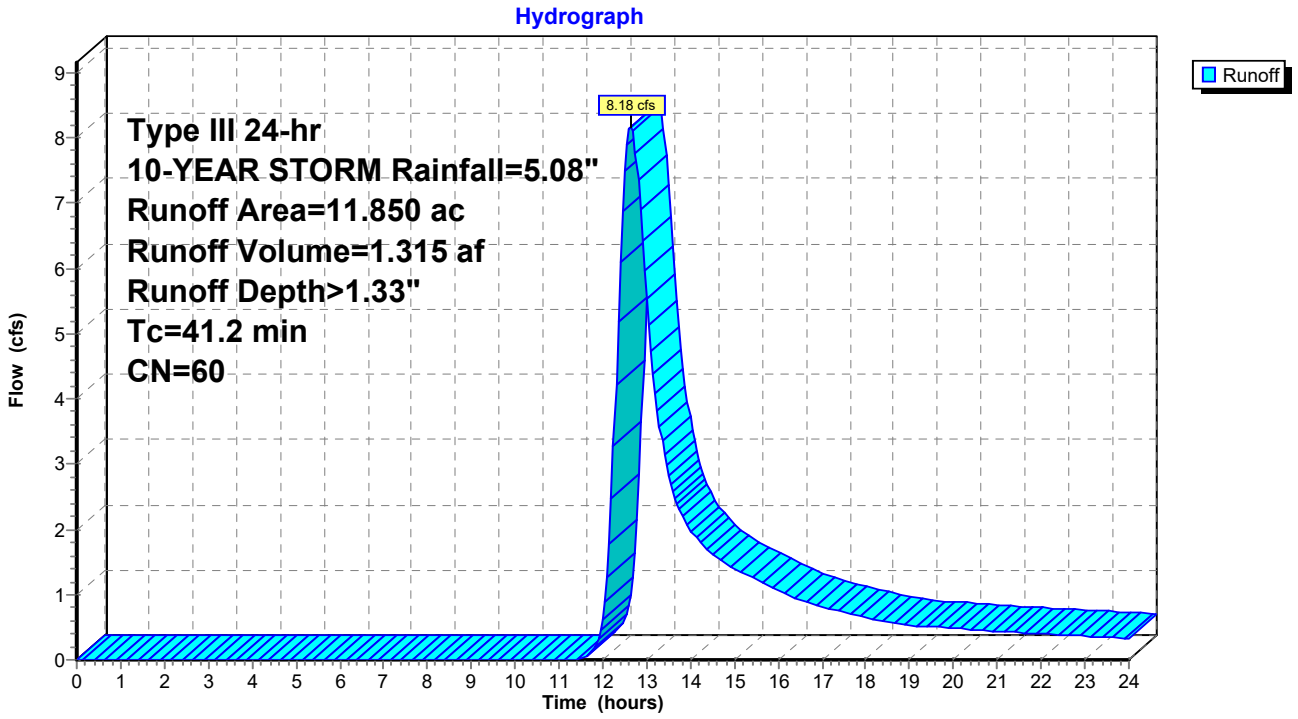
Runoff = 8.18 cfs @ 12.63 hrs, Volume= 1.315 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	11.850	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2					**Direct Entry, NRCS Part 630**

Subcatchment 1C:



Summary for Subcatchment 2:

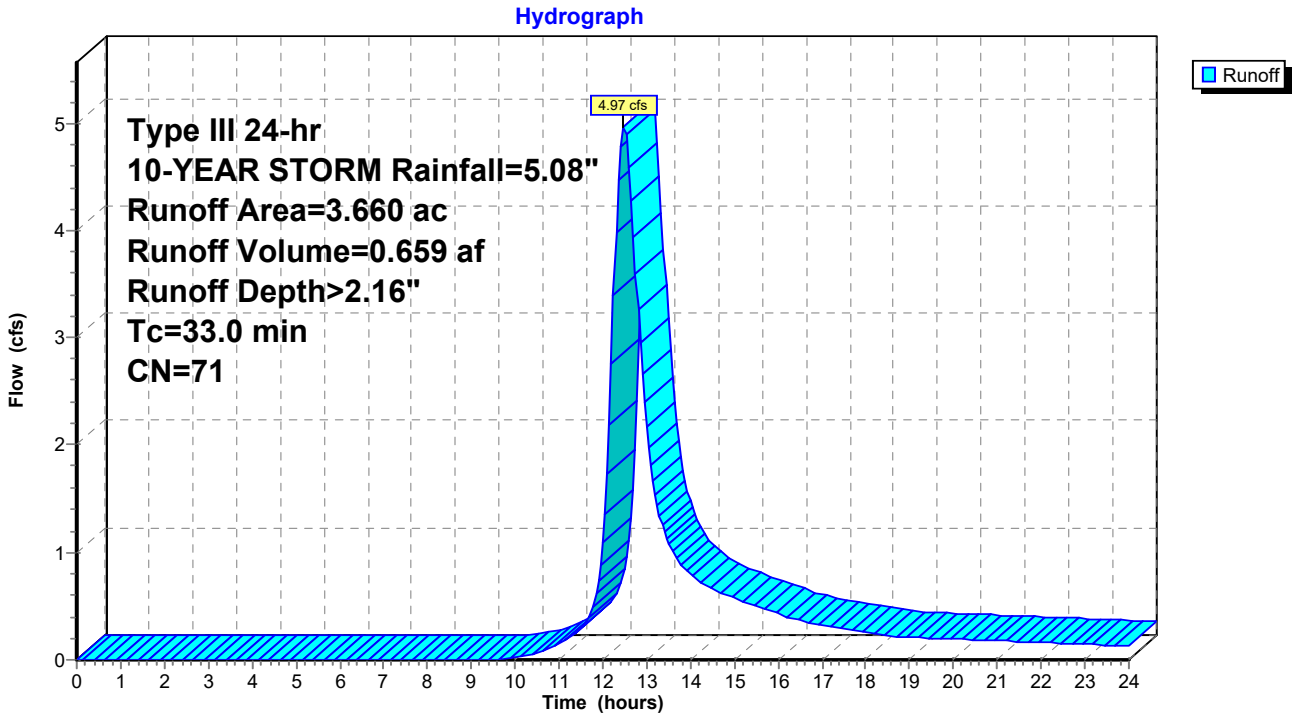
Runoff = 4.97 cfs @ 12.48 hrs, Volume= 0.659 af, Depth> 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	3.660	71	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.0					**Direct Entry, NRCS Part 630**

Subcatchment 2:



Summary for Subcatchment 4:

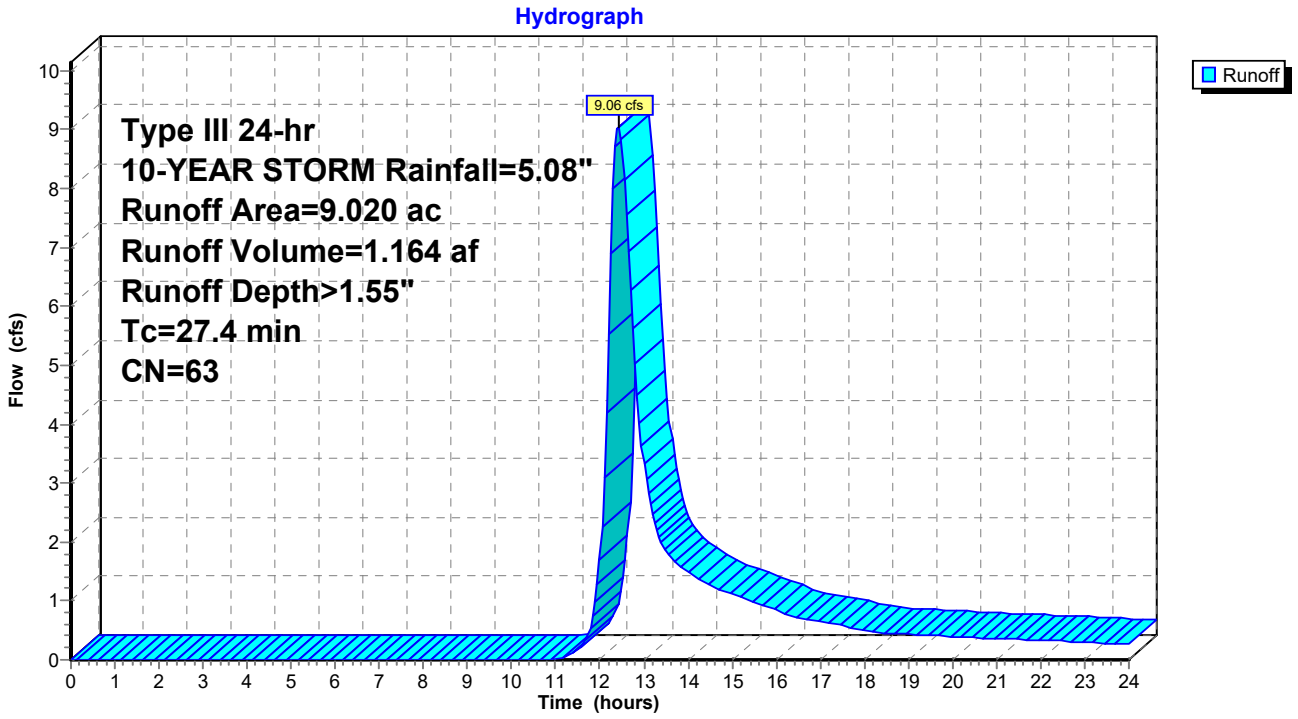
Runoff = 9.06 cfs @ 12.42 hrs, Volume= 1.164 af, Depth> 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	9.020	63	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4					**Direct Entry, NRCS Part 630**

Subcatchment 4:



Summary for Subcatchment 5:

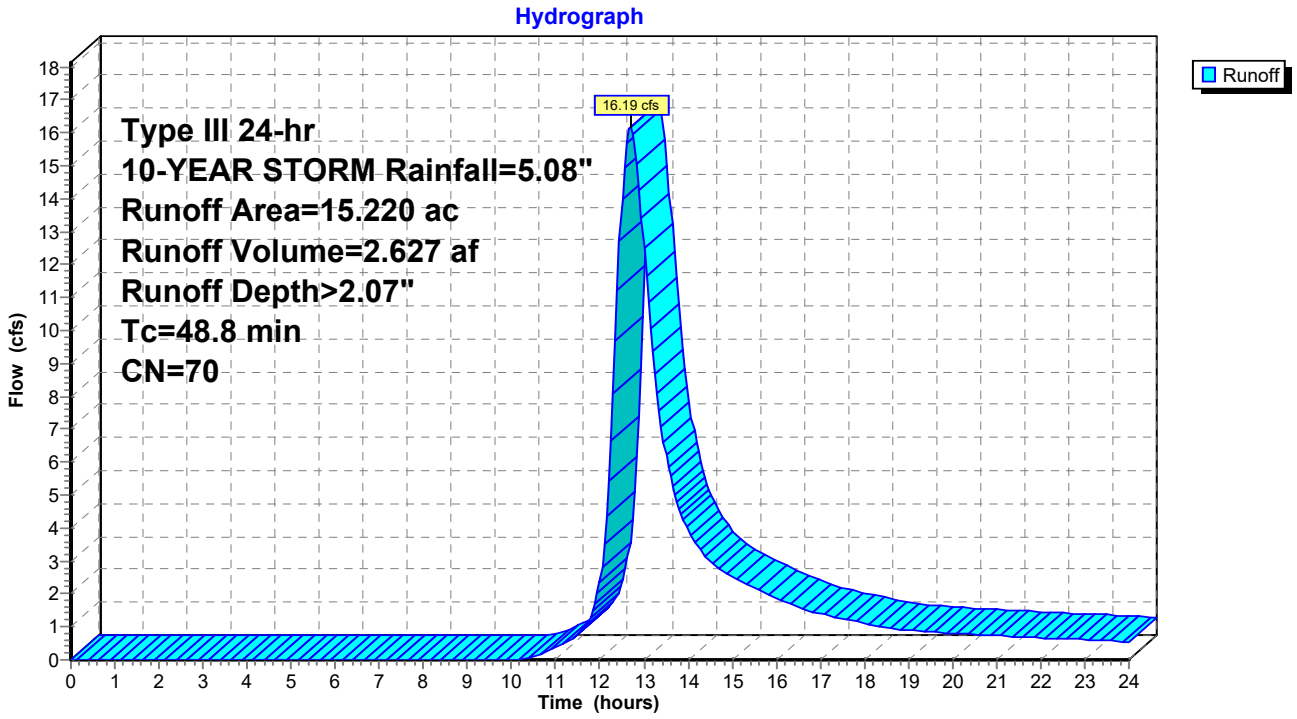
Runoff = 16.19 cfs @ 12.70 hrs, Volume= 2.627 af, Depth> 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	15.220	70	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
48.8					**Direct Entry, NRCS Part 630**

Subcatchment 5:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: Runoff Area=4.190 ac Runoff Depth>1.96"
Tc=55.2 min CN=60 Runoff=3.80 cfs 0.686 af

Subcatchment1B: Runoff Area=4.570 ac Runoff Depth>1.98"
Tc=34.5 min CN=60 Runoff=5.35 cfs 0.752 af

Subcatchment1C: Runoff Area=11.850 ac Runoff Depth>1.97"
Tc=41.2 min CN=60 Runoff=12.71 cfs 1.947 af

Subcatchment2: Runoff Area=3.660 ac Runoff Depth>2.97"
Tc=33.0 min CN=71 Runoff=6.90 cfs 0.905 af

Subcatchment4: Runoff Area=9.020 ac Runoff Depth>2.24"
Tc=27.4 min CN=63 Runoff=13.54 cfs 1.683 af

Subcatchment5: Runoff Area=15.220 ac Runoff Depth>2.86"
Tc=48.8 min CN=70 Runoff=22.66 cfs 3.628 af

Total Runoff Area = 48.510 ac Runoff Volume = 9.601 af Average Runoff Depth = 2.38"

Summary for Subcatchment 1A:

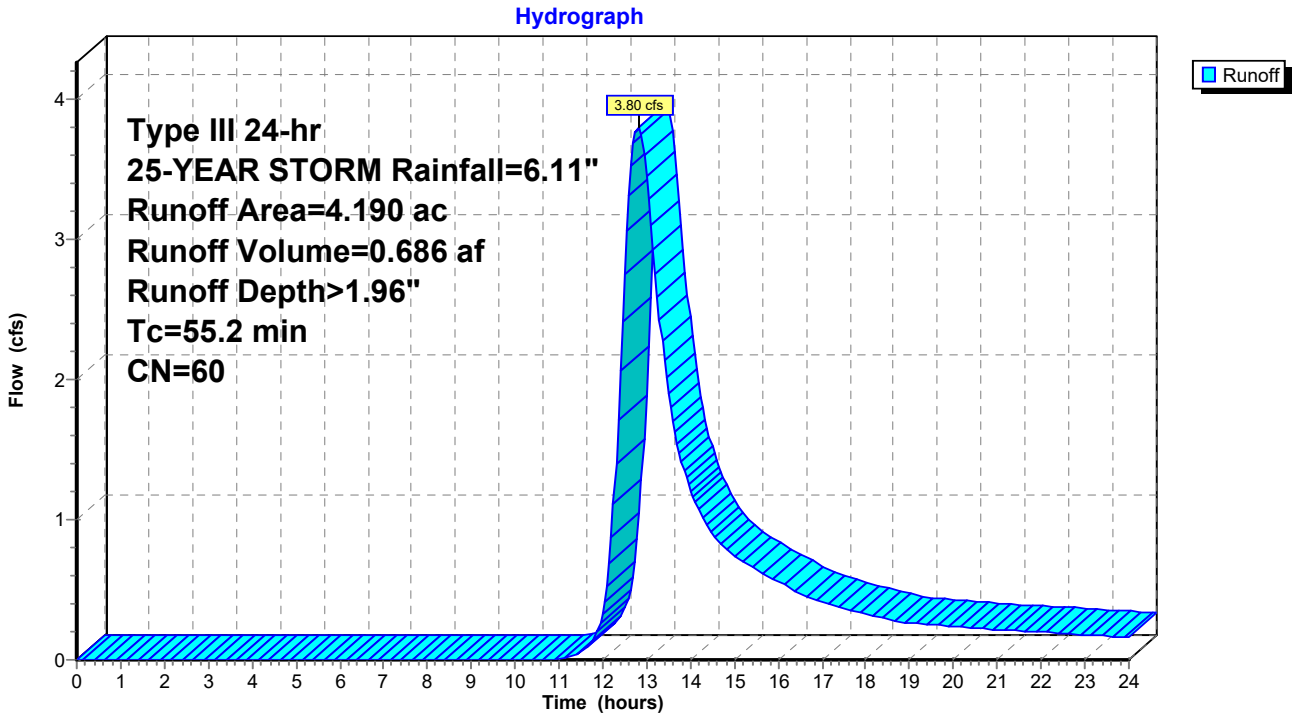
Runoff = 3.80 cfs @ 12.81 hrs, Volume= 0.686 af, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	4.190	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.2					**Direct Entry, NRCS Part 630**

Subcatchment 1A:



Summary for Subcatchment 1B:

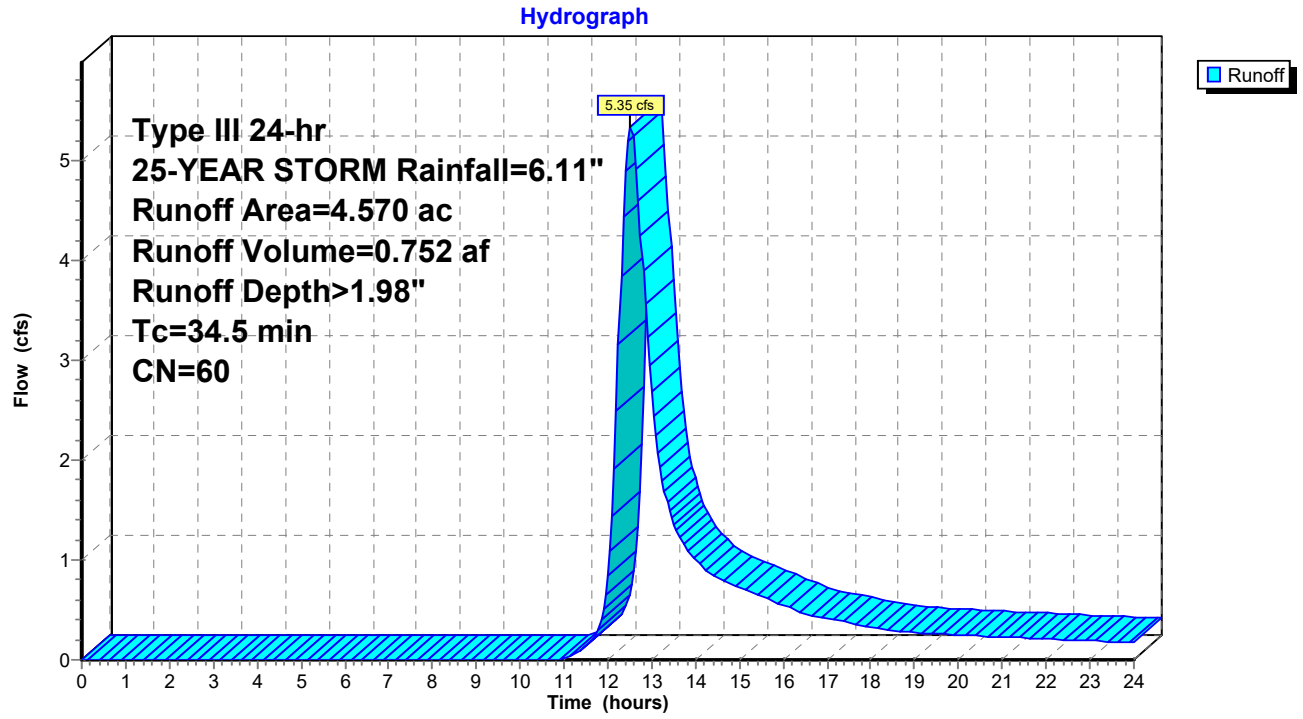
Runoff = 5.35 cfs @ 12.52 hrs, Volume= 0.752 af, Depth> 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	4.570	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.5					**Direct Entry, NRCS Part 630**

Subcatchment 1B:



Summary for Subcatchment 1C:

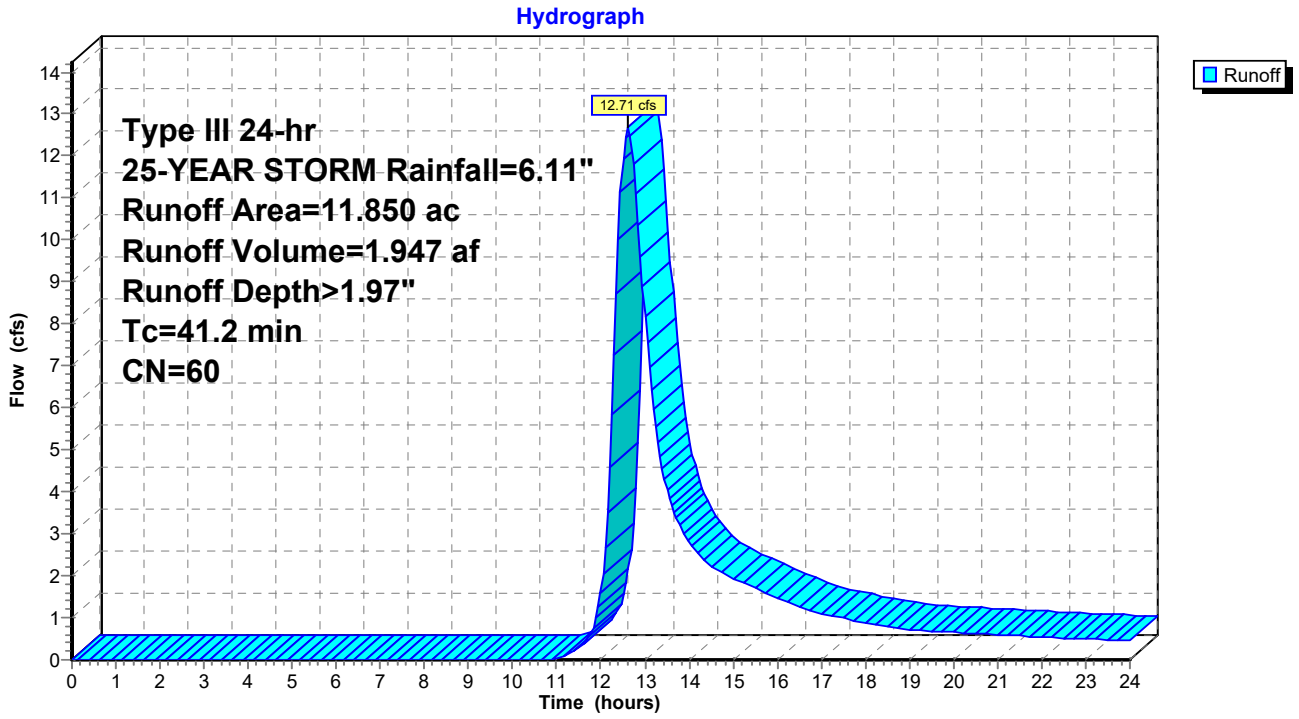
Runoff = 12.71 cfs @ 12.61 hrs, Volume= 1.947 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	11.850	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2					**Direct Entry, NRCS Part 630**

Subcatchment 1C:



Summary for Subcatchment 2:

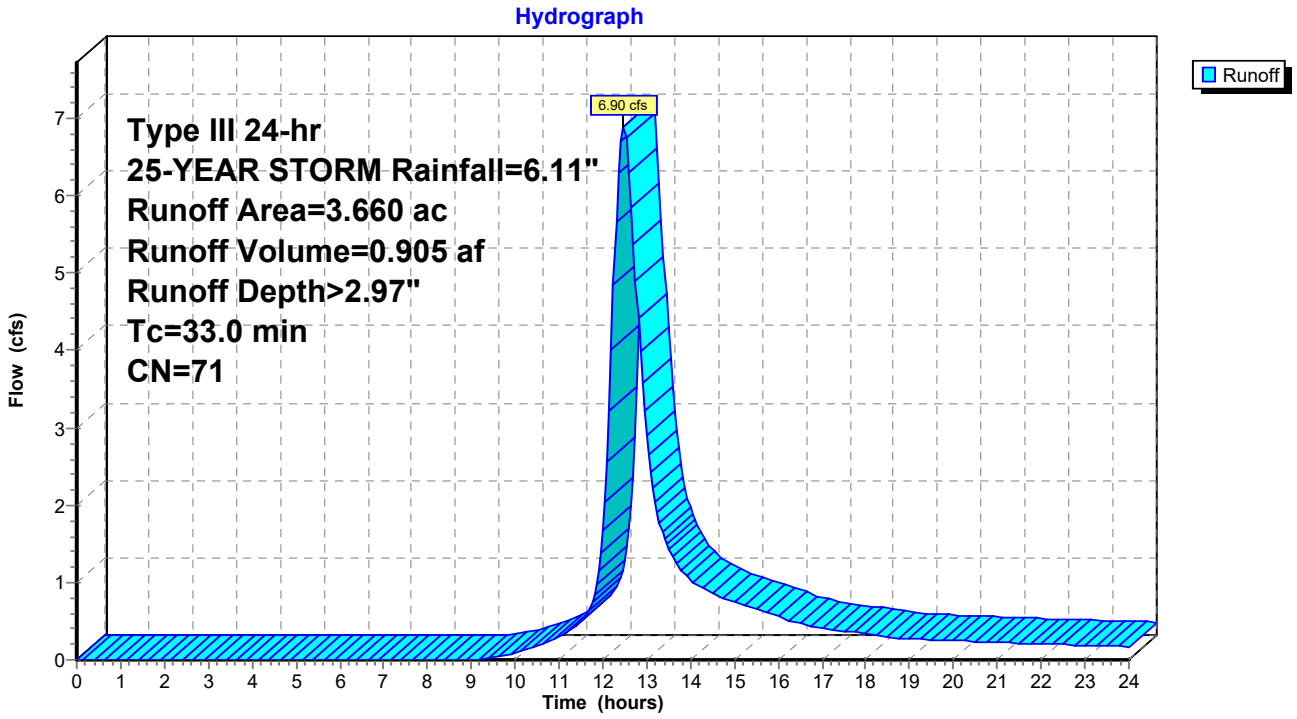
Runoff = 6.90 cfs @ 12.47 hrs, Volume= 0.905 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	3.660	71	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.0					**Direct Entry, NRCS Part 630**

Subcatchment 2:



Summary for Subcatchment 4:

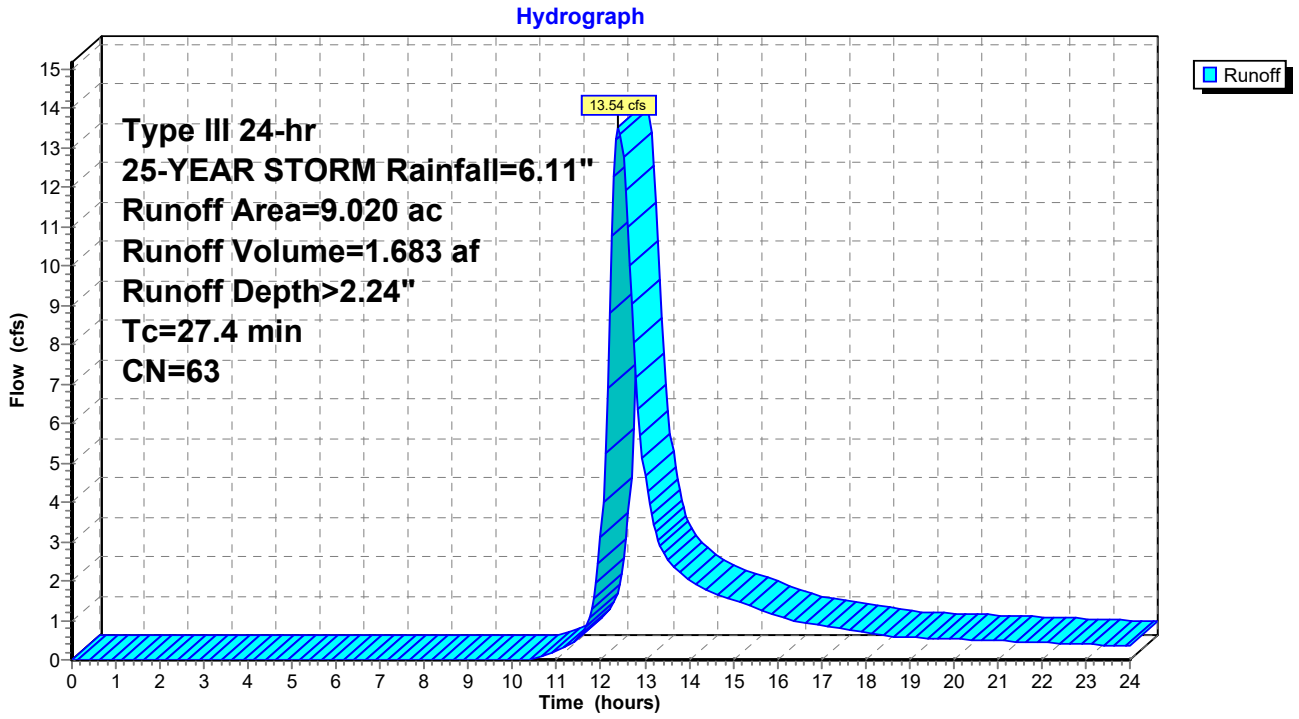
Runoff = 13.54 cfs @ 12.41 hrs, Volume= 1.683 af, Depth> 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	9.020	63	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4					**Direct Entry, NRCS Part 630**

Subcatchment 4:



Summary for Subcatchment 5:

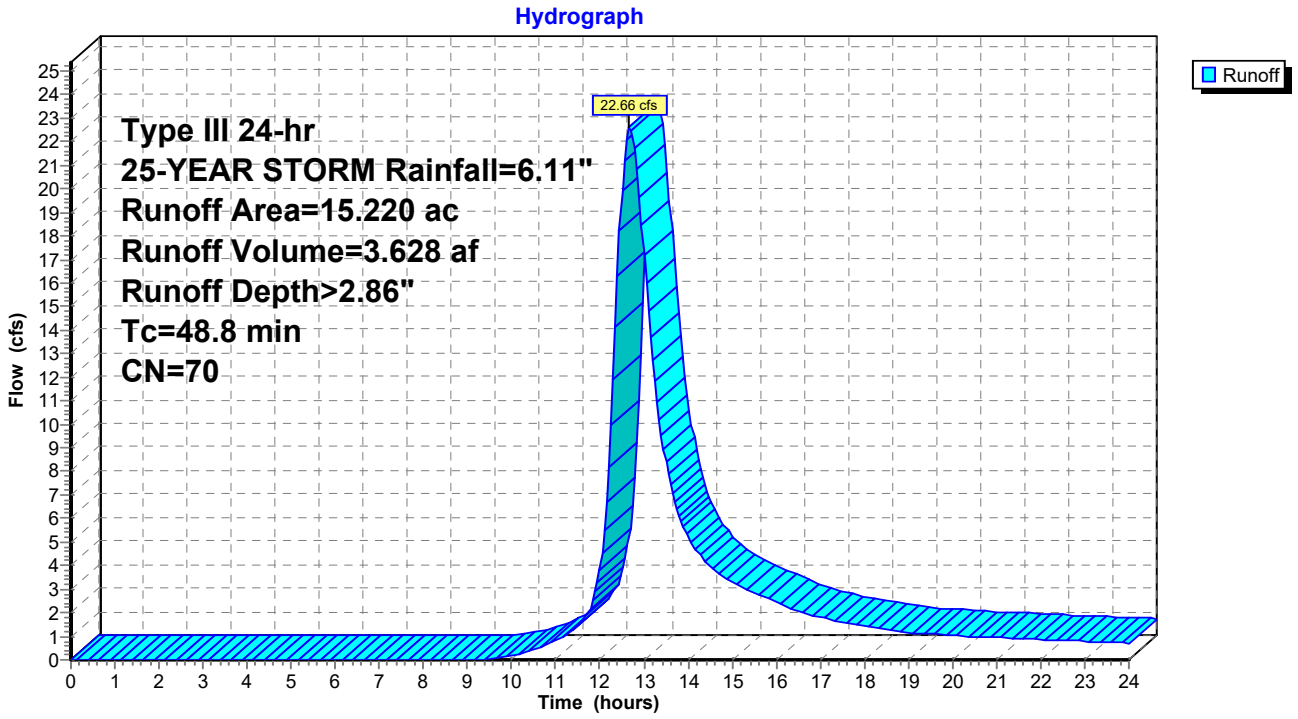
Runoff = 22.66 cfs @ 12.68 hrs, Volume= 3.628 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	15.220	70	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
48.8					**Direct Entry, NRCS Part 630**

Subcatchment 5:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: Runoff Area=4.190 ac Runoff Depth>2.48"
Tc=55.2 min CN=60 Runoff=4.91 cfs 0.867 af

Subcatchment1B: Runoff Area=4.570 ac Runoff Depth>2.50"
Tc=34.5 min CN=60 Runoff=6.89 cfs 0.951 af

Subcatchment1C: Runoff Area=11.850 ac Runoff Depth>2.49"
Tc=41.2 min CN=60 Runoff=16.38 cfs 2.462 af

Subcatchment2: Runoff Area=3.660 ac Runoff Depth>3.60"
Tc=33.0 min CN=71 Runoff=8.39 cfs 1.097 af

Subcatchment4: Runoff Area=9.020 ac Runoff Depth>2.79"
Tc=27.4 min CN=63 Runoff=17.12 cfs 2.100 af

Subcatchment5: Runoff Area=15.220 ac Runoff Depth>3.48"
Tc=48.8 min CN=70 Runoff=27.73 cfs 4.416 af

Total Runoff Area = 48.510 ac Runoff Volume = 11.892 af Average Runoff Depth = 2.94"

Summary for Subcatchment 1A:

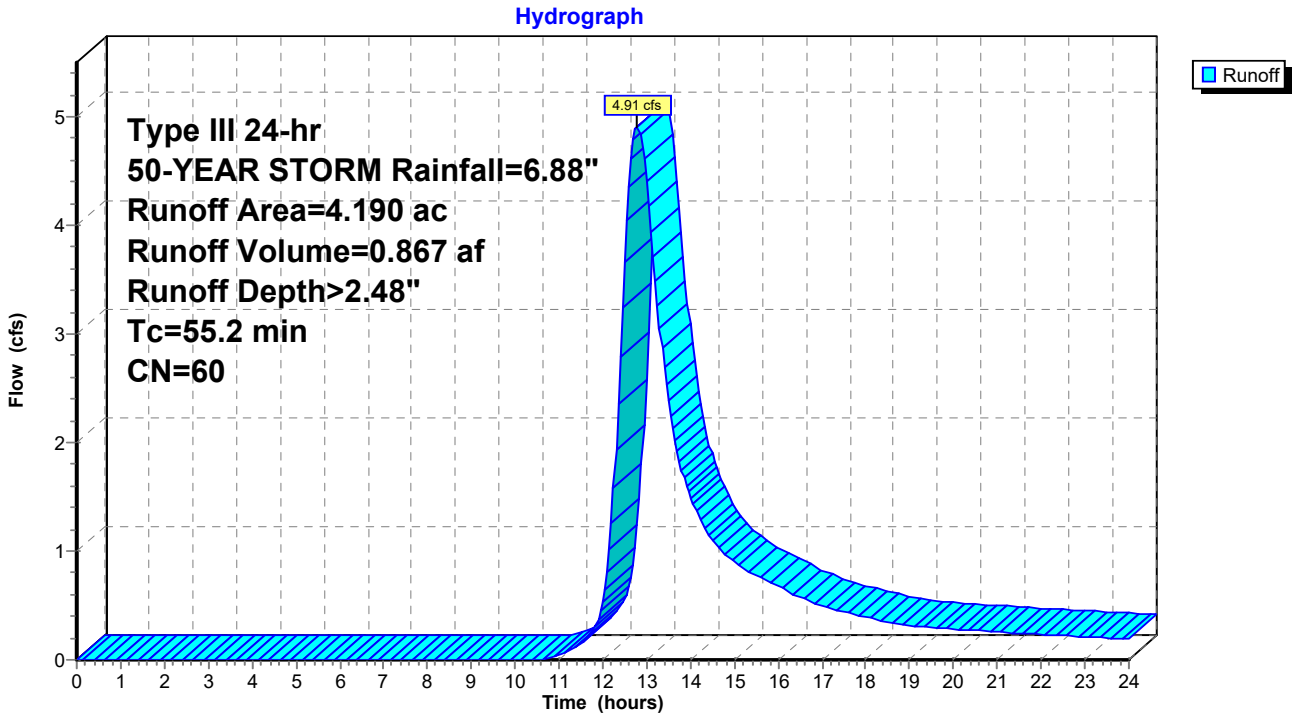
Runoff = 4.91 cfs @ 12.80 hrs, Volume= 0.867 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	4.190	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.2					**Direct Entry, NRCS Part 630**

Subcatchment 1A:



Summary for Subcatchment 1B:

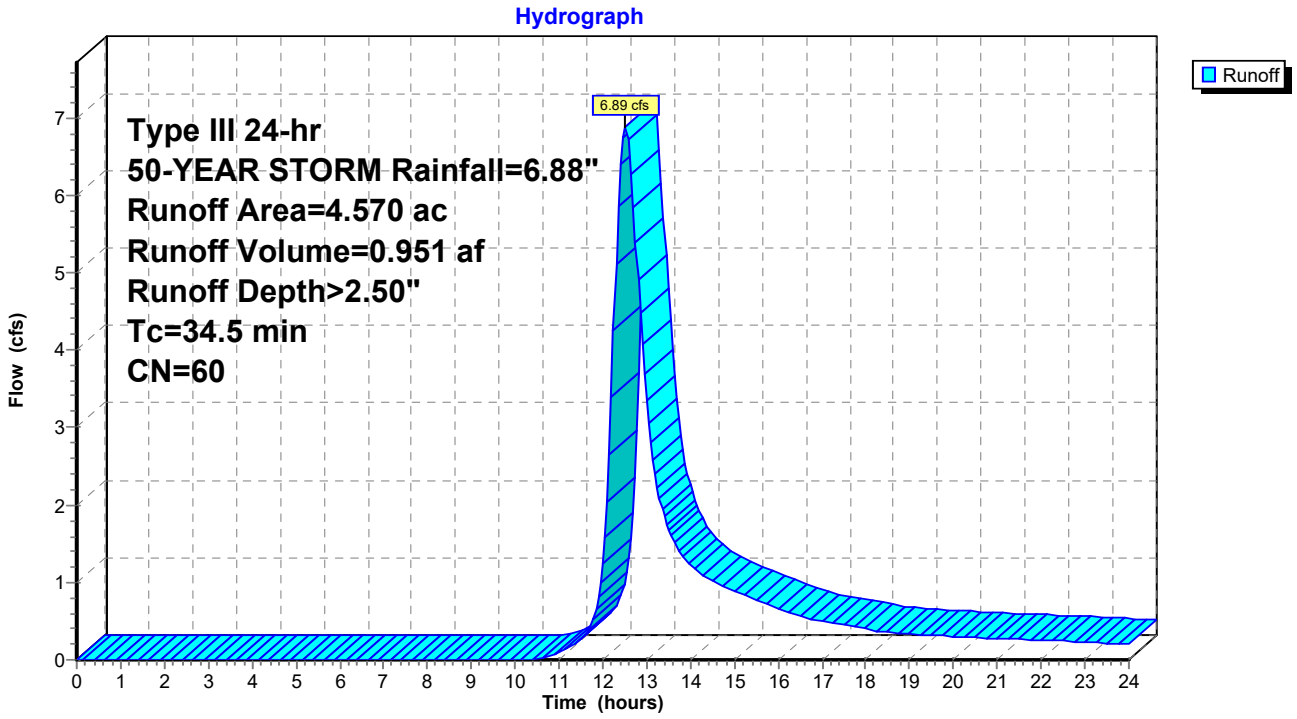
Runoff = 6.89 cfs @ 12.51 hrs, Volume= 0.951 af, Depth> 2.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	4.570	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.5					**Direct Entry, NRCS Part 630**

Subcatchment 1B:



Summary for Subcatchment 1C:

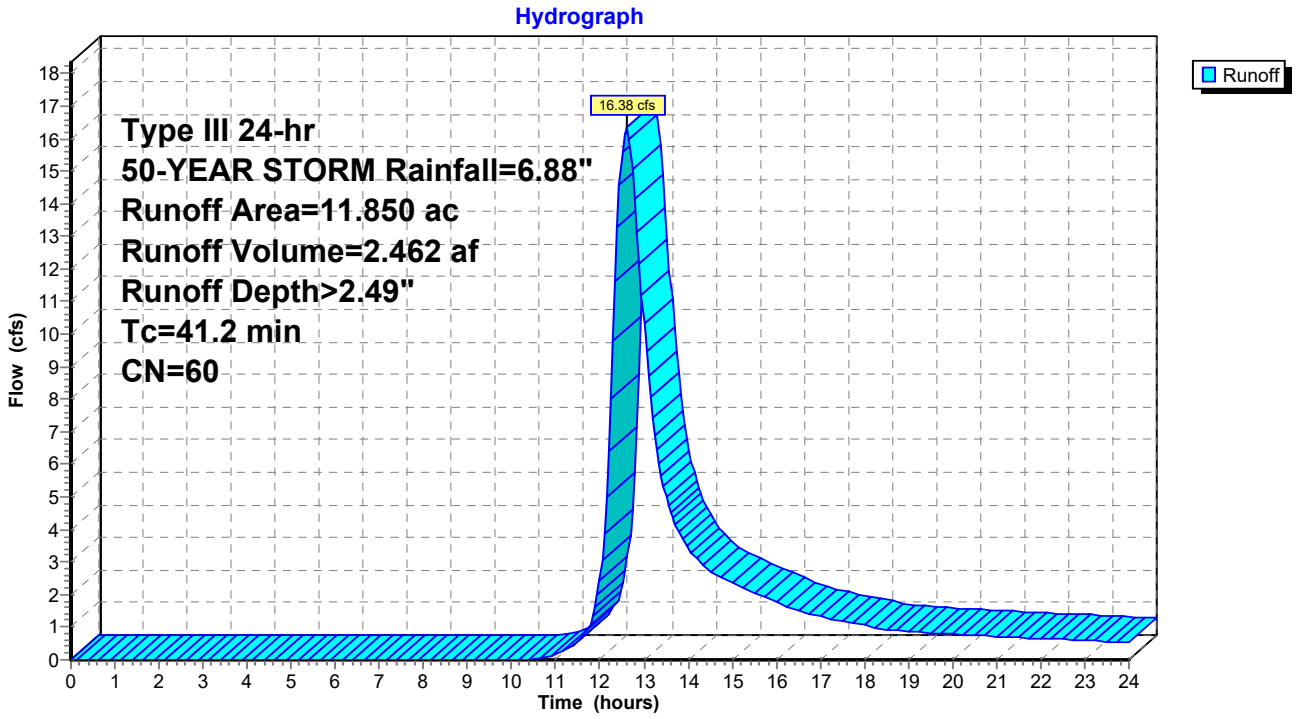
Runoff = 16.38 cfs @ 12.60 hrs, Volume= 2.462 af, Depth> 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	11.850	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2					**Direct Entry, NRCS Part 630**

Subcatchment 1C:



Summary for Subcatchment 2:

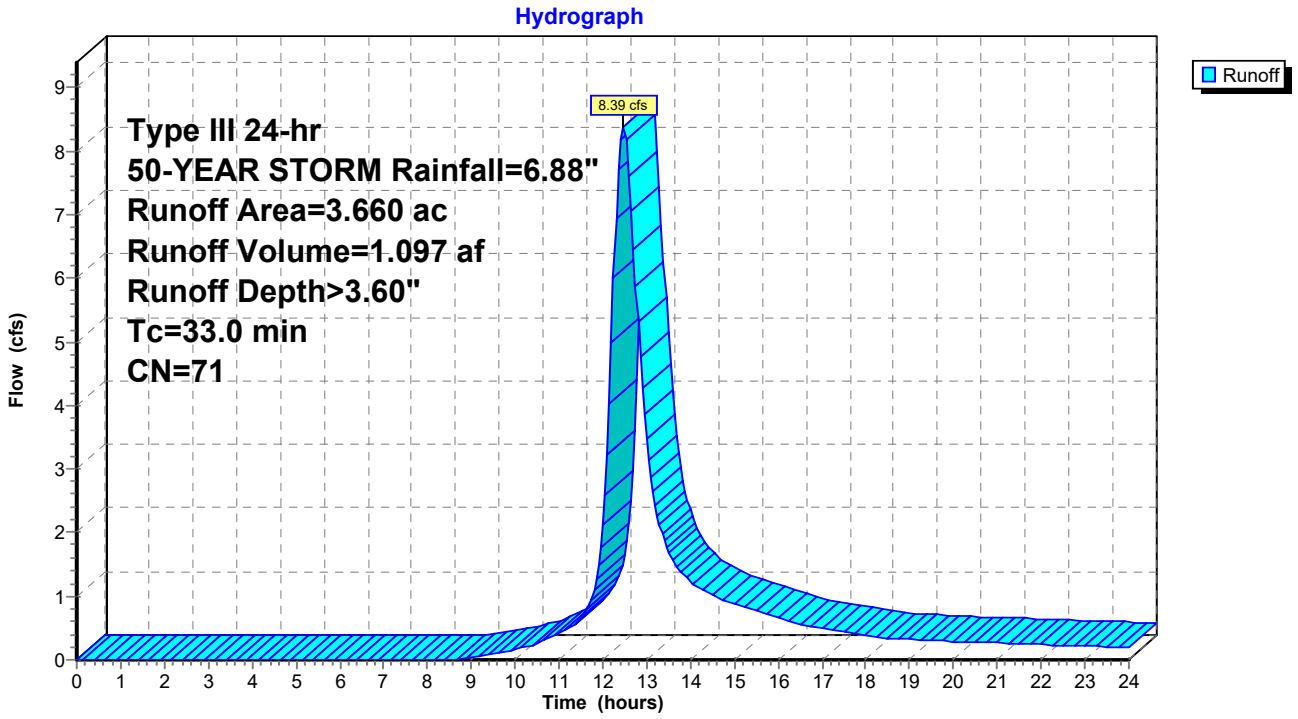
Runoff = 8.39 cfs @ 12.46 hrs, Volume= 1.097 af, Depth> 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	3.660	71	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.0					**Direct Entry, NRCS Part 630**

Subcatchment 2:



Summary for Subcatchment 4:

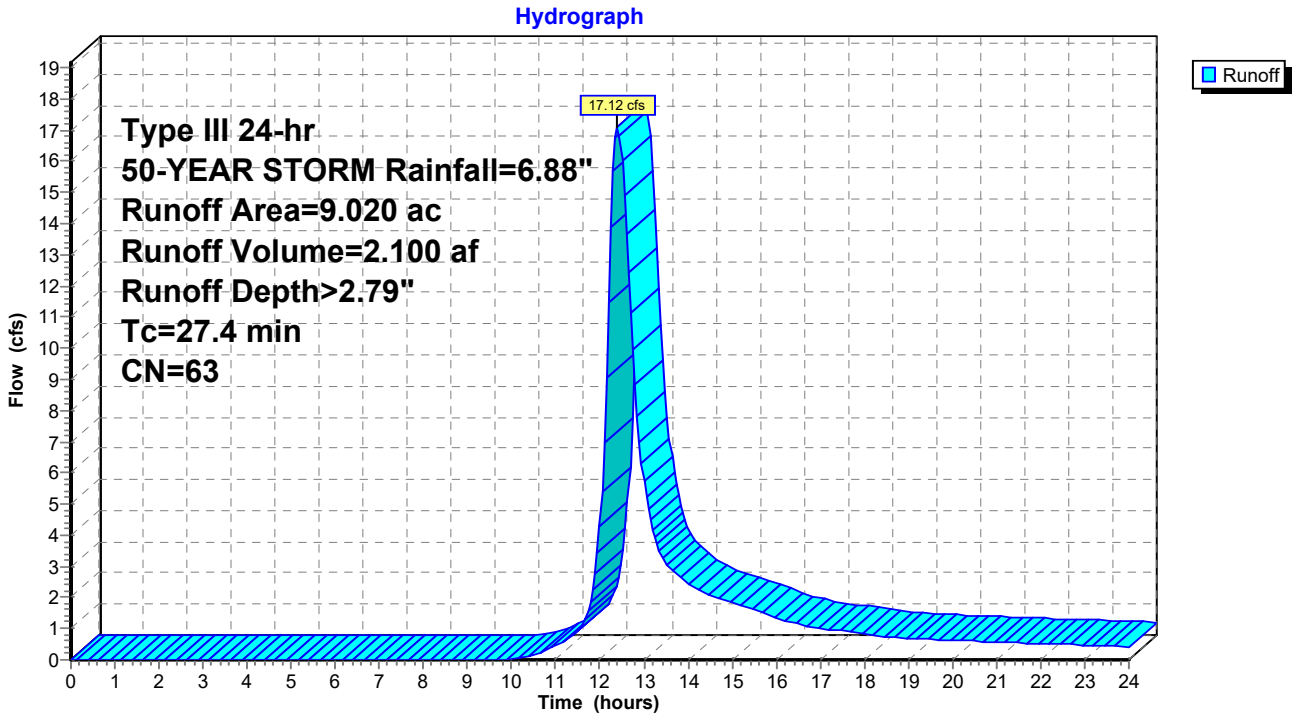
Runoff = 17.12 cfs @ 12.40 hrs, Volume= 2.100 af, Depth> 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	9.020	63	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4					**Direct Entry, NRCS Part 630**

Subcatchment 4:



Summary for Subcatchment 5:

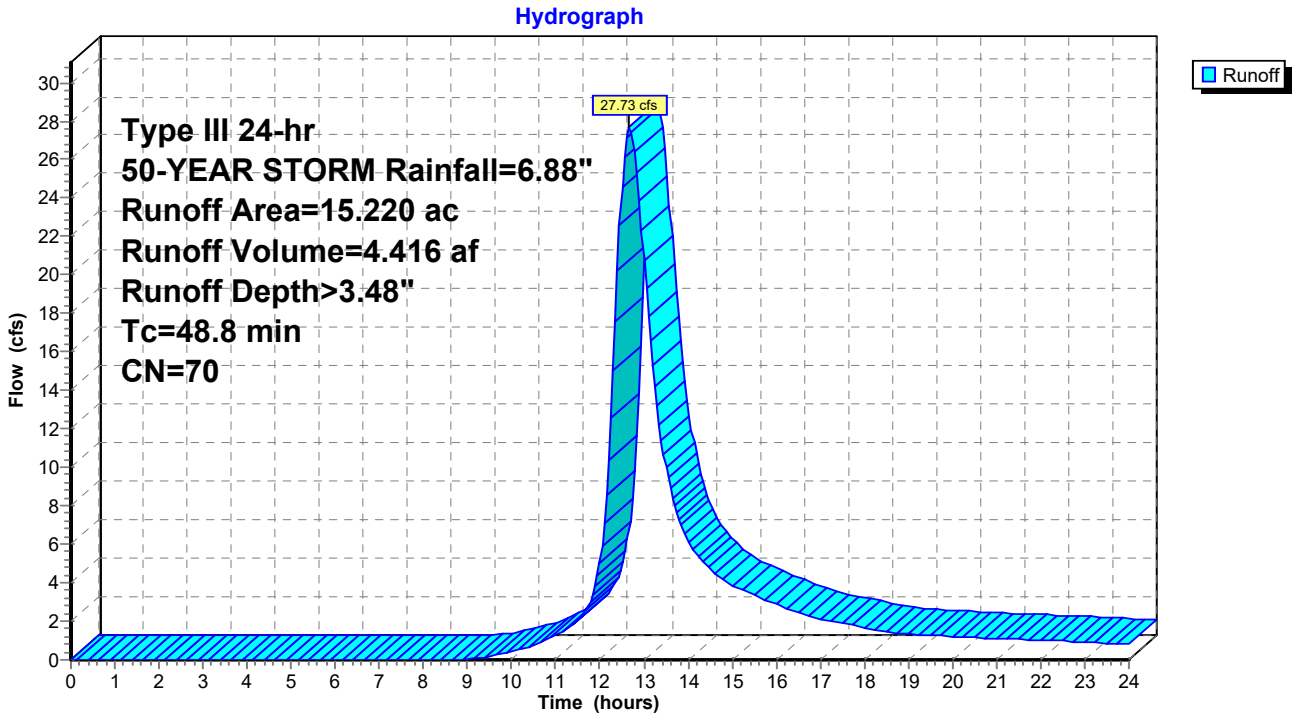
Runoff = 27.73 cfs @ 12.67 hrs, Volume= 4.416 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	15.220	70	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
48.8					**Direct Entry, NRCS Part 630**

Subcatchment 5:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: Runoff Area=4.190 ac Runoff Depth>3.07"
Tc=55.2 min CN=60 Runoff=6.15 cfs 1.071 af

Subcatchment1B: Runoff Area=4.570 ac Runoff Depth>3.08"
Tc=34.5 min CN=60 Runoff=8.62 cfs 1.175 af

Subcatchment1C: Runoff Area=11.850 ac Runoff Depth>3.08"
Tc=41.2 min CN=60 Runoff=20.49 cfs 3.041 af

Subcatchment2: Runoff Area=3.660 ac Runoff Depth>4.29"
Tc=33.0 min CN=71 Runoff=10.02 cfs 1.309 af

Subcatchment4: Runoff Area=9.020 ac Runoff Depth>3.41"
Tc=27.4 min CN=63 Runoff=21.11 cfs 2.566 af

Subcatchment5: Runoff Area=15.220 ac Runoff Depth>4.16"
Tc=48.8 min CN=70 Runoff=33.24 cfs 5.282 af

Total Runoff Area = 48.510 ac Runoff Volume = 14.443 af Average Runoff Depth = 3.57"

Summary for Subcatchment 1A:

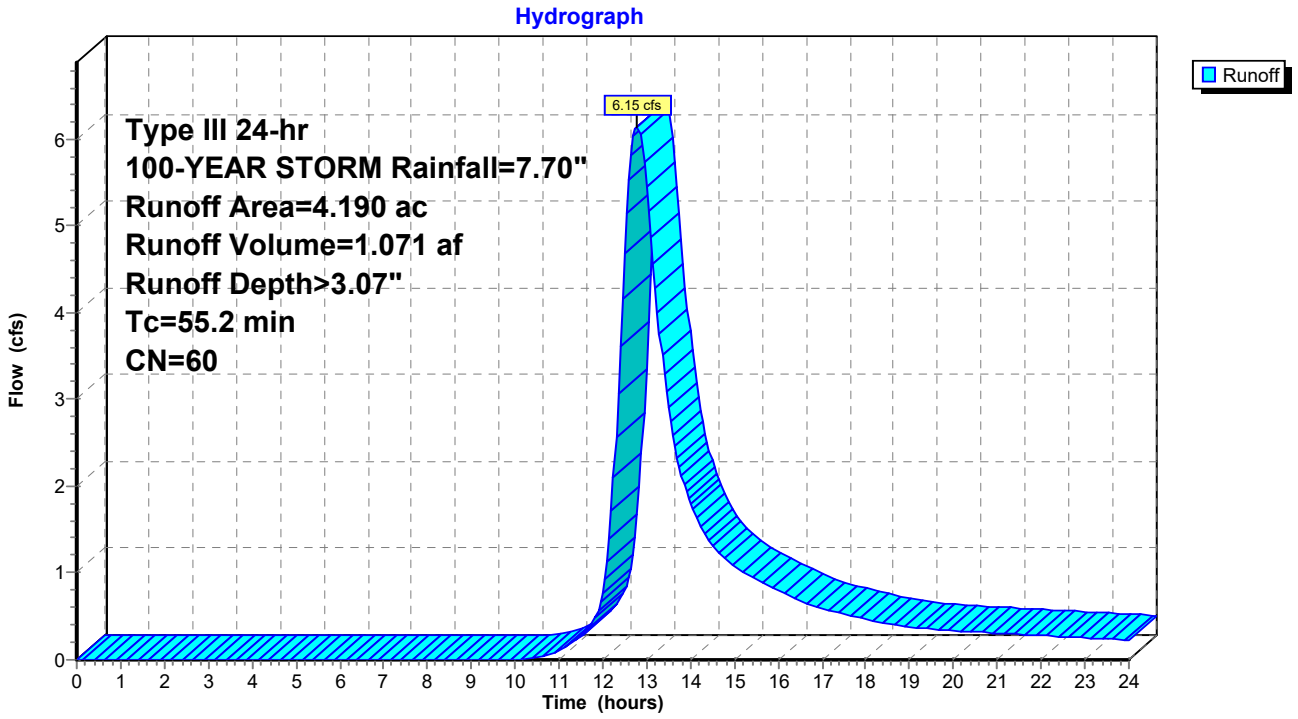
Runoff = 6.15 cfs @ 12.79 hrs, Volume= 1.071 af, Depth> 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	4.190	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.2					**Direct Entry, NRCS Part 630**

Subcatchment 1A:



Summary for Subcatchment 1B:

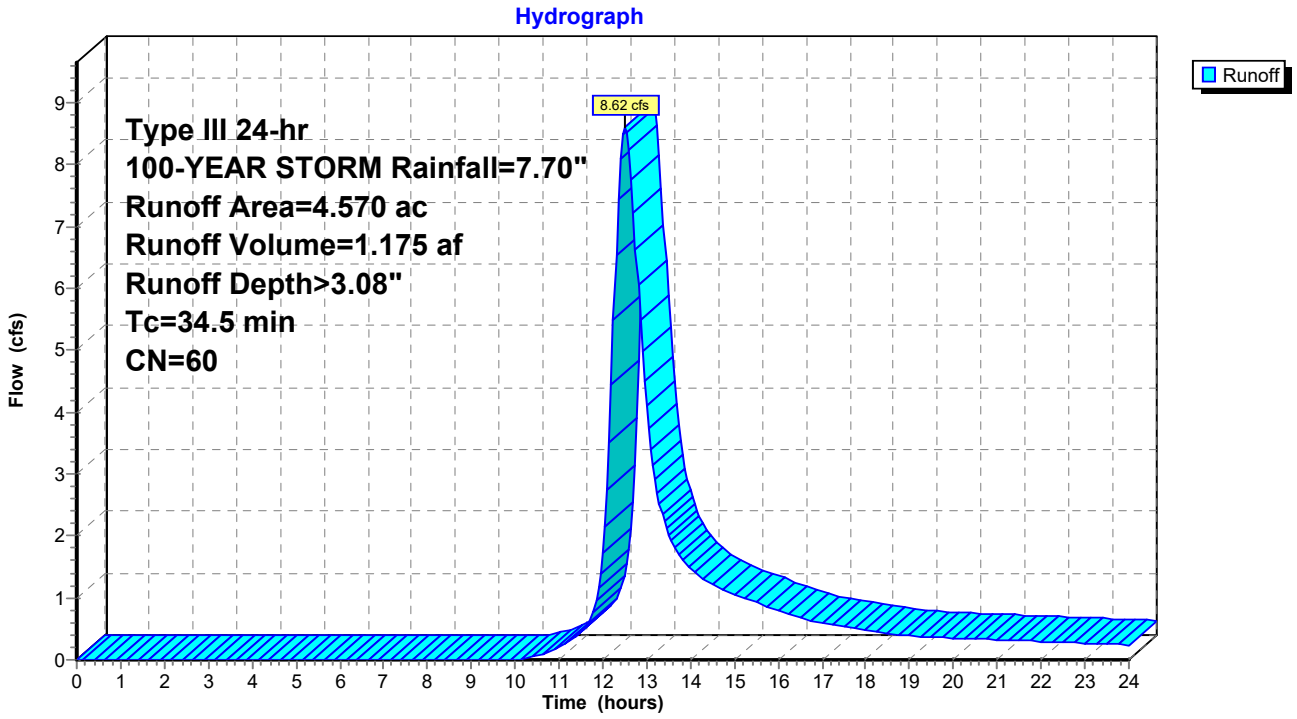
Runoff = 8.62 cfs @ 12.50 hrs, Volume= 1.175 af, Depth> 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	4.570	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.5					**Direct Entry, NRCS Part 630**

Subcatchment 1B:



Summary for Subcatchment 1C:

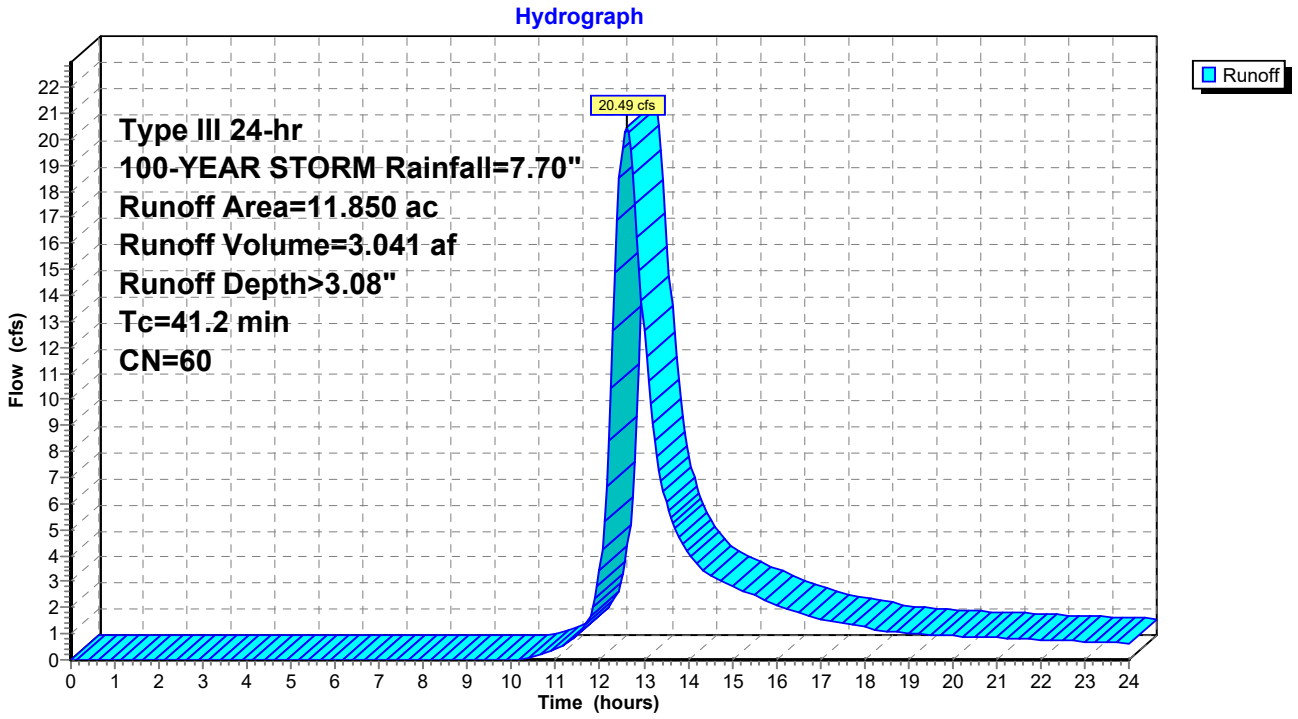
Runoff = 20.49 cfs @ 12.60 hrs, Volume= 3.041 af, Depth> 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	11.850	60	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2					**Direct Entry, NRCS Part 630**

Subcatchment 1C:



Summary for Subcatchment 2:

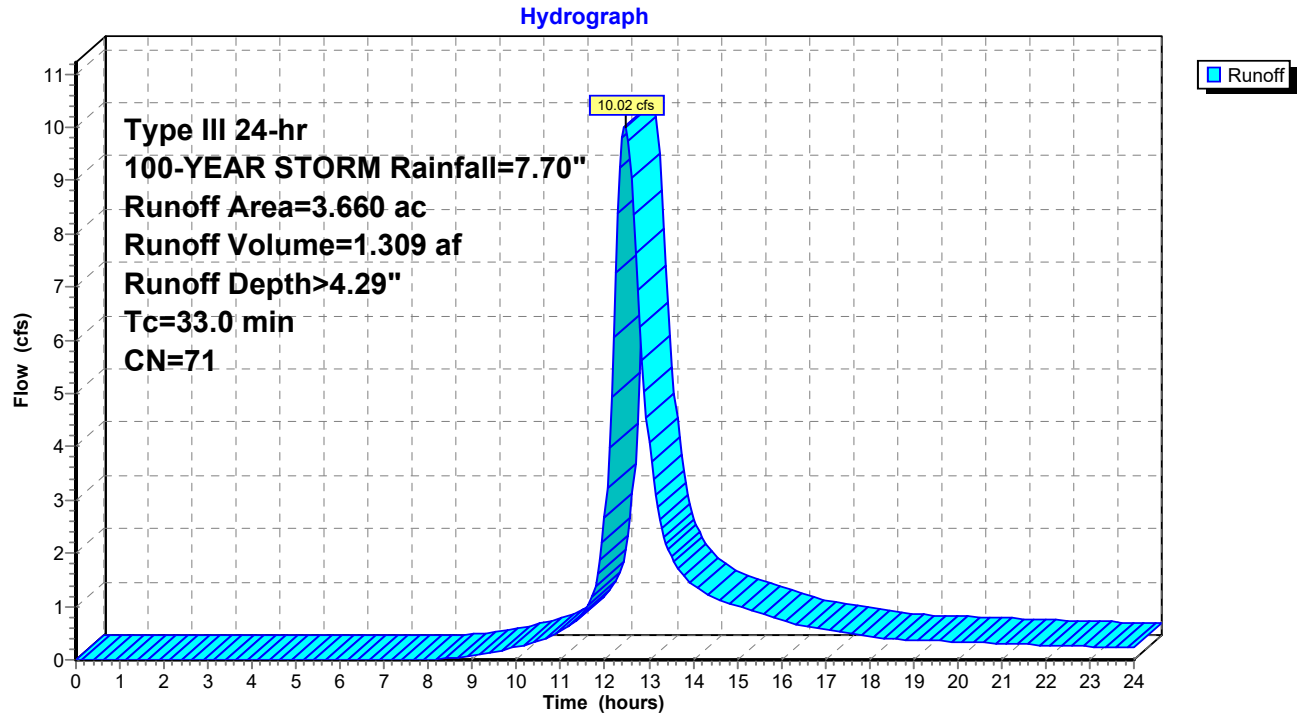
Runoff = 10.02 cfs @ 12.46 hrs, Volume= 1.309 af, Depth> 4.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	3.660	71	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.0					**Direct Entry, NRCS Part 630**

Subcatchment 2:



Summary for Subcatchment 4:

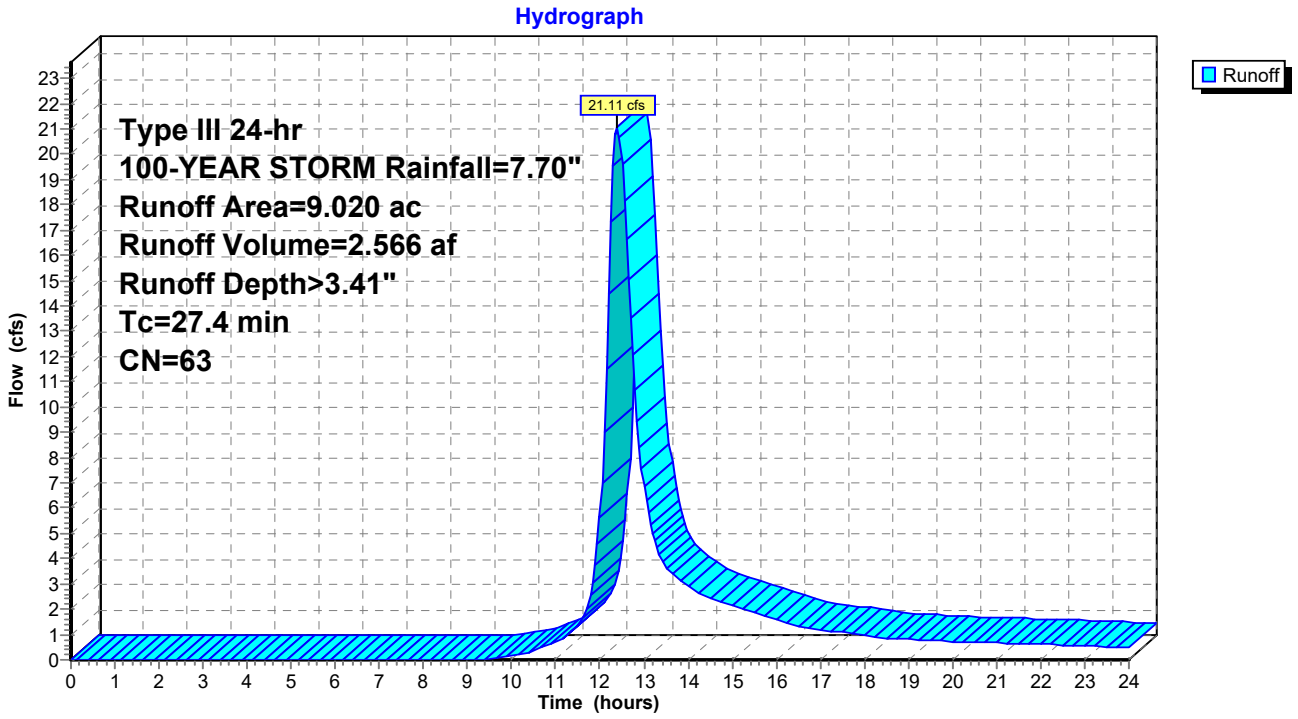
Runoff = 21.11 cfs @ 12.40 hrs, Volume= 2.566 af, Depth> 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	9.020	63	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4					**Direct Entry, NRCS Part 630**

Subcatchment 4:



Summary for Subcatchment 5:

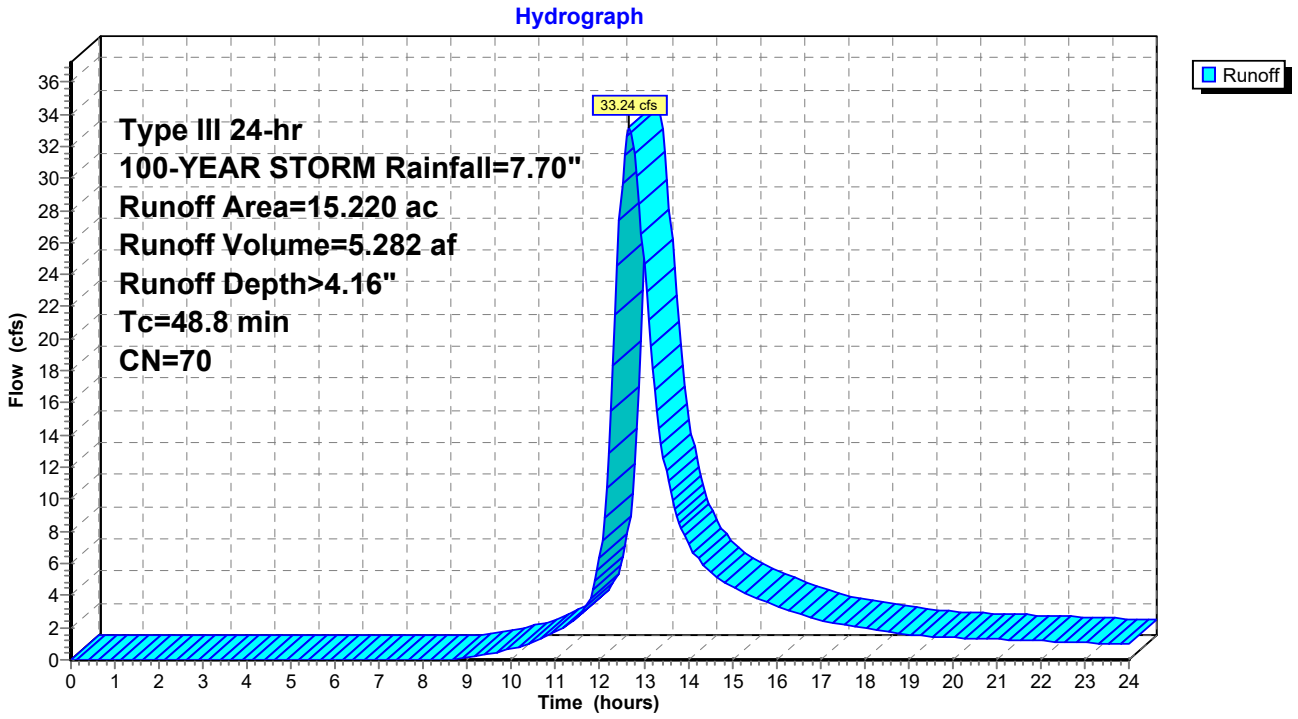
Runoff = 33.24 cfs @ 12.67 hrs, Volume= 5.282 af, Depth> 4.16"

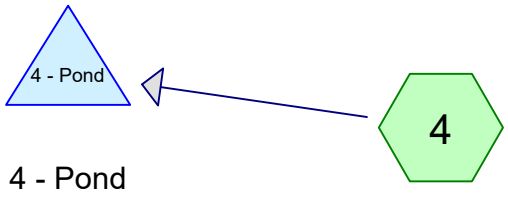
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	15.220	70	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
48.8					**Direct Entry, NRCS Part 630**

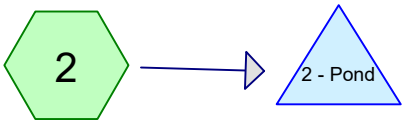
Subcatchment 5:



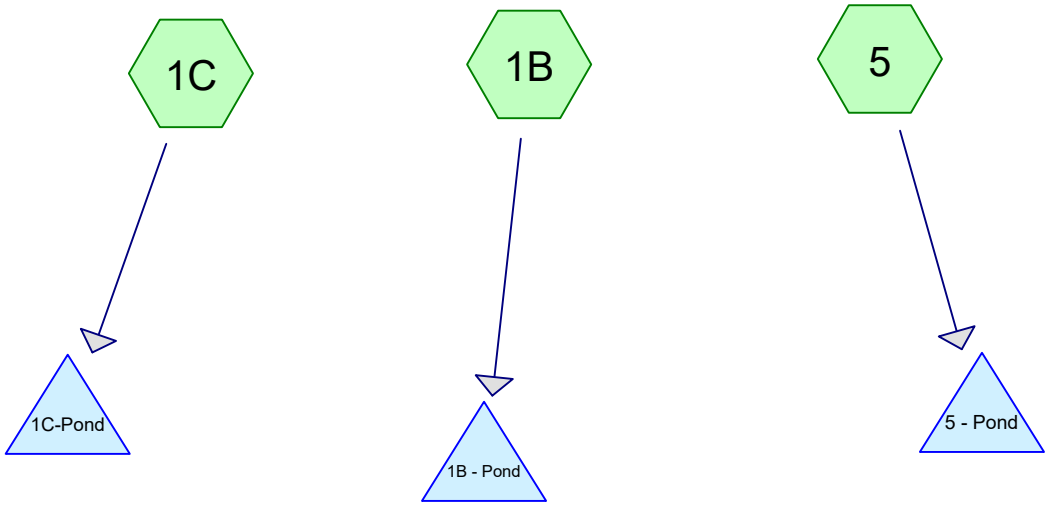


4 - Pond

1A - Pond



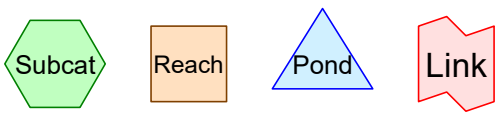
2 - Pond



1C - Pond

1B - Pond

5 - Pond



Routing Diagram for HydroCAD North Stonington Proposed_Rev 5-21
Prepared by HDR, Inc, Printed 6/25/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.190	77	(1A)
4.570	81	(1B)
11.850	83	(1C)
3.660	82	(2)
9.080	75	(4)
15.220	85	(5)
48.570	**81**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
48.570	Other	1A, 1B, 1C, 2, 4, 5
48.570		**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	0.000	0.000	48.570	48.570		1A, 1B, 1C, 2, 4, 5
0.000	**0.000**	**0.000**	**0.000**	**48.570**	**48.570**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1A - Pond	125.80	123.80	401.4	0.0050	0.012	24.0	0.0	0.0
2	1B - Pond	120.20	119.00	88.0	0.0136	0.012	15.0	0.0	0.0
3	1C-Pond	115.70	115.00	91.6	0.0076	0.012	18.0	0.0	0.0
4	2 - Pond	170.50	170.00	42.0	0.0119	0.012	12.0	0.0	0.0
5	4 - Pond	120.40	120.00	53.0	0.0075	0.012	18.0	0.0	0.0
6	5 - Pond	121.30	115.25	81.5	0.0742	0.012	24.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: Runoff Area=4.190 ac Runoff Depth>1.37"
Tc=13.2 min CN=77 Runoff=5.18 cfs 0.477 af

Subcatchment1B: Runoff Area=4.570 ac Runoff Depth>1.64"
Tc=18.7 min CN=81 Runoff=6.05 cfs 0.624 af

Subcatchment1C: Runoff Area=11.850 ac Runoff Depth>1.78"
Tc=19.3 min CN=83 Runoff=16.97 cfs 1.762 af

Subcatchment2: Runoff Area=3.660 ac Runoff Depth>1.71"
Tc=16.2 min CN=82 Runoff=5.35 cfs 0.522 af

Subcatchment4: Runoff Area=9.080 ac Runoff Depth>1.24"
Tc=12.4 min CN=75 Runoff=10.24 cfs 0.940 af

Subcatchment5: Runoff Area=15.220 ac Runoff Depth>1.94"
Tc=15.3 min CN=85 Runoff=26.00 cfs 2.462 af

Pond 1A - Pond: 1A - Pond Peak Elev=126.93' Storage=9,488 cf Inflow=5.18 cfs 0.477 af
Primary=0.83 cfs 0.335 af Secondary=0.00 cfs 0.000 af Outflow=0.83 cfs 0.335 af

Pond 1B - Pond: 1B - Pond Peak Elev=121.11' Storage=14,279 cf Inflow=6.05 cfs 0.624 af
Primary=0.77 cfs 0.414 af Secondary=0.00 cfs 0.000 af Outflow=0.77 cfs 0.414 af

Pond 1C-Pond: 1C - Pond Peak Elev=116.83' Storage=41,248 cf Inflow=16.97 cfs 1.762 af
Primary=2.22 cfs 1.141 af Secondary=0.00 cfs 0.000 af Outflow=2.22 cfs 1.141 af

Pond 2 - Pond: 2 - Pond Peak Elev=172.68' Storage=14,084 cf Inflow=5.35 cfs 0.522 af
Primary=0.34 cfs 0.300 af Secondary=0.00 cfs 0.000 af Outflow=0.34 cfs 0.300 af

Pond 4 - Pond: 4 - Pond Peak Elev=123.22' Storage=28,735 cf Inflow=10.24 cfs 0.940 af
Primary=0.34 cfs 0.317 af Secondary=0.00 cfs 0.000 af Outflow=0.34 cfs 0.317 af

Pond 5 - Pond: 5 - Pond Peak Elev=123.16' Storage=57,476 cf Inflow=26.00 cfs 2.462 af
Primary=3.15 cfs 1.811 af Secondary=0.00 cfs 0.000 af Outflow=3.15 cfs 1.811 af

Total Runoff Area = 48.570 ac Runoff Volume = 6.788 af Average Runoff Depth = 1.68"

Summary for Subcatchment 1A:

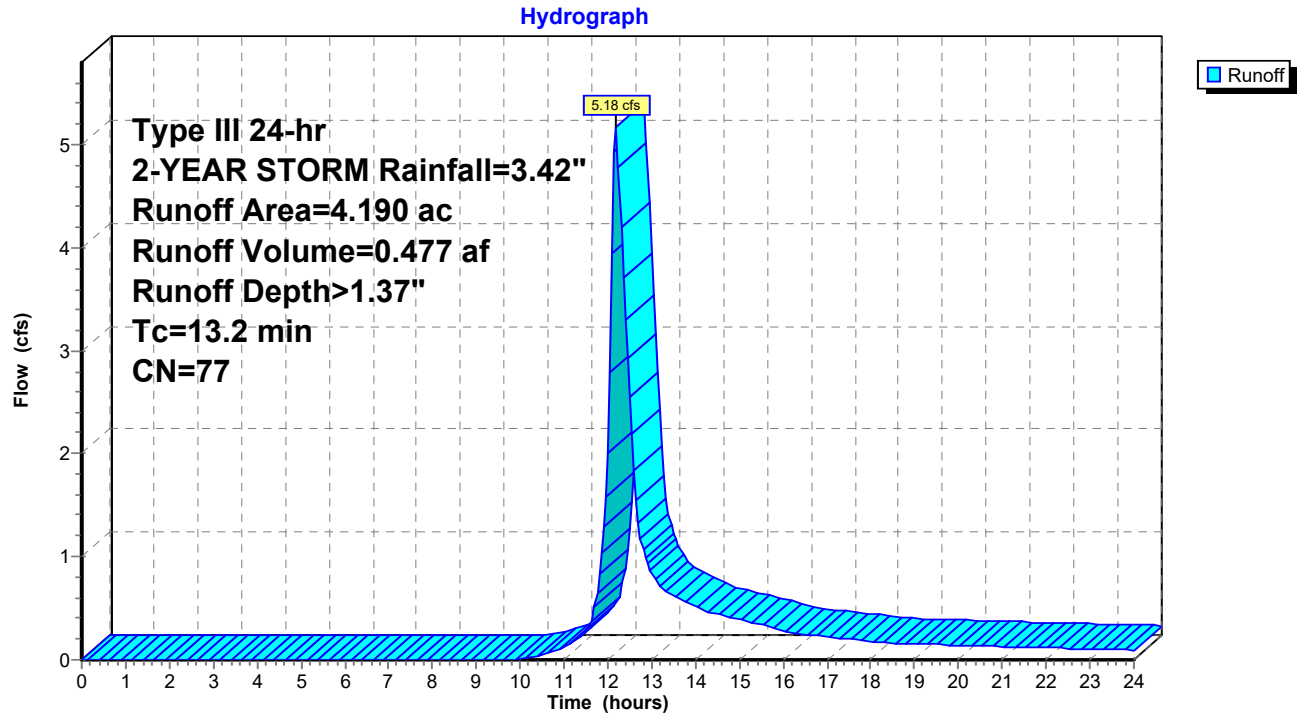
Runoff = 5.18 cfs @ 12.19 hrs, Volume= 0.477 af, Depth> 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	4.190	77	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2					**Direct Entry, NRCS Part 630**

Subcatchment 1A:



Summary for Subcatchment 1B:

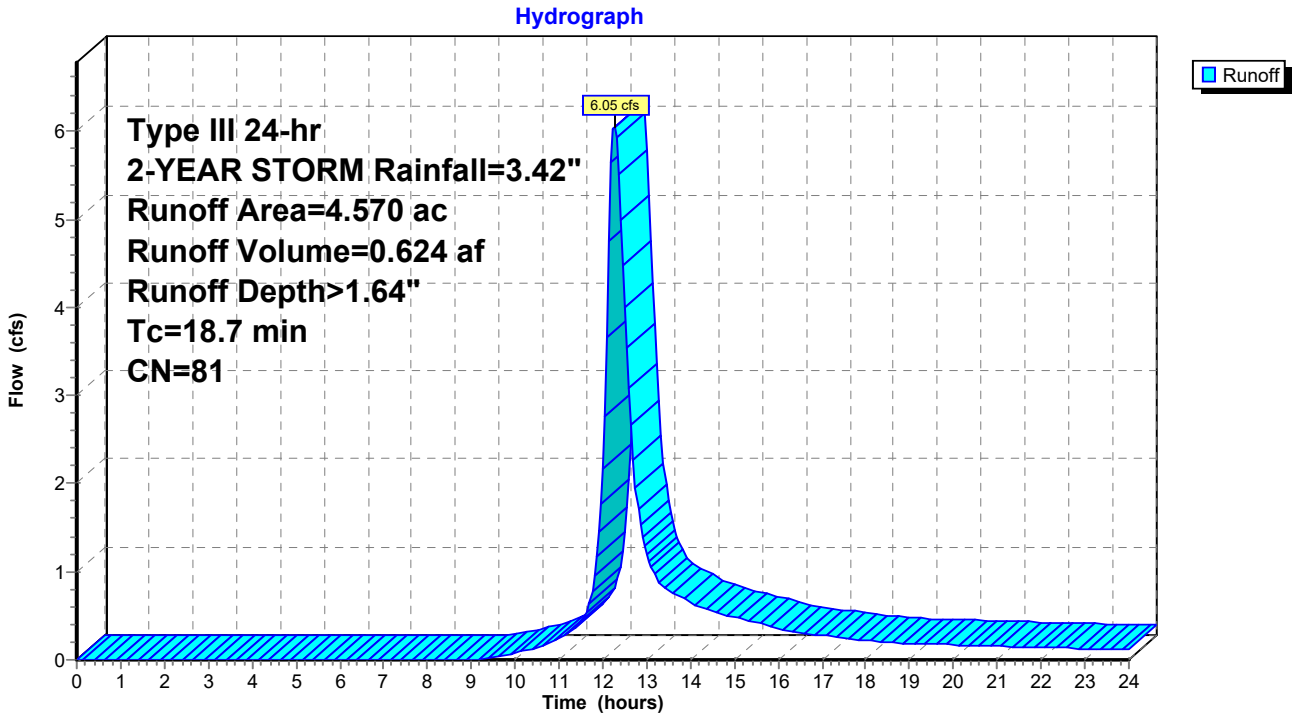
Runoff = 6.05 cfs @ 12.26 hrs, Volume= 0.624 af, Depth> 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	4.570	81	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					**Direct Entry, NRCS Part 630**

Subcatchment 1B:



Summary for Subcatchment 1C:

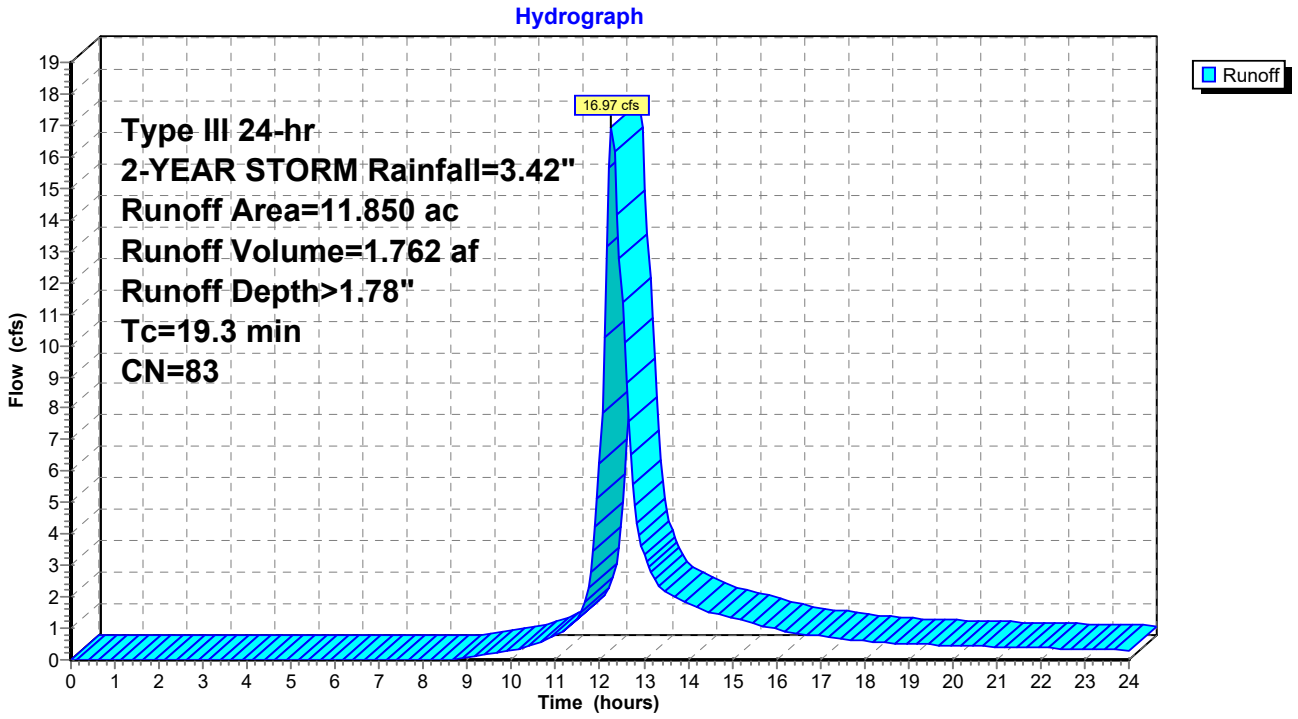
Runoff = 16.97 cfs @ 12.27 hrs, Volume= 1.762 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	11.850	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3					**Direct Entry, NRCS Part 630**

Subcatchment 1C:



Summary for Subcatchment 2:

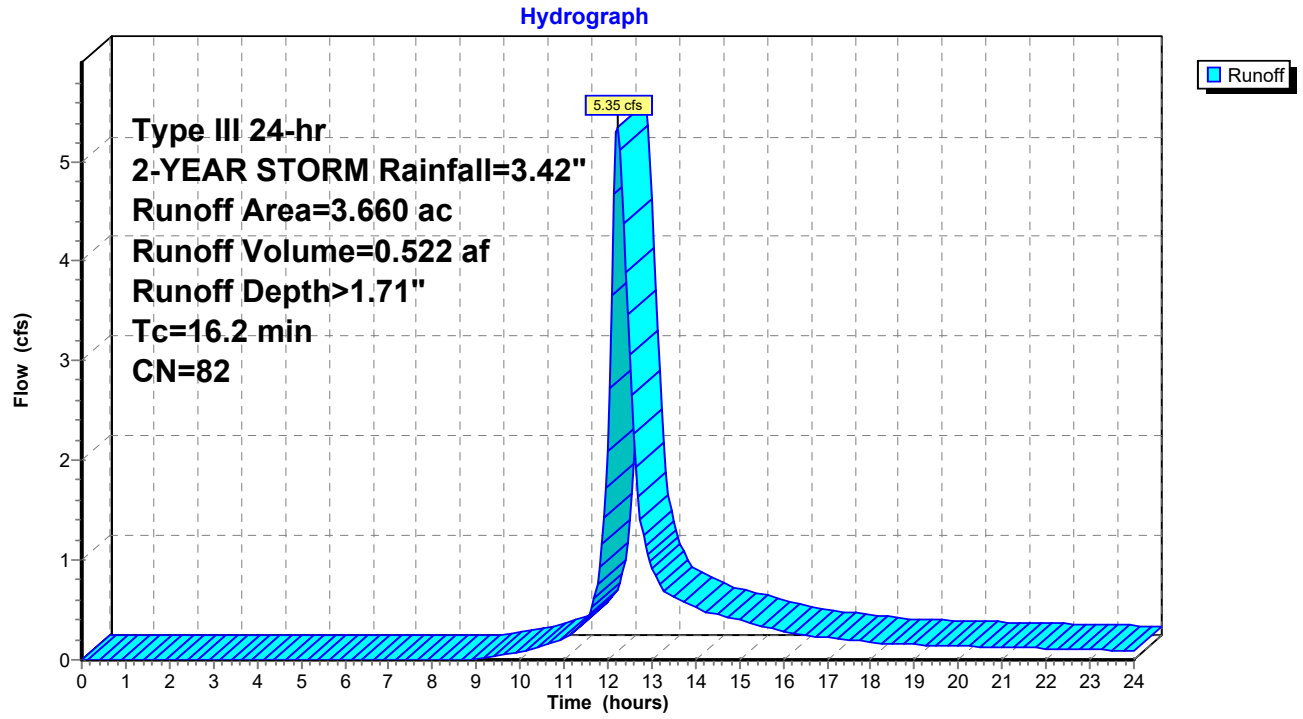
Runoff = 5.35 cfs @ 12.23 hrs, Volume= 0.522 af, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	3.660	82	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2					**Direct Entry, NRCS Part 630**

Subcatchment 2:



Summary for Subcatchment 4:

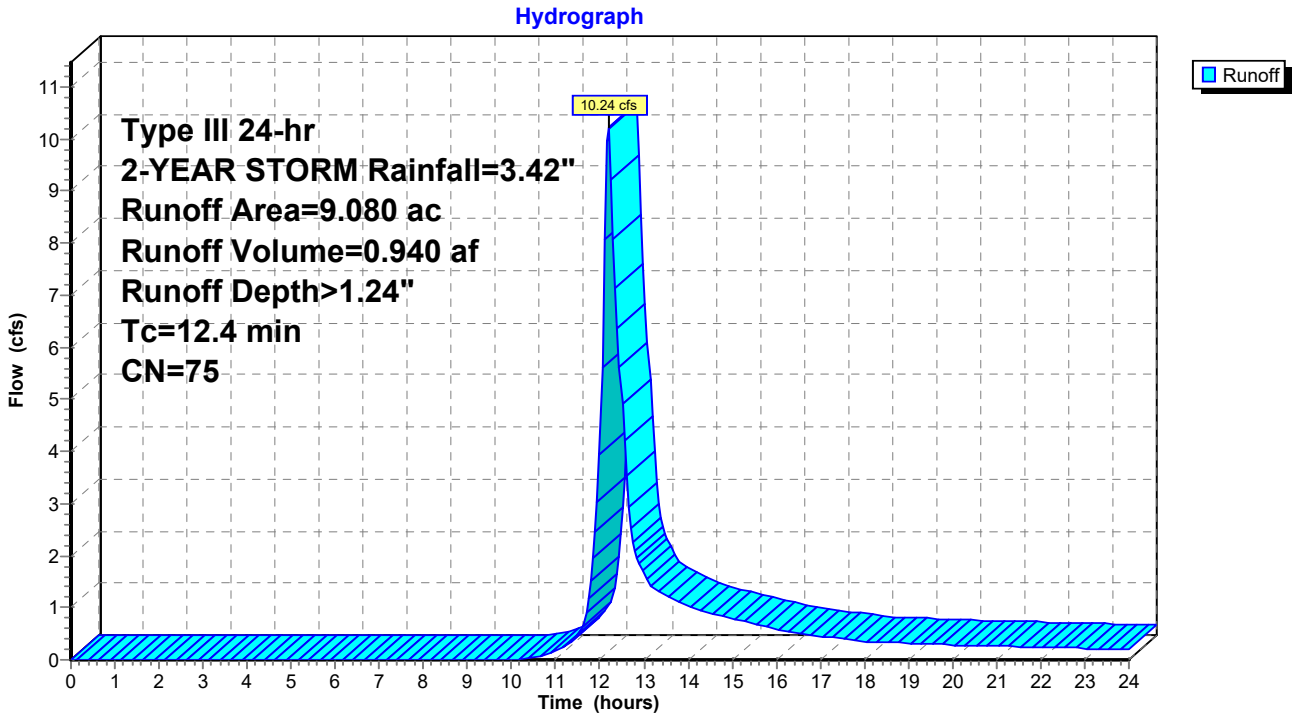
Runoff = 10.24 cfs @ 12.18 hrs, Volume= 0.940 af, Depth> 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	9.080	75	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4					**Direct Entry, NRCS Part 630**

Subcatchment 4:



Summary for Subcatchment 5:

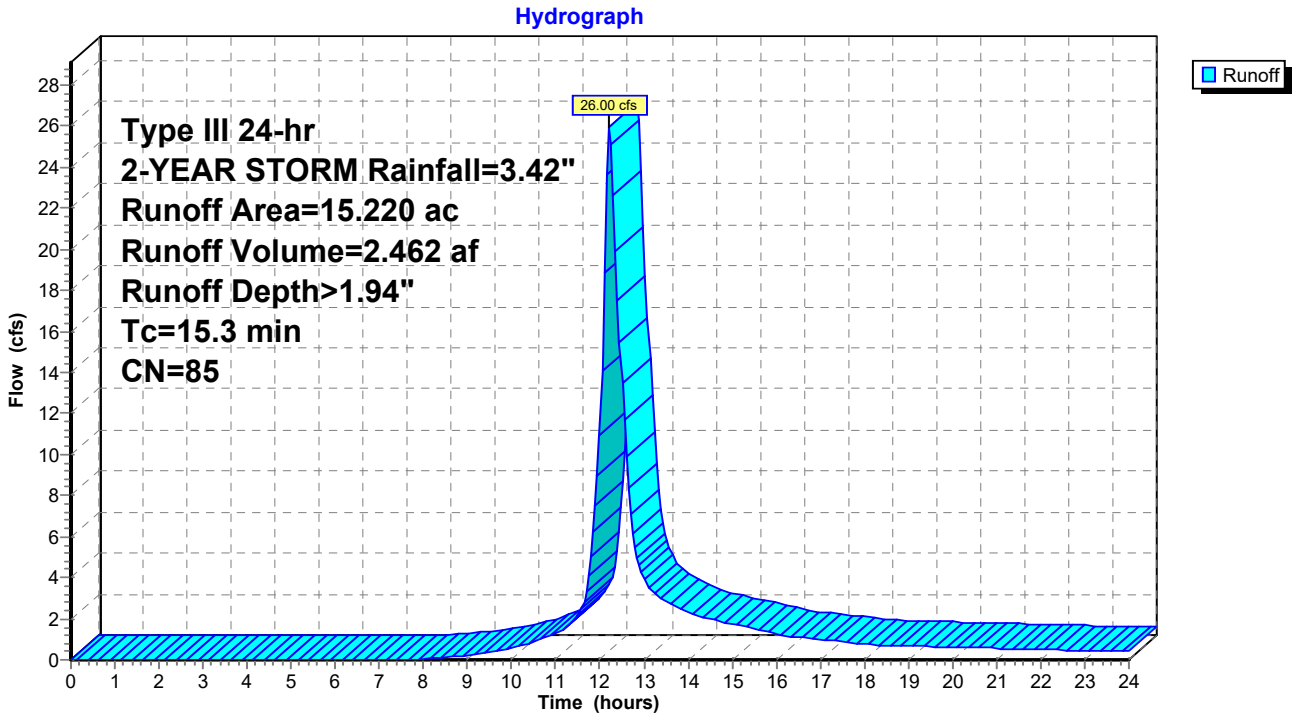
Runoff = 26.00 cfs @ 12.21 hrs, Volume= 2.462 af, Depth> 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.42"

	Area (ac)	CN	Description
*	15.220	85	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3					**Direct Entry, NRCS Part 630**

Subcatchment 5:



Summary for Pond 1A - Pond: 1A - Pond

Inflow Area = 4.190 ac, Inflow Depth > 1.37" for 2-YEAR STORM event
Inflow = 5.18 cfs @ 12.19 hrs, Volume= 0.477 af
Outflow = 0.83 cfs @ 13.01 hrs, Volume= 0.335 af, Atten= 84%, Lag= 48.7 min
Primary = 0.83 cfs @ 13.01 hrs, Volume= 0.335 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 126.93' @ 13.01 hrs Surf.Area= 4,377 sf Storage= 9,488 cf

Plug-Flow detention time= 199.6 min calculated for 0.335 af (70% of inflow)
Center-of-Mass det. time= 100.9 min (954.5 - 853.7)

Volume	Invert	Avail.Storage	Storage Description
#1	123.00'	37,272 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

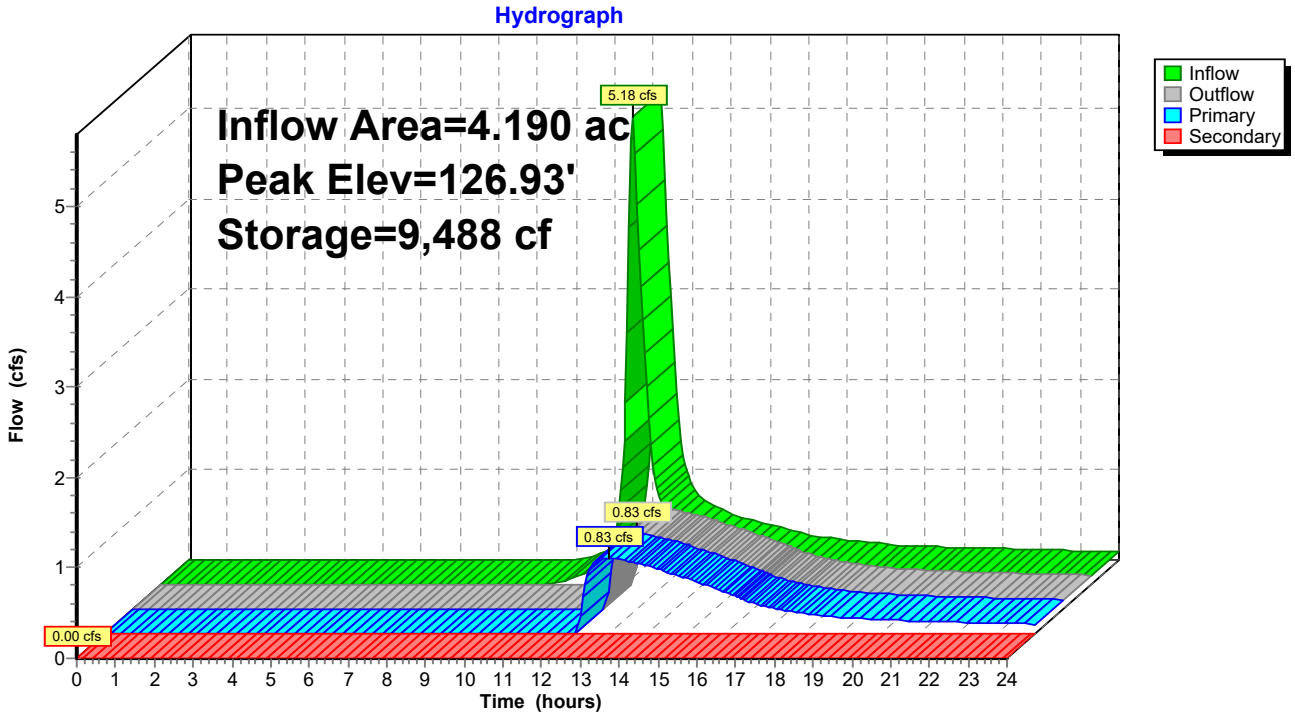
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
123.00	692	0	0
124.00	1,464	1,078	1,078
125.00	2,382	1,923	3,001
126.00	3,381	2,882	5,883
127.00	4,452	3,917	9,799
128.00	5,614	5,033	14,832
129.00	6,826	6,220	21,052
130.00	8,095	7,461	28,513
131.00	9,424	8,760	37,272

Device	Routing	Invert	Outlet Devices
#1	Secondary	130.90'	**20.0' long 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
#2	Primary	125.80'	**24.0" Round Culvert** L= 401.4' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 125.80' / 123.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	130.50'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 2	125.90'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.83 cfs @ 13.01 hrs HW=126.93' (Free Discharge)
└**2=Culvert** (Passes 0.83 cfs of 6.04 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.83 cfs @ 4.25 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=123.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A - Pond: 1A - Pond



Summary for Pond 1B - Pond: 1B - Pond

Inflow Area = 4.570 ac, Inflow Depth > 1.64" for 2-YEAR STORM event
Inflow = 6.05 cfs @ 12.26 hrs, Volume= 0.624 af
Outflow = 0.77 cfs @ 13.57 hrs, Volume= 0.414 af, Atten= 87%, Lag= 78.4 min
Primary = 0.77 cfs @ 13.57 hrs, Volume= 0.414 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 121.11' @ 13.57 hrs Surf.Area= 8,000 sf Storage= 14,279 cf

Plug-Flow detention time= 247.6 min calculated for 0.414 af (66% of inflow)
Center-of-Mass det. time= 145.9 min (991.6 - 845.7)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	83,261 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

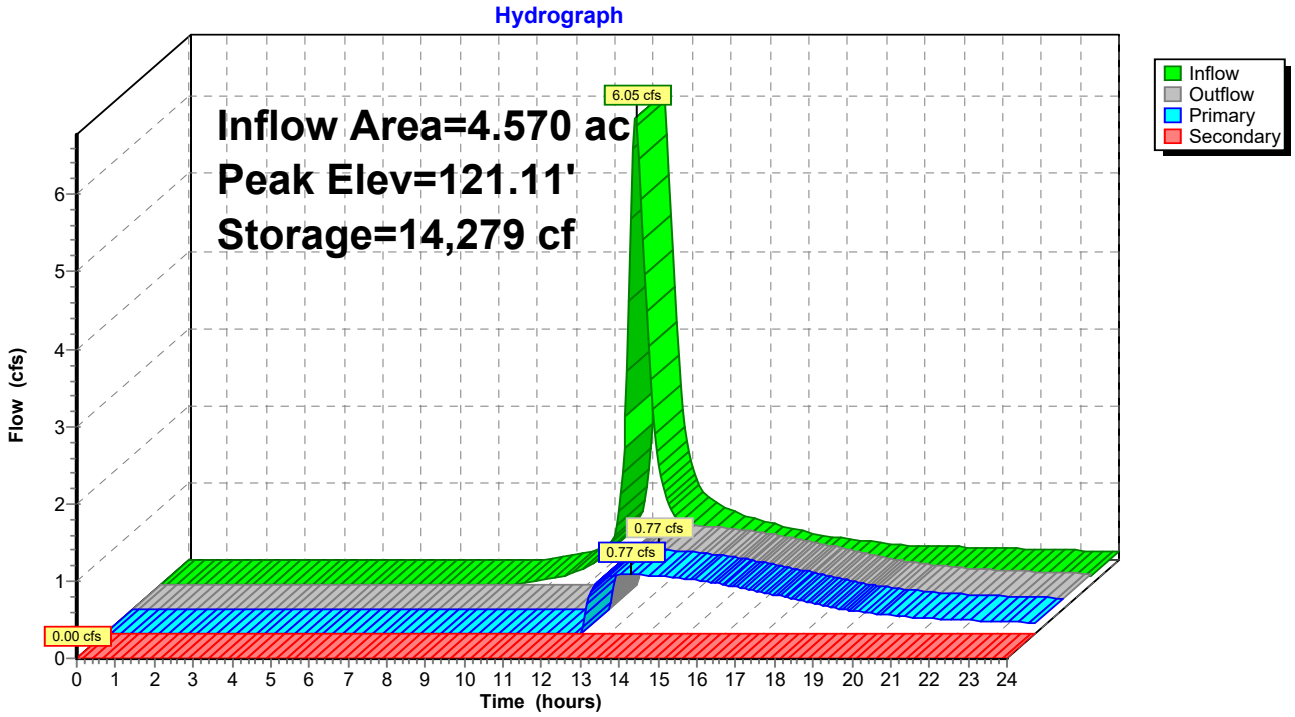
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.00	5,600	0	0
120.00	6,708	6,154	6,154
121.00	7,871	7,290	13,444
122.00	9,092	8,482	21,925
123.00	10,369	9,731	31,656
124.00	11,703	11,036	42,692
125.00	12,160	11,932	54,623
126.00	14,538	13,349	67,972
127.00	16,040	15,289	83,261

Device	Routing	Invert	Outlet Devices
#1	Primary	120.20'	**15.0" Round Culvert** L= 88.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 120.20' / 119.00' S= 0.0136 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	126.90'	**20.0' long 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
#3	Device 1	124.55'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	120.20'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.77 cfs @ 13.57 hrs HW=121.11' (Free Discharge)
└**1=Culvert** (Passes 0.77 cfs of 3.08 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.77 cfs @ 3.90 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B - Pond: 1B - Pond



Summary for Pond 1C-Pond: 1C - Pond

Inflow Area = 11.850 ac, Inflow Depth > 1.78" for 2-YEAR STORM event
Inflow = 16.97 cfs @ 12.27 hrs, Volume= 1.762 af
Outflow = 2.22 cfs @ 13.44 hrs, Volume= 1.141 af, Atten= 87%, Lag= 69.9 min
Primary = 2.22 cfs @ 13.44 hrs, Volume= 1.141 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 116.83' @ 13.44 hrs Surf.Area= 18,815 sf Storage= 41,248 cf

Plug-Flow detention time= 248.7 min calculated for 1.138 af (65% of inflow)
Center-of-Mass det. time= 147.1 min (987.0 - 839.8)

Volume	Invert	Avail.Storage	Storage Description
#1	114.00'	116,658 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

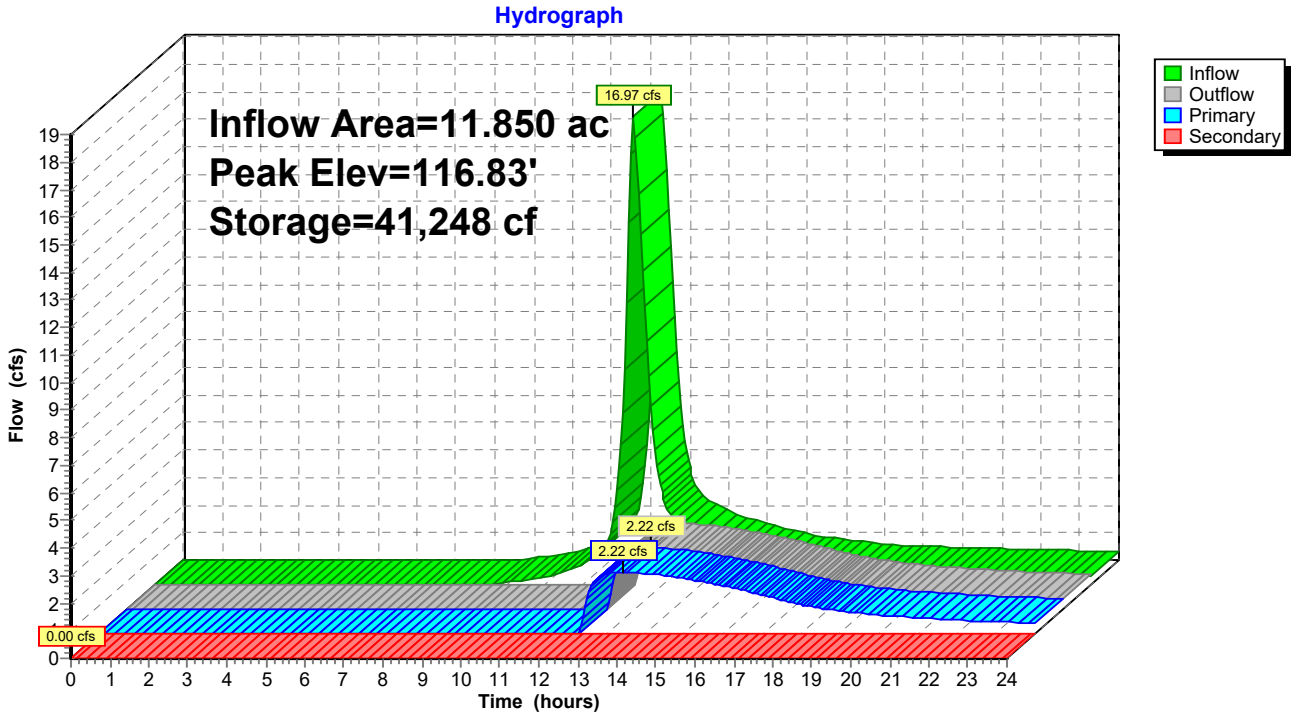
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	10,374	0	0
115.00	13,288	11,831	11,831
116.00	16,269	14,779	26,610
117.00	19,320	17,795	44,404
118.00	22,447	20,884	65,288
119.00	25,657	24,052	89,340
120.00	28,979	27,318	116,658

Device	Routing	Invert	Outlet Devices
#1	Primary	115.70'	**18.0" Round Culvert** L= 91.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 115.70' / 115.00' S= 0.0076 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	119.60'	**30.0' long x 8.0' 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 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	116.90'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	115.70'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.22 cfs @ 13.44 hrs HW=116.83' (Free Discharge)
└**1=Culvert** (Passes 2.22 cfs of 4.93 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 2.22 cfs @ 4.08 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=114.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1C-Pond: 1C - Pond



Summary for Pond 2 - Pond: 2 - Pond

Inflow Area = 3.660 ac, Inflow Depth > 1.71" for 2-YEAR STORM event
Inflow = 5.35 cfs @ 12.23 hrs, Volume= 0.522 af
Outflow = 0.34 cfs @ 15.53 hrs, Volume= 0.300 af, Atten= 94%, Lag= 198.2 min
Primary = 0.34 cfs @ 15.53 hrs, Volume= 0.300 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 172.68' @ 15.53 hrs Surf.Area= 5,398 sf Storage= 14,084 cf

Plug-Flow detention time= 346.7 min calculated for 0.300 af (57% of inflow)
Center-of-Mass det. time= 236.6 min (1,077.1 - 840.6)

Volume	Invert	Avail.Storage	Storage Description
#1	169.00'	29,377 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

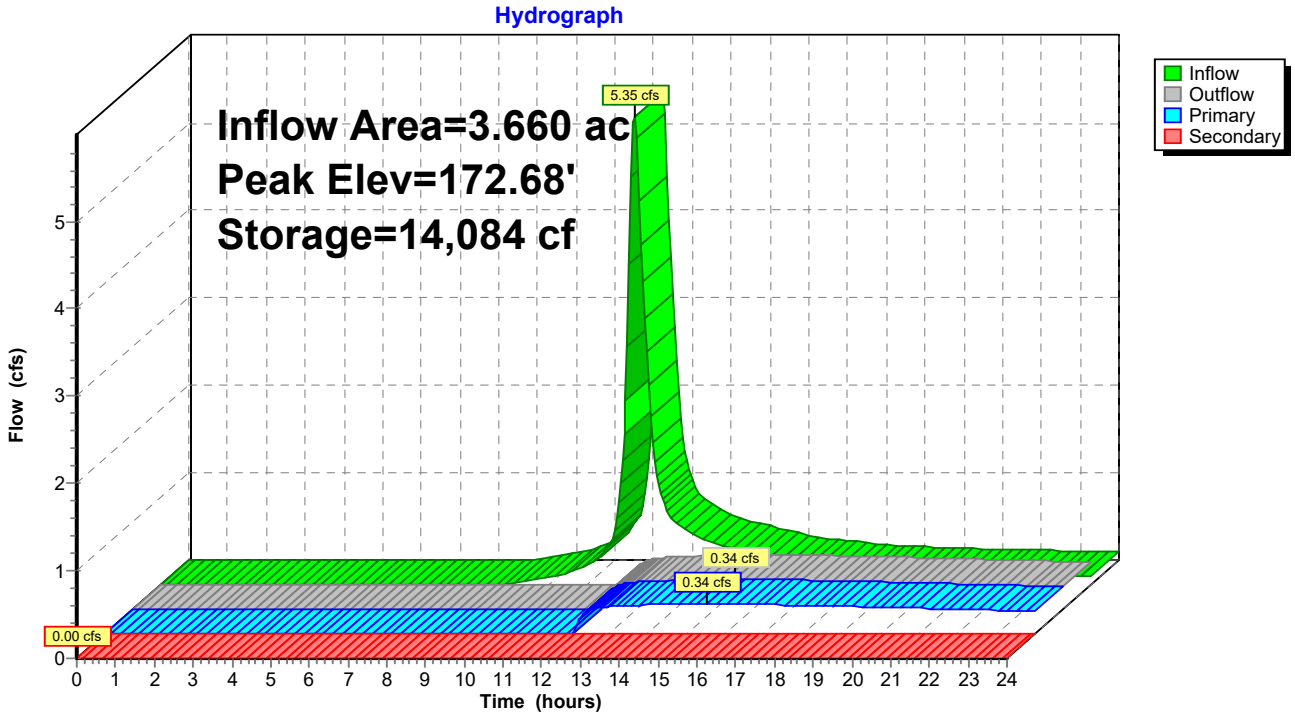
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.00	2,429	0	0
170.00	3,127	2,778	2,778
171.00	3,912	3,520	6,298
172.00	4,771	4,342	10,639
173.00	5,697	5,234	15,873
174.00	6,691	6,194	22,067
175.00	7,929	7,310	29,377

Device	Routing	Invert	Outlet Devices
#1	Device 2	172.70'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#2	Primary	170.50'	**12.0" Round Culvert** L= 42.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.50' / 170.00' S= 0.0119 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Secondary	174.60'	**30.0' long 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
#4	Device 2	170.50'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.34 cfs @ 15.53 hrs HW=172.68' (Free Discharge)
└**2=Culvert** (Passes 0.34 cfs of 4.90 cfs potential flow)
  ├**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.34 cfs @ 6.90 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=169.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2 - Pond: 2 - Pond



Summary for Pond 4 - Pond: 4 - Pond

Inflow Area = 9.080 ac, Inflow Depth > 1.24" for 2-YEAR STORM event
Inflow = 10.24 cfs @ 12.18 hrs, Volume= 0.940 af
Outflow = 0.34 cfs @ 18.17 hrs, Volume= 0.317 af, Atten= 97%, Lag= 358.9 min
Primary = 0.34 cfs @ 18.17 hrs, Volume= 0.317 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 123.22' @ 18.17 hrs Surf.Area= 11,199 sf Storage= 28,735 cf

Plug-Flow detention time= 374.4 min calculated for 0.317 af (34% of inflow)
Center-of-Mass det. time= 239.3 min (1,098.5 - 859.2)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	79,242 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

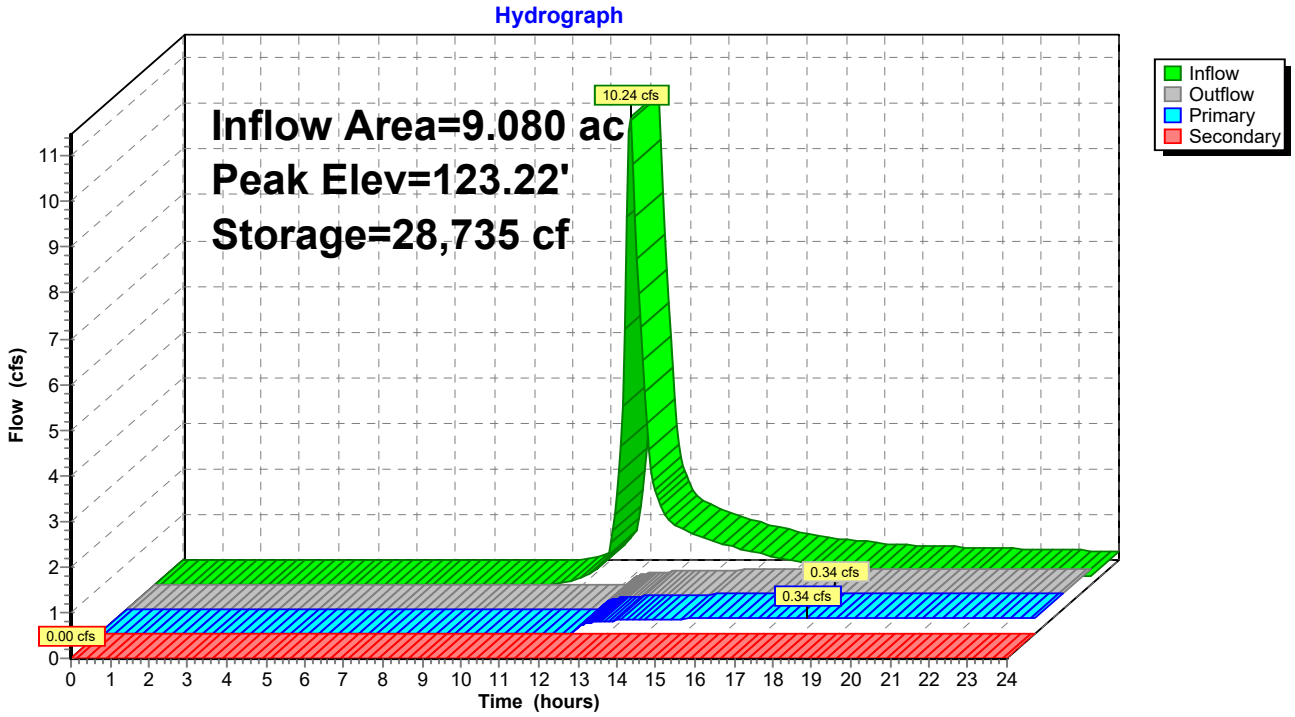
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	6,749	0	0
121.00	8,061	7,405	7,405
122.00	9,434	8,748	16,153
123.00	10,869	10,152	26,304
124.00	12,365	11,617	37,921
125.00	13,922	13,144	51,065
126.00	15,541	14,732	65,796
127.00	11,350	13,446	79,242

Device	Routing	Invert	Outlet Devices
#1	Primary	120.40'	**18.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 120.40' / 120.00' S= 0.0075 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	126.50'	**20.0' long 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
#3	Device 1	125.00'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	121.00'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.34 cfs @ 18.17 hrs HW=123.22' (Free Discharge)
└**1=Culvert** (Passes 0.34 cfs of 12.20 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.34 cfs @ 6.97 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=120.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4 - Pond: 4 - Pond



Summary for Pond 5 - Pond: 5 - Pond

Inflow Area = 15.220 ac, Inflow Depth > 1.94" for 2-YEAR STORM event
Inflow = 26.00 cfs @ 12.21 hrs, Volume= 2.462 af
Outflow = 3.15 cfs @ 13.26 hrs, Volume= 1.811 af, Atten= 88%, Lag= 63.1 min
Primary = 3.15 cfs @ 13.26 hrs, Volume= 1.811 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 123.16' @ 13.26 hrs Surf.Area= 21,433 sf Storage= 57,476 cf

Plug-Flow detention time= 247.9 min calculated for 1.811 af (74% of inflow)
Center-of-Mass det. time= 159.1 min (989.1 - 830.1)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	187,159 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

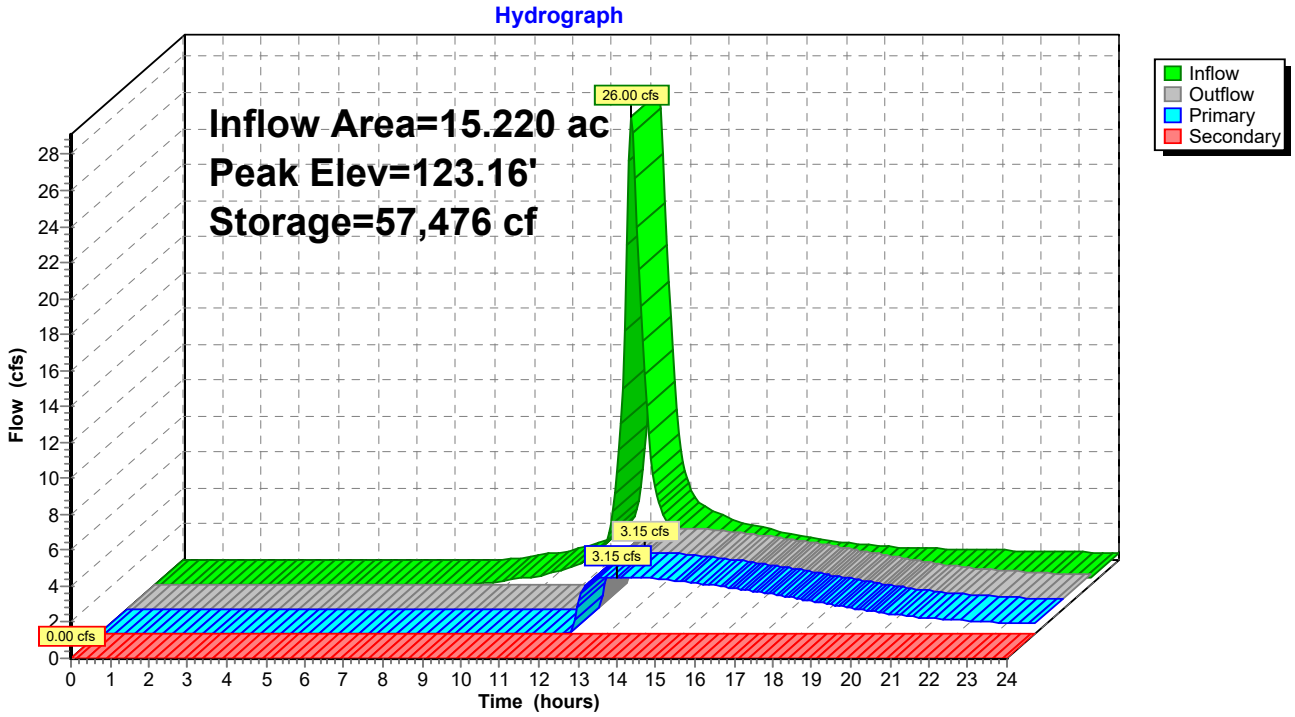
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	15,063	0	0
121.00	17,014	16,039	16,039
122.00	19,025	18,020	34,058
123.00	21,096	20,061	54,119
124.00	23,228	22,162	76,281
125.00	25,421	24,325	100,605
126.00	27,674	26,548	127,153
127.00	29,988	28,831	155,984
128.00	32,362	31,175	187,159

Device	Routing	Invert	Outlet Devices
#1	Device 2	123.50'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	121.30'	**24.0" Round Culvert** L= 81.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.30' / 115.25' S= 0.0742 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Secondary	127.90'	**30.0' long 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
#4	Device 2	121.30'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=3.15 cfs @ 13.26 hrs HW=123.16' (Free Discharge)
└**2=Culvert** (Passes 3.15 cfs of 14.12 cfs potential flow)
  ├**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 3.15 cfs @ 5.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=120.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5 - Pond: 5 - Pond



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: Runoff Area=4.190 ac Runoff Depth>2.68"
Tc=13.2 min CN=77 Runoff=10.38 cfs 0.937 af

Subcatchment1B: Runoff Area=4.570 ac Runoff Depth>3.05"
Tc=18.7 min CN=81 Runoff=11.32 cfs 1.160 af

Subcatchment1C: Runoff Area=11.850 ac Runoff Depth>3.24"
Tc=19.3 min CN=83 Runoff=30.71 cfs 3.195 af

Subcatchment2: Runoff Area=3.660 ac Runoff Depth>3.14"
Tc=16.2 min CN=82 Runoff=9.89 cfs 0.958 af

Subcatchment4: Runoff Area=9.080 ac Runoff Depth>2.51"
Tc=12.4 min CN=75 Runoff=21.38 cfs 1.898 af

Subcatchment5: Runoff Area=15.220 ac Runoff Depth>3.43"
Tc=15.3 min CN=85 Runoff=45.58 cfs 4.355 af

Pond 1A - Pond: 1A - Pond Peak Elev=128.80' Storage=19,701 cf Inflow=10.38 cfs 0.937 af
Primary=1.54 cfs 0.790 af Secondary=0.00 cfs 0.000 af Outflow=1.54 cfs 0.790 af

Pond 1B - Pond: 1B - Pond Peak Elev=122.58' Storage=27,461 cf Inflow=11.32 cfs 1.160 af
Primary=1.38 cfs 0.929 af Secondary=0.00 cfs 0.000 af Outflow=1.38 cfs 0.929 af

Pond 1C-Pond: 1C - Pond Peak Elev=117.94' Storage=63,859 cf Inflow=30.71 cfs 3.195 af
Primary=9.93 cfs 2.537 af Secondary=0.00 cfs 0.000 af Outflow=9.93 cfs 2.537 af

Pond 2 - Pond: 2 - Pond Peak Elev=173.29' Storage=17,550 cf Inflow=9.89 cfs 0.958 af
Primary=5.24 cfs 0.690 af Secondary=0.00 cfs 0.000 af Outflow=5.24 cfs 0.690 af

Pond 4 - Pond: 4 - Pond Peak Elev=125.21' Storage=54,059 cf Inflow=21.38 cfs 1.898 af
Primary=1.49 cfs 0.739 af Secondary=0.00 cfs 0.000 af Outflow=1.49 cfs 0.739 af

Pond 5 - Pond: 5 - Pond Peak Elev=124.71' Storage=93,318 cf Inflow=45.58 cfs 4.355 af
Primary=12.19 cfs 3.635 af Secondary=0.00 cfs 0.000 af Outflow=12.19 cfs 3.635 af

Total Runoff Area = 48.570 ac Runoff Volume = 12.503 af Average Runoff Depth = 3.09"

Summary for Subcatchment 1A:

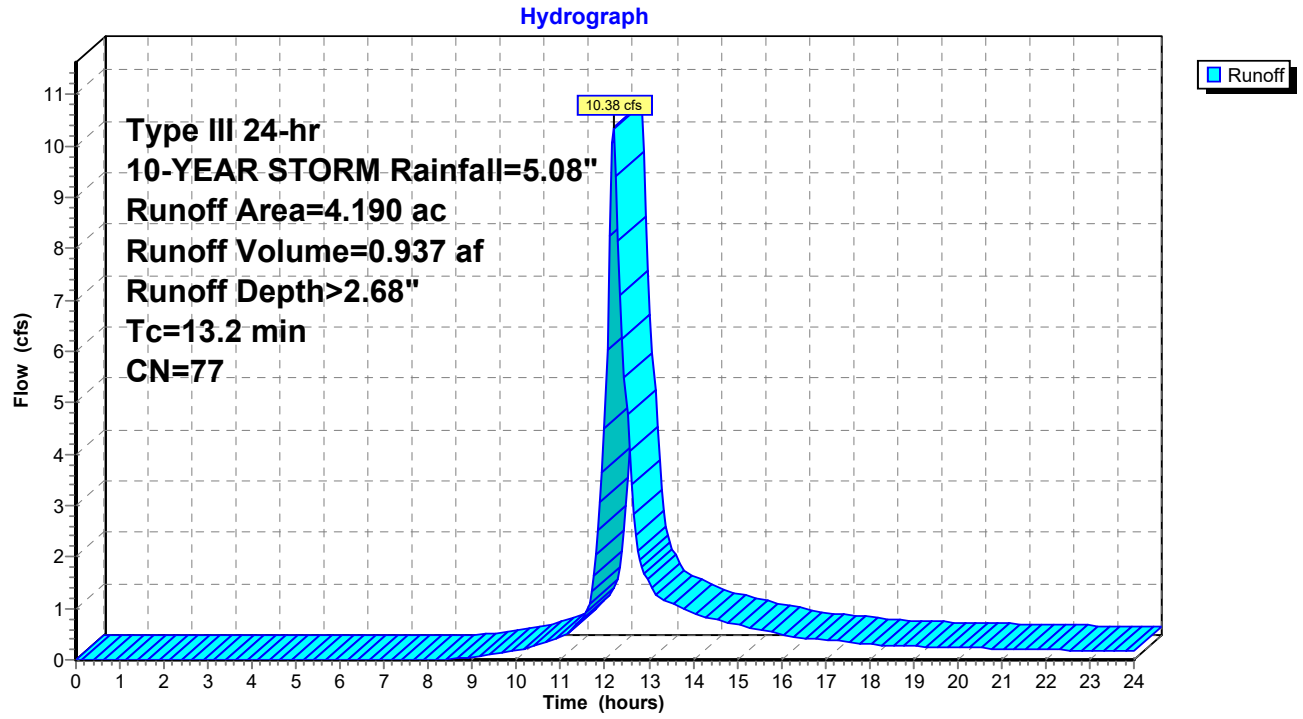
Runoff = 10.38 cfs @ 12.19 hrs, Volume= 0.937 af, Depth> 2.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	4.190	77	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2					**Direct Entry, NRCS Part 630**

Subcatchment 1A:



Summary for Subcatchment 1B:

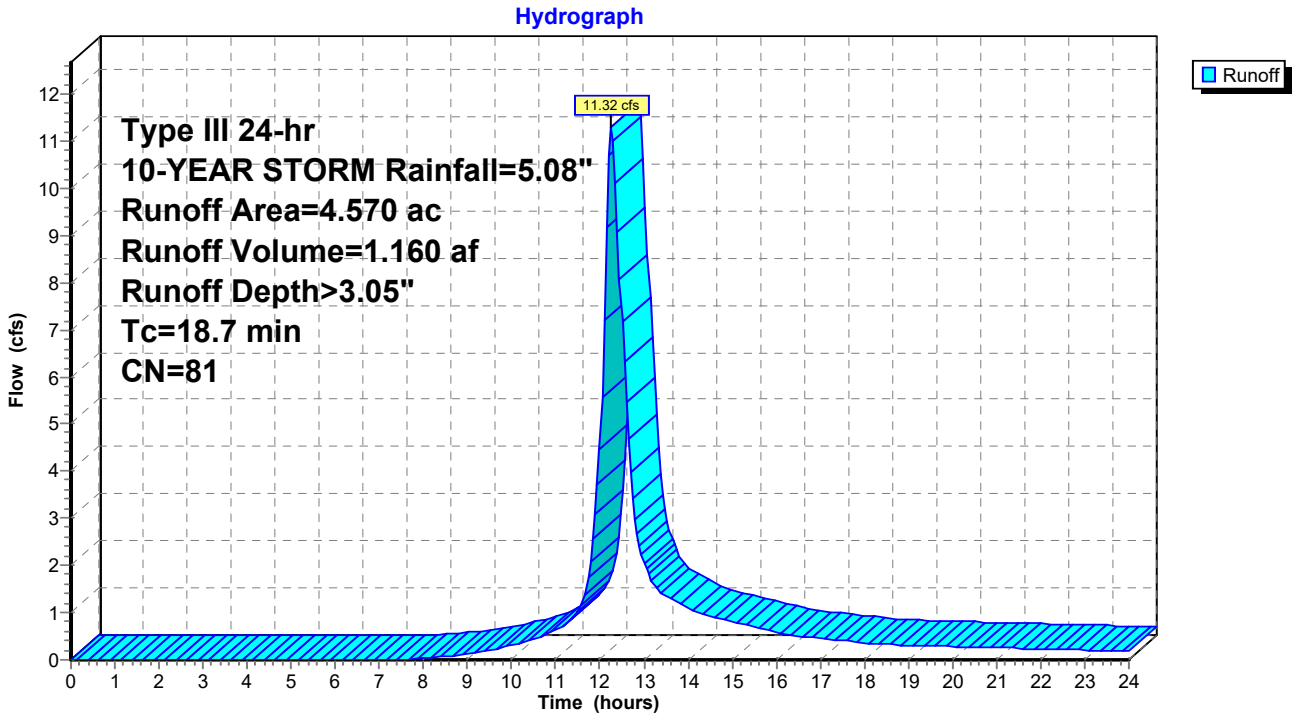
Runoff = 11.32 cfs @ 12.26 hrs, Volume= 1.160 af, Depth> 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	4.570	81	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					**Direct Entry, NRCS Part 630**

Subcatchment 1B:



Summary for Subcatchment 1C:

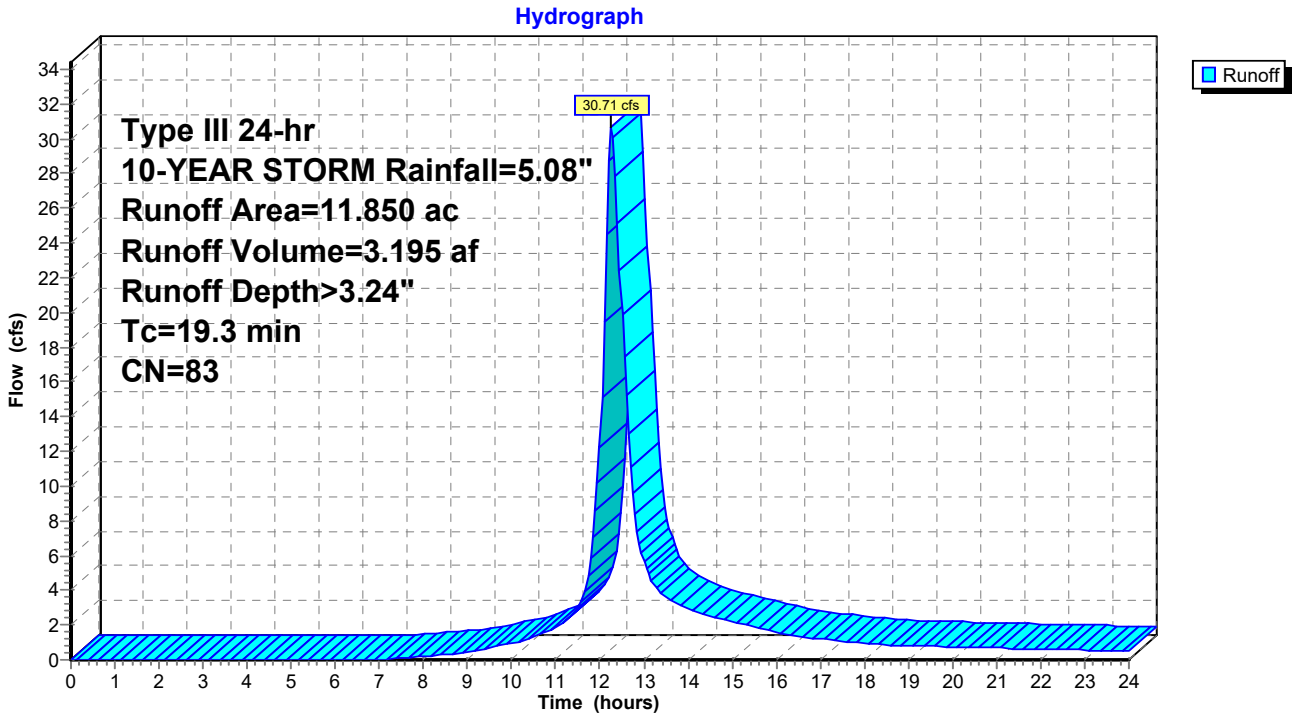
Runoff = 30.71 cfs @ 12.26 hrs, Volume= 3.195 af, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	11.850	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3					**Direct Entry, NRCS Part 630**

Subcatchment 1C:



Summary for Subcatchment 2:

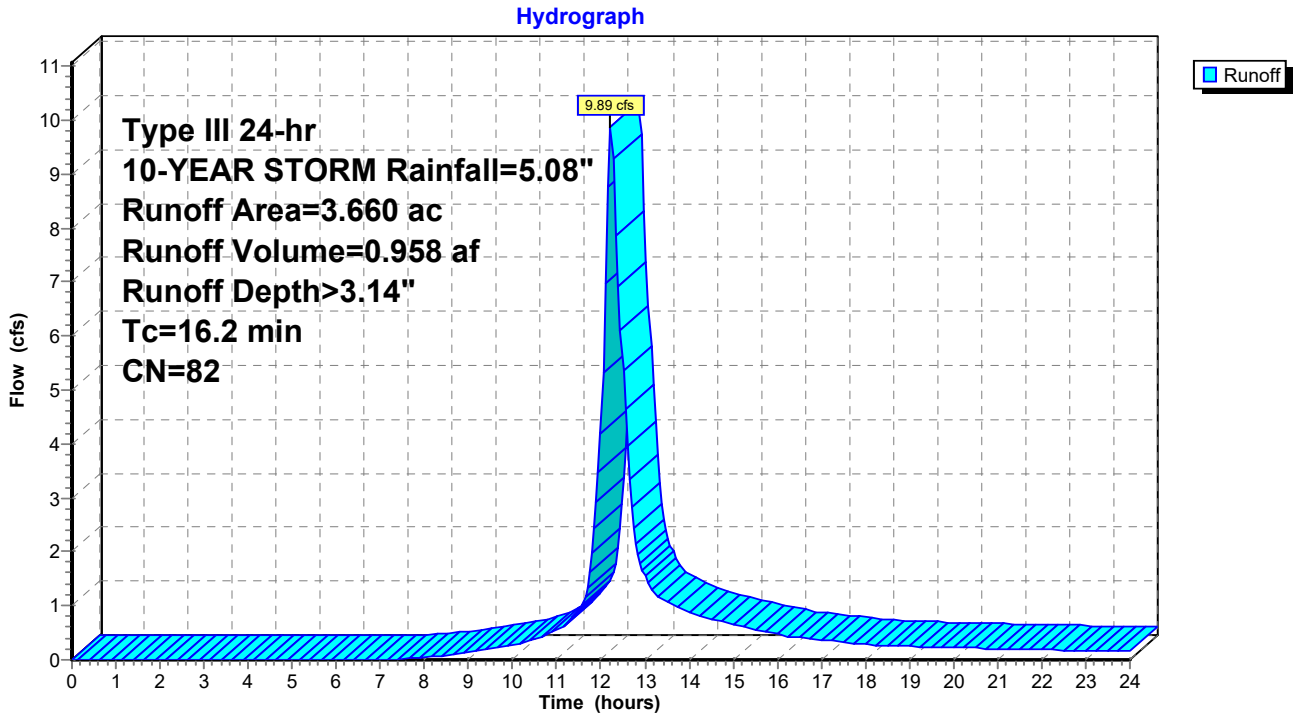
Runoff = 9.89 cfs @ 12.22 hrs, Volume= 0.958 af, Depth> 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	3.660	82	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2					**Direct Entry, NRCS Part 630**

Subcatchment 2:



Summary for Subcatchment 4:

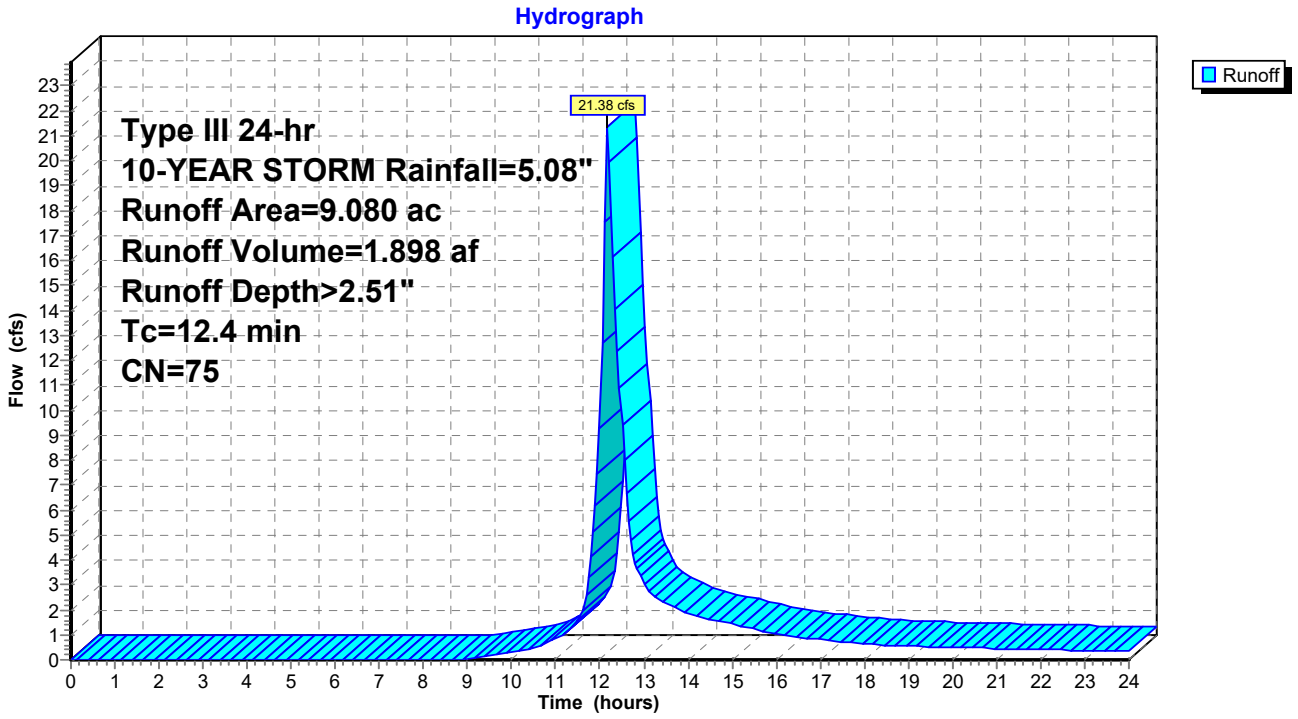
Runoff = 21.38 cfs @ 12.18 hrs, Volume= 1.898 af, Depth> 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	9.080	75	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4					**Direct Entry, NRCS Part 630**

Subcatchment 4:



Summary for Subcatchment 5:

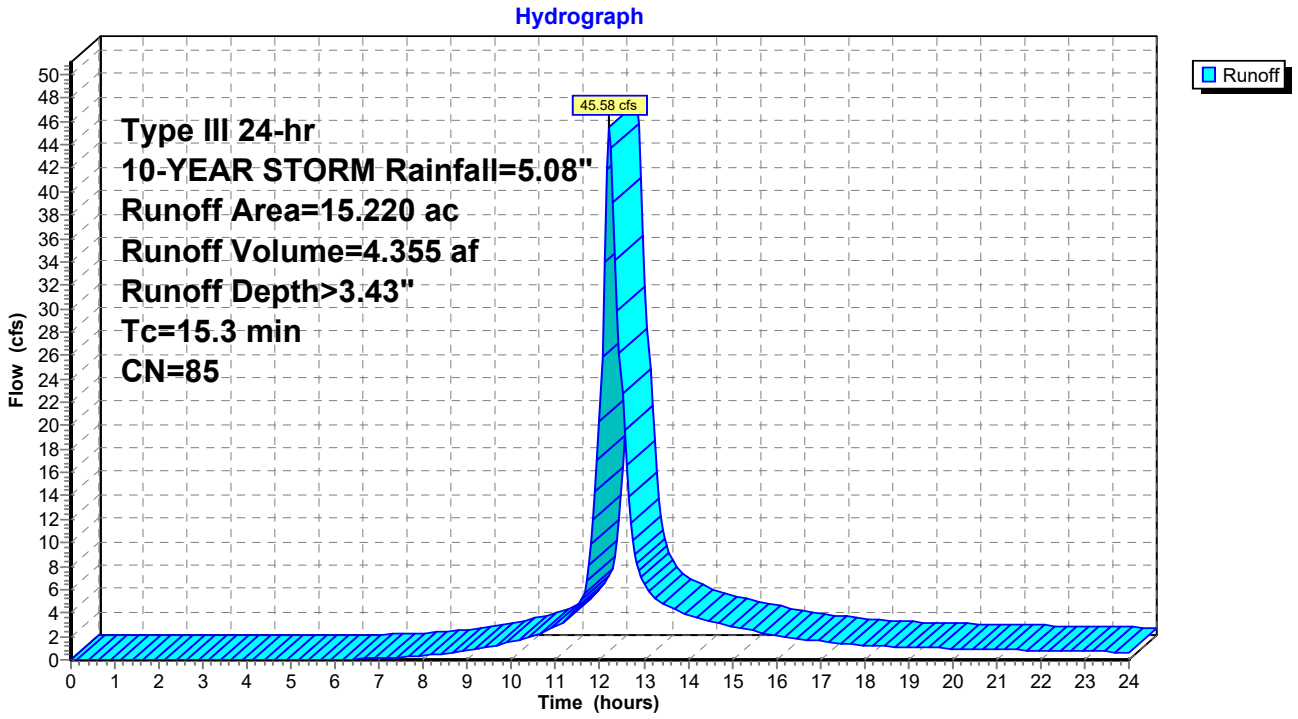
Runoff = 45.58 cfs @ 12.21 hrs, Volume= 4.355 af, Depth> 3.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=5.08"

	Area (ac)	CN	Description
*	15.220	85	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3					**Direct Entry, NRCS Part 630**

Subcatchment 5:



Summary for Pond 1A - Pond: 1A - Pond

Inflow Area = 4.190 ac, Inflow Depth > 2.68" for 10-YEAR STORM event
Inflow = 10.38 cfs @ 12.19 hrs, Volume= 0.937 af
Outflow = 1.54 cfs @ 12.98 hrs, Volume= 0.790 af, Atten= 85%, Lag= 47.8 min
Primary = 1.54 cfs @ 12.98 hrs, Volume= 0.790 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 128.80' @ 12.98 hrs Surf.Area= 6,582 sf Storage= 19,701 cf

Plug-Flow detention time= 188.7 min calculated for 0.788 af (84% of inflow)
Center-of-Mass det. time= 123.1 min (957.3 - 834.2)

Volume	Invert	Avail.Storage	Storage Description
#1	123.00'	37,272 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

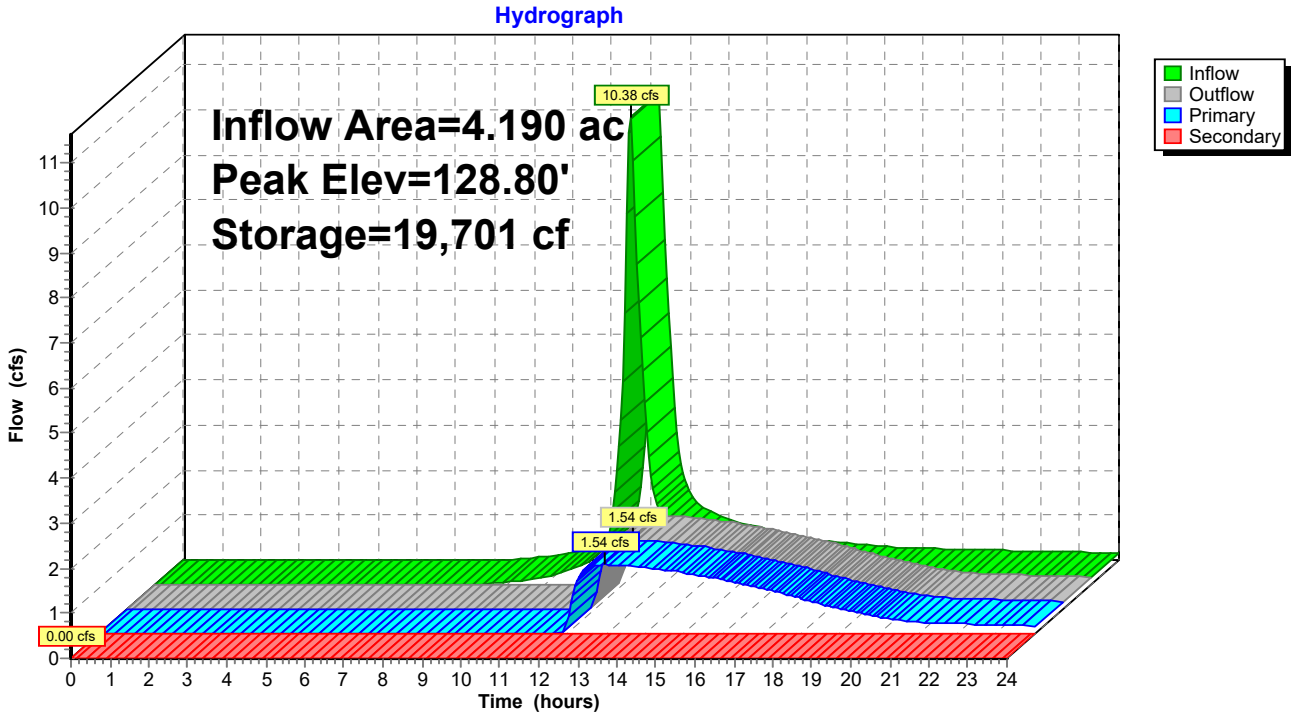
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
123.00	692	0	0
124.00	1,464	1,078	1,078
125.00	2,382	1,923	3,001
126.00	3,381	2,882	5,883
127.00	4,452	3,917	9,799
128.00	5,614	5,033	14,832
129.00	6,826	6,220	21,052
130.00	8,095	7,461	28,513
131.00	9,424	8,760	37,272

Device	Routing	Invert	Outlet Devices
#1	Secondary	130.90'	**20.0' long 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
#2	Primary	125.80'	**24.0" Round Culvert** L= 401.4' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 125.80' / 123.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	130.50'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 2	125.90'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.54 cfs @ 12.98 hrs HW=128.80' (Free Discharge)
└**2=Culvert** (Passes 1.54 cfs of 18.19 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 1.54 cfs @ 7.84 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=123.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A - Pond: 1A - Pond



Summary for Pond 1B - Pond: 1B - Pond

Inflow Area = 4.570 ac, Inflow Depth > 3.05" for 10-YEAR STORM event
Inflow = 11.32 cfs @ 12.26 hrs, Volume= 1.160 af
Outflow = 1.38 cfs @ 13.43 hrs, Volume= 0.929 af, Atten= 88%, Lag= 70.2 min
Primary = 1.38 cfs @ 13.43 hrs, Volume= 0.929 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 122.58' @ 13.43 hrs Surf.Area= 9,839 sf Storage= 27,461 cf

Plug-Flow detention time= 261.1 min calculated for 0.929 af (80% of inflow)
Center-of-Mass det. time= 185.9 min (1,014.0 - 828.1)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	83,261 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

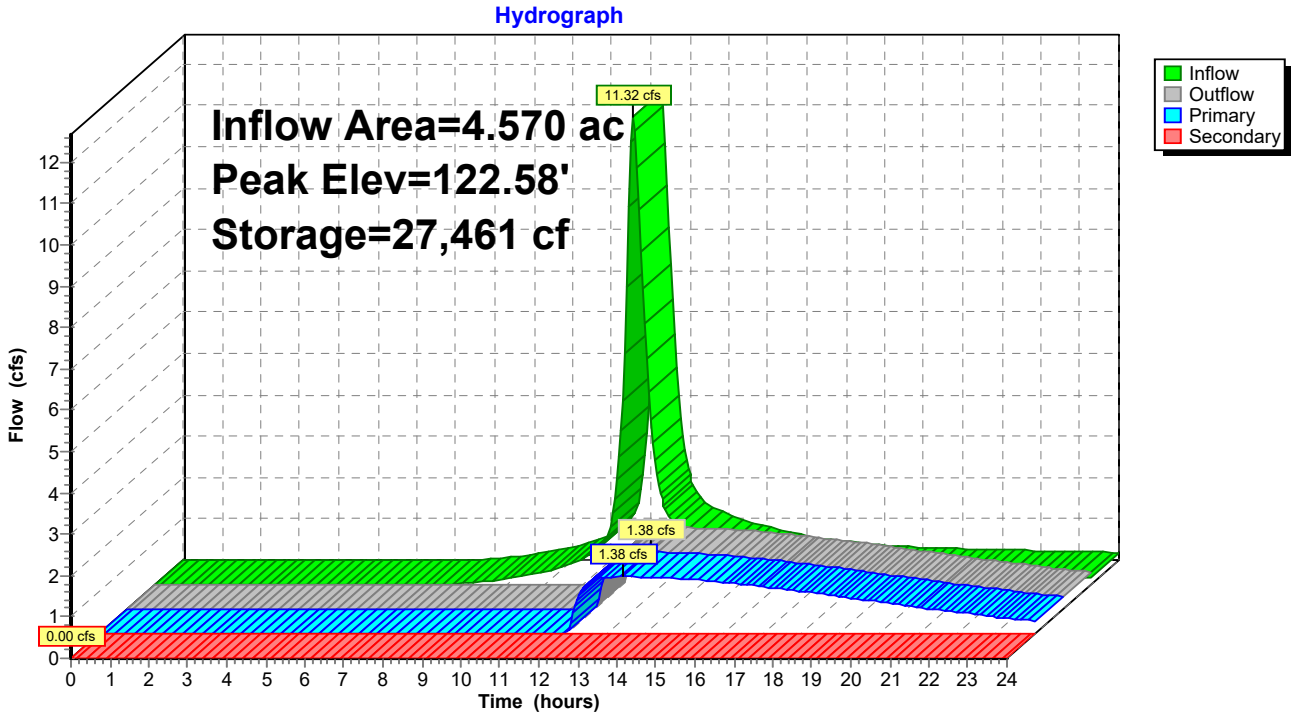
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.00	5,600	0	0
120.00	6,708	6,154	6,154
121.00	7,871	7,290	13,444
122.00	9,092	8,482	21,925
123.00	10,369	9,731	31,656
124.00	11,703	11,036	42,692
125.00	12,160	11,932	54,623
126.00	14,538	13,349	67,972
127.00	16,040	15,289	83,261

Device	Routing	Invert	Outlet Devices
#1	Primary	120.20'	**15.0" Round Culvert** L= 88.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 120.20' / 119.00' S= 0.0136 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	126.90'	**20.0' long 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
#3	Device 1	124.55'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	120.20'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.38 cfs @ 13.43 hrs HW=122.58' (Free Discharge)
└**1=Culvert** (Passes 1.38 cfs of 7.84 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 1.38 cfs @ 7.04 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B - Pond: 1B - Pond



Summary for Pond 1C-Pond: 1C - Pond

Inflow Area = 11.850 ac, Inflow Depth > 3.24" for 10-YEAR STORM event
Inflow = 30.71 cfs @ 12.26 hrs, Volume= 3.195 af
Outflow = 9.93 cfs @ 12.74 hrs, Volume= 2.537 af, Atten= 68%, Lag= 28.6 min
Primary = 9.93 cfs @ 12.74 hrs, Volume= 2.537 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 117.94' @ 12.74 hrs Surf.Area= 22,247 sf Storage= 63,859 cf

Plug-Flow detention time= 180.1 min calculated for 2.537 af (79% of inflow)
Center-of-Mass det. time= 104.0 min (927.0 - 823.0)

Volume	Invert	Avail.Storage	Storage Description
#1	114.00'	116,658 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

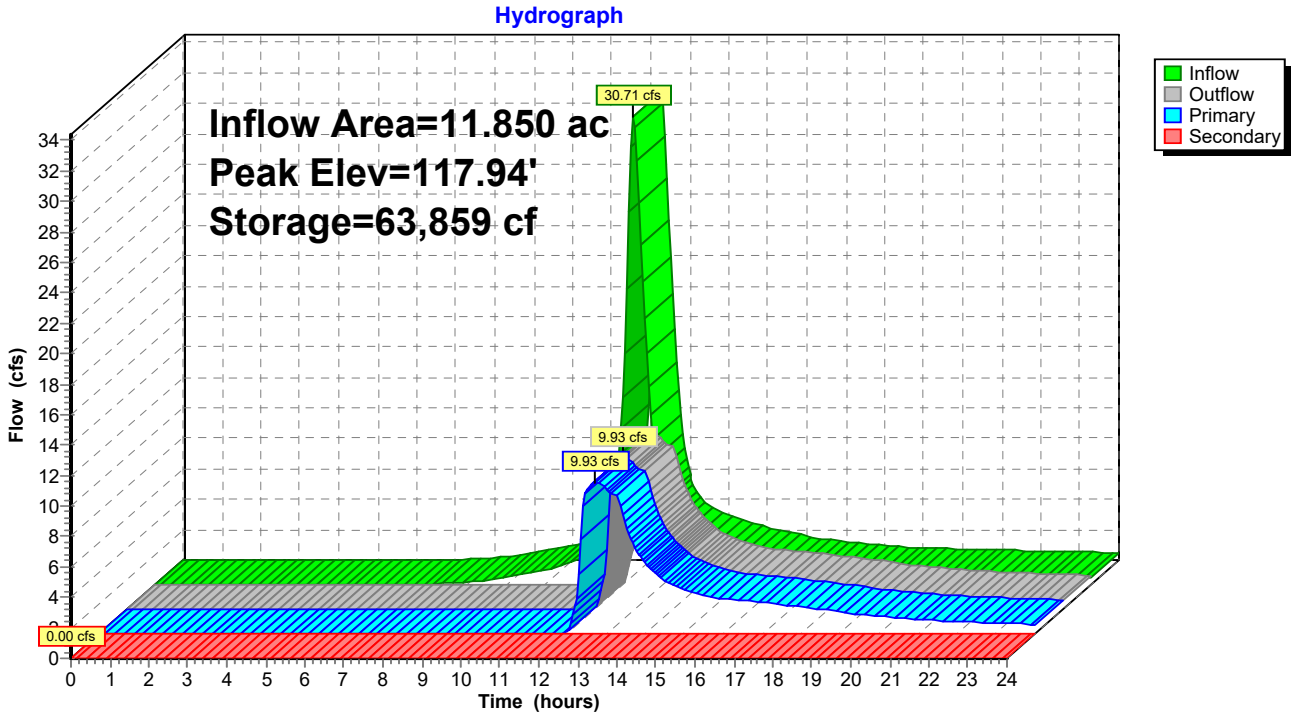
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	10,374	0	0
115.00	13,288	11,831	11,831
116.00	16,269	14,779	26,610
117.00	19,320	17,795	44,404
118.00	22,447	20,884	65,288
119.00	25,657	24,052	89,340
120.00	28,979	27,318	116,658

Device	Routing	Invert	Outlet Devices
#1	Primary	115.70'	**18.0" Round Culvert** L= 91.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 115.70' / 115.00' S= 0.0076 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	119.60'	**30.0' long x 8.0' 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 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	116.90'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	115.70'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=9.93 cfs @ 12.74 hrs HW=117.94' (Free Discharge)
└**1=Culvert** (Barrel Controls 9.93 cfs @ 5.62 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Passes < 12.06 cfs potential flow)
  └**4=Orifice/Grate** (Passes < 3.54 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=114.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1C-Pond: 1C - Pond



Summary for Pond 2 - Pond: 2 - Pond

Inflow Area = 3.660 ac, Inflow Depth > 3.14" for 10-YEAR STORM event
Inflow = 9.89 cfs @ 12.22 hrs, Volume= 0.958 af
Outflow = 5.24 cfs @ 12.51 hrs, Volume= 0.690 af, Atten= 47%, Lag= 17.5 min
Primary = 5.24 cfs @ 12.51 hrs, Volume= 0.690 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 173.29' @ 12.51 hrs Surf.Area= 5,982 sf Storage= 17,550 cf

Plug-Flow detention time= 197.6 min calculated for 0.690 af (72% of inflow)
Center-of-Mass det. time= 107.6 min (930.9 - 823.3)

Volume	Invert	Avail.Storage	Storage Description
#1	169.00'	29,377 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

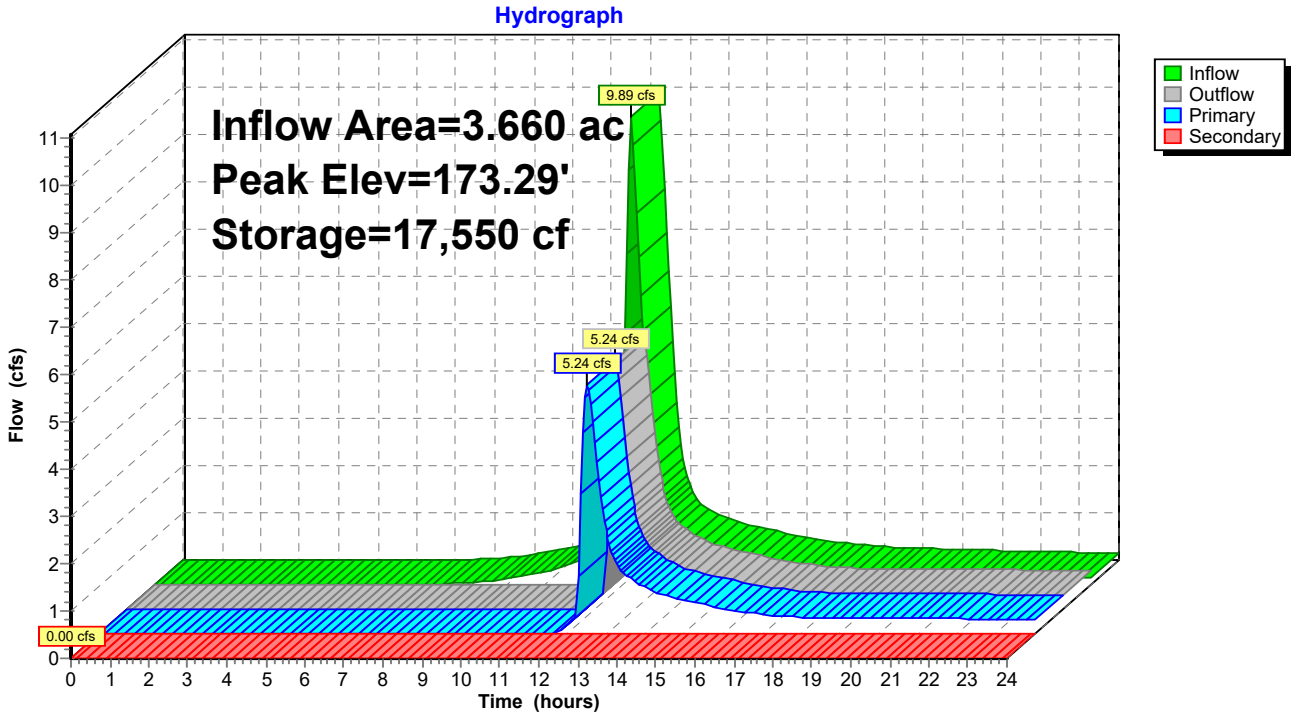
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.00	2,429	0	0
170.00	3,127	2,778	2,778
171.00	3,912	3,520	6,298
172.00	4,771	4,342	10,639
173.00	5,697	5,234	15,873
174.00	6,691	6,194	22,067
175.00	7,929	7,310	29,377

Device	Routing	Invert	Outlet Devices
#1	Device 2	172.70'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#2	Primary	170.50'	**12.0" Round Culvert** L= 42.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.50' / 170.00' S= 0.0119 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Secondary	174.60'	**30.0' long 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
#4	Device 2	170.50'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=5.20 cfs @ 12.51 hrs HW=173.28' (Free Discharge)
└**2=Culvert** (Passes 5.20 cfs of 5.72 cfs potential flow)
  ├**1=Sharp-Crested Rectangular Weir** (Weir Controls 4.82 cfs @ 2.86 fps)
  └**4=Orifice/Grate** (Orifice Controls 0.39 cfs @ 7.85 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=169.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2 - Pond: 2 - Pond



Summary for Pond 4 - Pond: 4 - Pond

Inflow Area = 9.080 ac, Inflow Depth > 2.51" for 10-YEAR STORM event
Inflow = 21.38 cfs @ 12.18 hrs, Volume= 1.898 af
Outflow = 1.49 cfs @ 14.84 hrs, Volume= 0.739 af, Atten= 93%, Lag= 160.0 min
Primary = 1.49 cfs @ 14.84 hrs, Volume= 0.739 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 125.21' @ 14.84 hrs Surf.Area= 14,266 sf Storage= 54,059 cf

Plug-Flow detention time= 324.9 min calculated for 0.737 af (39% of inflow)
Center-of-Mass det. time= 201.5 min (1,040.1 - 838.6)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	79,242 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

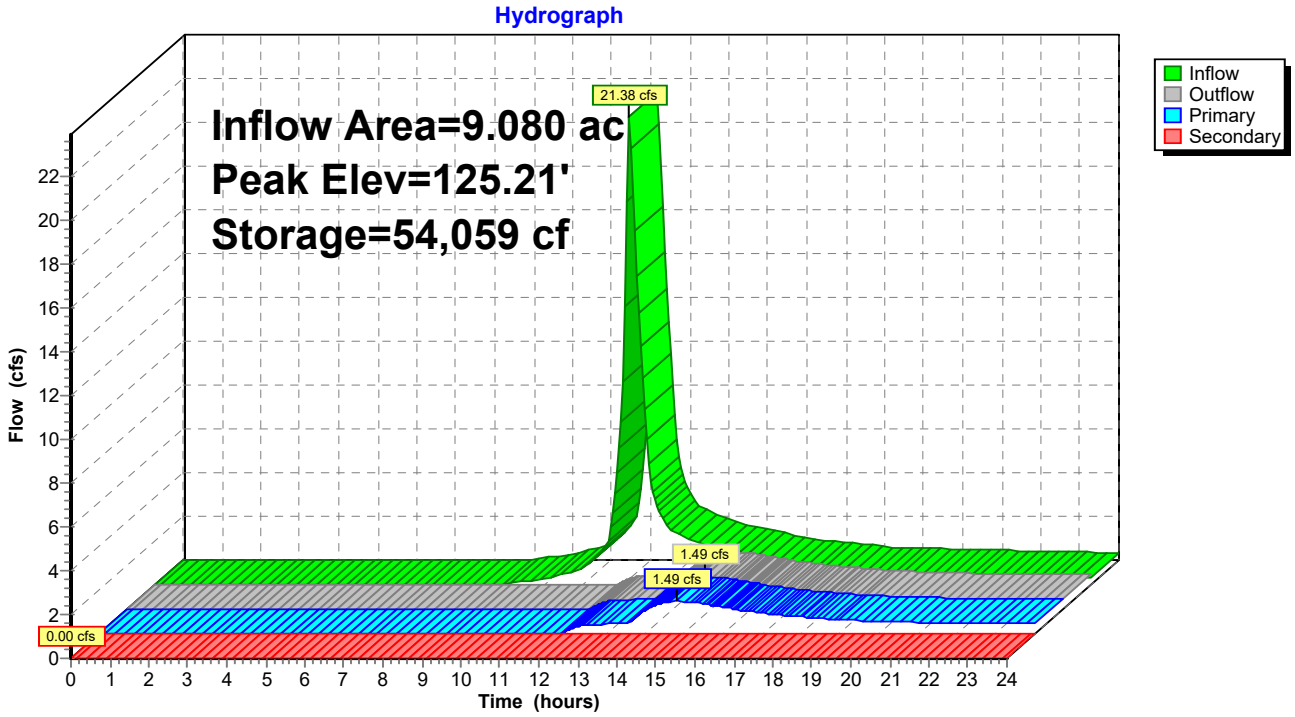
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	6,749	0	0
121.00	8,061	7,405	7,405
122.00	9,434	8,748	16,153
123.00	10,869	10,152	26,304
124.00	12,365	11,617	37,921
125.00	13,922	13,144	51,065
126.00	15,541	14,732	65,796
127.00	11,350	13,446	79,242

Device	Routing	Invert	Outlet Devices
#1	Primary	120.40'	**18.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 120.40' / 120.00' S= 0.0075 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	126.50'	**20.0' long 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
#3	Device 1	125.00'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	121.00'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.47 cfs @ 14.84 hrs HW=125.21' (Free Discharge)
└**1=Culvert** (Passes 1.47 cfs of 17.15 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 1.00 cfs @ 1.59 fps)
  └**4=Orifice/Grate** (Orifice Controls 0.48 cfs @ 9.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=120.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4 - Pond: 4 - Pond



Summary for Pond 5 - Pond: 5 - Pond

Inflow Area = 15.220 ac, Inflow Depth > 3.43" for 10-YEAR STORM event
Inflow = 45.58 cfs @ 12.21 hrs, Volume= 4.355 af
Outflow = 12.19 cfs @ 12.69 hrs, Volume= 3.635 af, Atten= 73%, Lag= 29.0 min
Primary = 12.19 cfs @ 12.69 hrs, Volume= 3.635 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 124.71' @ 12.69 hrs Surf.Area= 24,784 sf Storage= 93,318 cf

Plug-Flow detention time= 206.7 min calculated for 3.628 af (83% of inflow)
Center-of-Mass det. time= 140.6 min (954.5 - 814.0)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	187,159 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

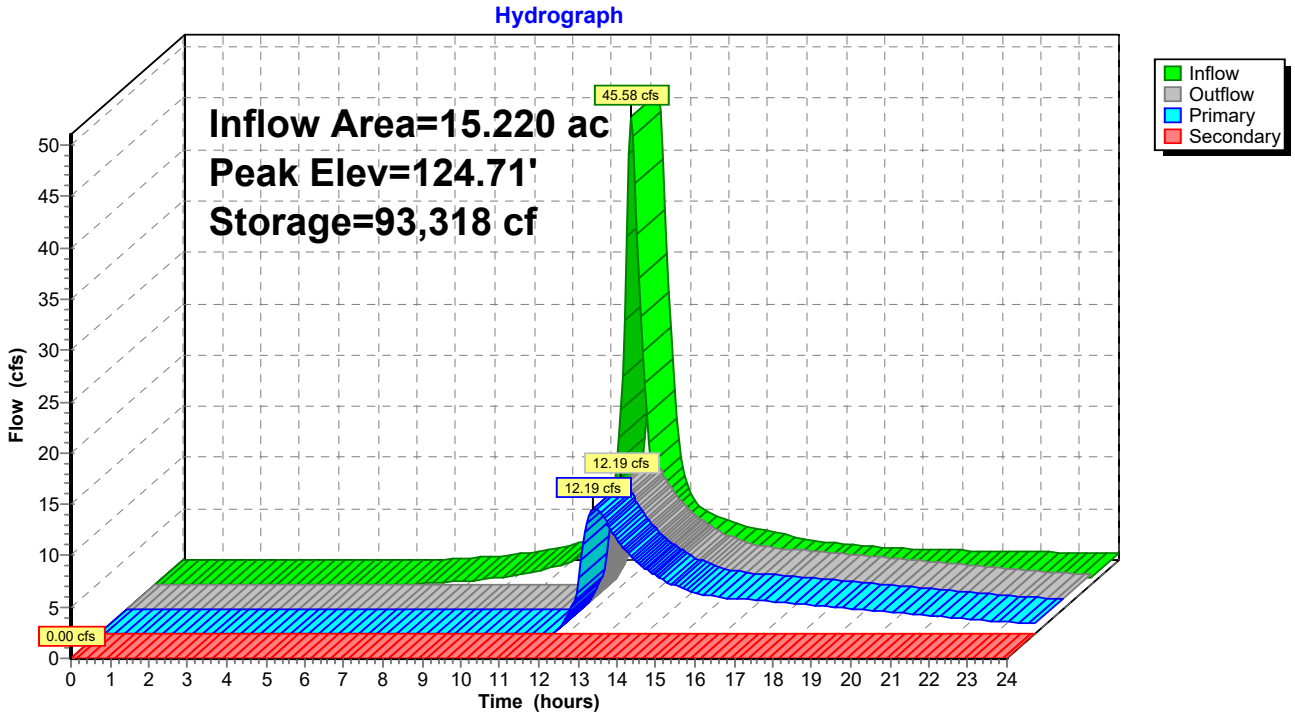
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	15,063	0	0
121.00	17,014	16,039	16,039
122.00	19,025	18,020	34,058
123.00	21,096	20,061	54,119
124.00	23,228	22,162	76,281
125.00	25,421	24,325	100,605
126.00	27,674	26,548	127,153
127.00	29,988	28,831	155,984
128.00	32,362	31,175	187,159

Device	Routing	Invert	Outlet Devices
#1	Device 2	123.50'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	121.30'	**24.0" Round Culvert** L= 81.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.30' / 115.25' S= 0.0742 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Secondary	127.90'	**30.0' long 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
#4	Device 2	121.30'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=12.18 cfs @ 12.69 hrs HW=124.71' (Free Discharge)
└**2=Culvert** (Passes 12.18 cfs of 23.48 cfs potential flow)
  ├**1=Sharp-Crested Rectangular Weir** (Weir Controls 7.64 cfs @ 3.60 fps)
  └**4=Orifice/Grate** (Orifice Controls 4.54 cfs @ 8.33 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=120.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5 - Pond: 5 - Pond



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: Runoff Area=4.190 ac Runoff Depth>3.57"
Tc=13.2 min CN=77 Runoff=13.81 cfs 1.245 af

Subcatchment1B: Runoff Area=4.570 ac Runoff Depth>3.97"
Tc=18.7 min CN=81 Runoff=14.69 cfs 1.512 af

Subcatchment1C: Runoff Area=11.850 ac Runoff Depth>4.18"
Tc=19.3 min CN=83 Runoff=39.43 cfs 4.128 af

Subcatchment2: Runoff Area=3.660 ac Runoff Depth>4.08"
Tc=16.2 min CN=82 Runoff=12.76 cfs 1.244 af

Subcatchment4: Runoff Area=9.080 ac Runoff Depth>3.37"
Tc=12.4 min CN=75 Runoff=29.01 cfs 2.549 af

Subcatchment5: Runoff Area=15.220 ac Runoff Depth>4.40"
Tc=15.3 min CN=85 Runoff=57.87 cfs 5.575 af

Pond 1A - Pond: 1A - Pond Peak Elev=129.84' Storage=27,261 cf Inflow=13.81 cfs 1.245 af
Primary=1.82 cfs 1.095 af Secondary=0.00 cfs 0.000 af Outflow=1.82 cfs 1.095 af

Pond 1B - Pond: 1B - Pond Peak Elev=123.49' Storage=36,842 cf Inflow=14.69 cfs 1.512 af
Primary=1.65 cfs 1.234 af Secondary=0.00 cfs 0.000 af Outflow=1.65 cfs 1.234 af

Pond 1C-Pond: 1C - Pond Peak Elev=118.70' Storage=81,787 cf Inflow=39.43 cfs 4.128 af
Primary=12.29 cfs 3.449 af Secondary=0.00 cfs 0.000 af Outflow=12.29 cfs 3.449 af

Pond 2 - Pond: 2 - Pond Peak Elev=173.82' Storage=20,879 cf Inflow=12.76 cfs 1.244 af
Primary=6.35 cfs 0.954 af Secondary=0.00 cfs 0.000 af Outflow=6.35 cfs 0.954 af

Pond 4 - Pond: 4 - Pond Peak Elev=125.54' Storage=58,819 cf Inflow=29.01 cfs 2.549 af
Primary=4.75 cfs 1.372 af Secondary=0.00 cfs 0.000 af Outflow=4.75 cfs 1.372 af

Pond 5 - Pond: 5 - Pond Peak Elev=125.45' Storage=112,279 cf Inflow=57.87 cfs 5.575 af
Primary=19.41 cfs 4.812 af Secondary=0.00 cfs 0.000 af Outflow=19.41 cfs 4.812 af

Total Runoff Area = 48.570 ac Runoff Volume = 16.253 af Average Runoff Depth = 4.02"

Summary for Subcatchment 1A:

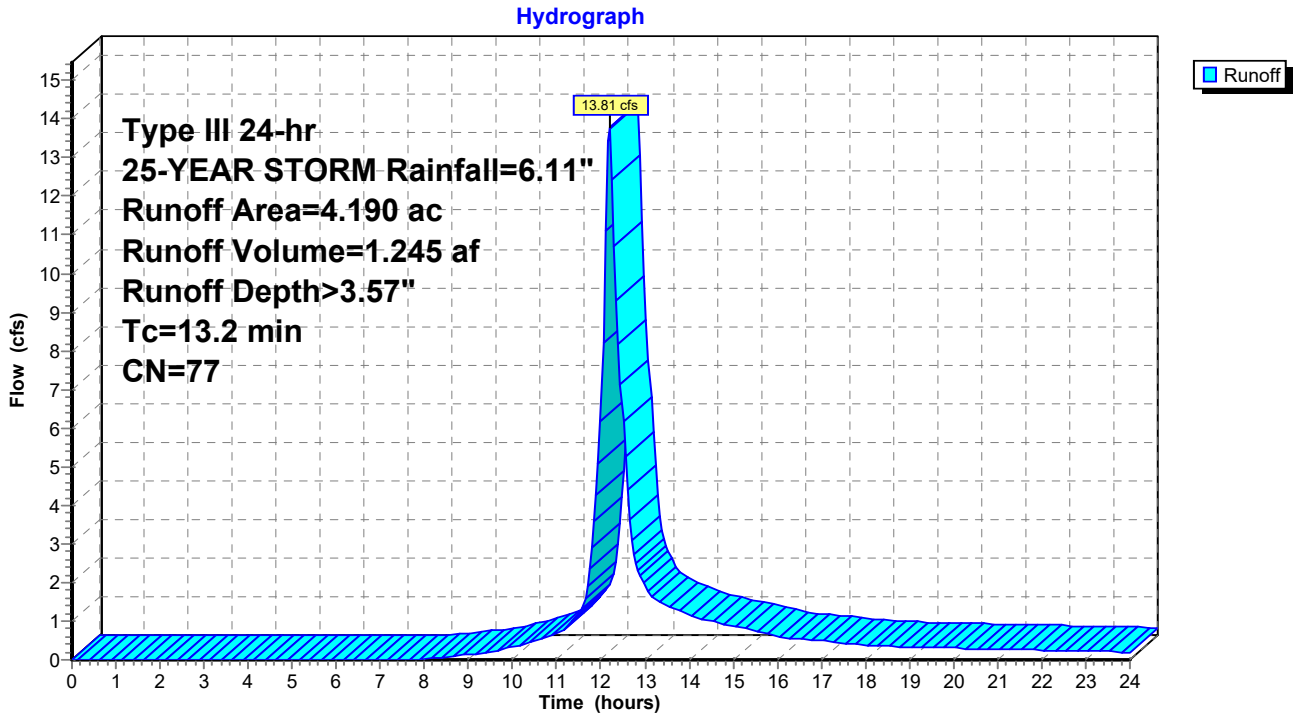
Runoff = 13.81 cfs @ 12.18 hrs, Volume= 1.245 af, Depth> 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	4.190	77	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2					**Direct Entry, NRCS Part 630**

Subcatchment 1A:



Summary for Subcatchment 1B:

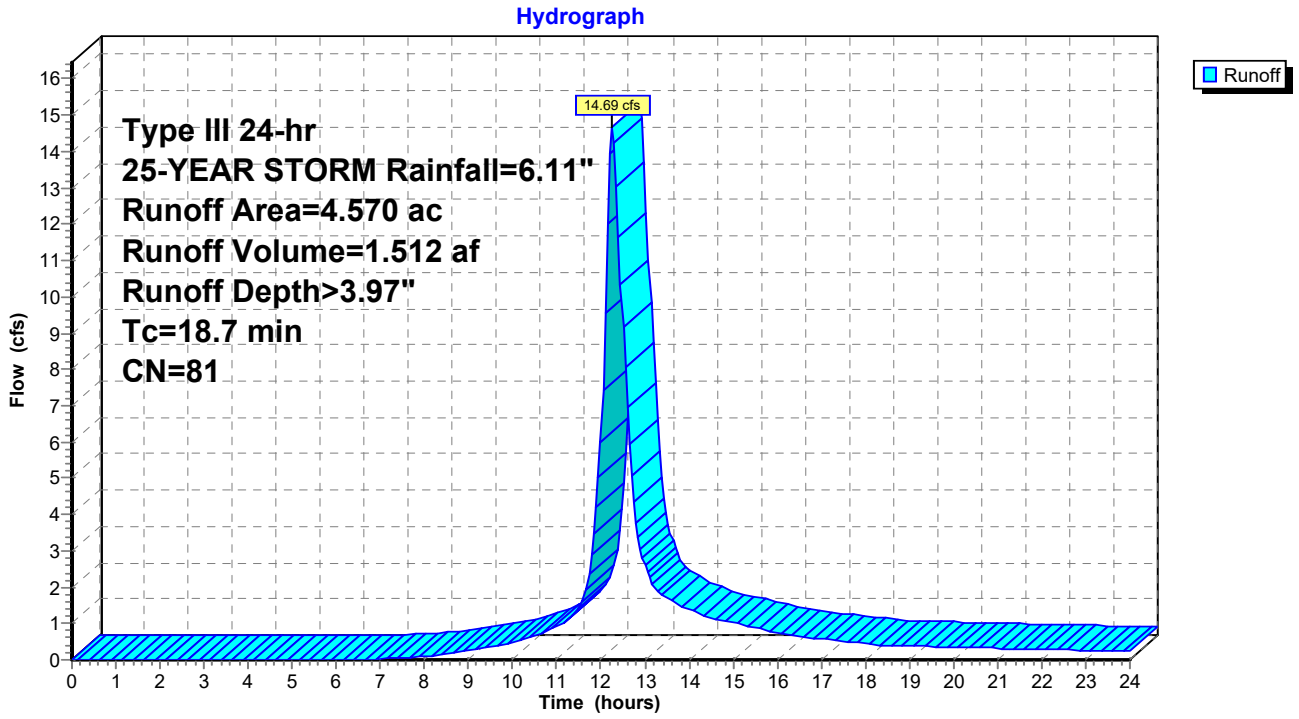
Runoff = 14.69 cfs @ 12.26 hrs, Volume= 1.512 af, Depth> 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	4.570	81	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					**Direct Entry, NRCS Part 630**

Subcatchment 1B:



Summary for Subcatchment 1C:

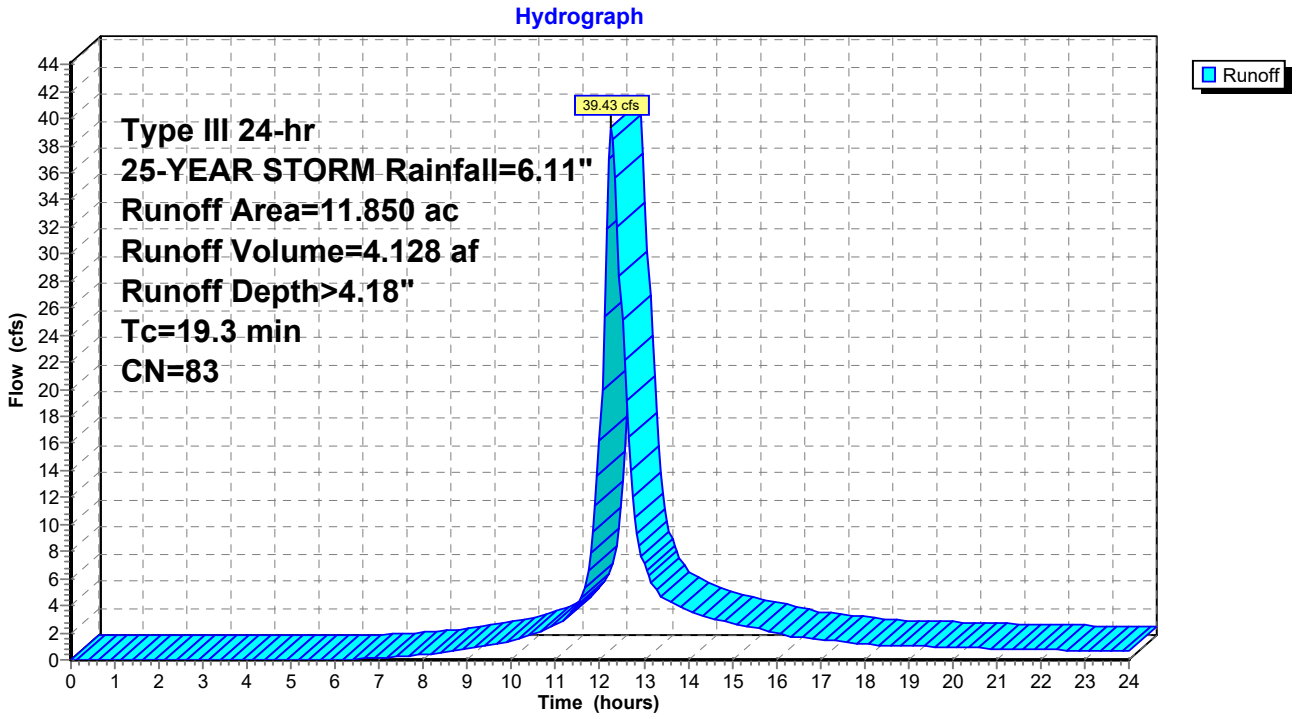
Runoff = 39.43 cfs @ 12.26 hrs, Volume= 4.128 af, Depth> 4.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	11.850	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3					**Direct Entry, NRCS Part 630**

Subcatchment 1C:



Summary for Subcatchment 2:

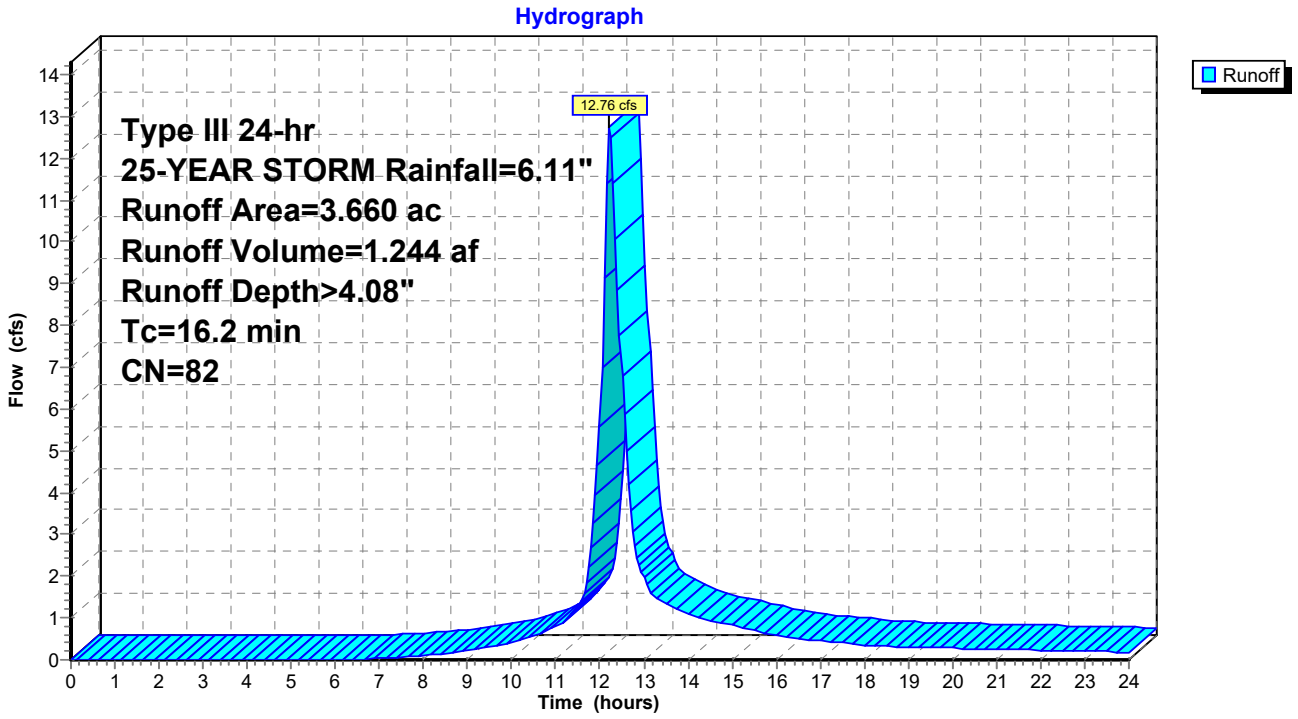
Runoff = 12.76 cfs @ 12.22 hrs, Volume= 1.244 af, Depth> 4.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	3.660	82	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2					**Direct Entry, NRCS Part 630**

Subcatchment 2:



Summary for Subcatchment 4:

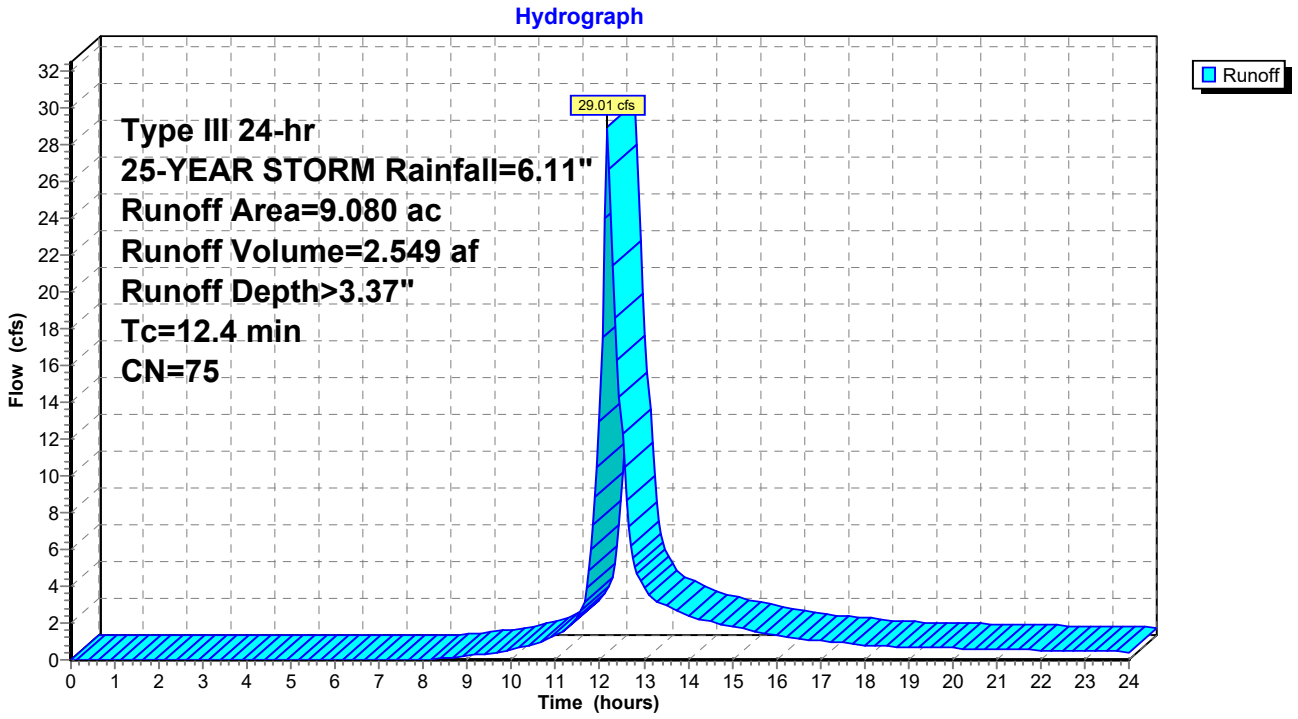
Runoff = 29.01 cfs @ 12.17 hrs, Volume= 2.549 af, Depth> 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	9.080	75	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4					**Direct Entry, NRCS Part 630**

Subcatchment 4:



Summary for Subcatchment 5:

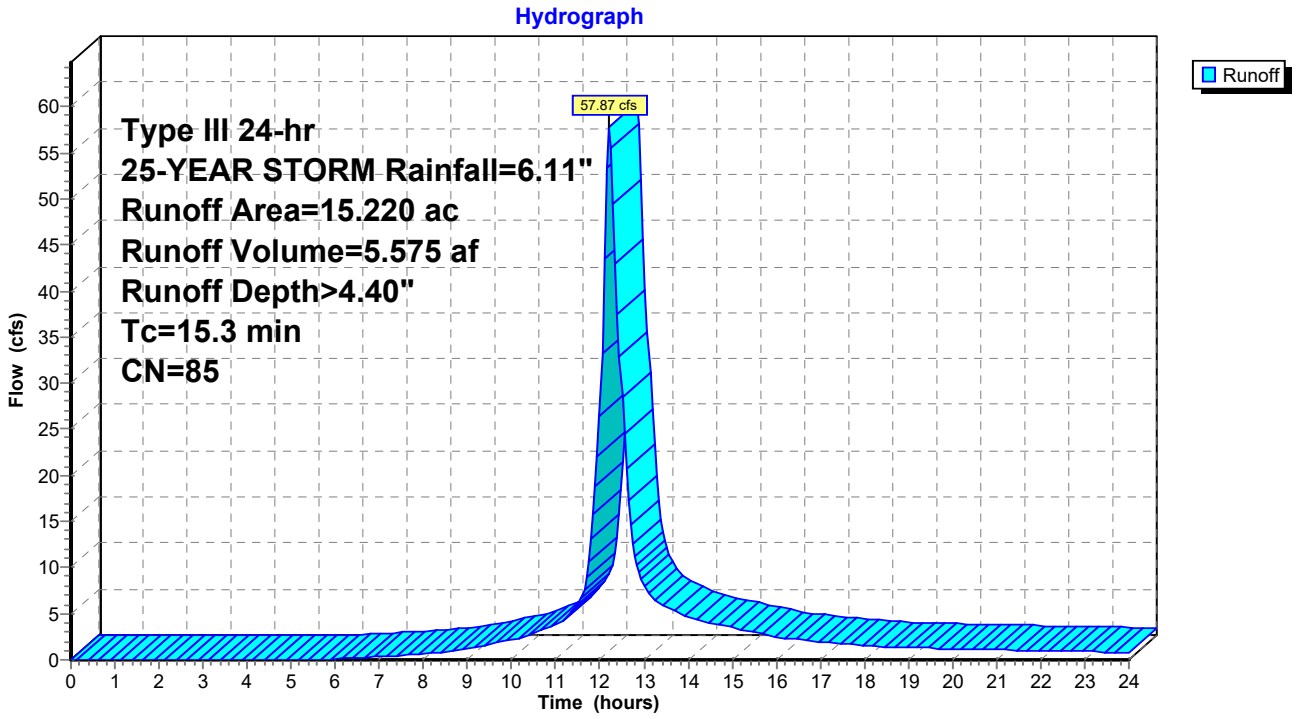
Runoff = 57.87 cfs @ 12.21 hrs, Volume= 5.575 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=6.11"

	Area (ac)	CN	Description
*	15.220	85	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3					**Direct Entry, NRCS Part 630**

Subcatchment 5:



Summary for Pond 1A - Pond: 1A - Pond

Inflow Area = 4.190 ac, Inflow Depth > 3.57" for 25-YEAR STORM event
Inflow = 13.81 cfs @ 12.18 hrs, Volume= 1.245 af
Outflow = 1.82 cfs @ 13.06 hrs, Volume= 1.095 af, Atten= 87%, Lag= 52.5 min
Primary = 1.82 cfs @ 13.06 hrs, Volume= 1.095 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 129.84' @ 13.06 hrs Surf.Area= 7,896 sf Storage= 27,261 cf

Plug-Flow detention time= 205.5 min calculated for 1.093 af (88% of inflow)
Center-of-Mass det. time= 151.0 min (977.1 - 826.1)

Volume	Invert	Avail.Storage	Storage Description
#1	123.00'	37,272 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

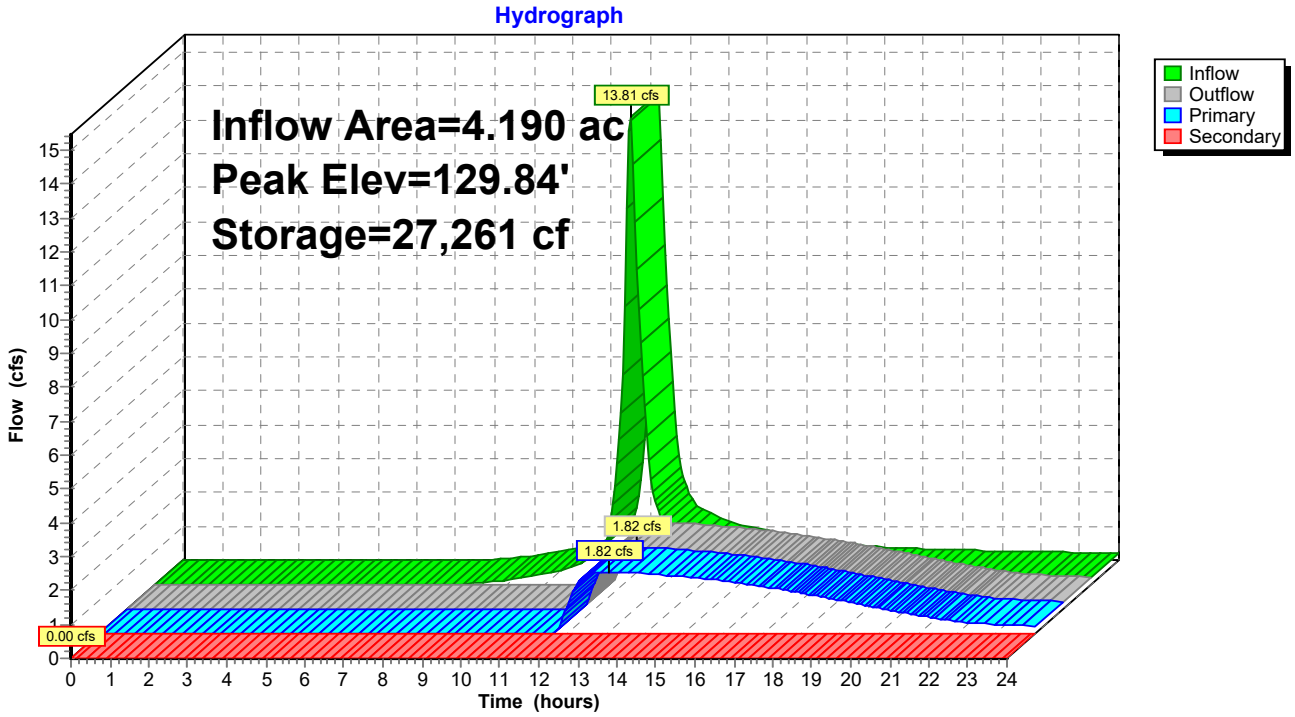
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
123.00	692	0	0
124.00	1,464	1,078	1,078
125.00	2,382	1,923	3,001
126.00	3,381	2,882	5,883
127.00	4,452	3,917	9,799
128.00	5,614	5,033	14,832
129.00	6,826	6,220	21,052
130.00	8,095	7,461	28,513
131.00	9,424	8,760	37,272

Device	Routing	Invert	Outlet Devices
#1	Secondary	130.90'	**20.0' long 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
#2	Primary	125.80'	**24.0" Round Culvert** L= 401.4' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 125.80' / 123.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	130.50'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 2	125.90'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.82 cfs @ 13.06 hrs HW=129.84' (Free Discharge)
└**2=Culvert** (Passes 1.82 cfs of 21.12 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 1.82 cfs @ 9.25 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=123.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A - Pond: 1A - Pond



Summary for Pond 1B - Pond: 1B - Pond

Inflow Area = 4.570 ac, Inflow Depth > 3.97" for 25-YEAR STORM event
Inflow = 14.69 cfs @ 12.26 hrs, Volume= 1.512 af
Outflow = 1.65 cfs @ 13.55 hrs, Volume= 1.234 af, Atten= 89%, Lag= 77.9 min
Primary = 1.65 cfs @ 13.55 hrs, Volume= 1.234 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 123.49' @ 13.55 hrs Surf.Area= 11,016 sf Storage= 36,842 cf

Plug-Flow detention time= 281.6 min calculated for 1.234 af (82% of inflow)
Center-of-Mass det. time= 210.4 min (1,031.0 - 820.6)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	83,261 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

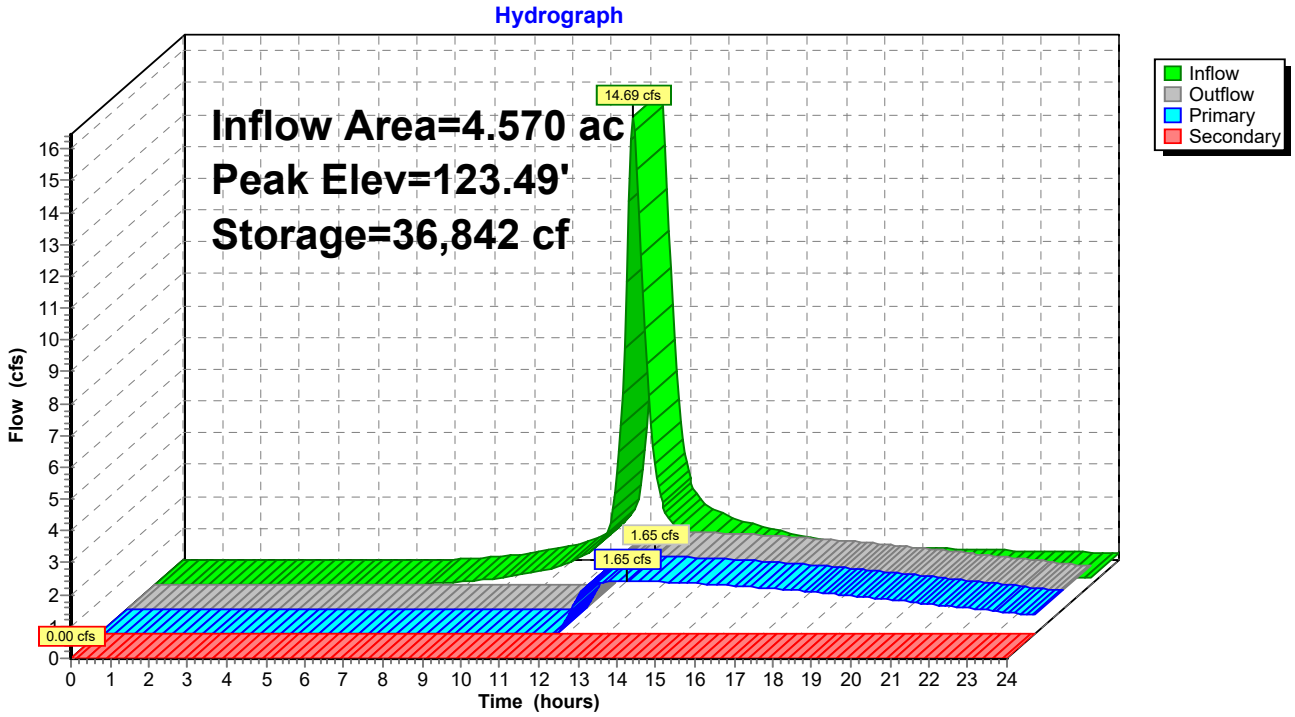
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.00	5,600	0	0
120.00	6,708	6,154	6,154
121.00	7,871	7,290	13,444
122.00	9,092	8,482	21,925
123.00	10,369	9,731	31,656
124.00	11,703	11,036	42,692
125.00	12,160	11,932	54,623
126.00	14,538	13,349	67,972
127.00	16,040	15,289	83,261

Device	Routing	Invert	Outlet Devices
#1	Primary	120.20'	**15.0" Round Culvert** L= 88.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 120.20' / 119.00' S= 0.0136 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	126.90'	**20.0' long 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
#3	Device 1	124.55'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	120.20'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.65 cfs @ 13.55 hrs HW=123.48' (Free Discharge)
└**1=Culvert** (Passes 1.65 cfs of 9.64 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 1.65 cfs @ 8.39 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B - Pond: 1B - Pond



Summary for Pond 1C-Pond: 1C - Pond

Inflow Area = 11.850 ac, Inflow Depth > 4.18" for 25-YEAR STORM event
Inflow = 39.43 cfs @ 12.26 hrs, Volume= 4.128 af
Outflow = 12.29 cfs @ 12.75 hrs, Volume= 3.449 af, Atten= 69%, Lag= 29.1 min
Primary = 12.29 cfs @ 12.75 hrs, Volume= 3.449 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 118.70' @ 12.75 hrs Surf.Area= 24,694 sf Storage= 81,787 cf

Plug-Flow detention time= 162.8 min calculated for 3.442 af (83% of inflow)
Center-of-Mass det. time= 97.3 min (913.2 - 815.8)

Volume	Invert	Avail.Storage	Storage Description
#1	114.00'	116,658 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

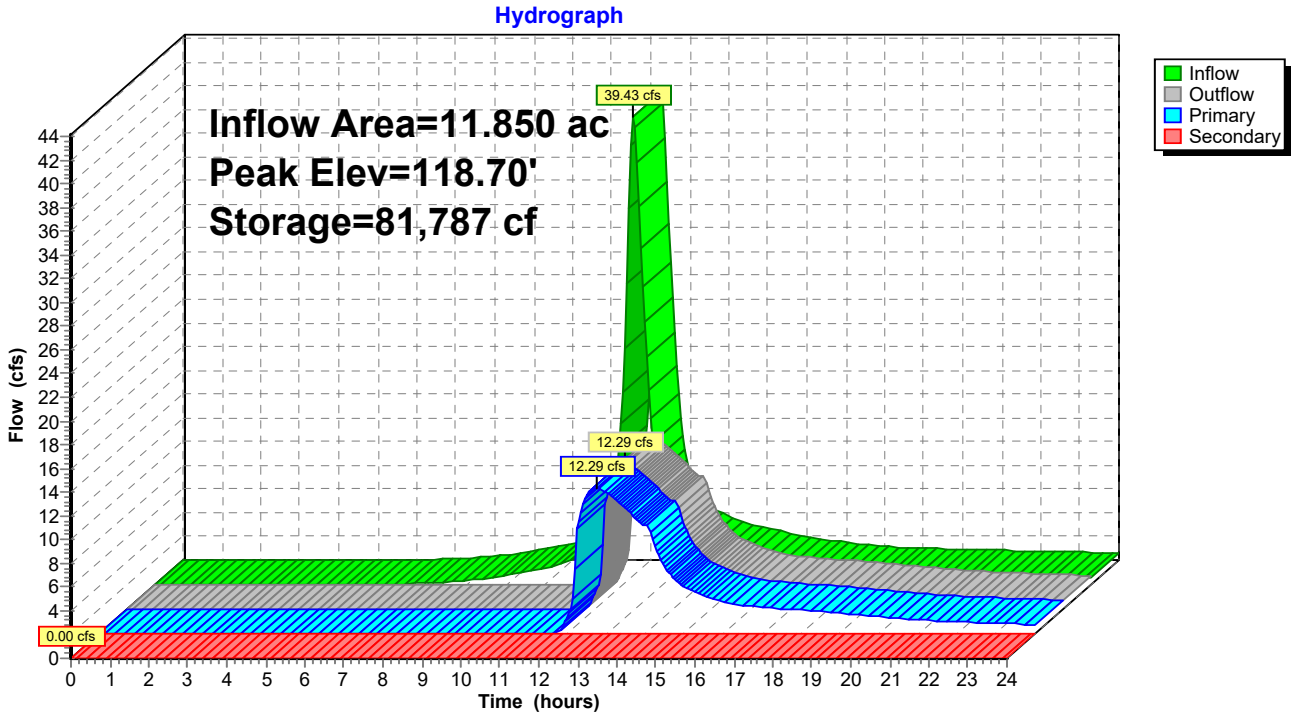
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	10,374	0	0
115.00	13,288	11,831	11,831
116.00	16,269	14,779	26,610
117.00	19,320	17,795	44,404
118.00	22,447	20,884	65,288
119.00	25,657	24,052	89,340
120.00	28,979	27,318	116,658

Device	Routing	Invert	Outlet Devices
#1	Primary	115.70'	**18.0" Round Culvert** L= 91.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 115.70' / 115.00' S= 0.0076 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	119.60'	**30.0' long x 8.0' 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 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	116.90'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	115.70'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=12.29 cfs @ 12.75 hrs HW=118.70' (Free Discharge)
↑**1=Culvert** (Barrel Controls 12.29 cfs @ 6.96 fps)
↑**3=Sharp-Crested Rectangular Weir** (Passes < 30.01 cfs potential flow)
4=Orifice/Grate (Passes < 4.22 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=114.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1C-Pond: 1C - Pond



Summary for Pond 2 - Pond: 2 - Pond

Inflow Area = 3.660 ac, Inflow Depth > 4.08" for 25-YEAR STORM event
Inflow = 12.76 cfs @ 12.22 hrs, Volume= 1.244 af
Outflow = 6.35 cfs @ 12.52 hrs, Volume= 0.954 af, Atten= 50%, Lag= 18.3 min
Primary = 6.35 cfs @ 12.52 hrs, Volume= 0.954 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 173.82' @ 12.52 hrs Surf.Area= 6,512 sf Storage= 20,879 cf

Plug-Flow detention time= 160.1 min calculated for 0.954 af (77% of inflow)
Center-of-Mass det. time= 78.9 min (894.8 - 816.0)

Volume	Invert	Avail.Storage	Storage Description
#1	169.00'	29,377 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

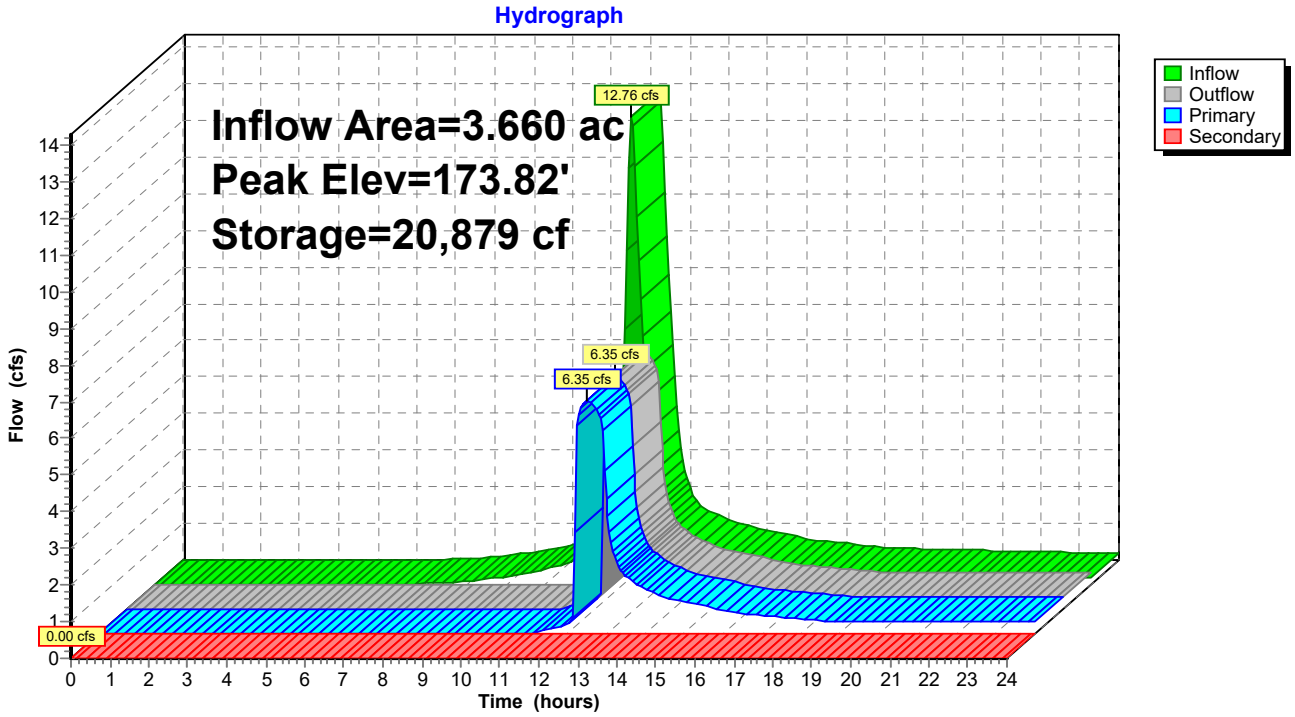
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.00	2,429	0	0
170.00	3,127	2,778	2,778
171.00	3,912	3,520	6,298
172.00	4,771	4,342	10,639
173.00	5,697	5,234	15,873
174.00	6,691	6,194	22,067
175.00	7,929	7,310	29,377

Device	Routing	Invert	Outlet Devices
#1	Device 2	172.70'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#2	Primary	170.50'	**12.0" Round Culvert** L= 42.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.50' / 170.00' S= 0.0119 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Secondary	174.60'	**30.0' long 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
#4	Device 2	170.50'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=6.35 cfs @ 12.52 hrs HW=173.82' (Free Discharge)
└**2=Culvert** (Inlet Controls 6.35 cfs @ 8.08 fps)
  ├**1=Sharp-Crested Rectangular Weir** (Passes < 13.64 cfs potential flow)
  └**4=Orifice/Grate** (Passes < 0.42 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=169.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2 - Pond: 2 - Pond



Summary for Pond 4 - Pond: 4 - Pond

Inflow Area = 9.080 ac, Inflow Depth > 3.37" for 25-YEAR STORM event
Inflow = 29.01 cfs @ 12.17 hrs, Volume= 2.549 af
Outflow = 4.75 cfs @ 12.85 hrs, Volume= 1.372 af, Atten= 84%, Lag= 40.4 min
Primary = 4.75 cfs @ 12.85 hrs, Volume= 1.372 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 125.54' @ 12.85 hrs Surf.Area= 14,796 sf Storage= 58,819 cf

Plug-Flow detention time= 238.6 min calculated for 1.372 af (54% of inflow)
Center-of-Mass det. time= 126.7 min (956.9 - 830.2)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	79,242 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

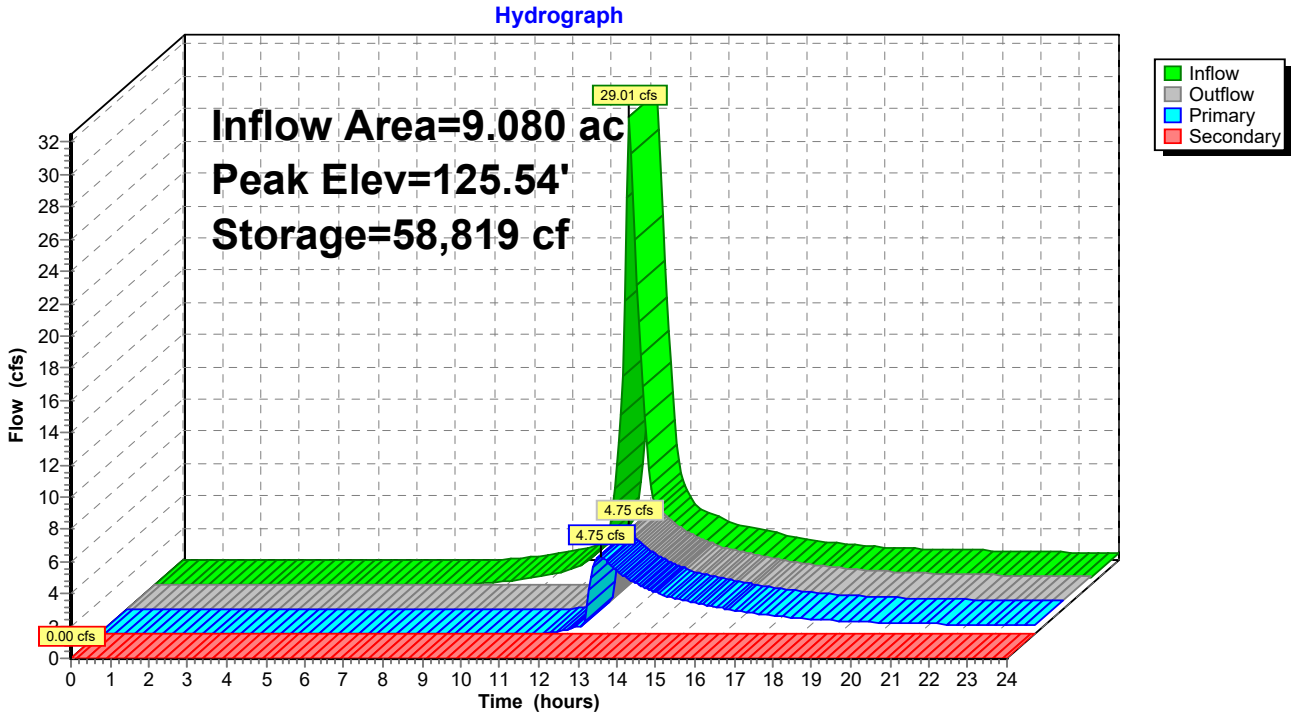
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	6,749	0	0
121.00	8,061	7,405	7,405
122.00	9,434	8,748	16,153
123.00	10,869	10,152	26,304
124.00	12,365	11,617	37,921
125.00	13,922	13,144	51,065
126.00	15,541	14,732	65,796
127.00	11,350	13,446	79,242

Device	Routing	Invert	Outlet Devices
#1	Primary	120.40'	**18.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 120.40' / 120.00' S= 0.0075 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	126.50'	**20.0' long 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
#3	Device 1	125.00'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	121.00'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=4.74 cfs @ 12.85 hrs HW=125.54' (Free Discharge)
└**1=Culvert** (Passes 4.74 cfs of 17.83 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 4.25 cfs @ 2.72 fps)
  └**4=Orifice/Grate** (Orifice Controls 0.50 cfs @ 10.12 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=120.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4 - Pond: 4 - Pond



Summary for Pond 5 - Pond: 5 - Pond

Inflow Area = 15.220 ac, Inflow Depth > 4.40" for 25-YEAR STORM event
Inflow = 57.87 cfs @ 12.21 hrs, Volume= 5.575 af
Outflow = 19.41 cfs @ 12.62 hrs, Volume= 4.812 af, Atten= 66%, Lag= 24.8 min
Primary = 19.41 cfs @ 12.62 hrs, Volume= 4.812 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 125.45' @ 12.62 hrs Surf.Area= 26,435 sf Storage= 112,279 cf

Plug-Flow detention time= 183.1 min calculated for 4.812 af (86% of inflow)
Center-of-Mass det. time= 124.0 min (931.0 - 807.1)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	187,159 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

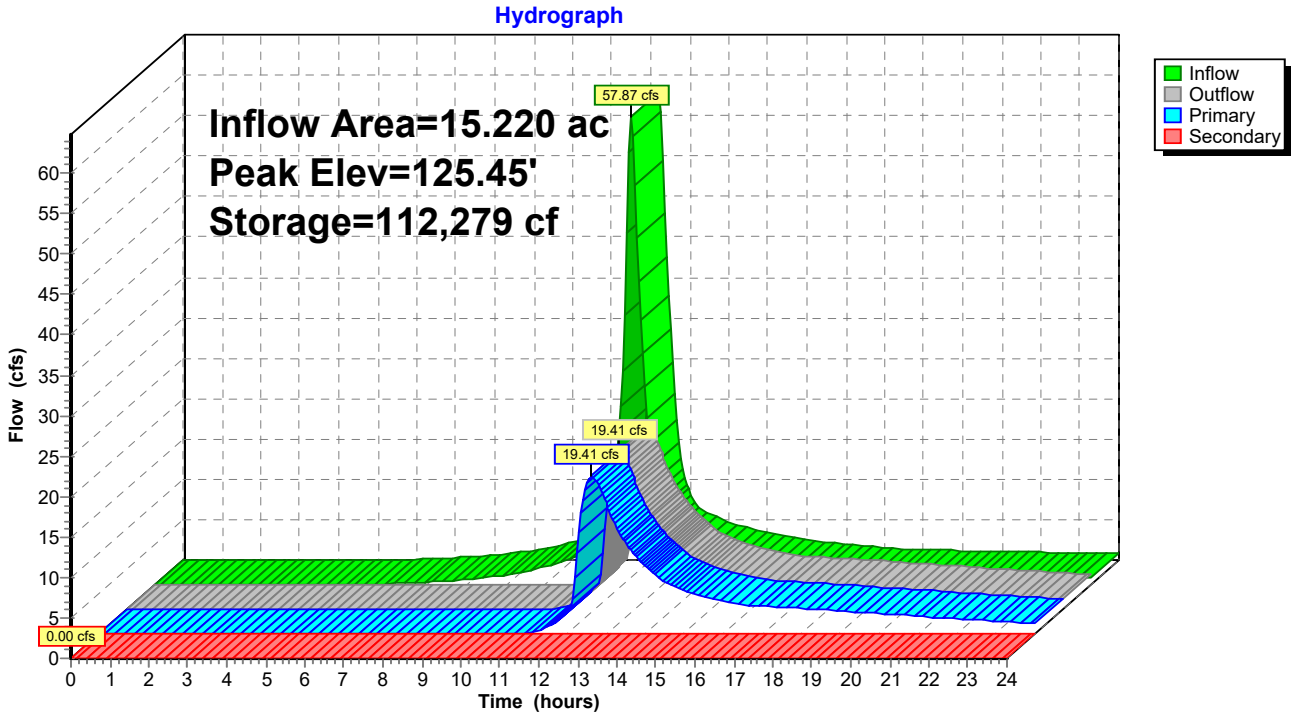
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	15,063	0	0
121.00	17,014	16,039	16,039
122.00	19,025	18,020	34,058
123.00	21,096	20,061	54,119
124.00	23,228	22,162	76,281
125.00	25,421	24,325	100,605
126.00	27,674	26,548	127,153
127.00	29,988	28,831	155,984
128.00	32,362	31,175	187,159

Device	Routing	Invert	Outlet Devices
#1	Device 2	123.50'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	121.30'	**24.0" Round Culvert** L= 81.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.30' / 115.25' S= 0.0742 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Secondary	127.90'	**30.0' long 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
#4	Device 2	121.30'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=19.38 cfs @ 12.62 hrs HW=125.45' (Free Discharge)
└**2=Culvert** (Passes 19.38 cfs of 26.84 cfs potential flow)
  ├**1=Sharp-Crested Rectangular Weir** (Weir Controls 14.31 cfs @ 4.56 fps)
  └**4=Orifice/Grate** (Orifice Controls 5.07 cfs @ 9.30 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=120.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5 - Pond: 5 - Pond



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: Runoff Area=4.190 ac Runoff Depth>4.25"
Tc=13.2 min CN=77 Runoff=16.42 cfs 1.483 af

Subcatchment1B: Runoff Area=4.570 ac Runoff Depth>4.68"
Tc=18.7 min CN=81 Runoff=17.24 cfs 1.782 af

Subcatchment1C: Runoff Area=11.850 ac Runoff Depth>4.90"
Tc=19.3 min CN=83 Runoff=45.97 cfs 4.838 af

Subcatchment2: Runoff Area=3.660 ac Runoff Depth>4.79"
Tc=16.2 min CN=82 Runoff=14.93 cfs 1.461 af

Subcatchment4: Runoff Area=9.080 ac Runoff Depth>4.04"
Tc=12.4 min CN=75 Runoff=34.74 cfs 3.053 af

Subcatchment5: Runoff Area=15.220 ac Runoff Depth>5.13"
Tc=15.3 min CN=85 Runoff=67.06 cfs 6.501 af

Pond 1A - Pond: 1A - Pond Peak Elev=130.54' Storage=33,114 cf Inflow=16.42 cfs 1.483 af
Primary=2.10 cfs 1.329 af Secondary=0.00 cfs 0.000 af Outflow=2.10 cfs 1.329 af

Pond 1B - Pond: 1B - Pond Peak Elev=124.12' Storage=44,133 cf Inflow=17.24 cfs 1.782 af
Primary=1.81 cfs 1.441 af Secondary=0.00 cfs 0.000 af Outflow=1.81 cfs 1.441 af

Pond 1C-Pond: 1C - Pond Peak Elev=119.25' Storage=95,892 cf Inflow=45.97 cfs 4.838 af
Primary=13.75 cfs 4.144 af Secondary=0.00 cfs 0.000 af Outflow=13.75 cfs 4.144 af

Pond 2 - Pond: 2 - Pond Peak Elev=174.32' Storage=24,291 cf Inflow=14.93 cfs 1.461 af
Primary=6.89 cfs 1.159 af Secondary=0.00 cfs 0.000 af Outflow=6.89 cfs 1.159 af

Pond 4 - Pond: 4 - Pond Peak Elev=125.90' Storage=64,317 cf Inflow=34.74 cfs 3.053 af
Primary=10.21 cfs 1.869 af Secondary=0.00 cfs 0.000 af Outflow=10.21 cfs 1.869 af

Pond 5 - Pond: 5 - Pond Peak Elev=125.96' Storage=126,080 cf Inflow=67.06 cfs 6.501 af
Primary=24.45 cfs 5.699 af Secondary=0.00 cfs 0.000 af Outflow=24.45 cfs 5.699 af

Total Runoff Area = 48.570 ac Runoff Volume = 19.119 af Average Runoff Depth = 4.72"

Summary for Subcatchment 1A:

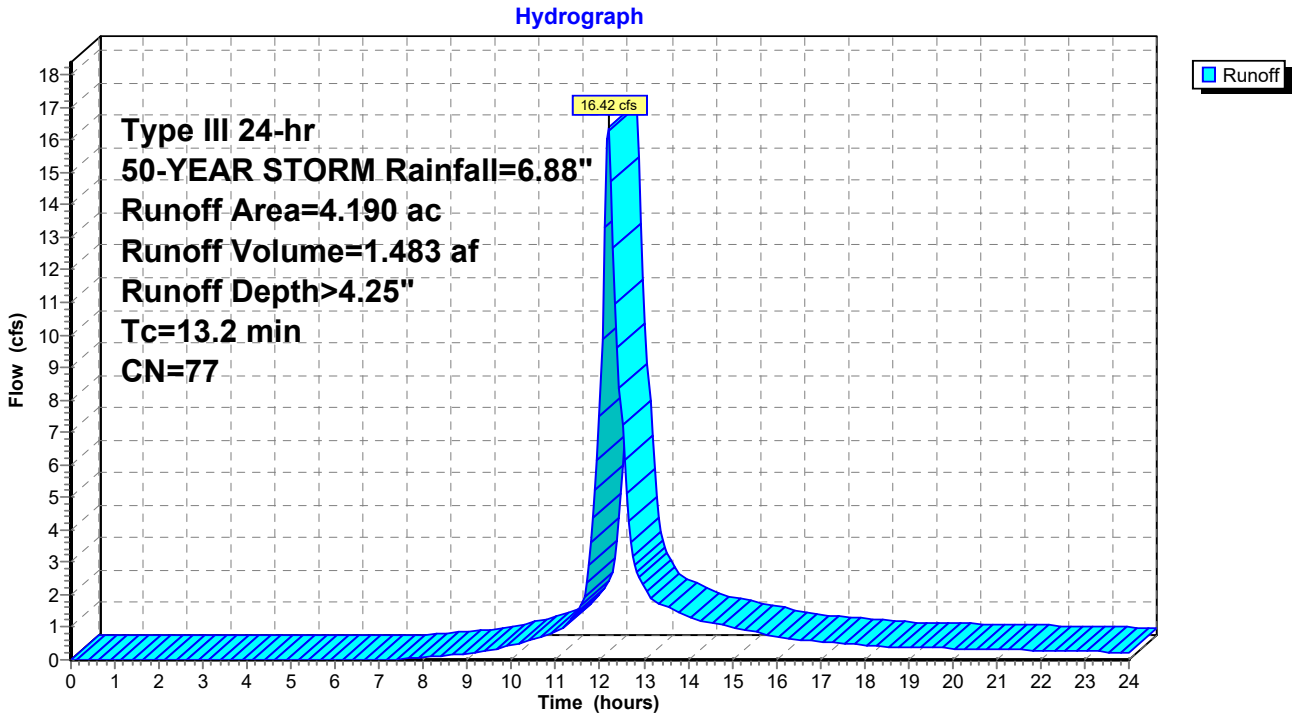
Runoff = 16.42 cfs @ 12.18 hrs, Volume= 1.483 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	4.190	77	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2					**Direct Entry, NRCS Part 630**

Subcatchment 1A:



Summary for Subcatchment 1B:

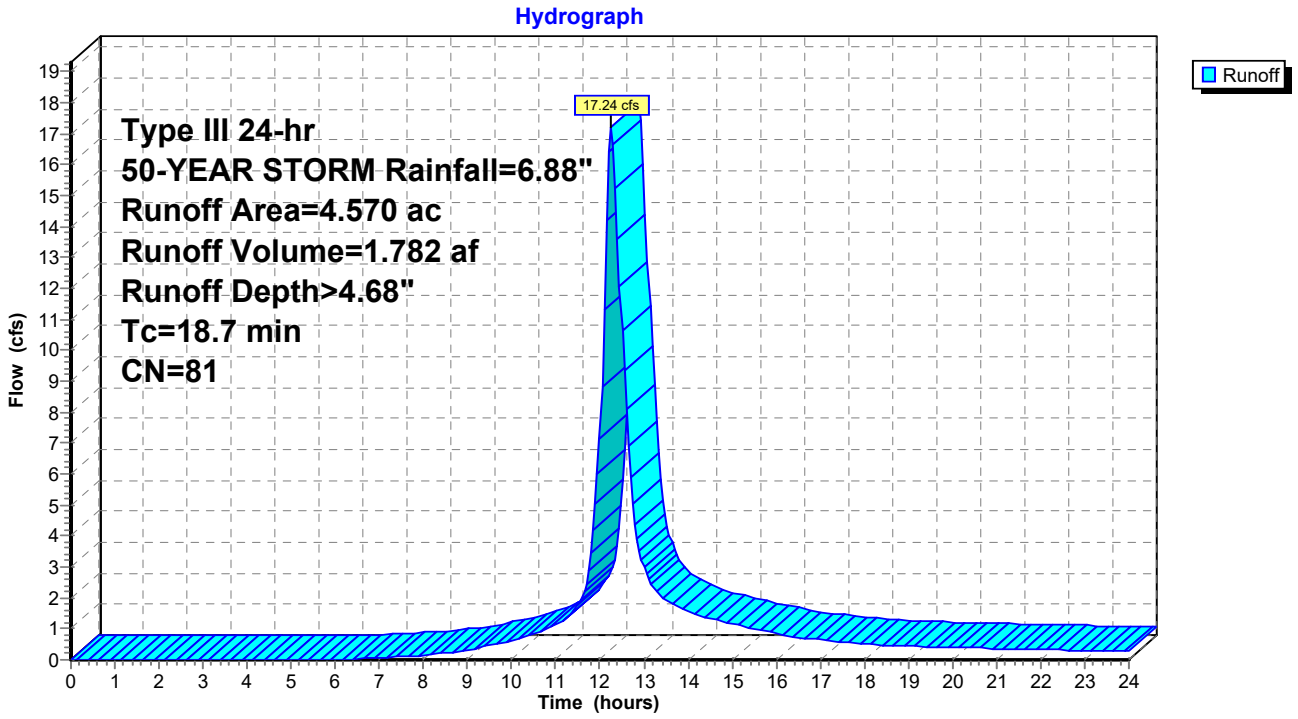
Runoff = 17.24 cfs @ 12.25 hrs, Volume= 1.782 af, Depth> 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	4.570	81	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					**Direct Entry, NRCS Part 630**

Subcatchment 1B:



Summary for Subcatchment 1C:

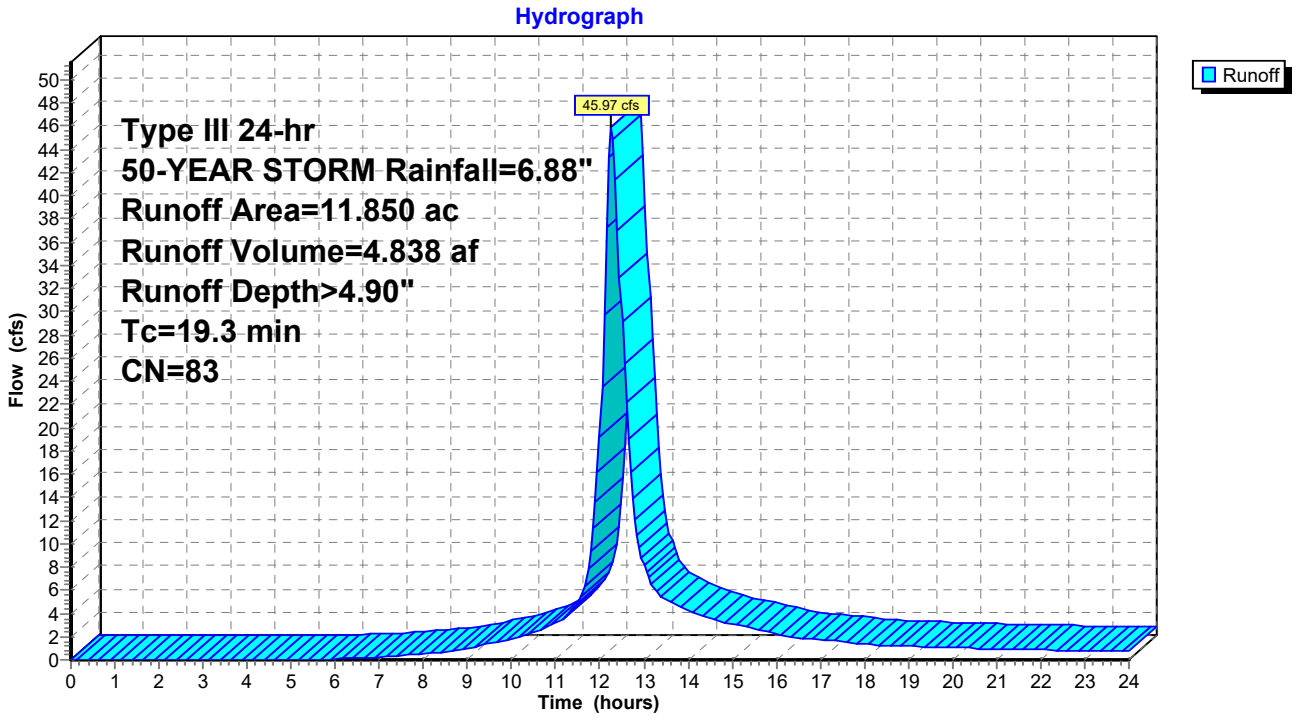
Runoff = 45.97 cfs @ 12.26 hrs, Volume= 4.838 af, Depth> 4.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	11.850	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3					**Direct Entry, NRCS Part 630**

Subcatchment 1C:



Summary for Subcatchment 2:

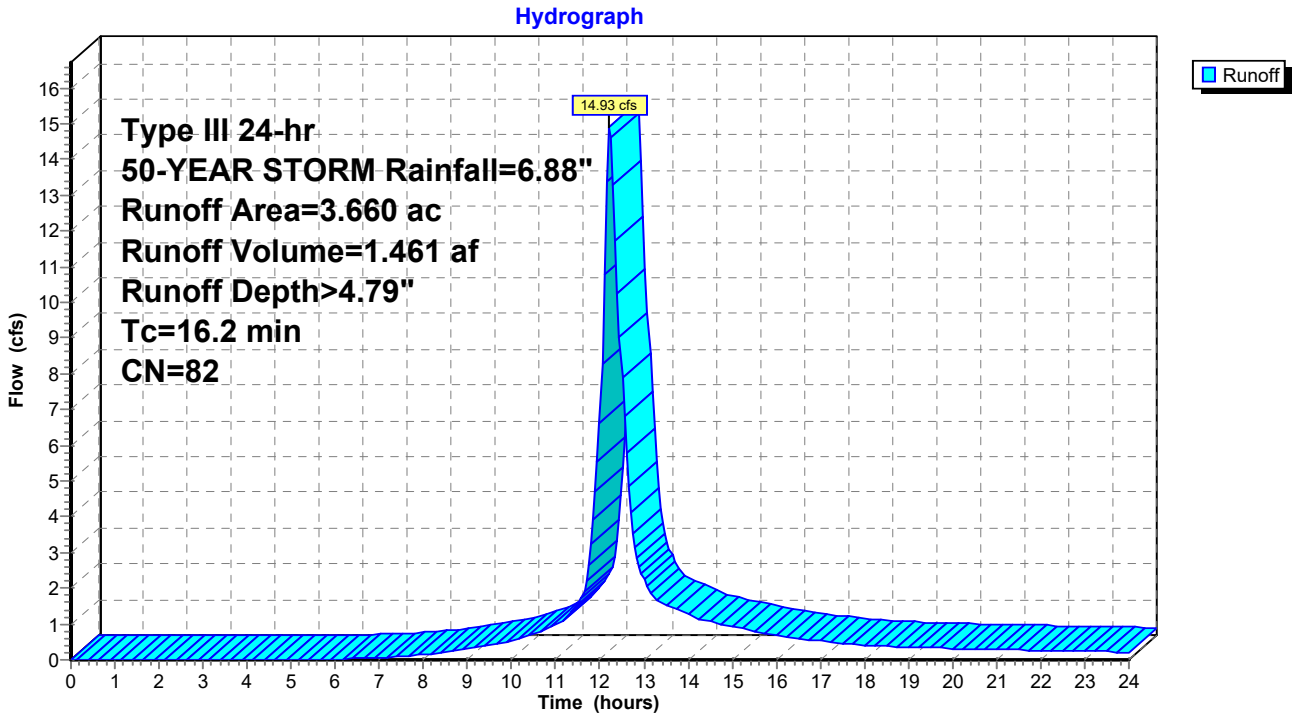
Runoff = 14.93 cfs @ 12.22 hrs, Volume= 1.461 af, Depth> 4.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	3.660	82	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2					**Direct Entry, NRCS Part 630**

Subcatchment 2:



Summary for Subcatchment 4:

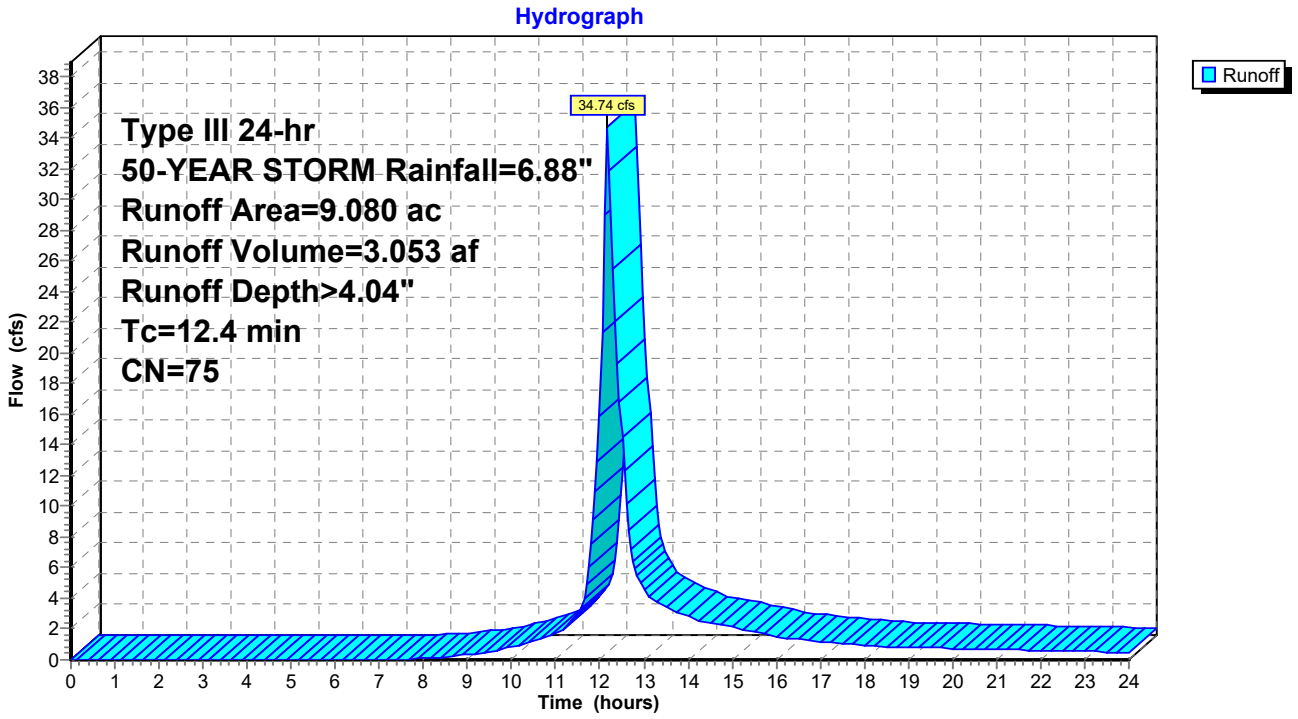
Runoff = 34.74 cfs @ 12.17 hrs, Volume= 3.053 af, Depth> 4.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	9.080	75	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4					**Direct Entry, NRCS Part 630**

Subcatchment 4:



Summary for Subcatchment 5:

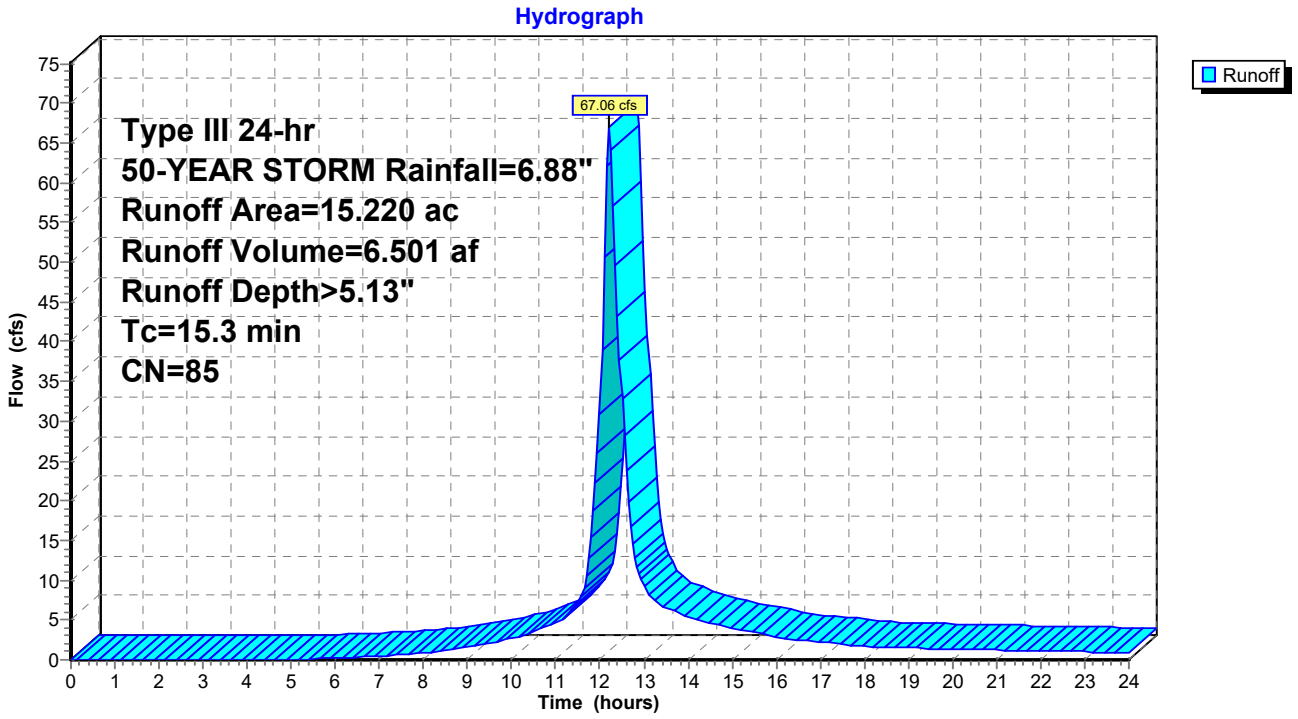
Runoff = 67.06 cfs @ 12.21 hrs, Volume= 6.501 af, Depth> 5.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YEAR STORM Rainfall=6.88"

	Area (ac)	CN	Description
*	15.220	85	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3					**Direct Entry, NRCS Part 630**

Subcatchment 5:



Summary for Pond 1A - Pond: 1A - Pond

Inflow Area = 4.190 ac, Inflow Depth > 4.25" for 50-YEAR STORM event
Inflow = 16.42 cfs @ 12.18 hrs, Volume= 1.483 af
Outflow = 2.10 cfs @ 13.07 hrs, Volume= 1.329 af, Atten= 87%, Lag= 53.2 min
Primary = 2.10 cfs @ 13.07 hrs, Volume= 1.329 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 130.54' @ 13.07 hrs Surf.Area= 8,818 sf Storage= 33,114 cf

Plug-Flow detention time= 220.1 min calculated for 1.326 af (89% of inflow)
Center-of-Mass det. time= 171.2 min (992.3 - 821.1)

Volume	Invert	Avail.Storage	Storage Description
#1	123.00'	37,272 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

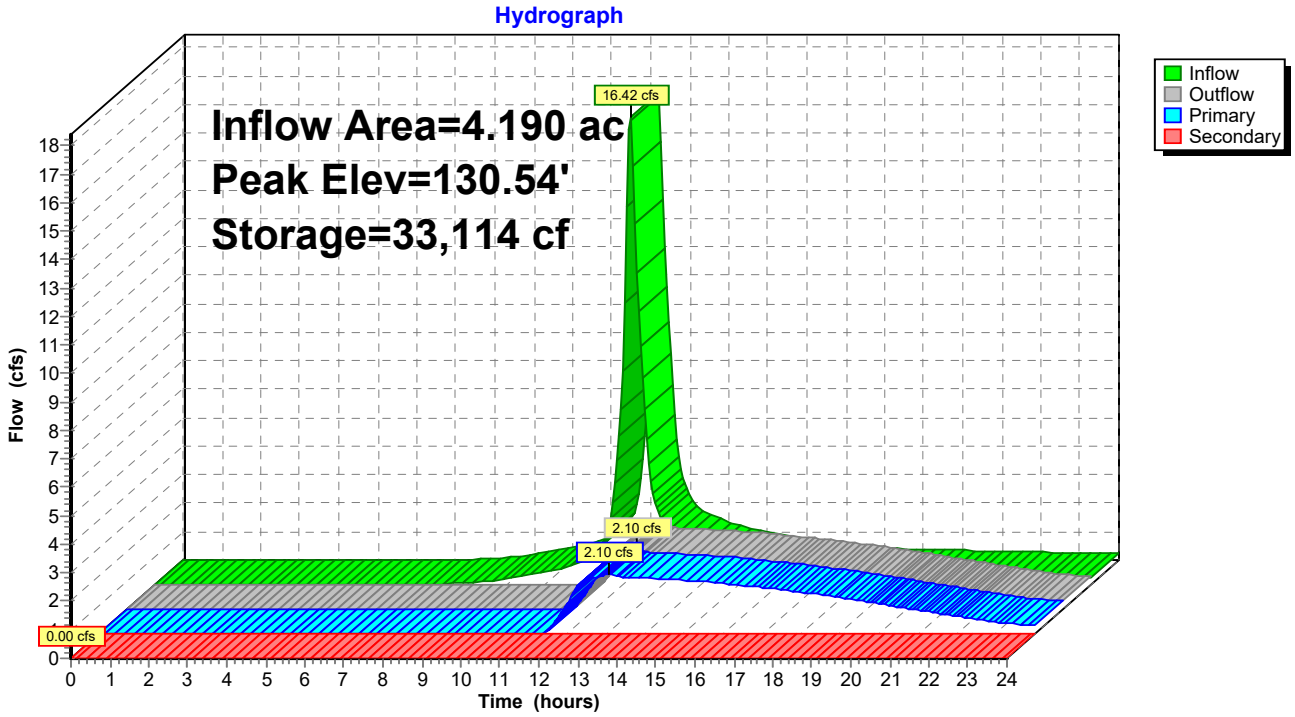
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
123.00	692	0	0
124.00	1,464	1,078	1,078
125.00	2,382	1,923	3,001
126.00	3,381	2,882	5,883
127.00	4,452	3,917	9,799
128.00	5,614	5,033	14,832
129.00	6,826	6,220	21,052
130.00	8,095	7,461	28,513
131.00	9,424	8,760	37,272

Device	Routing	Invert	Outlet Devices
#1	Secondary	130.90'	**20.0' long 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
#2	Primary	125.80'	**24.0" Round Culvert** L= 401.4' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 125.80' / 123.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	130.50'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 2	125.90'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.07 cfs @ 13.07 hrs HW=130.54' (Free Discharge)
└**2=Culvert** (Passes 2.07 cfs of 22.87 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.09 cfs @ 0.69 fps)
  └**4=Orifice/Grate** (Orifice Controls 1.98 cfs @ 10.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=123.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A - Pond: 1A - Pond



Summary for Pond 1B - Pond: 1B - Pond

Inflow Area = 4.570 ac, Inflow Depth > 4.68" for 50-YEAR STORM event
Inflow = 17.24 cfs @ 12.25 hrs, Volume= 1.782 af
Outflow = 1.81 cfs @ 13.67 hrs, Volume= 1.441 af, Atten= 89%, Lag= 85.2 min
Primary = 1.81 cfs @ 13.67 hrs, Volume= 1.441 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 124.12' @ 13.67 hrs Surf.Area= 11,759 sf Storage= 44,133 cf

Plug-Flow detention time= 295.1 min calculated for 1.441 af (81% of inflow)
Center-of-Mass det. time= 222.6 min (1,038.6 - 816.0)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	83,261 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

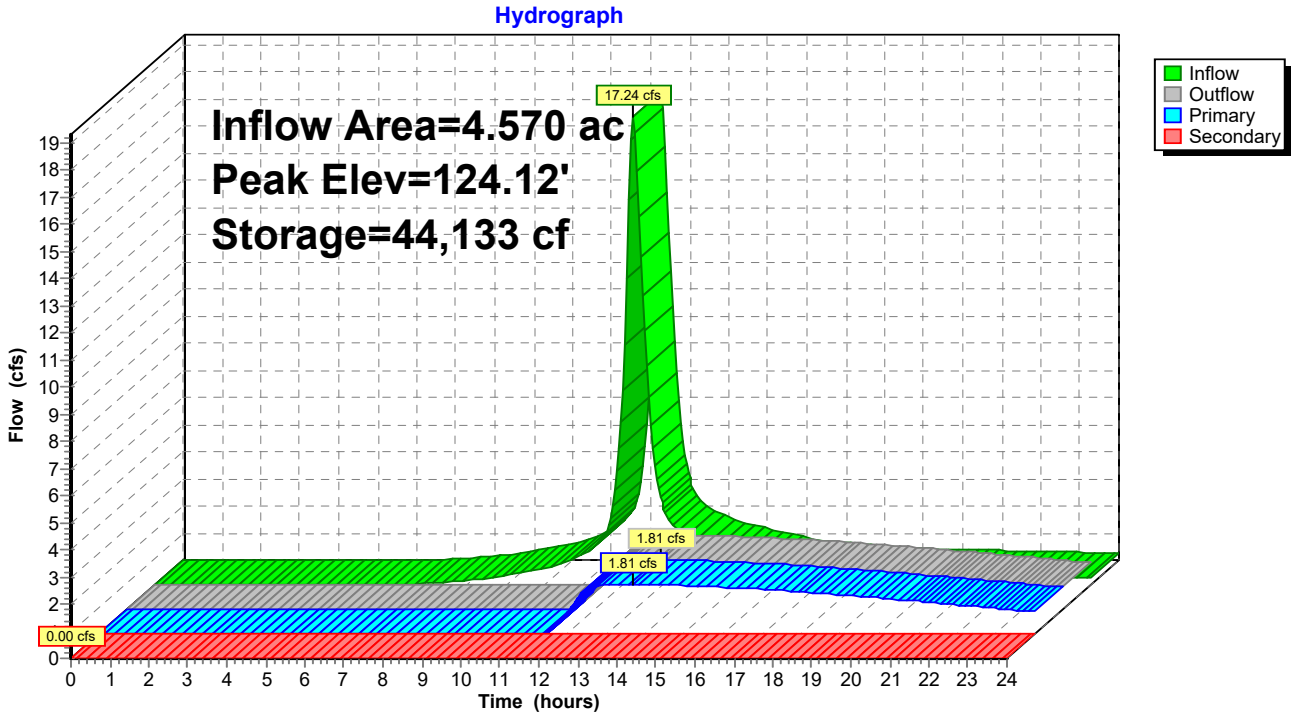
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.00	5,600	0	0
120.00	6,708	6,154	6,154
121.00	7,871	7,290	13,444
122.00	9,092	8,482	21,925
123.00	10,369	9,731	31,656
124.00	11,703	11,036	42,692
125.00	12,160	11,932	54,623
126.00	14,538	13,349	67,972
127.00	16,040	15,289	83,261

Device	Routing	Invert	Outlet Devices
#1	Primary	120.20'	**15.0" Round Culvert** L= 88.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 120.20' / 119.00' S= 0.0136 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	126.90'	**20.0' long 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
#3	Device 1	124.55'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	120.20'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.81 cfs @ 13.67 hrs HW=124.12' (Free Discharge)
└**1=Culvert** (Passes 1.81 cfs of 10.73 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 1.81 cfs @ 9.23 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B - Pond: 1B - Pond



Summary for Pond 1C-Pond: 1C - Pond

Inflow Area = 11.850 ac, Inflow Depth > 4.90" for 50-YEAR STORM event
Inflow = 45.97 cfs @ 12.26 hrs, Volume= 4.838 af
Outflow = 13.75 cfs @ 12.76 hrs, Volume= 4.144 af, Atten= 70%, Lag= 29.8 min
Primary = 13.75 cfs @ 12.76 hrs, Volume= 4.144 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 119.25' @ 12.76 hrs Surf.Area= 26,492 sf Storage= 95,892 cf

Plug-Flow detention time= 157.1 min calculated for 4.144 af (86% of inflow)
Center-of-Mass det. time= 96.5 min (907.9 - 811.4)

Volume	Invert	Avail.Storage	Storage Description
#1	114.00'	116,658 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

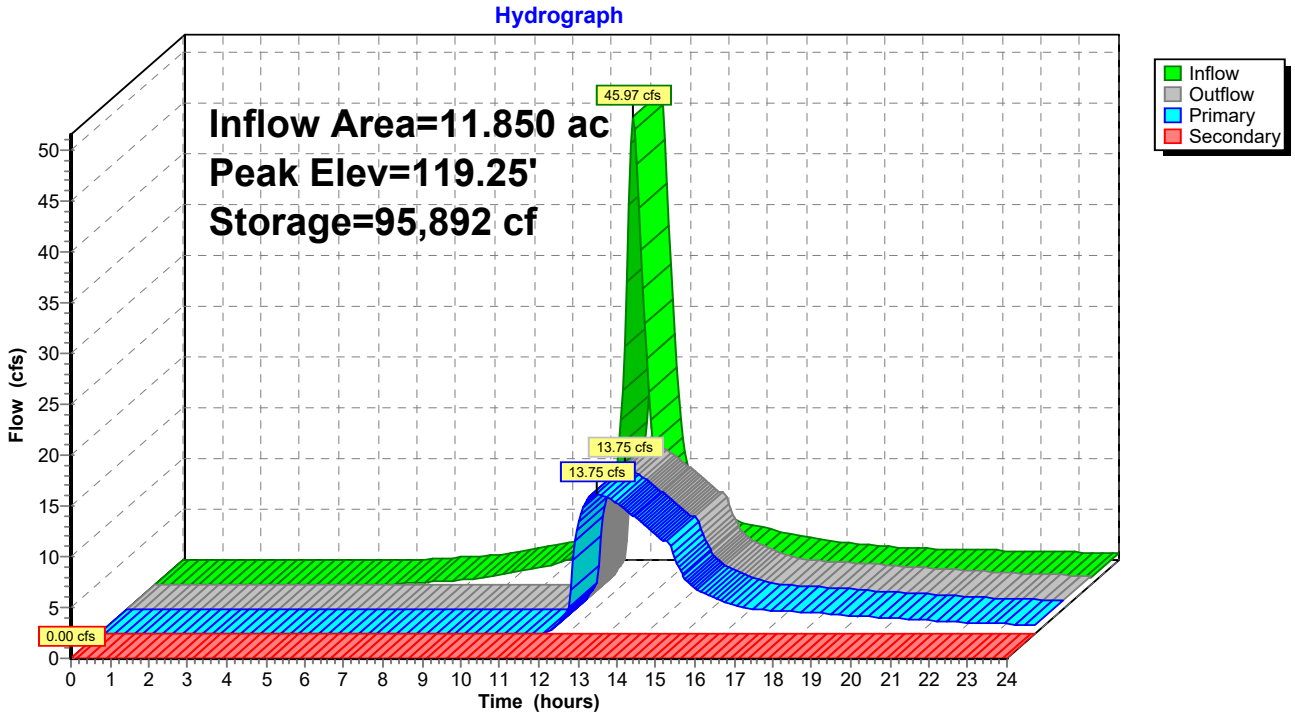
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	10,374	0	0
115.00	13,288	11,831	11,831
116.00	16,269	14,779	26,610
117.00	19,320	17,795	44,404
118.00	22,447	20,884	65,288
119.00	25,657	24,052	89,340
120.00	28,979	27,318	116,658

Device	Routing	Invert	Outlet Devices
#1	Primary	115.70'	**18.0" Round Culvert** L= 91.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 115.70' / 115.00' S= 0.0076 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	119.60'	**30.0' long x 8.0' 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 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	116.90'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	115.70'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=13.75 cfs @ 12.76 hrs HW=119.25' (Free Discharge)
└**1=Culvert** (Barrel Controls 13.75 cfs @ 7.78 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Passes < 46.96 cfs potential flow)
  └**4=Orifice/Grate** (Passes < 4.65 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=114.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1C-Pond: 1C - Pond



Summary for Pond 2 - Pond: 2 - Pond

Inflow Area = 3.660 ac, Inflow Depth > 4.79" for 50-YEAR STORM event
Inflow = 14.93 cfs @ 12.22 hrs, Volume= 1.461 af
Outflow = 6.89 cfs @ 12.55 hrs, Volume= 1.159 af, Atten= 54%, Lag= 19.7 min
Primary = 6.89 cfs @ 12.55 hrs, Volume= 1.159 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 174.32' @ 12.55 hrs Surf.Area= 7,091 sf Storage= 24,291 cf

Plug-Flow detention time= 143.4 min calculated for 1.157 af (79% of inflow)
Center-of-Mass det. time= 68.3 min (879.8 - 811.5)

Volume	Invert	Avail.Storage	Storage Description
#1	169.00'	29,377 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

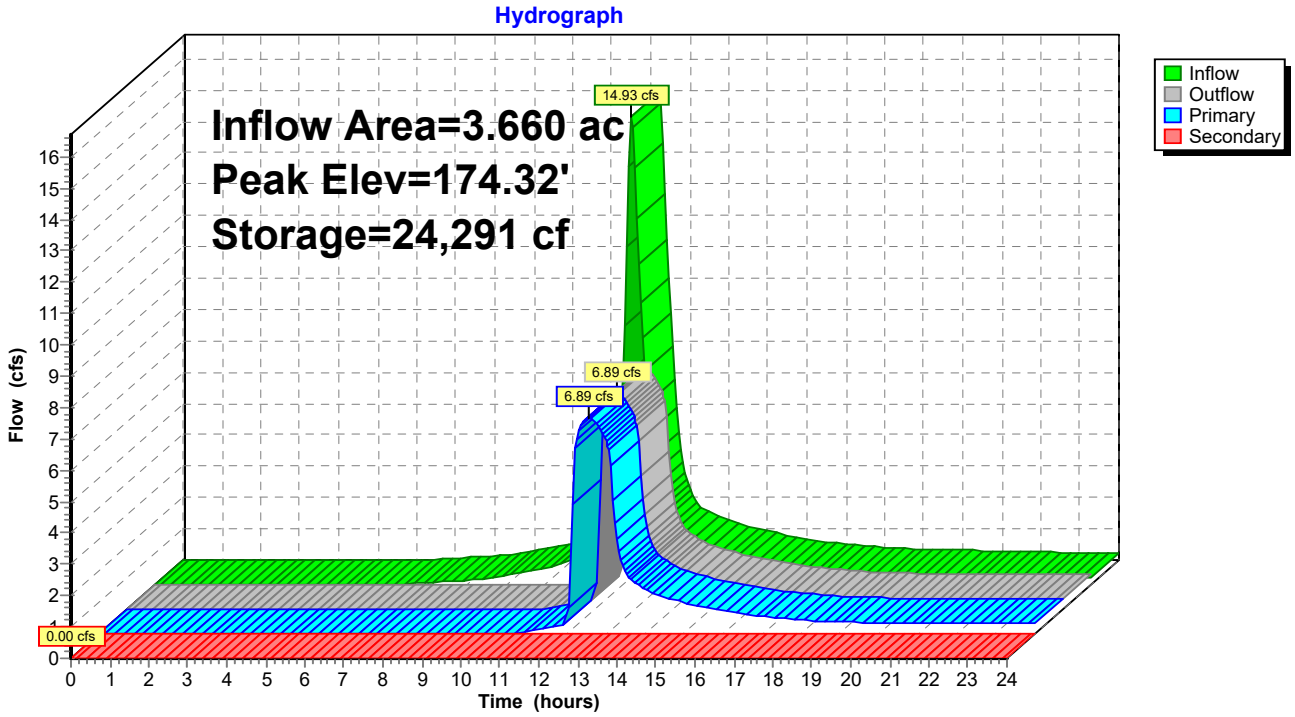
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.00	2,429	0	0
170.00	3,127	2,778	2,778
171.00	3,912	3,520	6,298
172.00	4,771	4,342	10,639
173.00	5,697	5,234	15,873
174.00	6,691	6,194	22,067
175.00	7,929	7,310	29,377

Device	Routing	Invert	Outlet Devices
#1	Device 2	172.70'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#2	Primary	170.50'	**12.0" Round Culvert** L= 42.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.50' / 170.00' S= 0.0119 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Secondary	174.60'	**30.0' long 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
#4	Device 2	170.50'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=6.89 cfs @ 12.55 hrs HW=174.32' (Free Discharge)
└**2=Culvert** (Inlet Controls 6.89 cfs @ 8.78 fps)
  ├**1=Sharp-Crested Rectangular Weir** (Passes < 25.24 cfs potential flow)
  └**4=Orifice/Grate** (Passes < 0.45 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=169.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2 - Pond: 2 - Pond



Summary for Pond 4 - Pond: 4 - Pond

Inflow Area = 9.080 ac, Inflow Depth > 4.04" for 50-YEAR STORM event
Inflow = 34.74 cfs @ 12.17 hrs, Volume= 3.053 af
Outflow = 10.21 cfs @ 12.60 hrs, Volume= 1.869 af, Atten= 71%, Lag= 26.0 min
Primary = 10.21 cfs @ 12.60 hrs, Volume= 1.869 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 125.90' @ 12.60 hrs Surf.Area= 15,386 sf Storage= 64,317 cf

Plug-Flow detention time= 204.8 min calculated for 1.869 af (61% of inflow)
Center-of-Mass det. time= 100.3 min (925.3 - 825.0)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	79,242 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

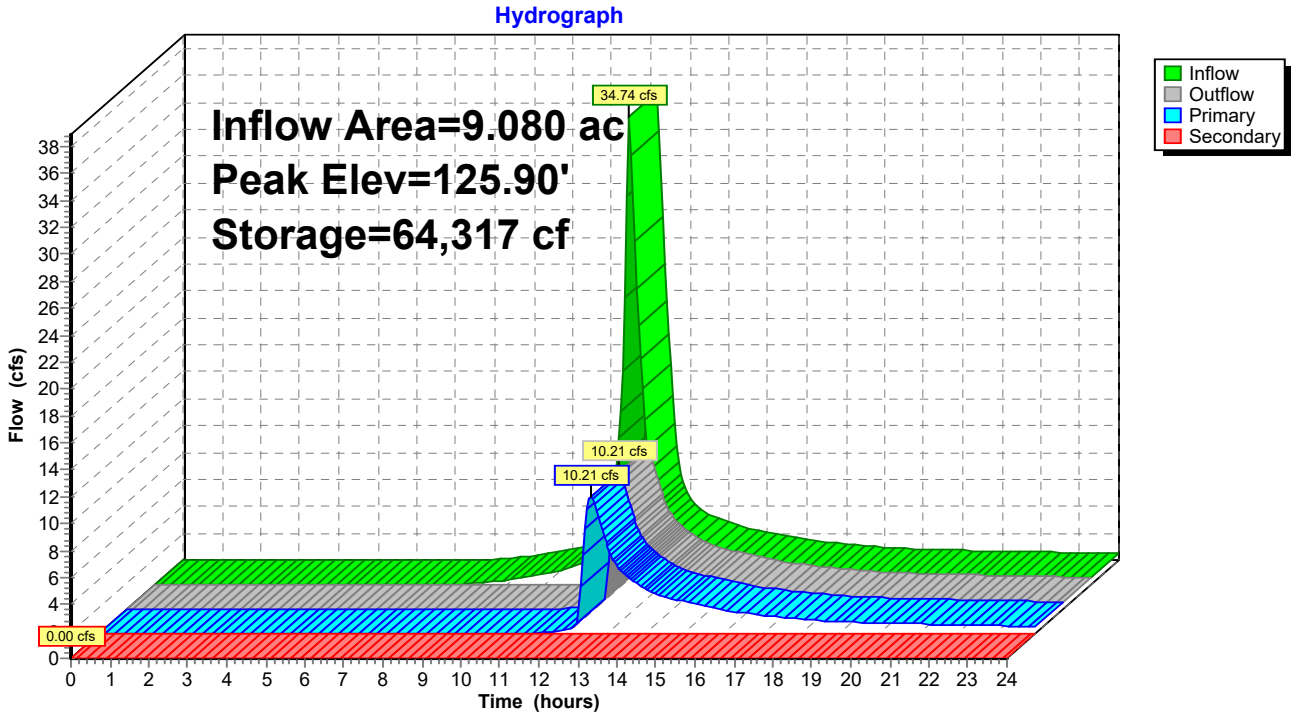
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	6,749	0	0
121.00	8,061	7,405	7,405
122.00	9,434	8,748	16,153
123.00	10,869	10,152	26,304
124.00	12,365	11,617	37,921
125.00	13,922	13,144	51,065
126.00	15,541	14,732	65,796
127.00	11,350	13,446	79,242

Device	Routing	Invert	Outlet Devices
#1	Primary	120.40'	**18.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 120.40' / 120.00' S= 0.0075 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	126.50'	**20.0' long 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
#3	Device 1	125.00'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	121.00'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=10.18 cfs @ 12.60 hrs HW=125.90' (Free Discharge)
└**1=Culvert** (Passes 10.18 cfs of 18.55 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 9.66 cfs @ 3.79 fps)
  └**4=Orifice/Grate** (Orifice Controls 0.52 cfs @ 10.53 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=120.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4 - Pond: 4 - Pond



Summary for Pond 5 - Pond: 5 - Pond

Inflow Area = 15.220 ac, Inflow Depth > 5.13" for 50-YEAR STORM event
Inflow = 67.06 cfs @ 12.21 hrs, Volume= 6.501 af
Outflow = 24.45 cfs @ 12.59 hrs, Volume= 5.699 af, Atten= 64%, Lag= 23.3 min
Primary = 24.45 cfs @ 12.59 hrs, Volume= 5.699 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 125.96' @ 12.59 hrs Surf.Area= 27,587 sf Storage= 126,080 cf

Plug-Flow detention time= 169.3 min calculated for 5.688 af (87% of inflow)
Center-of-Mass det. time= 114.8 min (917.6 - 802.8)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	187,159 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

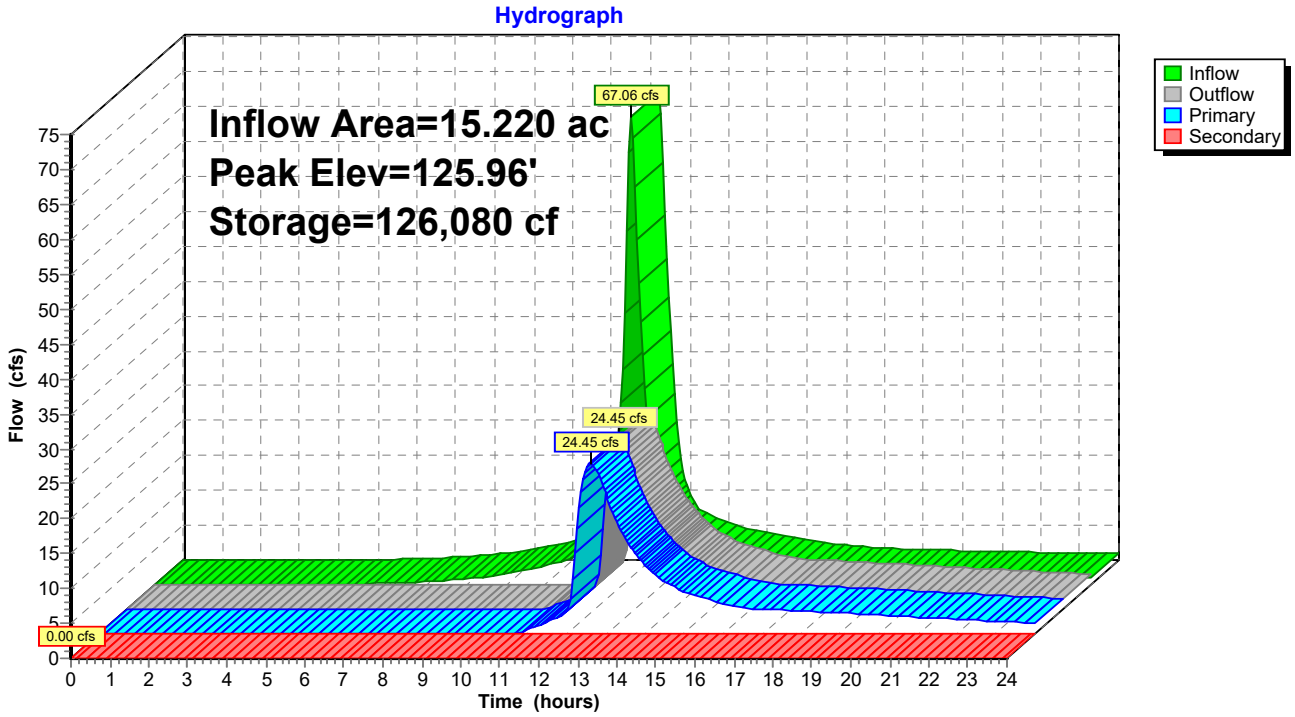
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	15,063	0	0
121.00	17,014	16,039	16,039
122.00	19,025	18,020	34,058
123.00	21,096	20,061	54,119
124.00	23,228	22,162	76,281
125.00	25,421	24,325	100,605
126.00	27,674	26,548	127,153
127.00	29,988	28,831	155,984
128.00	32,362	31,175	187,159

Device	Routing	Invert	Outlet Devices
#1	Device 2	123.50'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	121.30'	**24.0" Round Culvert** L= 81.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.30' / 115.25' S= 0.0742 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Secondary	127.90'	**30.0' long 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
#4	Device 2	121.30'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=24.43 cfs @ 12.59 hrs HW=125.96' (Free Discharge)
└**2=Culvert** (Passes 24.43 cfs of 28.94 cfs potential flow)
  ├**1=Sharp-Crested Rectangular Weir** (Weir Controls 19.02 cfs @ 5.13 fps)
  └**4=Orifice/Grate** (Orifice Controls 5.41 cfs @ 9.92 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=120.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5 - Pond: 5 - Pond



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: Runoff Area=4.190 ac Runoff Depth>4.99"
Tc=13.2 min CN=77 Runoff=19.22 cfs 1.742 af

Subcatchment1B: Runoff Area=4.570 ac Runoff Depth>5.44"
Tc=18.7 min CN=81 Runoff=19.96 cfs 2.073 af

Subcatchment1C: Runoff Area=11.850 ac Runoff Depth>5.67"
Tc=19.3 min CN=83 Runoff=52.94 cfs 5.603 af

Subcatchment2: Runoff Area=3.660 ac Runoff Depth>5.56"
Tc=16.2 min CN=82 Runoff=17.23 cfs 1.696 af

Subcatchment4: Runoff Area=9.080 ac Runoff Depth>4.76"
Tc=12.4 min CN=75 Runoff=40.93 cfs 3.603 af

Subcatchment5: Runoff Area=15.220 ac Runoff Depth>5.91"
Tc=15.3 min CN=85 Runoff=76.83 cfs 7.497 af

Pond 1A - Pond: 1A - Pond Peak Elev=130.91' Storage=36,406 cf Inflow=19.22 cfs 1.742 af
Primary=4.79 cfs 1.582 af Secondary=0.05 cfs 0.000 af Outflow=4.84 cfs 1.582 af

Pond 1B - Pond: 1B - Pond Peak Elev=124.70' Storage=50,963 cf Inflow=19.96 cfs 2.073 af
Primary=2.53 cfs 1.660 af Secondary=0.00 cfs 0.000 af Outflow=2.53 cfs 1.660 af

Pond 1C-Pond: 1C - Pond Peak Elev=119.74' Storage=109,182 cf Inflow=52.94 cfs 5.603 af
Primary=14.91 cfs 4.816 af Secondary=3.80 cfs 0.077 af Outflow=18.72 cfs 4.893 af

Pond 2 - Pond: 2 - Pond Peak Elev=174.71' Storage=27,099 cf Inflow=17.23 cfs 1.696 af
Primary=7.28 cfs 1.349 af Secondary=2.62 cfs 0.034 af Outflow=9.90 cfs 1.383 af

Pond 4 - Pond: 4 - Pond Peak Elev=126.25' Storage=69,489 cf Inflow=40.93 cfs 3.603 af
Primary=16.86 cfs 2.413 af Secondary=0.00 cfs 0.000 af Outflow=16.86 cfs 2.413 af

Pond 5 - Pond: 5 - Pond Peak Elev=126.48' Storage=140,738 cf Inflow=76.83 cfs 7.497 af
Primary=29.36 cfs 6.650 af Secondary=0.00 cfs 0.000 af Outflow=29.36 cfs 6.650 af

Total Runoff Area = 48.570 ac Runoff Volume = 22.214 af Average Runoff Depth = 5.49"

Summary for Subcatchment 1A:

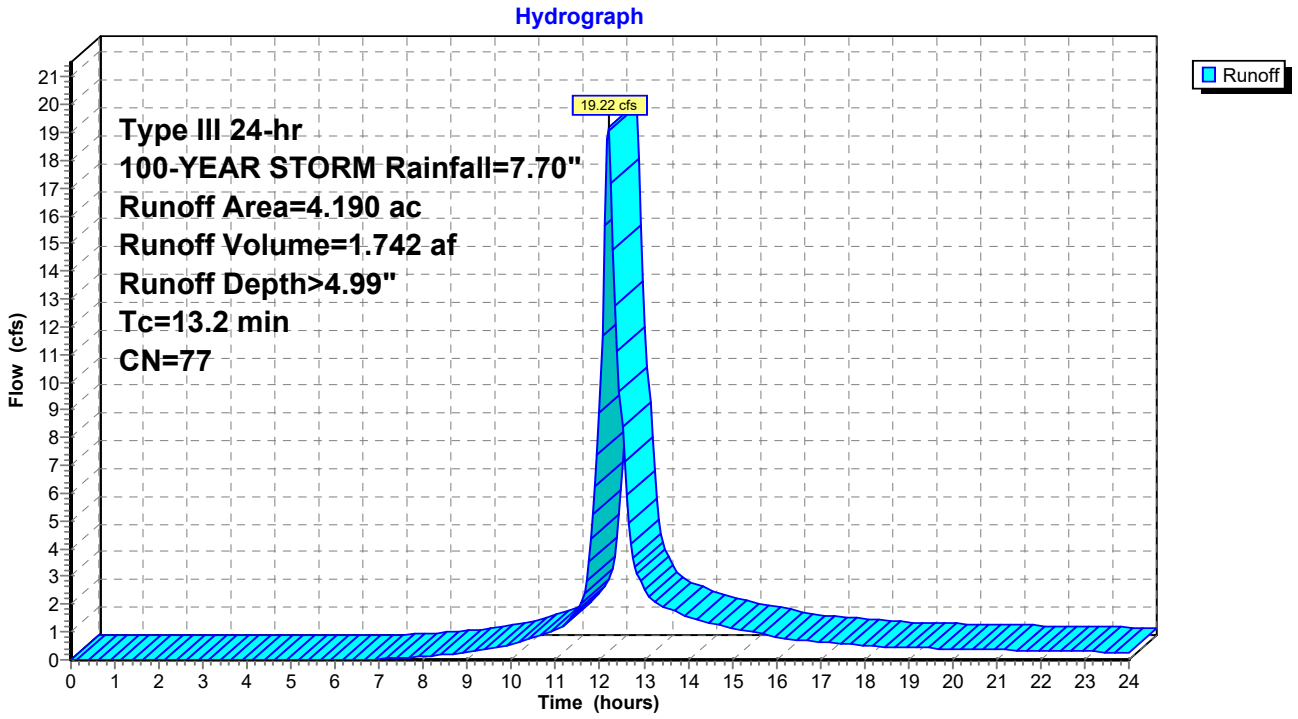
Runoff = 19.22 cfs @ 12.18 hrs, Volume= 1.742 af, Depth> 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	4.190	77	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2					**Direct Entry, NRCS Part 630**

Subcatchment 1A:



Summary for Subcatchment 1B:

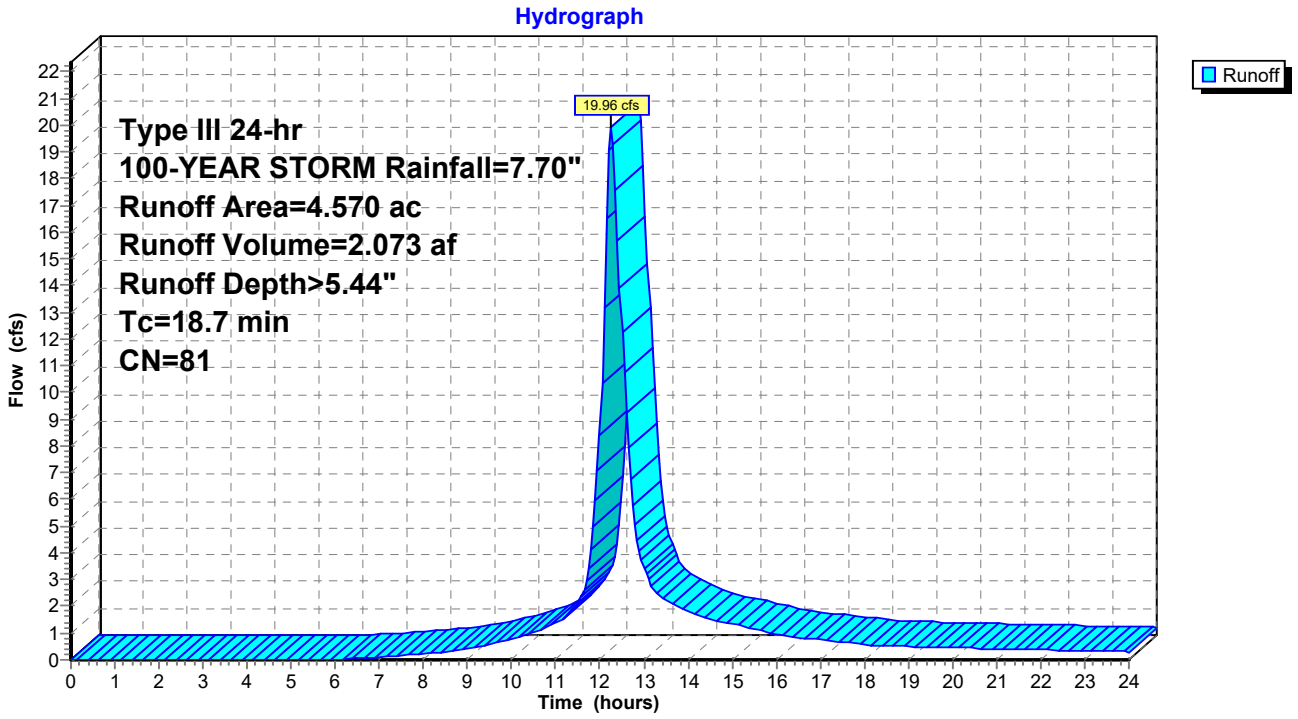
Runoff = 19.96 cfs @ 12.25 hrs, Volume= 2.073 af, Depth> 5.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	4.570	81	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					**Direct Entry, NRCS Part 630**

Subcatchment 1B:



Summary for Subcatchment 1C:

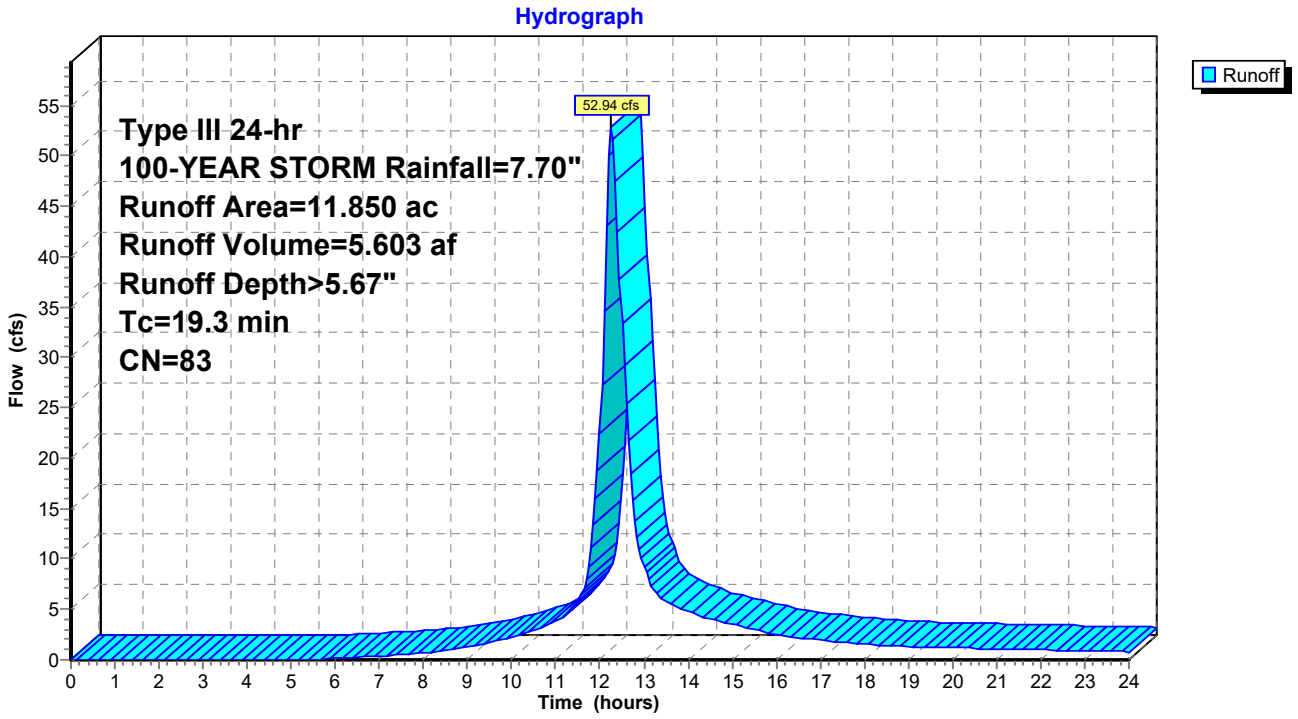
Runoff = 52.94 cfs @ 12.26 hrs, Volume= 5.603 af, Depth> 5.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	11.850	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3					**Direct Entry, NRCS Part 630**

Subcatchment 1C:



Summary for Subcatchment 2:

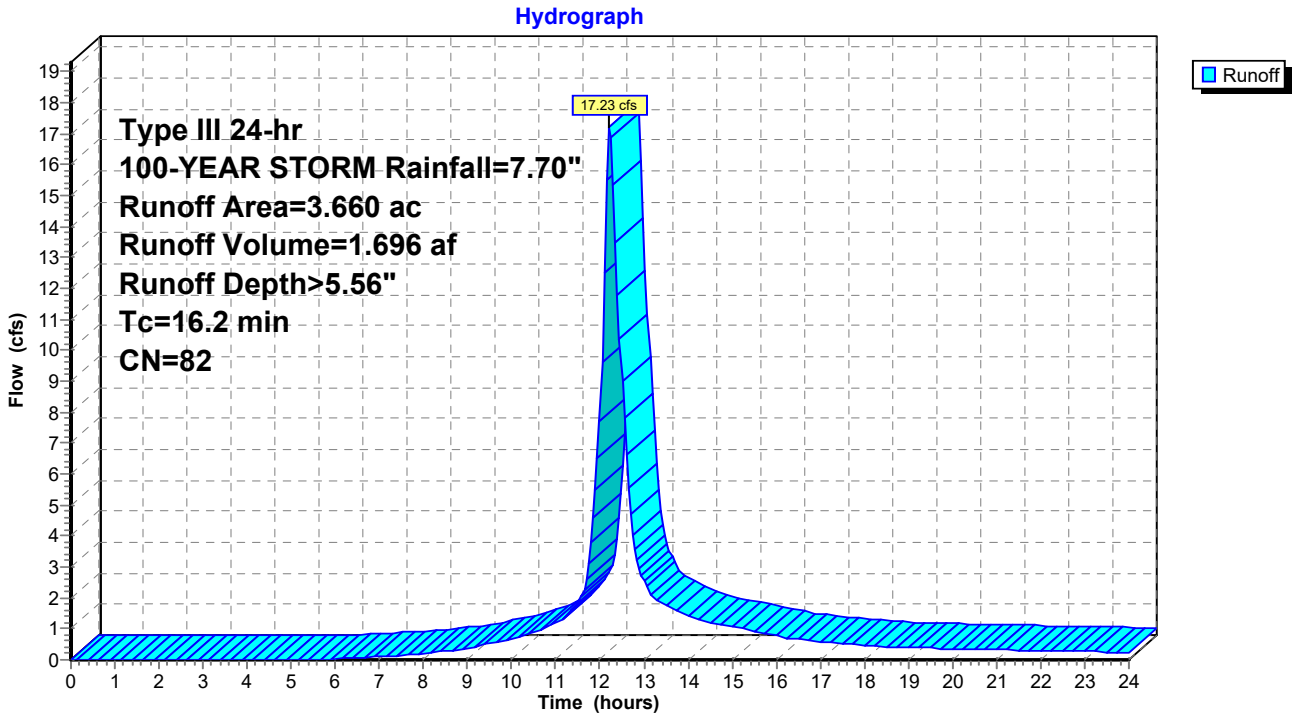
Runoff = 17.23 cfs @ 12.22 hrs, Volume= 1.696 af, Depth> 5.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	3.660	82	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2					**Direct Entry, NRCS Part 630**

Subcatchment 2:



Summary for Subcatchment 4:

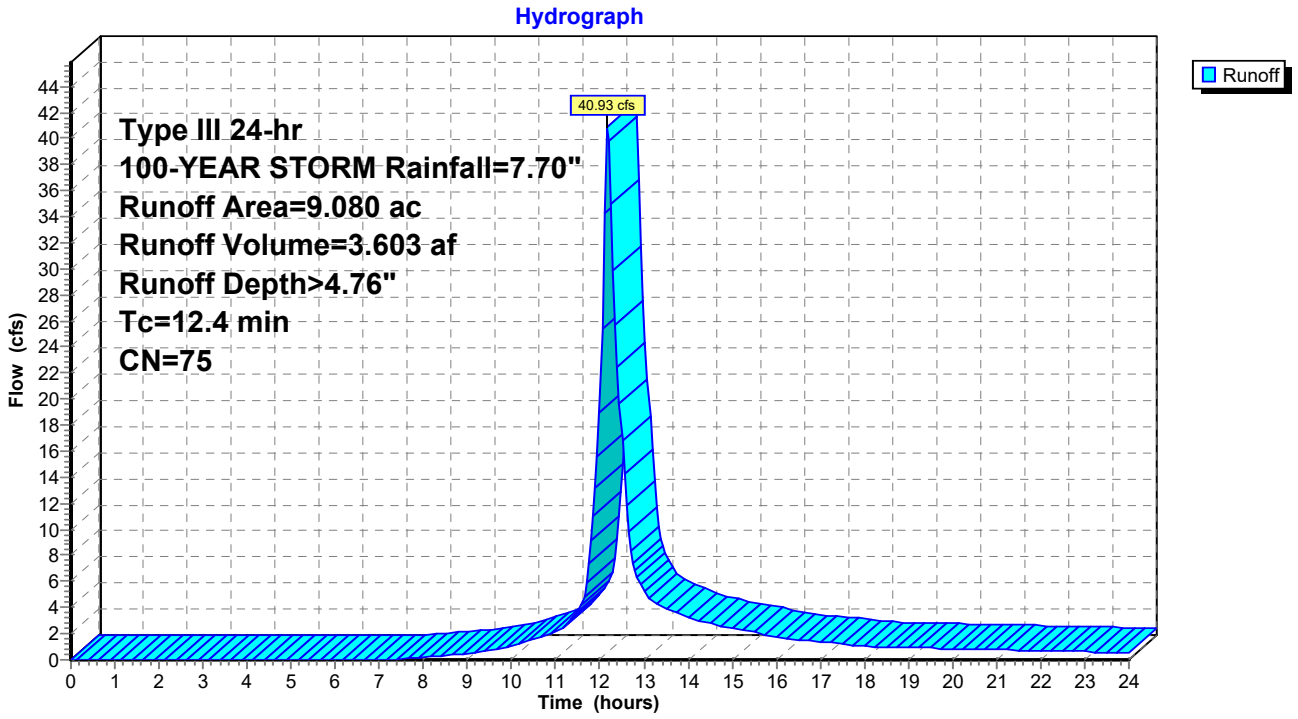
Runoff = 40.93 cfs @ 12.17 hrs, Volume= 3.603 af, Depth> 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	9.080	75	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4					**Direct Entry, NRCS Part 630**

Subcatchment 4:



Summary for Subcatchment 5:

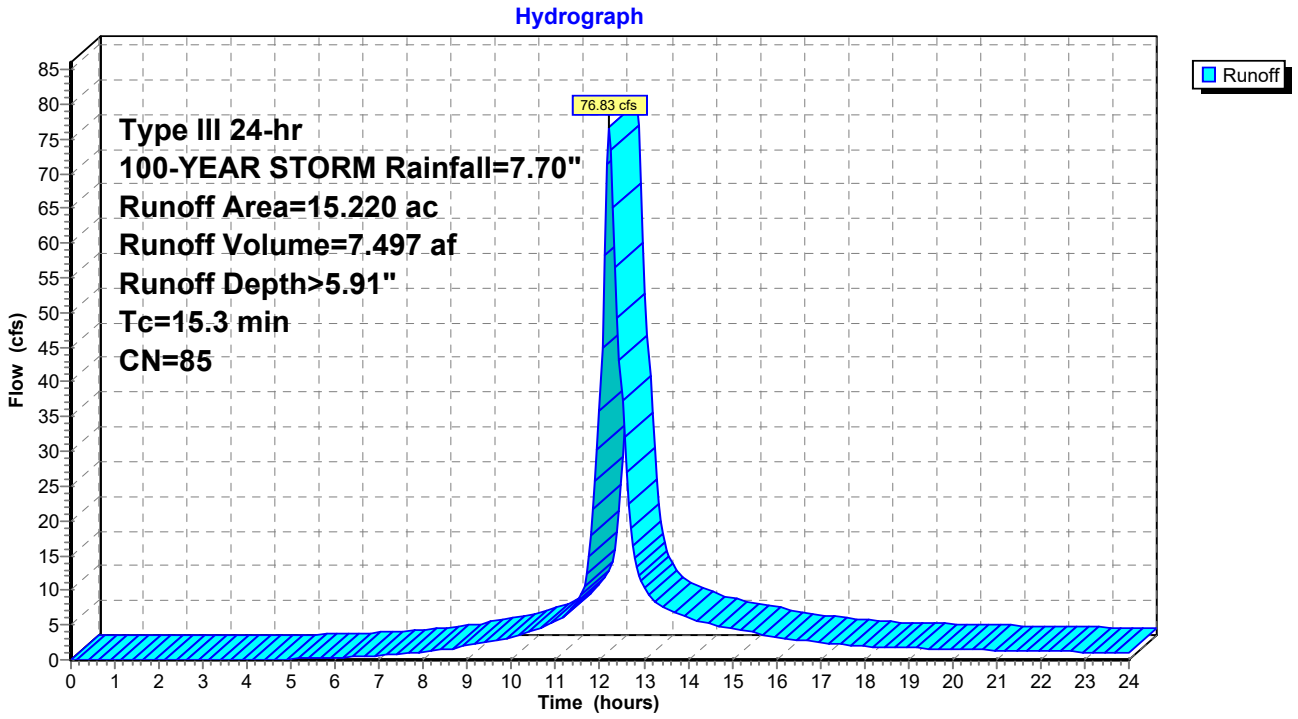
Runoff = 76.83 cfs @ 12.21 hrs, Volume= 7.497 af, Depth> 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR STORM Rainfall=7.70"

	Area (ac)	CN	Description
*	15.220	85	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3					**Direct Entry, NRCS Part 630**

Subcatchment 5:



Summary for Pond 1A - Pond: 1A - Pond

Inflow Area = 4.190 ac, Inflow Depth > 4.99" for 100-YEAR STORM event
Inflow = 19.22 cfs @ 12.18 hrs, Volume= 1.742 af
Outflow = 4.84 cfs @ 12.66 hrs, Volume= 1.582 af, Atten= 75%, Lag= 28.6 min
Primary = 4.79 cfs @ 12.66 hrs, Volume= 1.582 af
Secondary = 0.05 cfs @ 12.65 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 130.91' @ 12.66 hrs Surf.Area= 9,301 sf Storage= 36,406 cf

Plug-Flow detention time= 205.2 min calculated for 1.582 af (91% of inflow)
Center-of-Mass det. time= 160.6 min (977.1 - 816.6)

Volume	Invert	Avail.Storage	Storage Description
#1	123.00'	37,272 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

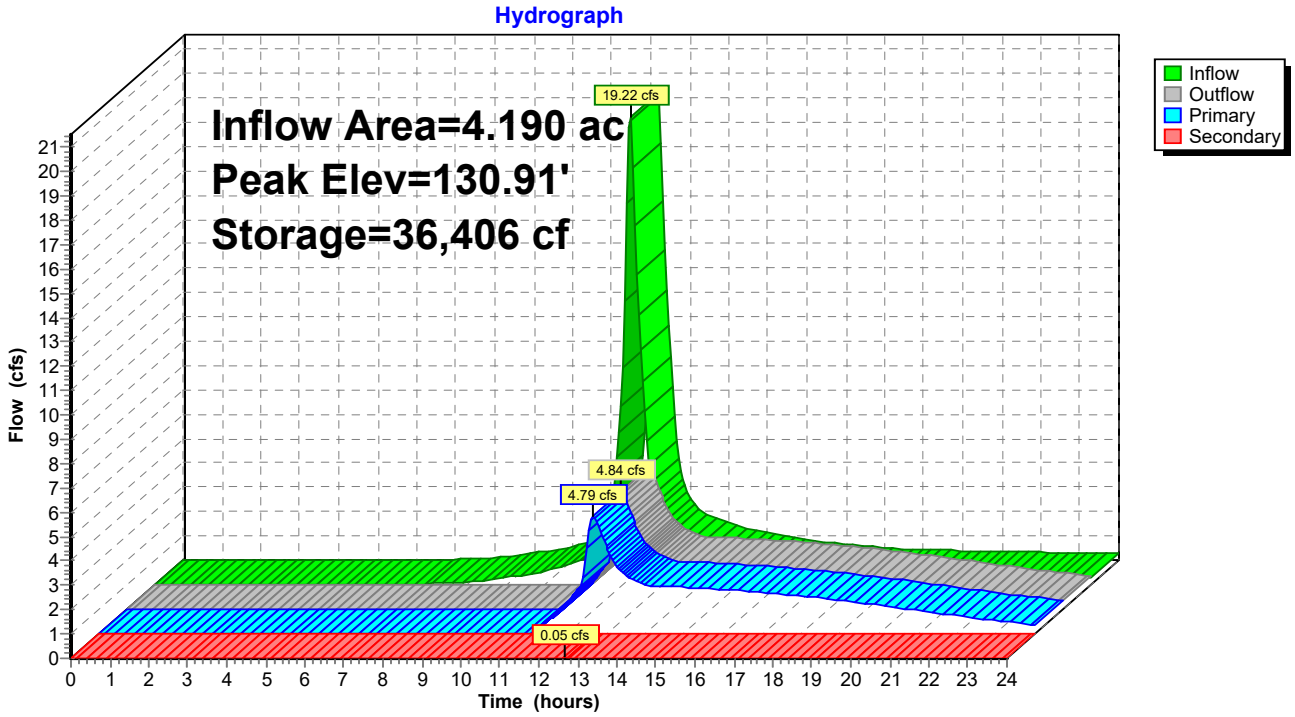
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
123.00	692	0	0
124.00	1,464	1,078	1,078
125.00	2,382	1,923	3,001
126.00	3,381	2,882	5,883
127.00	4,452	3,917	9,799
128.00	5,614	5,033	14,832
129.00	6,826	6,220	21,052
130.00	8,095	7,461	28,513
131.00	9,424	8,760	37,272

Device	Routing	Invert	Outlet Devices
#1	Secondary	130.90'	**20.0' long 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
#2	Primary	125.80'	**24.0" Round Culvert** L= 401.4' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 125.80' / 123.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	130.50'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 2	125.90'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=4.78 cfs @ 12.66 hrs HW=130.91' (Free Discharge)
└**2=Culvert** (Passes 4.78 cfs of 23.73 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 2.71 cfs @ 2.29 fps)
  └**4=Orifice/Grate** (Orifice Controls 2.06 cfs @ 10.50 fps)

Secondary OutFlow Max=0.03 cfs @ 12.65 hrs HW=130.91' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.21 fps)

Pond 1A - Pond: 1A - Pond



Summary for Pond 1B - Pond: 1B - Pond

Inflow Area = 4.570 ac, Inflow Depth > 5.44" for 100-YEAR STORM event
Inflow = 19.96 cfs @ 12.25 hrs, Volume= 2.073 af
Outflow = 2.53 cfs @ 13.27 hrs, Volume= 1.660 af, Atten= 87%, Lag= 60.7 min
Primary = 2.53 cfs @ 13.27 hrs, Volume= 1.660 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 124.70' @ 13.27 hrs Surf.Area= 12,022 sf Storage= 50,963 cf

Plug-Flow detention time= 296.4 min calculated for 1.656 af (80% of inflow)
Center-of-Mass det. time= 222.9 min (1,034.7 - 811.8)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	83,261 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

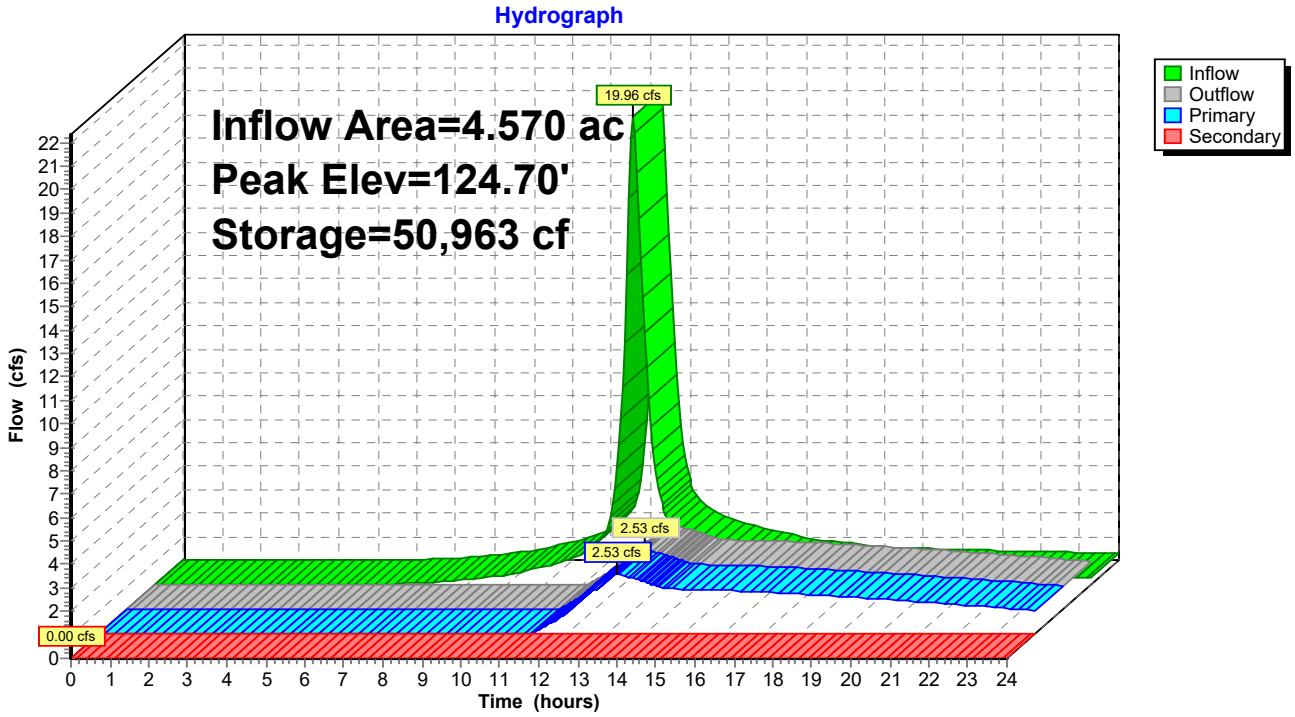
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.00	5,600	0	0
120.00	6,708	6,154	6,154
121.00	7,871	7,290	13,444
122.00	9,092	8,482	21,925
123.00	10,369	9,731	31,656
124.00	11,703	11,036	42,692
125.00	12,160	11,932	54,623
126.00	14,538	13,349	67,972
127.00	16,040	15,289	83,261

Device	Routing	Invert	Outlet Devices
#1	Primary	120.20'	**15.0" Round Culvert** L= 88.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 120.20' / 119.00' S= 0.0136 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	126.90'	**20.0' long 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
#3	Device 1	124.55'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	120.20'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.52 cfs @ 13.27 hrs HW=124.70' (Free Discharge)
└**1=Culvert** (Passes 2.52 cfs of 11.52 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.57 cfs @ 1.30 fps)
  └**4=Orifice/Grate** (Orifice Controls 1.95 cfs @ 9.92 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B - Pond: 1B - Pond



Summary for Pond 1C-Pond: 1C - Pond

Inflow Area = 11.850 ac, Inflow Depth > 5.67" for 100-YEAR STORM event
Inflow = 52.94 cfs @ 12.26 hrs, Volume= 5.603 af
Outflow = 18.72 cfs @ 12.70 hrs, Volume= 4.893 af, Atten= 65%, Lag= 26.5 min
Primary = 14.91 cfs @ 12.70 hrs, Volume= 4.816 af
Secondary = 3.80 cfs @ 12.70 hrs, Volume= 0.077 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 119.74' @ 12.70 hrs Surf.Area= 28,109 sf Storage= 109,182 cf

Plug-Flow detention time= 151.3 min calculated for 4.893 af (87% of inflow)
Center-of-Mass det. time= 95.5 min (902.8 - 807.3)

Volume	Invert	Avail.Storage	Storage Description
#1	114.00'	116,658 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

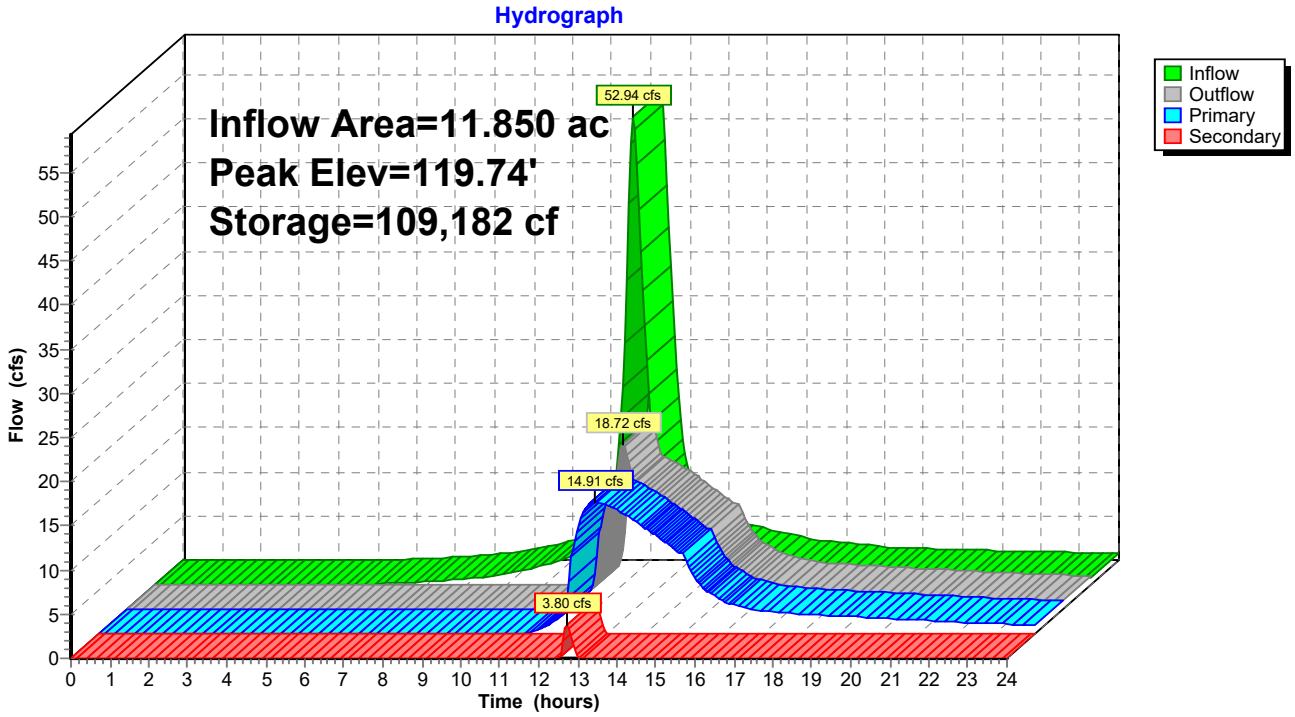
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	10,374	0	0
115.00	13,288	11,831	11,831
116.00	16,269	14,779	26,610
117.00	19,320	17,795	44,404
118.00	22,447	20,884	65,288
119.00	25,657	24,052	89,340
120.00	28,979	27,318	116,658

Device	Routing	Invert	Outlet Devices
#1	Primary	115.70'	**18.0" Round Culvert** L= 91.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 115.70' / 115.00' S= 0.0076 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	119.60'	**30.0' long x 8.0' 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 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	116.90'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	115.70'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=14.91 cfs @ 12.70 hrs HW=119.74' (Free Discharge)
└**1=Culvert** (Barrel Controls 14.91 cfs @ 8.44 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Passes < 64.42 cfs potential flow)
  └**4=Orifice/Grate** (Passes < 5.00 cfs potential flow)

Secondary OutFlow Max=3.73 cfs @ 12.70 hrs HW=119.74' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 3.73 cfs @ 0.90 fps)

Pond 1C-Pond: 1C - Pond



Summary for Pond 2 - Pond: 2 - Pond

Inflow Area = 3.660 ac, Inflow Depth > 5.56" for 100-YEAR STORM event
Inflow = 17.23 cfs @ 12.22 hrs, Volume= 1.696 af
Outflow = 9.90 cfs @ 12.47 hrs, Volume= 1.383 af, Atten= 43%, Lag= 15.4 min
Primary = 7.28 cfs @ 12.47 hrs, Volume= 1.349 af
Secondary = 2.62 cfs @ 12.47 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 174.71' @ 12.47 hrs Surf.Area= 7,565 sf Storage= 27,099 cf

Plug-Flow detention time= 131.9 min calculated for 1.383 af (82% of inflow)
Center-of-Mass det. time= 61.0 min (868.3 - 807.3)

Volume	Invert	Avail.Storage	Storage Description
#1	169.00'	29,377 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

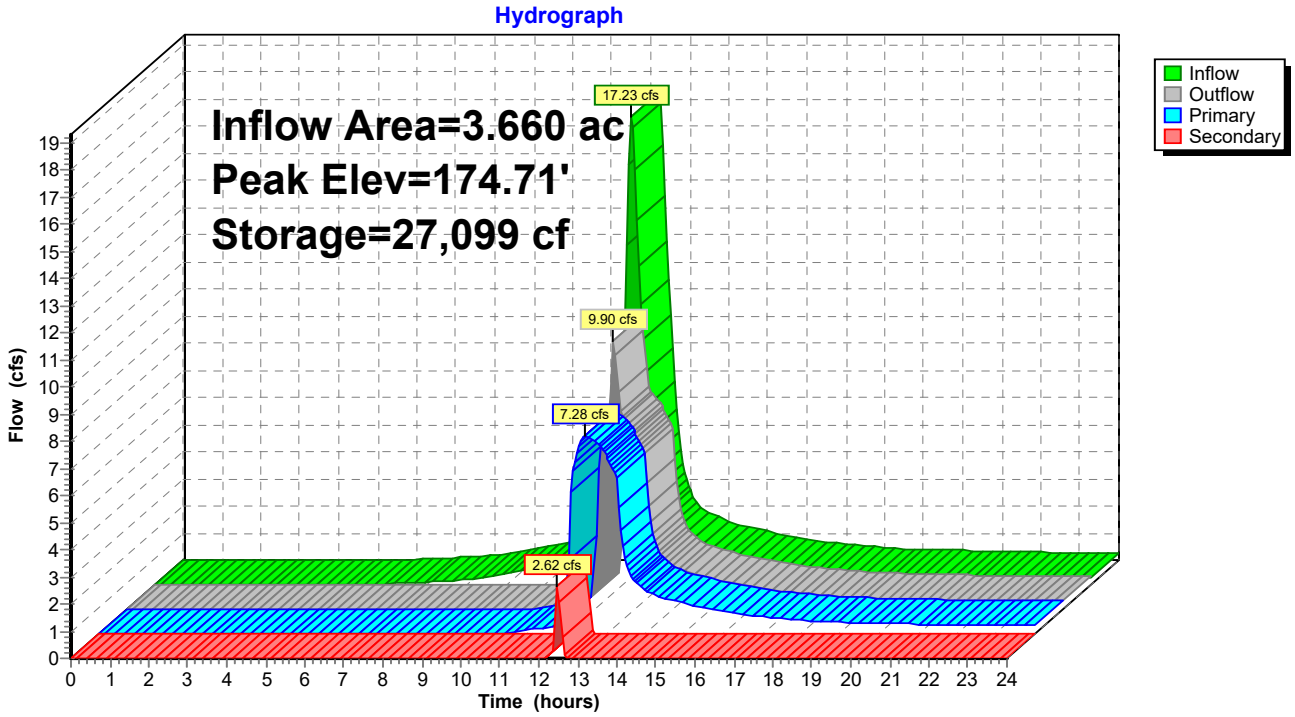
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.00	2,429	0	0
170.00	3,127	2,778	2,778
171.00	3,912	3,520	6,298
172.00	4,771	4,342	10,639
173.00	5,697	5,234	15,873
174.00	6,691	6,194	22,067
175.00	7,929	7,310	29,377

Device	Routing	Invert	Outlet Devices
#1	Device 2	172.70'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#2	Primary	170.50'	**12.0" Round Culvert** L= 42.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.50' / 170.00' S= 0.0119 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Secondary	174.60'	**30.0' long 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
#4	Device 2	170.50'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=7.27 cfs @ 12.47 hrs HW=174.70' (Free Discharge)
└**2=Culvert** (Inlet Controls 7.27 cfs @ 9.26 fps)
  ├**1=Sharp-Crested Rectangular Weir** (Passes < 35.80 cfs potential flow)
  └**4=Orifice/Grate** (Passes < 0.48 cfs potential flow)

Secondary OutFlow Max=2.42 cfs @ 12.47 hrs HW=174.70' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 2.42 cfs @ 0.81 fps)

Pond 2 - Pond: 2 - Pond



Summary for Pond 4 - Pond: 4 - Pond

Inflow Area = 9.080 ac, Inflow Depth > 4.76" for 100-YEAR STORM event
Inflow = 40.93 cfs @ 12.17 hrs, Volume= 3.603 af
Outflow = 16.86 cfs @ 12.50 hrs, Volume= 2.413 af, Atten= 59%, Lag= 20.0 min
Primary = 16.86 cfs @ 12.50 hrs, Volume= 2.413 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 126.25' @ 12.50 hrs Surf.Area= 14,511 sf Storage= 69,489 cf

Plug-Flow detention time= 181.2 min calculated for 2.413 af (67% of inflow)
Center-of-Mass det. time= 83.8 min (904.2 - 820.3)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	79,242 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

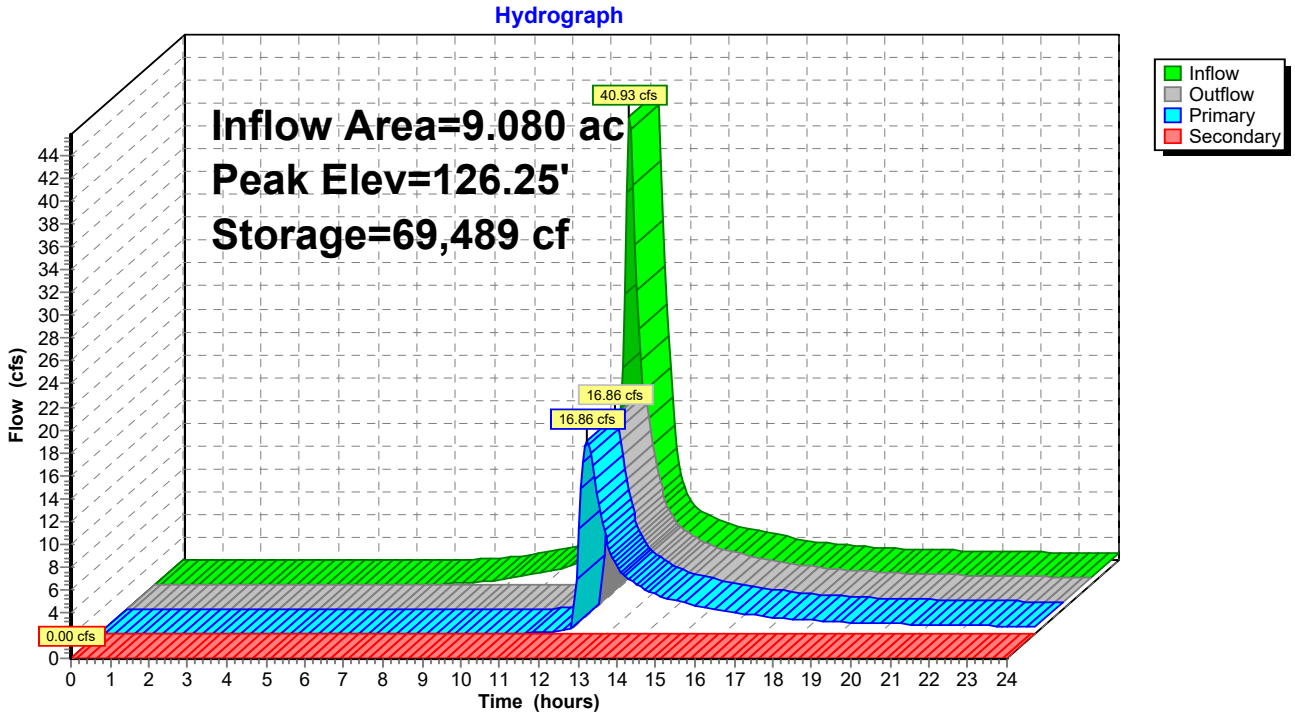
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	6,749	0	0
121.00	8,061	7,405	7,405
122.00	9,434	8,748	16,153
123.00	10,869	10,152	26,304
124.00	12,365	11,617	37,921
125.00	13,922	13,144	51,065
126.00	15,541	14,732	65,796
127.00	11,350	13,446	79,242

Device	Routing	Invert	Outlet Devices
#1	Primary	120.40'	**18.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 120.40' / 120.00' S= 0.0075 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	126.50'	**20.0' long 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
#3	Device 1	125.00'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#4	Device 1	121.00'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=16.83 cfs @ 12.50 hrs HW=126.24' (Free Discharge)
↑ **1=Culvert** (Passes 16.83 cfs of 19.21 cfs potential flow)
↑ **3=Sharp-Crested Rectangular Weir** (Weir Controls 16.29 cfs @ 4.76 fps)
4=Orifice/Grate (Orifice Controls 0.53 cfs @ 10.89 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=120.00' (Free Discharge)
↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4 - Pond: 4 - Pond



Summary for Pond 5 - Pond: 5 - Pond

Inflow Area = 15.220 ac, Inflow Depth > 5.91" for 100-YEAR STORM event
Inflow = 76.83 cfs @ 12.21 hrs, Volume= 7.497 af
Outflow = 29.36 cfs @ 12.58 hrs, Volume= 6.650 af, Atten= 62%, Lag= 22.3 min
Primary = 29.36 cfs @ 12.58 hrs, Volume= 6.650 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 126.48' @ 12.58 hrs Surf.Area= 28,788 sf Storage= 140,738 cf

Plug-Flow detention time= 158.4 min calculated for 6.636 af (89% of inflow)
Center-of-Mass det. time= 107.1 min (906.0 - 798.9)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	187,159 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

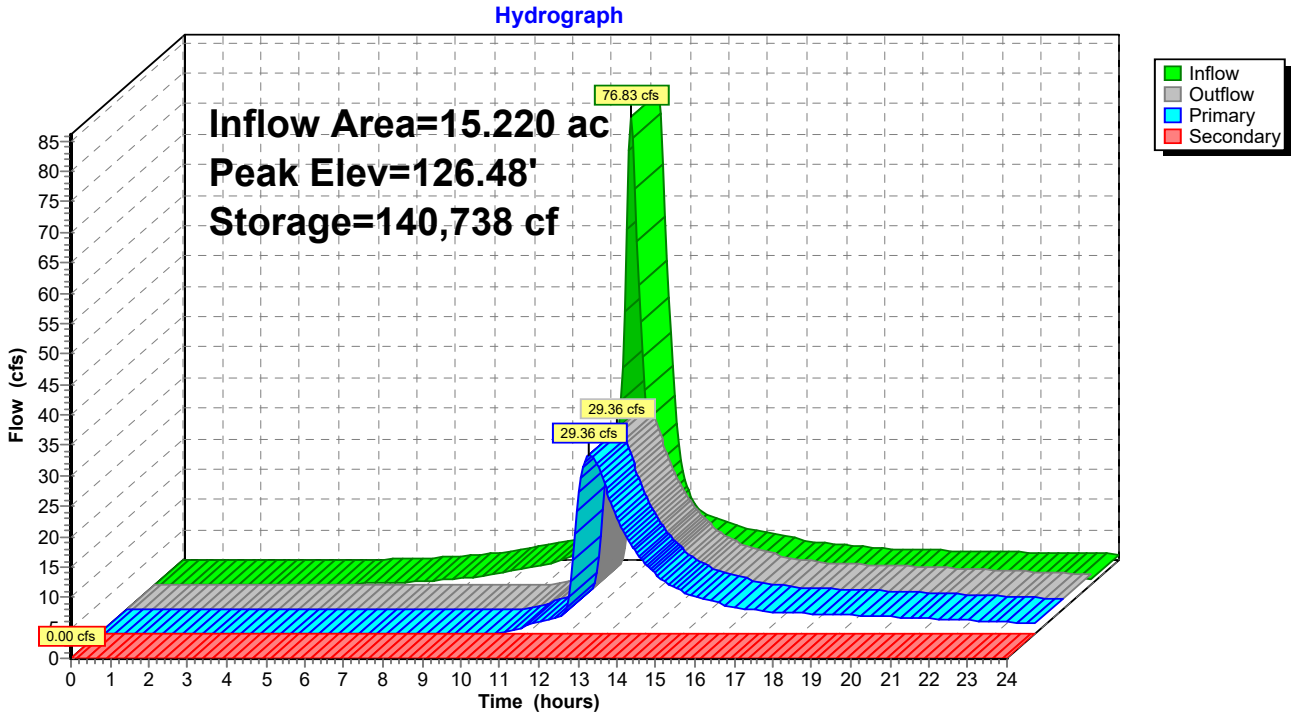
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	15,063	0	0
121.00	17,014	16,039	16,039
122.00	19,025	18,020	34,058
123.00	21,096	20,061	54,119
124.00	23,228	22,162	76,281
125.00	25,421	24,325	100,605
126.00	27,674	26,548	127,153
127.00	29,988	28,831	155,984
128.00	32,362	31,175	187,159

Device	Routing	Invert	Outlet Devices
#1	Device 2	123.50'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	121.30'	**24.0" Round Culvert** L= 81.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.30' / 115.25' S= 0.0742 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Secondary	127.90'	**30.0' long 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
#4	Device 2	121.30'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=29.33 cfs @ 12.58 hrs HW=126.48' (Free Discharge)
└**2=Culvert** (Passes 29.33 cfs of 30.92 cfs potential flow)
  ├**1=Sharp-Crested Rectangular Weir** (Weir Controls 23.60 cfs @ 5.64 fps)
  └**4=Orifice/Grate** (Orifice Controls 5.73 cfs @ 10.51 fps)

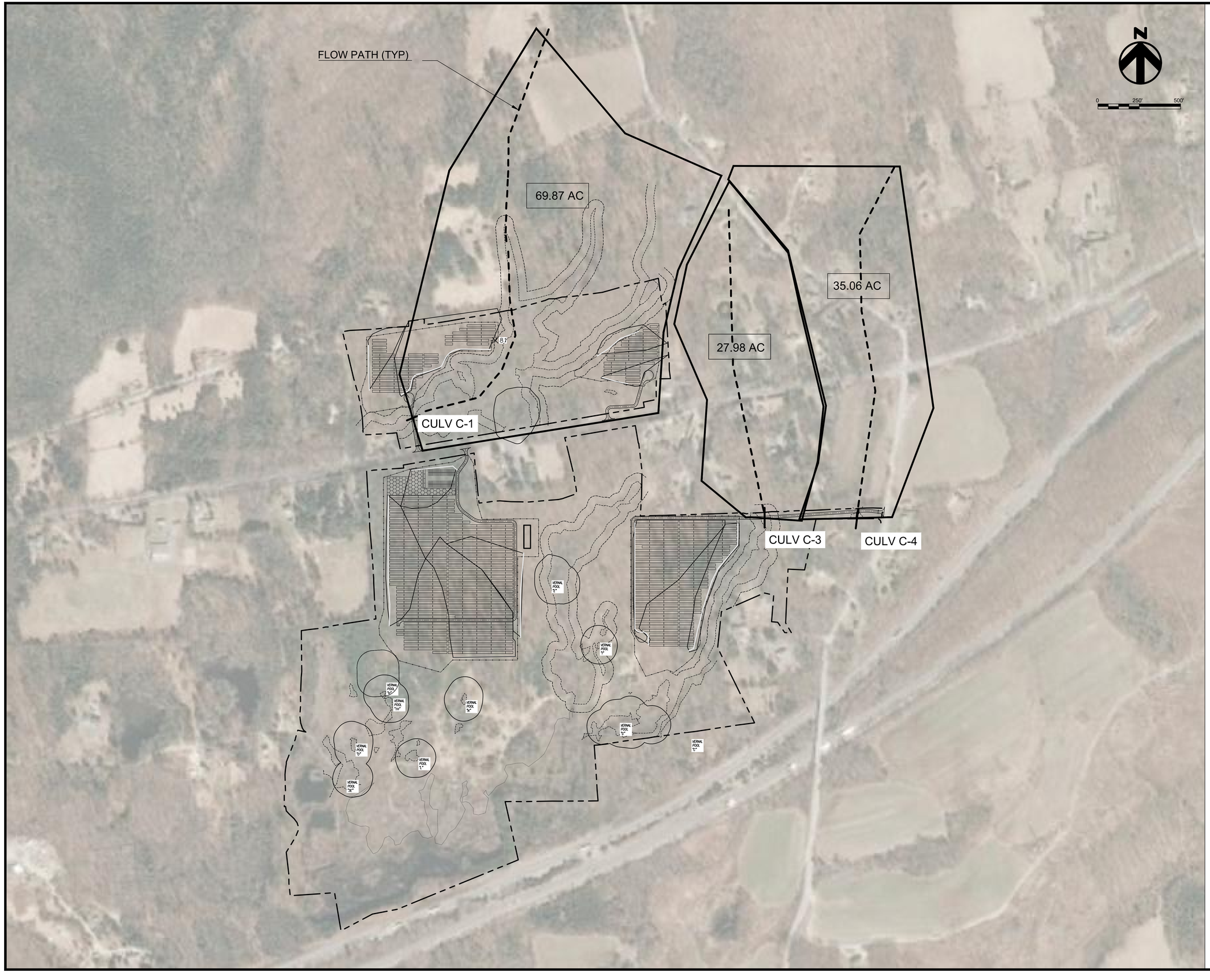
Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=120.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5 - Pond: 5 - Pond



Appendix I

Culvert, Ditch, and Water Quality Calculations



HDR

SILICON RANCH

NOT FOR CONSTRUCTION

STONINGTON SOLAR

428, PROVIDENCE-NEW LONDON TURNPIKE
NORTH STONINGTON, CT 06359, USA

LAT: 41.431830°N
LON: 71.821514°W

STONINGTON, CT

REV. NO	DESCRIPTION	DATE
3	RE-ISSUED FOR PERMIT	06/25/21
2	RE-ISSUED FOR PERMIT	05/28/21
1	RE-ISSUED FOR PERMIT	02/19/21
0	ISSUED FOR PERMIT	09/30/20

SHEET TITLE:

CULVERT DRAINAGE AREAS

PROJ. MGR.	PROJ. ENGR.	DATE:
WK	MB	5/28/21
DRAWN BY:	CHECKED BY:	SCALE:
NC	CP	1:250

DRAWING NO.

EXHIBIT

HDR

SILICON RANCH

NOT FOR CONSTRUCTION

STONINGTON SOLAR

428, PROVIDENCE-NEW LONDON TURNPIKE
NORTH STONINGTON, CT 06359, USA
LAT: 41.431830°N
LON: 71.821514°W

STONINGTON, CT

REV. NO	DESCRIPTION	DATE
3	RE-ISSUED FOR PERMIT	06/25/21
2	RE-ISSUED FOR PERMIT	05/28/21
1	RE-ISSUED FOR PERMIT	02/19/21
0	ISSUED FOR PERMIT	09/30/20

SHEET TITLE:

DITCH DRAINAGE AREA EXHIBIT

PROJ. MGR.	PROJ. ENGR.	DATE:
WK	MB	5/28/21
DRAWN BY:	CHECKED BY:	SCALE:
NC	CP	1:250

DRAWING NO.

EXHIBIT

Stonington Solar Array Facility
North Stonington, CT
SRC

9/23/2020

Culvert Calculations

Storm Event: 50-yr

Culvert	Type	Est. Peak Flow Q 25 (cfs)	Est. Peak Flow Q 50-yr (cfs)	Length (ft)	Shape	Span (ft)	Rise (ft)	Area (sf)	Open Area (sf)	OR (Open Area) / Length	Ex Stream Slope (%)	Arch Req'd
C-1	New	126.13	163.36	20	Box	9	3.00	27	18	0.90	0.40	No
C-3	New	69.43	87.23	20	Arch (Bottomless)	9	2.92	26.25	26.25	1.31	5.4	Yes
C-4	Existing	83.36	104.78	20	Arch (Bottomless)	10	3.46	34.58	34.58	1.73	3.5	Yes

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	126.13	2	748	758,965	------	------	------	CULVERT C-1
2	SCS Runoff	21.52	2	740	112,804	------	------	------	CULVERT C-2
3	SCS Runoff	69.43	2	740	363,040	------	------	------	CULVERT C-3
4	SCS Runoff	83.36	2	742	460,589	------	------	------	CULVERT C-4

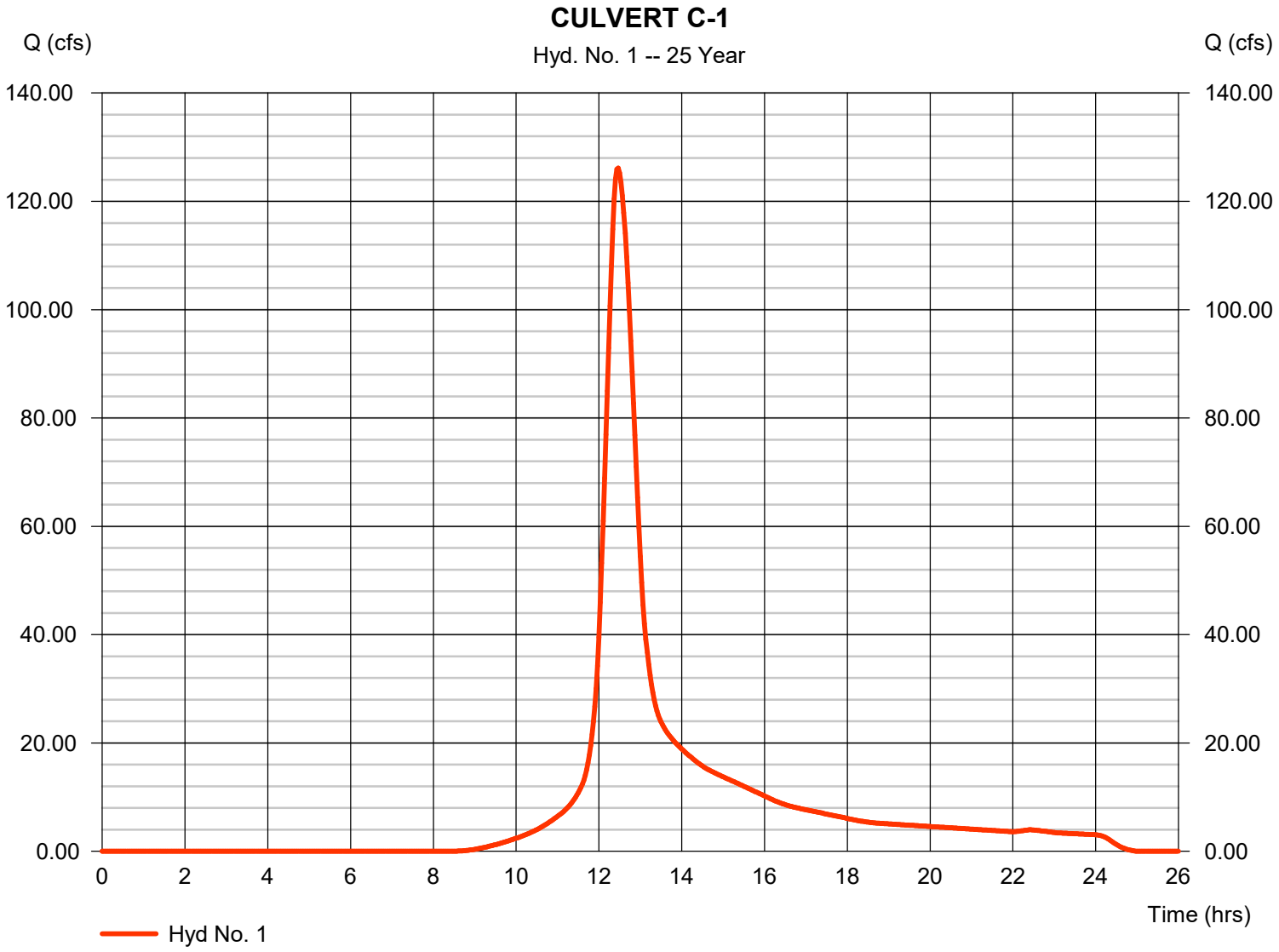
Hydrograph Report

Hyd. No. 1

CULVERT C-1

Hydrograph type	= SCS Runoff	Peak discharge	= 126.13 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.47 hrs
Time interval	= 2 min	Hyd. volume	= 758,965 cuft
Drainage area	= 69.870 ac	Curve number	= 74*
Basin Slope	= 4.5 %	Hydraulic length	= 2679 ft
Tc method	= LAG	Time of conc. (Tc)	= 39.45 min
Total precip.	= 5.77 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(35.000 x 79) + (34.870 x 68)] / 69.870

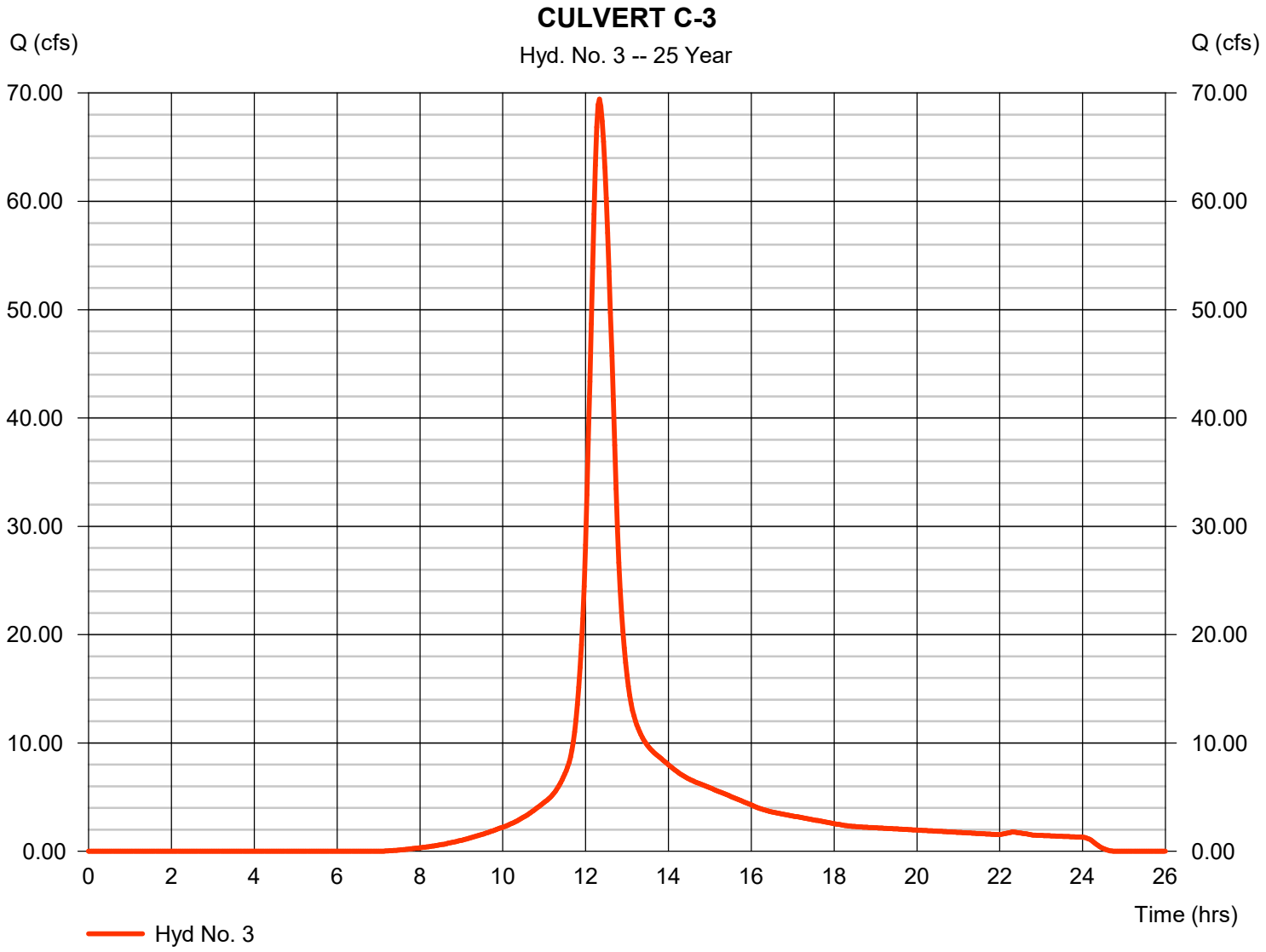


Hydrograph Report

Hyd. No. 3

CULVERT C-3

Hydrograph type	= SCS Runoff	Peak discharge	= 69.43 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 363,040 cuft
Drainage area	= 27.980 ac	Curve number	= 80
Basin Slope	= 3.2 %	Hydraulic length	= 1874 ft
Tc method	= LAG	Time of conc. (Tc)	= 29.42 min
Total precip.	= 5.77 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

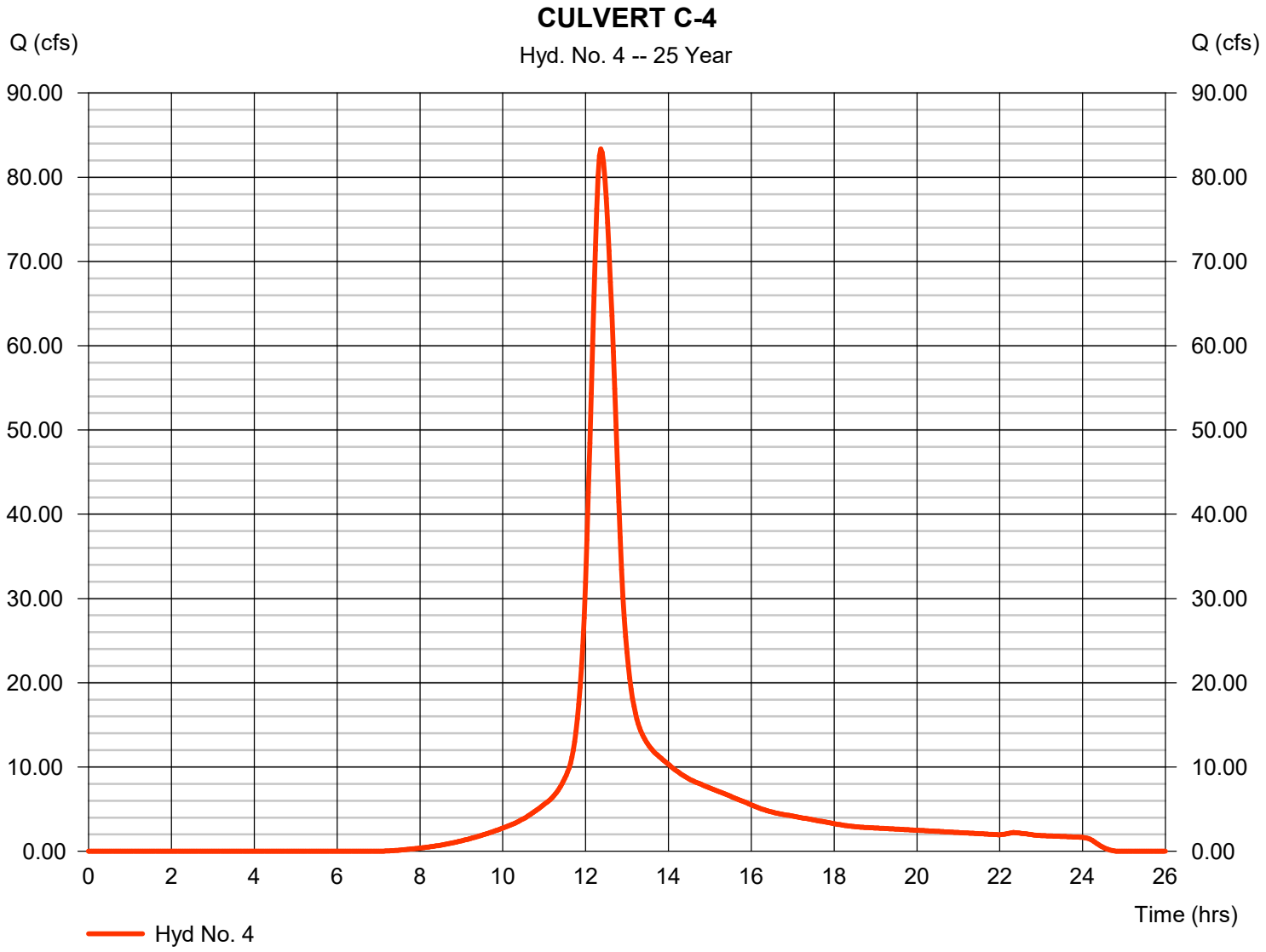


Hydrograph Report

Hyd. No. 4

CULVERT C-4

Hydrograph type	=	SCS Runoff	Peak discharge	=	83.36 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.37 hrs
Time interval	=	2 min	Hyd. volume	=	460,589 cuft
Drainage area	=	35.060 ac	Curve number	=	80
Basin Slope	=	3.6 %	Hydraulic length	=	2196 ft
Tc method	=	LAG	Time of conc. (Tc)	=	31.49 min
Total precip.	=	5.77 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	163.36	2	746	981,098	------	------	------	CULVERT C-1
2	SCS Runoff	28.04	2	740	146,448	------	------	------	CULVERT C-2
3	SCS Runoff	87.23	2	740	458,092	------	------	------	CULVERT C-3
4	SCS Runoff	104.78	2	742	581,182	------	------	------	CULVERT C-4

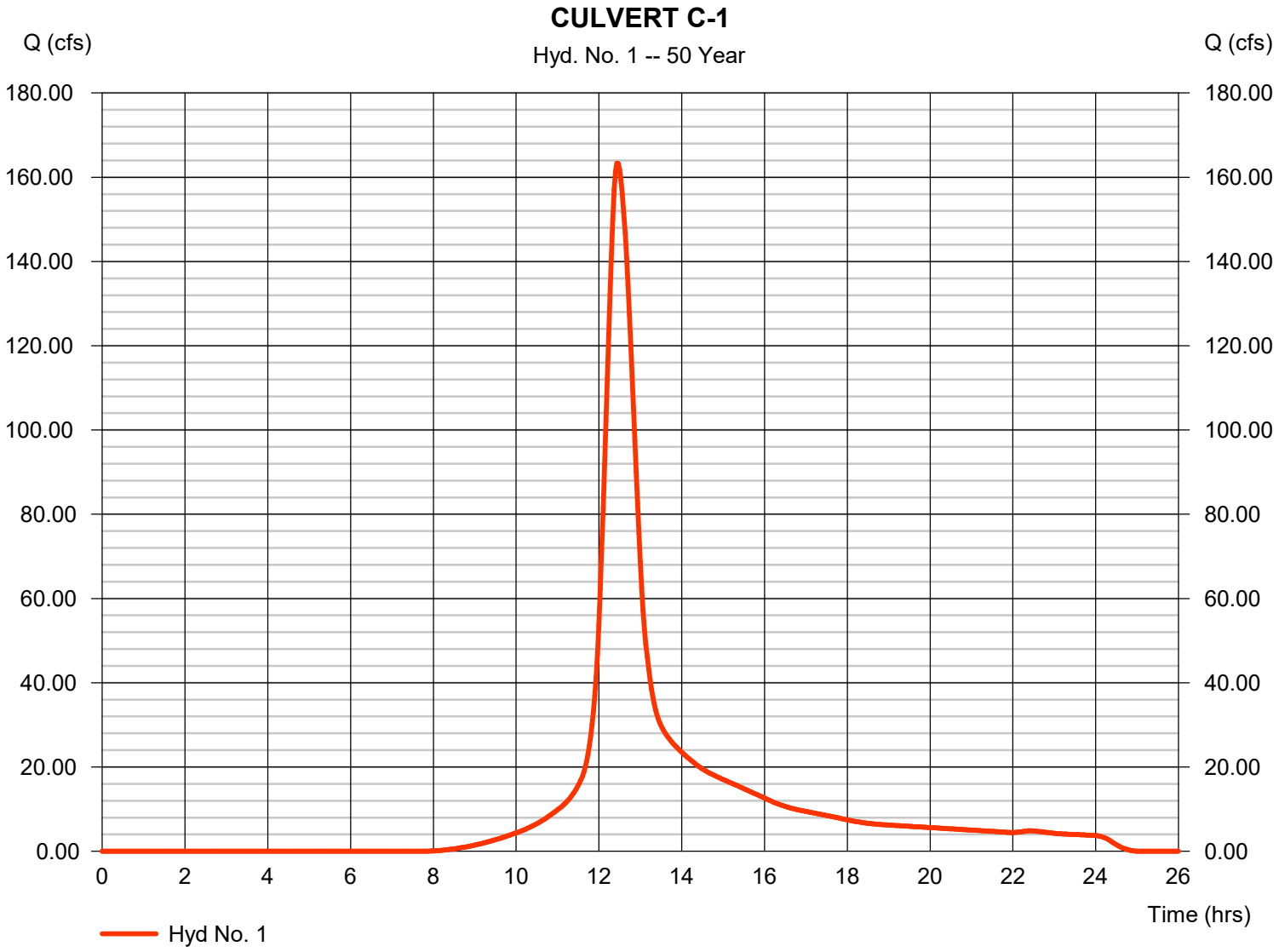
Hydrograph Report

Hyd. No. 1

CULVERT C-1

Hydrograph type	= SCS Runoff	Peak discharge	= 163.36 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 981,098 cuft
Drainage area	= 69.870 ac	Curve number	= 74*
Basin Slope	= 4.5 %	Hydraulic length	= 2679 ft
Tc method	= LAG	Time of conc. (Tc)	= 39.45 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(35.000 x 79) + (34.870 x 68)] / 69.870

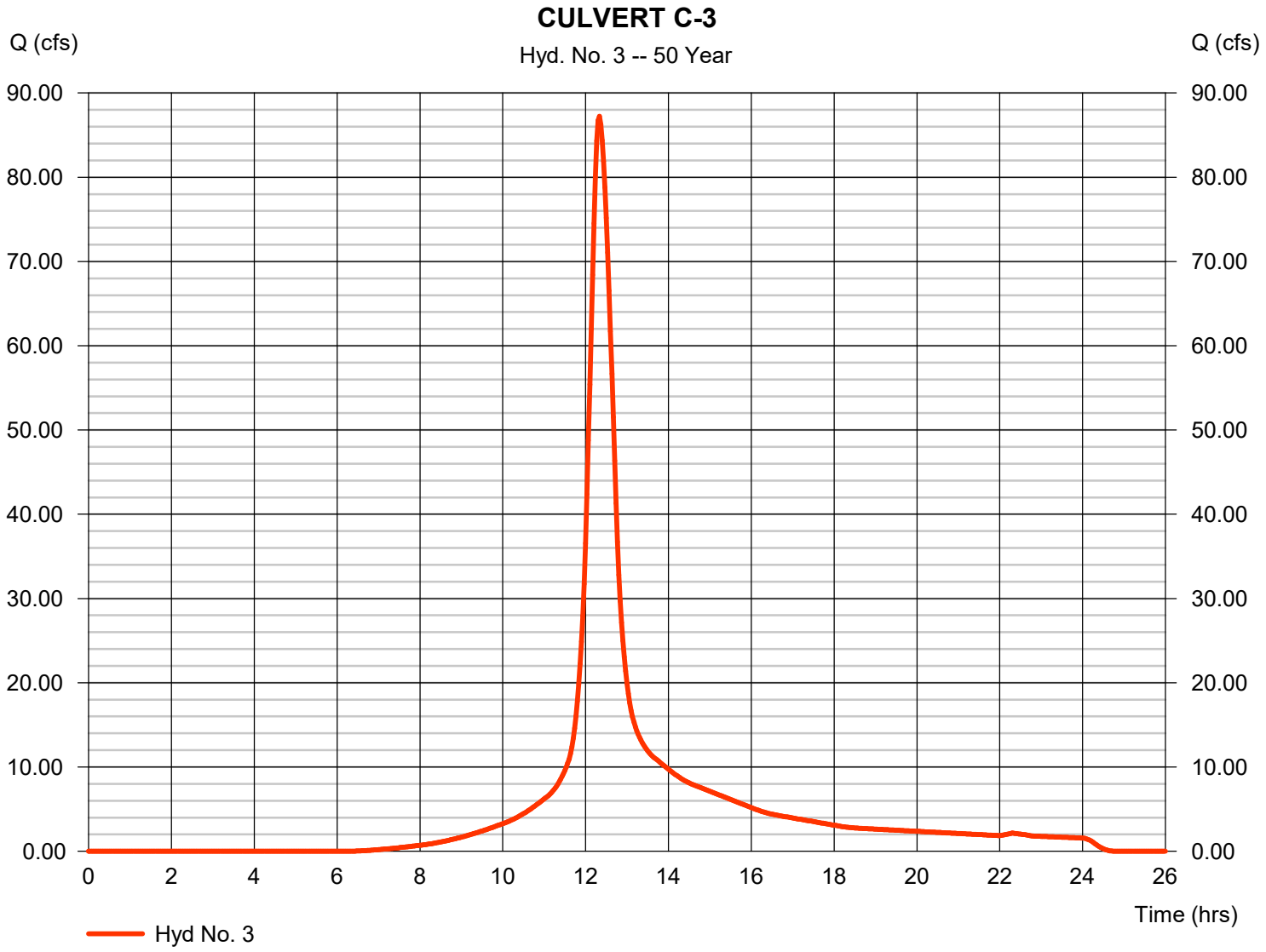


Hydrograph Report

Hyd. No. 3

CULVERT C-3

Hydrograph type	=	SCS Runoff	Peak discharge	=	87.23 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.33 hrs
Time interval	=	2 min	Hyd. volume	=	458,092 cuft
Drainage area	=	27.980 ac	Curve number	=	80
Basin Slope	=	3.2 %	Hydraulic length	=	1874 ft
Tc method	=	LAG	Time of conc. (Tc)	=	29.42 min
Total precip.	=	6.80 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

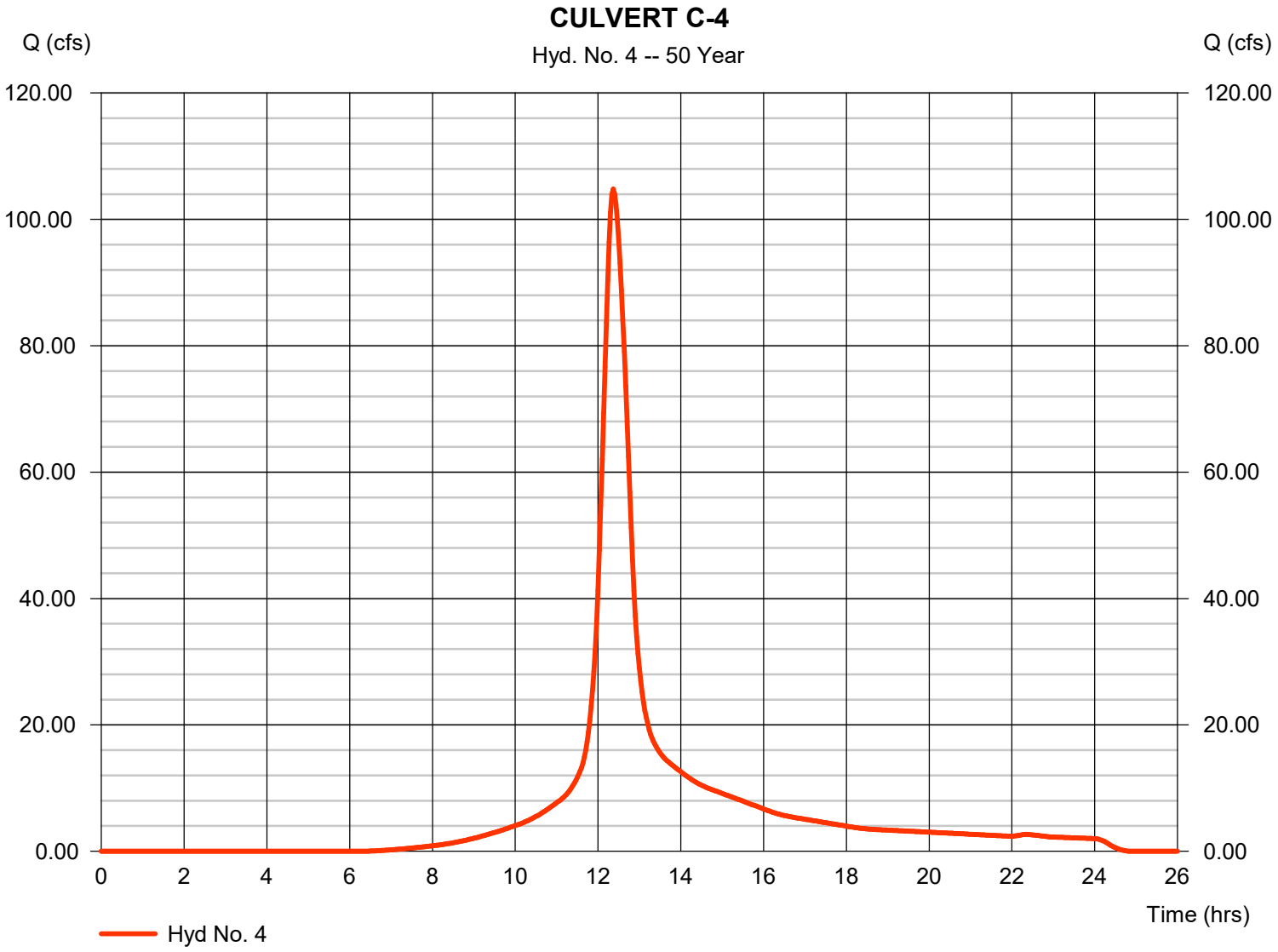


Hydrograph Report

Hyd. No. 4

CULVERT C-4

Hydrograph type	=	SCS Runoff	Peak discharge	=	104.78 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.37 hrs
Time interval	=	2 min	Hyd. volume	=	581,182 cuft
Drainage area	=	35.060 ac	Curve number	=	80
Basin Slope	=	3.6 %	Hydraulic length	=	2196 ft
Tc method	=	LAG	Time of conc. (Tc)	=	31.49 min
Total precip.	=	6.80 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



HY-8 Culvert Analysis Report

Water Surface Profile Plot for Culvert: CULV C-1

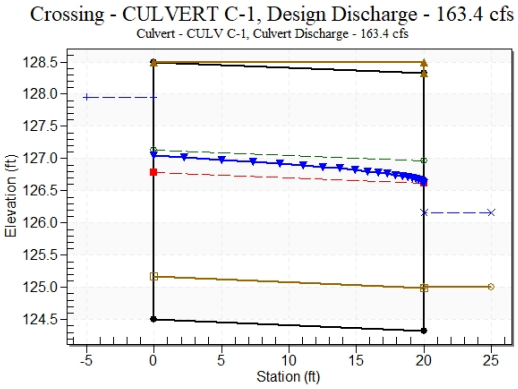


Table 1 - Culvert Summary Table: CULV C-1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10.00	10.00	125.62	0.418	0.451	3-M 2t	0.360	0.251	0.276	0.272	2.592	2.887
25.34	25.34	125.99	0.795	0.818	2-M 2c	0.632	0.467	0.467	0.453	3.878	3.848
40.67	40.67	126.28	1.090	1.112	2-M 2c	0.843	0.640	0.640	0.582	4.539	4.419
56.01	56.01	126.54	1.349	1.371	2-M 2c	1.024	0.792	0.792	0.686	5.050	4.842
71.34	71.34	126.77	1.585	1.606	2-M 2c	1.186	0.931	0.931	0.776	5.474	5.180
86.68	86.68	126.99	1.801	1.826	2-M 2c	1.335	1.060	1.060	0.855	5.842	5.466
102.02	102.02	127.20	2.001	2.033	2-M 2c	1.474	1.181	1.181	0.927	6.168	5.715
117.35	117.35	127.40	2.192	2.231	2-M 2c	1.606	1.297	1.297	0.992	6.462	5.936
132.69	132.69	127.59	2.375	2.420	2-M 2c	1.731	1.408	1.408	1.053	6.732	6.135
148.02	148.02	127.77	2.551	2.602	2-M 2c	1.851	1.514	1.514	1.110	6.982	6.318
163.36	163.36	127.94	2.723	2.778	2-M 2c	1.966	1.617	1.617	1.164	7.216	6.487

****
****

Straight Culvert

Inlet Elevation (invert): 125.17 ft, Outlet Elevation (invert): 125.00 ft

Culvert Length: 20.00 ft, Culvert Slope: 0.0085

****
****

Site Data - CULV C-1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 124.50 ft

Outlet Station: 20.00 ft

Outlet Elevation: 124.33 ft

Number of Barrels: 1

Culvert Data Summary - CULV C-1

Barrel Shape: Concrete Box

Barrel Span: 14.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 8.00 in

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Square Edge (90º) Headwall

Inlet Depression: None

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 10 cfs

Design Flow: 163.36 cfs

Maximum Flow: 163.36 cfs

Table 2 - Summary of Culvert Flows at Crossing: CULVERT C-1

Headwater Elevation (ft)	Total Discharge (cfs)	CULV C-1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
125.62	10.00	10.00	0.00	1
125.99	25.34	25.34	0.00	1
126.28	40.67	40.67	0.00	1
126.54	56.01	56.01	0.00	1
126.77	71.34	71.34	0.00	1
126.99	86.68	86.68	0.00	1
127.20	102.02	102.02	0.00	1
127.40	117.35	117.35	0.00	1
127.59	132.69	132.69	0.00	1
127.77	148.02	148.02	0.00	1
127.94	163.36	163.36	0.00	1
128.50	214.82	214.82	0.00	Overtopping

Table 3 - Downstream Channel Rating Curve (Crossing: CULVERT C-1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
10.00	125.27	0.27	2.89	0.58	1.07
25.34	125.45	0.45	3.85	0.96	1.15
40.67	125.58	0.58	4.42	1.23	1.19
56.01	125.69	0.69	4.84	1.46	1.22
71.34	125.78	0.78	5.18	1.65	1.24
86.68	125.85	0.85	5.47	1.81	1.26
102.02	125.93	0.93	5.71	1.97	1.27
117.35	125.99	0.99	5.94	2.11	1.29
132.69	126.05	1.05	6.14	2.23	1.30
148.02	126.11	1.11	6.32	2.36	1.31
163.36	126.16	1.16	6.49	2.47	1.31

Tailwater Channel Data - CULVERT C-1

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0340

Channel Manning's n: 0.0350

Channel Invert Elevation: 125.00 ft

Roadway Data for Crossing: CULVERT C-1

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 200.00 ft

Crest Elevation: 128.50 ft

Roadway Surface: Gravel

Roadway Top Width: 20.00 ft

Water Surface Profile Plot for Culvert: CULV C-3

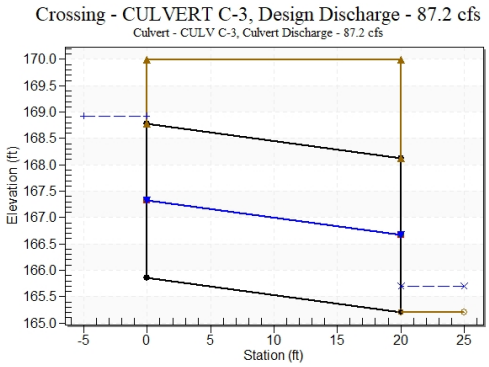


Table 7 - Culvert Summary Table: CULV C-3

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10.00	10.00	166.47	0.610	0.0*	1-S2n	0.329	0.339	0.329	0.134	3.441	2.628
17.72	17.72	166.76	0.900	0.0*	1-S2n	0.476	0.499	0.476	0.189	4.261	3.288
25.45	25.45	167.01	1.153	0.062	1-S2n	0.603	0.636	0.603	0.234	4.861	3.784
33.17	33.17	167.25	1.386	0.239	1-S2n	0.721	0.760	0.721	0.274	5.348	4.194
40.89	40.89	167.47	1.614	0.422	1-S2n	0.832	0.875	0.832	0.311	5.755	4.545
48.62	48.62	167.71	1.846	0.612	1-S2n	0.940	0.984	0.940	0.345	6.110	4.857
56.34	56.34	167.94	2.077	0.810	1-S2n	1.044	1.087	1.044	0.376	6.421	5.138
64.06	64.06	168.17	2.308	1.017	1-S2n	1.148	1.185	1.151	0.406	6.685	5.396
71.78	71.78	168.38	2.519	1.235	1-S2n	1.252	1.279	1.252	0.435	6.943	5.634
79.51	79.51	168.59	2.729	1.463	1-S2n	1.356	1.370	1.356	0.462	7.166	5.855
87.23	87.23	168.92	2.939	3.064	7-M2c	1.461	1.458	1.458	0.488	7.380	6.064

* Full Flow Headwater elevation is below inlet invert.

****

Straight Culvert

Inlet Elevation (invert): 165.86 ft, Outlet Elevation (invert): 165.21 ft

Culvert Length: 20.01 ft, Culvert Slope: 0.0325

****

Site Data - CULV C-3

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 165.86 ft

Outlet Station: 20.00 ft

Outlet Elevation: 165.21 ft

Number of Barrels: 1

Culvert Data Summary - CULV C-3

Barrel Shape: Arch, Open Bottom

Barrel Span: 9.00 ft

Barrel Rise: 2.92 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0350 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 10 cfs

Design Flow: 87.23 cfs

Maximum Flow: 87.23 cfs

Table 8 - Summary of Culvert Flows at Crossing: CULVERT C-3

Headwater Elevation (ft)	Total Discharge (cfs)	CULV C-3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
166.47	10.00	10.00	0.00	1
166.76	17.72	17.72	0.00	1
167.01	25.45	25.45	0.00	1
167.25	33.17	33.17	0.00	1
167.47	40.89	40.89	0.00	1
167.71	48.62	48.62	0.00	1
167.94	56.34	56.34	0.00	1
168.17	64.06	64.06	0.00	1
168.38	71.78	71.78	0.00	1
168.59	79.51	79.51	0.00	1
168.92	87.23	87.23	0.00	1
170.00	129.81	129.81	0.00	Overtopping

Table 9 - Downstream Channel Rating Curve (Crossing: CULVERT C-3)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
10.00	165.34	0.13	2.63	0.48	1.27
17.72	165.40	0.19	3.29	0.67	1.35
25.45	165.44	0.23	3.78	0.83	1.39
33.17	165.48	0.27	4.19	0.98	1.43
40.89	165.52	0.31	4.55	1.11	1.46
48.62	165.55	0.34	4.86	1.23	1.48
56.34	165.59	0.38	5.14	1.34	1.50
64.06	165.62	0.41	5.40	1.45	1.52
71.78	165.64	0.43	5.63	1.55	1.54
79.51	165.67	0.46	5.86	1.64	1.55
87.23	165.70	0.49	6.06	1.74	1.57

Tailwater Channel Data - CULVERT C-3

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 28.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0570

Channel Manning's n: 0.0350

Channel Invert Elevation: 165.21 ft

Roadway Data for Crossing: CULVERT C-3

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 170.00 ft

Roadway Surface: Gravel

Roadway Top Width: 20.00 ft

Water Surface Profile Plot for Culvert: CULV C-4

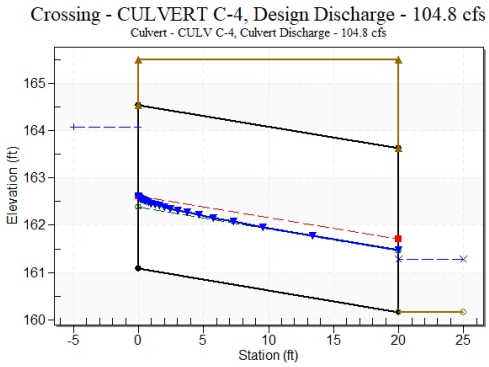


Table 10 - Culvert Summary Table: CULV C-4

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10.00	10.00	161.64	0.558	0.0*	1-S2n	0.275	0.316	0.275	0.321	3.678	2.481
19.48	19.48	161.96	0.876	0.0*	1-S2n	0.419	0.494	0.419	0.464	4.745	3.060
28.96	28.96	162.23	1.147	0.0*	1-S2n	0.541	0.645	0.541	0.575	5.496	3.449
38.43	38.43	162.47	1.393	0.0*	1-S2n	0.649	0.780	0.649	0.668	6.105	3.749
47.91	47.91	162.70	1.623	0.139	1-S2n	0.751	0.904	0.751	0.750	6.611	3.996
57.39	57.39	162.93	1.850	0.319	1-S2n	0.849	1.021	0.849	0.823	7.050	4.207
66.87	66.87	163.16	2.083	0.504	1-S2n	0.942	1.132	0.942	0.890	7.438	4.392
76.35	76.35	163.40	2.315	0.696	1-S2n	1.033	1.239	1.033	0.951	7.788	4.557
85.82	85.82	163.63	2.548	0.893	1-S2n	1.121	1.340	1.121	1.009	8.106	4.707
95.30	95.30	163.86	2.776	1.099	1-S2n	1.208	1.437	1.215	1.063	8.358	4.845
104.78	104.78	164.07	2.987	1.312	1-S2n	1.295	1.531	1.302	1.114	8.620	4.972

* Full Flow Headwater elevation is below inlet invert.

****

Straight Culvert

Inlet Elevation (invert): 161.08 ft, Outlet Elevation (invert): 160.17 ft

Culvert Length: 20.02 ft, Culvert Slope: 0.0455

****

Site Data - CULV C-4

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 161.08 ft

Outlet Station: 20.00 ft

Outlet Elevation: 160.17 ft

Number of Barrels: 1

Culvert Data Summary - CULV C-4

Barrel Shape: Arch, Open Bottom

Barrel Span: 10.00 ft

Barrel Rise: 3.46 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0350 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 10 cfs

Design Flow: 104.78 cfs

Maximum Flow: 104.78 cfs

Table 11 - Summary of Culvert Flows at Crossing: CULVERT C-4

Headwater Elevation (ft)	Total Discharge (cfs)	CULV C-4 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
161.64	10.00	10.00	0.00	1
161.96	19.48	19.48	0.00	1
162.23	28.96	28.96	0.00	1
162.47	38.43	38.43	0.00	1
162.70	47.91	47.91	0.00	1
162.93	57.39	57.39	0.00	1
163.16	66.87	66.87	0.00	1
163.40	76.35	76.35	0.00	1
163.63	85.82	85.82	0.00	1
163.86	95.30	95.30	0.00	1
164.07	104.78	104.78	0.00	1
165.50	168.02	168.02	0.00	Overtopping

Table 12 - Downstream Channel Rating Curve (Crossing: CULVERT C-4)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
10.00	160.49	0.32	2.48	0.40	0.85
19.48	160.63	0.46	3.06	0.58	0.89
28.96	160.74	0.57	3.45	0.72	0.92
38.43	160.84	0.67	3.75	0.83	0.94
47.91	160.92	0.75	4.00	0.94	0.95
57.39	160.99	0.82	4.21	1.03	0.97
66.87	161.06	0.89	4.39	1.11	0.98
76.35	161.12	0.95	4.56	1.19	0.99
85.82	161.18	1.01	4.71	1.26	0.99
95.30	161.23	1.06	4.85	1.33	1.00
104.78	161.28	1.11	4.97	1.39	1.01

Tailwater Channel Data - CULVERT C-4

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 8.00 (_:1)

Channel Slope: 0.0200

Channel Manning's n: 0.0350

Channel Invert Elevation: 160.17 ft

Roadway Data for Crossing: CULVERT C-4

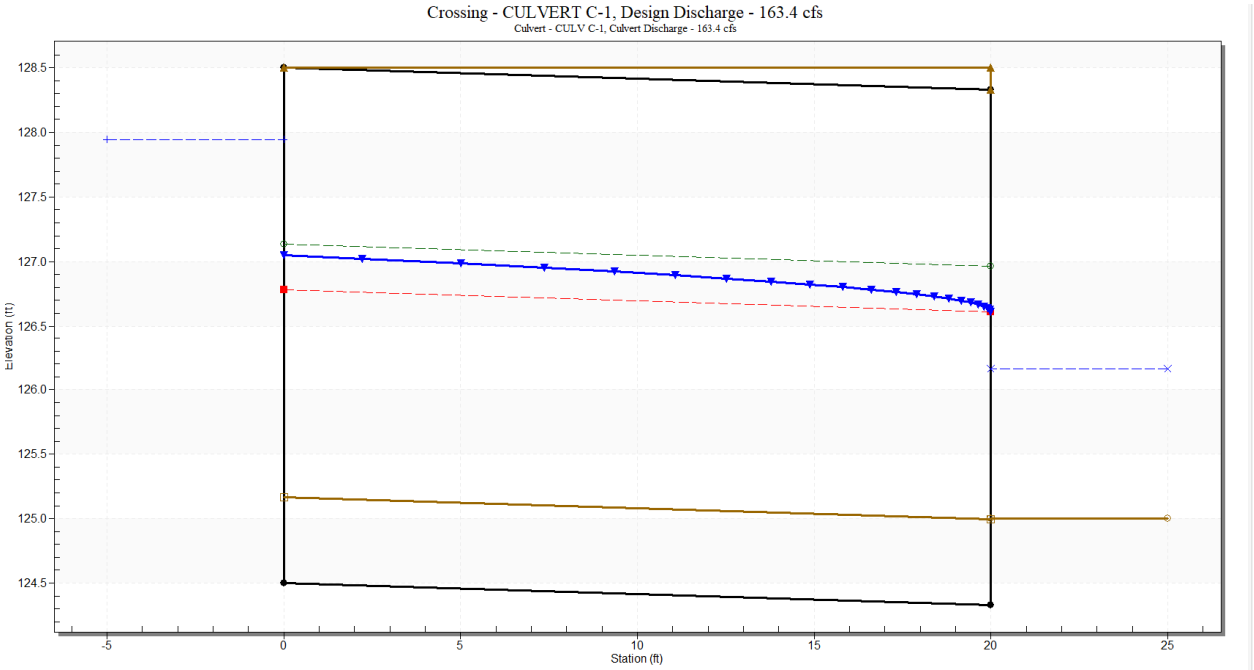
Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 165.50 ft

Roadway Surface: Gravel

Roadway Top Width: 20.00 ft



Crossing Data - CULVERT C-1

Crossing Properties

Name: CULVERT C-1

Parameter	Value	Units
DISCHARGE DATA		
Discharge Method	Minimum, Design, and Maximum	
Minimum Flow	10.000	cfs
Design Flow	163.360	cfs
Maximum Flow	163.360	cfs
TAILWATER DATA		
Channel Type	Trapezoidal Channel	
Bottom Width	10.000	ft
Side Slope (H:V)	10.000	_:1
Channel Slope	0.0340	ft/ft
Manning's n (channel)	0.035	
Channel Invert Elevation	125.000	ft
Rating Curve	View...	
ROADWAY DATA		
Roadway Profile Shape	Constant Roadway Elevation	
First Roadway Station	0.000	ft
Crest Length	200.000	ft
Crest Elevation	128.500	ft
Roadway Surface	Gravel	
Top Width	20.000	ft

Culvert Properties

CULV C-1

Add Culvert

Duplicate Culvert

Delete Culvert

Parameter	Value	Units
CULVERT DATA		
Name	CULV C-1	
Shape	Concrete Box	
Material	Concrete	
Span	14.000	ft
Rise	4.000	ft
Embedment Depth	8.000	in
Manning's n (Top/Sides)	0.012	
Manning's n (Bottom)	0.035	
Culvert Type	Straight	
Inlet Configuration	Square Edge (90°) Headwall	
Inlet Depression?	No	
SITE DATA		
Site Data Input Option	Culvert Invert Data	
Inlet Station	0.000	ft
Inlet Elevation	124.500	ft
Outlet Station	20.000	ft
Outlet Elevation	124.330	ft
Number of Barrels	1	

Help | Click on any icon for help on a specific topic | Low Flow | AOP | Energy Dissipation | Analyze Crossing | OK | Cancel

Summary of Flows at Crossing - CULVERT C-1

Headwater Elevation (ft)	Total Discharge (cfs)	CULV C-1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
125.62	10.00	10.00	0.00	1
125.99	25.34	25.34	0.00	1
126.28	40.67	40.67	0.00	1
126.54	56.01	56.01	0.00	1
126.77	71.34	71.34	0.00	1
126.99	86.68	86.68	0.00	1
127.20	102.02	102.02	0.00	1
127.40	117.35	117.35	0.00	1
127.59	132.69	132.69	0.00	1
127.77	148.02	148.02	0.00	1
127.94	163.36	163.36	0.00	1
128.50	214.82	214.82	0.00	Overtopping

Display
- (•) Crossing Summary Table
- ( ) Culvert Summary Table — CULV C-1
- ( ) Water Surface Profiles
- ( ) Tapered Inlet Table
- ( ) Customized Table — Options...

Geometry
- Inlet Elevation: 125.17 ft
- Outlet Elevation: 125.00 ft
- Culvert Length: 20.00 ft
- Culvert Slope: 0.0085
- Inlet Crest: 0.00 ft
- Inlet Throat: 0.00 ft
- Outlet Control: Profiles

Plot
- Crossing Rating Curve
- Culvert Performance Curve
- Selected Water Profile
- Water Surface Profile Data

Help | Flow Types... | Edit Input Data... | Energy Dissipation... | AOP... | Low Flow... | Export Report | Adobe PDF (*.pdf) | Close

Culvert Summary Table - CULV C-1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10.00	10.00	125.62	0.42	**0.45**	3-M2t	0.36	0.25	0.28	0.27	2.59	2.89
25.34	25.34	125.99	0.79	**0.82**	2-M2c	0.63	0.47	0.47	0.45	3.88	3.85
40.67	40.67	126.28	1.09	**1.11**	2-M2c	0.84	0.64	0.64	0.58	4.54	4.42
56.01	56.01	126.54	1.35	**1.37**	2-M2c	1.02	0.79	0.79	0.69	5.05	4.84
71.34	71.34	126.77	1.58	**1.61**	2-M2c	1.19	0.93	0.93	0.78	5.47	5.18
86.68	86.68	126.99	1.80	**1.83**	2-M2c	1.33	1.06	1.06	0.85	5.84	5.47
102.02	102.02	127.20	2.00	**2.03**	2-M2c	1.47	1.18	1.18	0.93	6.17	5.71
117.35	117.35	127.40	2.19	**2.23**	2-M2c	1.61	1.30	1.30	0.99	6.46	5.94
132.69	132.69	127.59	2.37	**2.42**	2-M2c	1.73	1.41	1.41	1.05	6.73	6.14
148.02	148.02	127.77	2.55	**2.60**	2-M2c	1.85	1.51	1.51	1.11	6.98	6.32
163.36	163.36	127.94	2.72	**2.78**	2-M2c	1.97	1.62	1.62	1.16	7.22	6.49

Display
- ( ) Crossing Summary Table
- (•) Culvert Summary Table — CULV C-1
- ( ) Water Surface Profiles
- ( ) Tapered Inlet Table
- ( ) Customized Table — Options...

Geometry
- Inlet Elevation: 125.17 ft
- Outlet Elevation: 125.00 ft
- Culvert Length: 20.00 ft
- Culvert Slope: 0.0085
- Inlet Crest: 0.00 ft
- Inlet Throat: 0.00 ft
- Outlet Control: Profiles

Plot
- Crossing Rating Curve
- Culvert Performance Curve
- Selected Water Profile
- Water Surface Profile Data

Help | Flow Types... | Edit Input Data... | Energy Dissipation... | AOP... | Low Flow... | Export Report | Adobe PDF (*.pdf) | Close

Water Surface Profile Table - CULV C-1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Length Full (ft)	Length Free (ft)
10.00	10.00	125.62	0.42	**0.45**	3-M2t	0.00	20.00
25.34	25.34	125.99	0.79	**0.82**	2-M2c	0.00	20.00
40.67	40.67	126.28	1.09	**1.11**	2-M2c	0.00	20.00
56.01	56.01	126.54	1.35	**1.37**	2-M2c	0.00	20.00
71.34	71.34	126.77	1.58	**1.61**	2-M2c	0.00	20.00
86.68	86.68	126.99	1.80	**1.83**	2-M2c	0.00	20.00
102.02	102.02	127.20	2.00	**2.03**	2-M2c	0.00	20.00
117.35	117.35	127.40	2.19	**2.23**	2-M2c	0.00	20.00
132.69	132.69	127.59	2.37	**2.42**	2-M2c	0.00	20.00
148.02	148.02	127.77	2.55	**2.60**	2-M2c	0.00	20.00
163.36	163.36	127.94	2.72	**2.78**	2-M2c	0.00	20.00

Display
- ○ Crossing Summary Table
- ○ Culvert Summary Table — CULV C-1
- ◉ Water Surface Profiles
- ○ Tapered Inlet Table
- ○ Customized Table — Options...

Geometry
- Inlet Elevation: 125.17 ft
- Outlet Elevation: 125.00 ft
- Culvert Length: 20.00 ft
- Culvert Slope: 0.0085
- Inlet Crest: 0.00 ft
- Inlet Throat: 0.00 ft
- Outlet Control: Profiles

Plot
- Crossing Rating Curve
- Culvert Performance Curve
- Selected Water Profile
- Water Surface Profile Data

Help | Flow Types... | Edit Input Data... | Energy Dissipation... | AOP... | Low Flow... | Export Report | Adobe PDF (*.pdf) | Close

Tapered Inlet Table - CULV C-1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Crest Control Elev(ft)	Face Control Elev(ft)	Throat Control Elev(ft)	Tailwater Elevation (ft)
10.00	10.00	125.62	0.42	**0.45**	3-M2t	0.00	0.00	0.00	125.27
25.34	25.34	125.99	0.79	**0.82**	2-M2c	0.00	0.00	0.00	125.45
40.67	40.67	126.28	1.09	**1.11**	2-M2c	0.00	0.00	0.00	125.58
56.01	56.01	126.54	1.35	**1.37**	2-M2c	0.00	0.00	0.00	125.69
71.34	71.34	126.77	1.58	**1.61**	2-M2c	0.00	0.00	0.00	125.78
86.68	86.68	126.99	1.80	**1.83**	2-M2c	0.00	0.00	0.00	125.85
102.02	102.02	127.20	2.00	**2.03**	2-M2c	0.00	0.00	0.00	125.93
117.35	117.35	127.40	2.19	**2.23**	2-M2c	0.00	0.00	0.00	125.99
132.69	132.69	127.59	2.37	**2.42**	2-M2c	0.00	0.00	0.00	126.05
148.02	148.02	127.77	2.55	**2.60**	2-M2c	0.00	0.00	0.00	126.11
163.36	163.36	127.94	2.72	**2.78**	2-M2c	0.00	0.00	0.00	126.16

Display
- ○ Crossing Summary Table
- ○ Culvert Summary Table — CULV C-1
- ○ Water Surface Profiles
- ◉ Tapered Inlet Table
- ○ Customized Table — Options...

Geometry
- Inlet Elevation: 125.17 ft
- Outlet Elevation: 125.00 ft
- Culvert Length: 20.00 ft
- Culvert Slope: 0.0085
- Inlet Crest: 0.00 ft
- Inlet Throat: 0.00 ft
- Outlet Control: Profiles

Plot
- Crossing Rating Curve
- Culvert Performance Curve
- Selected Water Profile
- Water Surface Profile Data

Help | Flow Types... | Edit Input Data... | Energy Dissipation... | AOP... | Low Flow... | Export Report | Adobe PDF (*.pdf) | Close

Custom Table - CULV C-1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Crest Control Elev(ft)	Face Control Elev(ft)	Throat Control Elev(ft)	Tailwater Elevation (ft)
10.00	10.00	125.62	0.42	0.45	3-M2t	0.00	0.00	0.00	125.27
25.34	25.34	125.99	0.79	0.82	2-M2c	0.00	0.00	0.00	125.45
40.67	40.67	126.28	1.09	1.11	2-M2c	0.00	0.00	0.00	125.58
56.01	56.01	126.54	1.35	1.37	2-M2c	0.00	0.00	0.00	125.69
71.34	71.34	126.77	1.58	1.61	2-M2c	0.00	0.00	0.00	125.78
86.68	86.68	126.99	1.80	1.83	2-M2c	0.00	0.00	0.00	125.85
102.02	102.02	127.20	2.00	2.03	2-M2c	0.00	0.00	0.00	125.93
117.35	117.35	127.40	2.19	2.23	2-M2c	0.00	0.00	0.00	125.99
132.69	132.69	127.59	2.37	2.42	2-M2c	0.00	0.00	0.00	126.05
148.02	148.02	127.77	2.55	2.60	2-M2c	0.00	0.00	0.00	126.11
163.36	163.36	127.94	2.72	2.78	2-M2c	0.00	0.00	0.00	126.16

Display

- ○ Crossing Summary Table
- ○ Culvert Summary Table — CULV C-1
- ○ Water Surface Profiles
- ○ Tapered Inlet Table
- ◉ Customized Table — Options...

Geometry

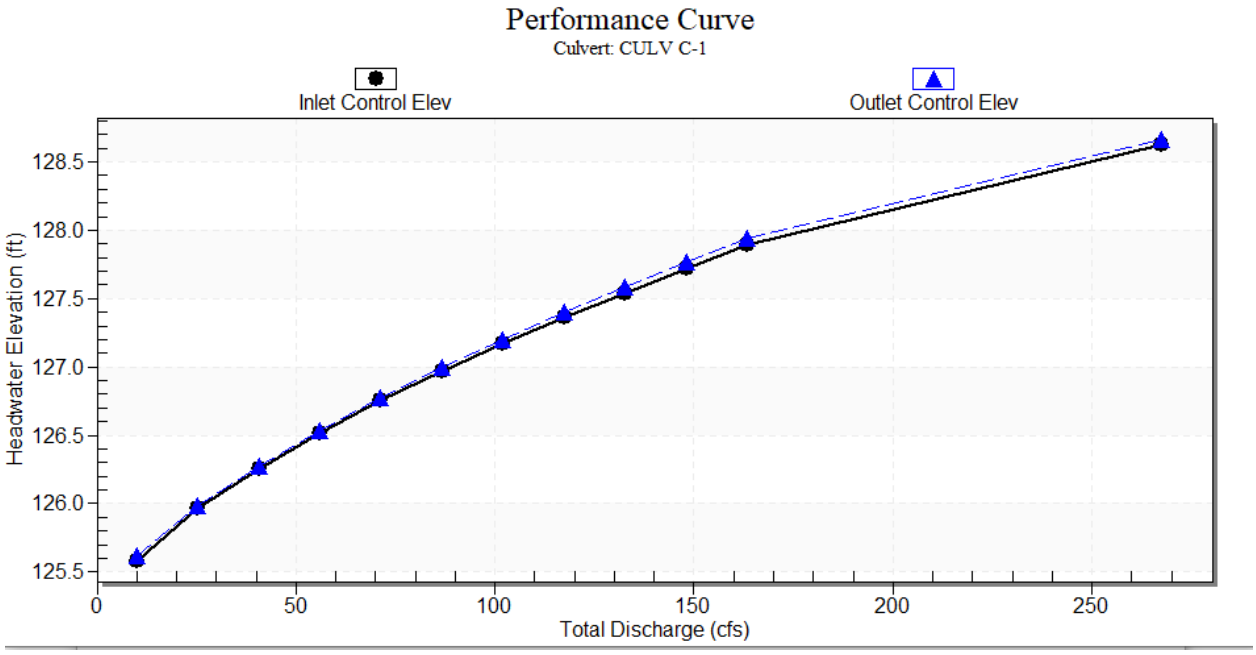
Inlet Elevation:	125.17 ft
Outlet Elevation:	125.00 ft
Culvert Length:	20.00 ft
Culvert Slope:	0.0085
Inlet Crest:	0.00 ft
Inlet Throat:	0.00 ft
Outlet Control:	Profiles

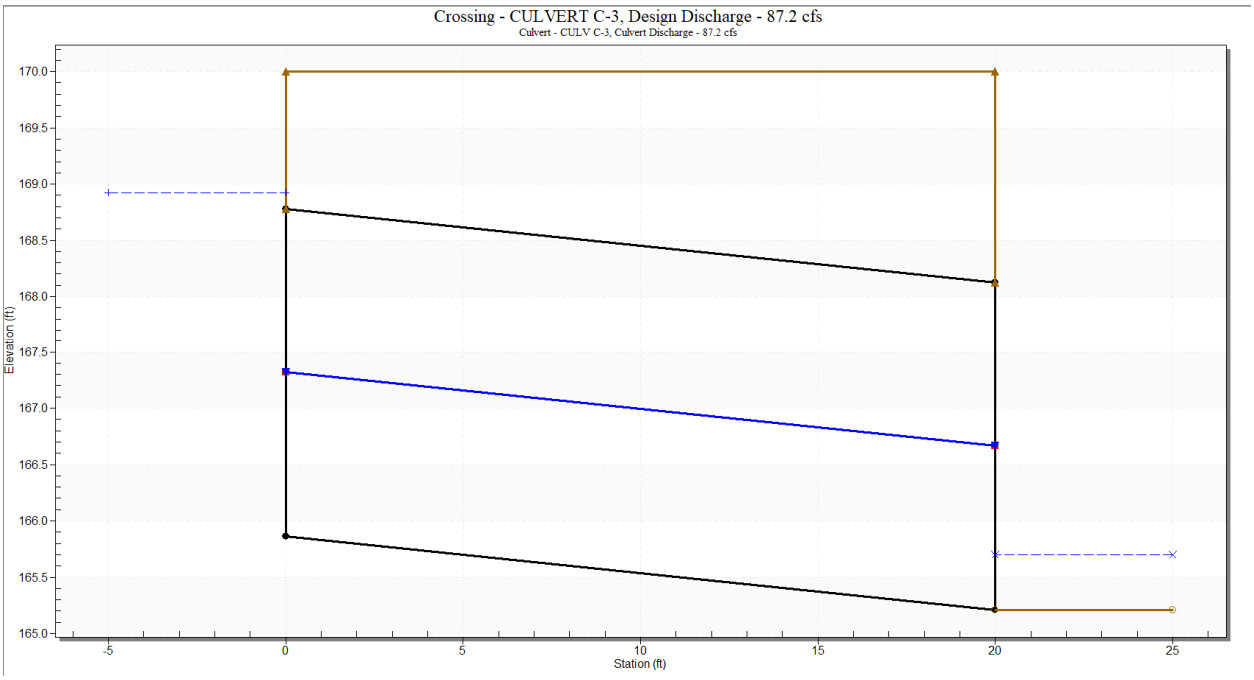
Plot

- Crossing Rating Curve
- Culvert Performance Curve
- Selected Water Profile
- Water Surface Profile Data

Help | Flow Types... | Edit Input Data... | Energy Dissipation... | AOP... | Low Flow... | Export Report | Adobe PDF (*.pdf) | Close

Performance Curve





Crossing Data - CULVERT C-3

Crossing Properties

Name: CULVERT C-3

Parameter	Value	Units
DISCHARGE DATA		
Discharge Method	Minimum, Design, and Maximum	
Minimum Flow	10.000	cfs
Design Flow	87.230	cfs
Maximum Flow	87.230	cfs
TAILWATER DATA		
Channel Type	Trapezoidal Channel	
Bottom Width	28.000	ft
Side Slope (H:V)	3.000	_:1
Channel Slope	0.0570	ft/ft
Manning's n (channel)	0.035	
Channel Invert Elevation	165.210	ft
Rating Curve	View...	
ROADWAY DATA		
Roadway Profile Shape	Constant Roadway Elevation	
First Roadway Station	0.000	ft
Crest Length	100.000	ft
Crest Elevation	170.000	ft
Roadway Surface	Gravel	
Top Width	20.000	ft

Culvert Properties

CULV C-3

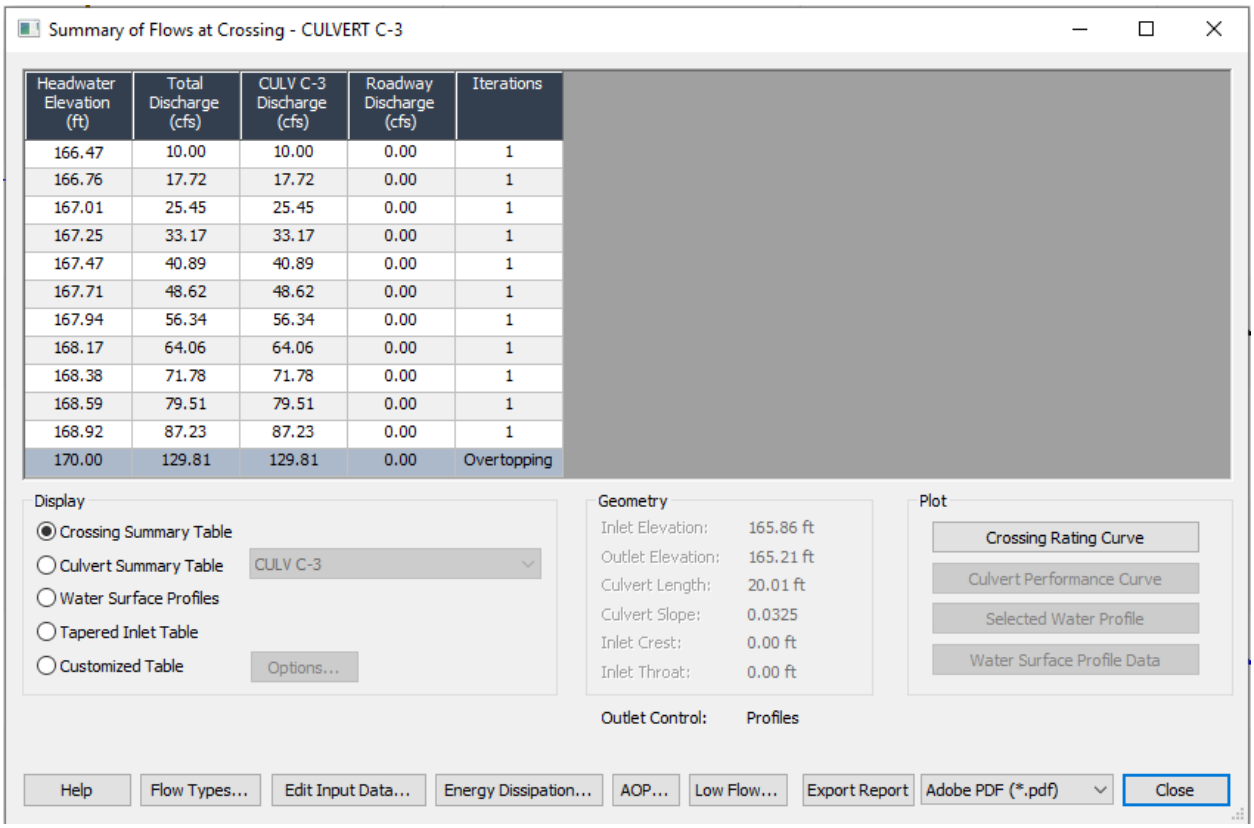
Add Culvert

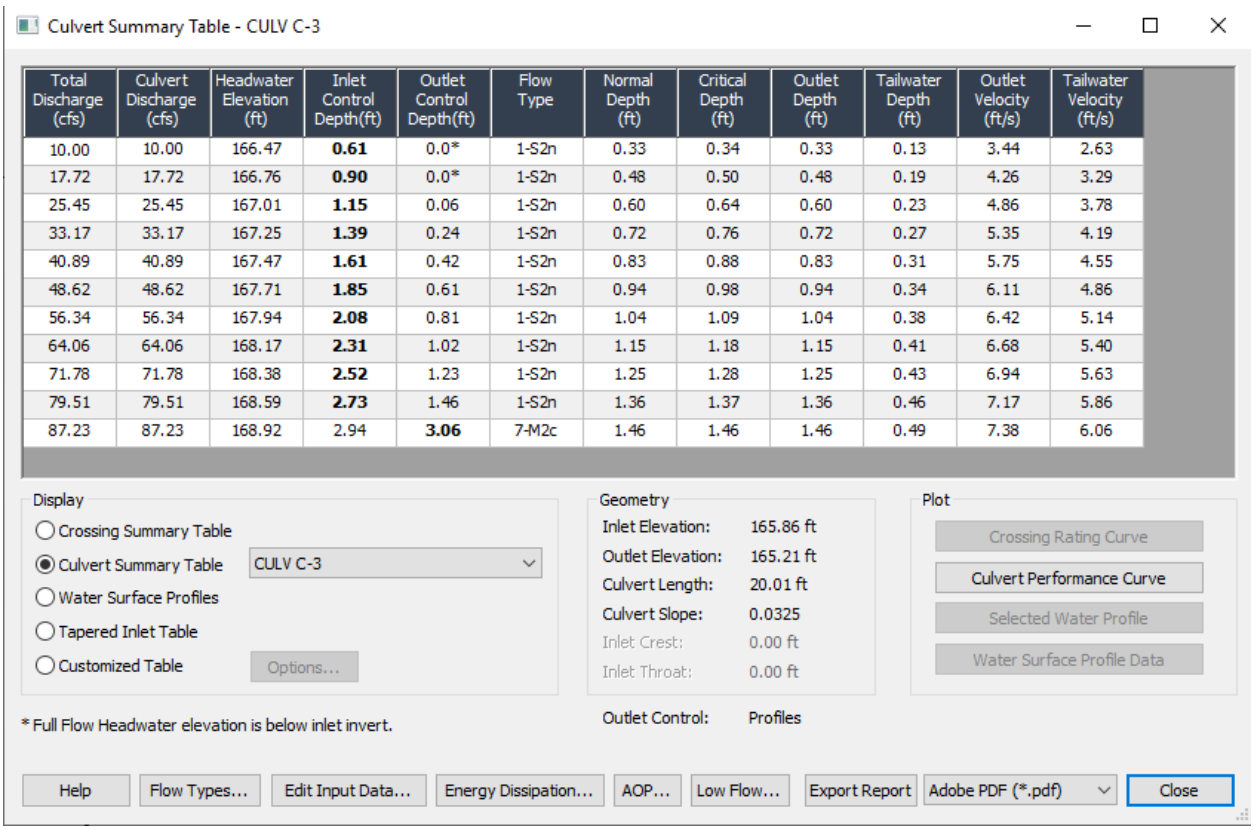
Duplicate Culvert

Delete Culvert

Parameter	Value	Units
CULVERT DATA		
Name	CULV C-3	
Shape	Arch, Open Bottom	
Material	Corrugated Steel	
Size	Define...	
Span	9.000	ft
Rise	2.917	ft
Embedment Depth	0.000	in
Manning's n (Top/Sides)	0.035	
Manning's n (Bottom)	0.035	
Culvert Type	Straight	
Inlet Configuration	Thin Edge Projecting	
Inlet Depression?	No	
SITE DATA		
Site Data Input Option	Culvert Invert Data	
Inlet Station	0.000	ft
Inlet Elevation	165.860	ft
Outlet Station	20.000	ft
Outlet Elevation	165.210	ft
Number of Barrels	1	

Help | Click on any icon for help on a specific topic | Low Flow | AOP | Energy Dissipation | Analyze Crossing | OK | Cancel


Summary of Flows at Crossing - CULVERT C-3
Headwater Elevation (ft) | Total Discharge (cfs) | CULV C-3 Discharge (cfs) | Roadway Discharge (cfs) | Iterations
166.47 | 10.00 | 10.00 | 0.00 | 1
166.76 | 17.72 | 17.72 | 0.00 | 1
167.01 | 25.45 | 25.45 | 0.00 | 1
167.25 | 33.17 | 33.17 | 0.00 | 1
167.47 | 40.89 | 40.89 | 0.00 | 1
167.71 | 48.62 | 48.62 | 0.00 | 1
167.94 | 56.34 | 56.34 | 0.00 | 1
168.17 | 64.06 | 64.06 | 0.00 | 1
168.38 | 71.78 | 71.78 | 0.00 | 1
168.59 | 79.51 | 79.51 | 0.00 | 1
168.92 | 87.23 | 87.23 | 0.00 | 1
170.00 | 129.81 | 129.81 | 0.00 | Overtopping
Display
Crossing Summary Table
Culvert Summary Table
CULV C-3
Water Surface Profiles
Tapered Inlet Table
Customized Table
Options...
Geometry
Inlet Elevation: 165.86 ft
Outlet Elevation: 165.21 ft
Culvert Length: 20.01 ft
Culvert Slope: 0.0325
Inlet Crest: 0.00 ft
Inlet Throat: 0.00 ft
Outlet Control: Profiles
Plot
Crossing Rating Curve
Culvert Performance Curve
Selected Water Profile
Water Surface Profile Data
Help
Flow Types...
Edit Input Data...
Energy Dissipation...
AOP...
Low Flow...
Export Report
Adobe PDF (*.pdf)
Close


Culvert Summary Table - CULV C-3
Total Discharge (cfs) | Culvert Discharge (cfs) | Headwater Elevation (ft) | Inlet Control Depth(ft) | Outlet Control Depth(ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | Tailwater Depth (ft) | Outlet Velocity (ft/s) | Tailwater Velocity (ft/s)
10.00 | 10.00 | 166.47 | 0.61 | 0.0* | 1-S2n | 0.33 | 0.34 | 0.33 | 0.13 | 3.44 | 2.63
17.72 | 17.72 | 166.76 | 0.90 | 0.0* | 1-S2n | 0.48 | 0.50 | 0.48 | 0.19 | 4.26 | 3.29
25.45 | 25.45 | 167.01 | 1.15 | 0.06 | 1-S2n | 0.60 | 0.64 | 0.60 | 0.23 | 4.86 | 3.78
33.17 | 33.17 | 167.25 | 1.39 | 0.24 | 1-S2n | 0.72 | 0.76 | 0.72 | 0.27 | 5.35 | 4.19
40.89 | 40.89 | 167.47 | 1.61 | 0.42 | 1-S2n | 0.83 | 0.88 | 0.83 | 0.31 | 5.75 | 4.55
48.62 | 48.62 | 167.71 | 1.85 | 0.61 | 1-S2n | 0.94 | 0.98 | 0.94 | 0.34 | 6.11 | 4.86
56.34 | 56.34 | 167.94 | 2.08 | 0.81 | 1-S2n | 1.04 | 1.09 | 1.04 | 0.38 | 6.42 | 5.14
64.06 | 64.06 | 168.17 | 2.31 | 1.02 | 1-S2n | 1.15 | 1.18 | 1.15 | 0.41 | 6.68 | 5.40
71.78 | 71.78 | 168.38 | 2.52 | 1.23 | 1-S2n | 1.25 | 1.28 | 1.25 | 0.43 | 6.94 | 5.63
79.51 | 79.51 | 168.59 | 2.73 | 1.46 | 1-S2n | 1.36 | 1.37 | 1.36 | 0.46 | 7.17 | 5.86
87.23 | 87.23 | 168.92 | 2.94 | 3.06 | 7-M2c | 1.46 | 1.46 | 1.46 | 0.49 | 7.38 | 6.06
Display
Crossing Summary Table
Culvert Summary Table
CULV C-3
Water Surface Profiles
Tapered Inlet Table
Customized Table
Options...
* Full Flow Headwater elevation is below inlet invert.
Geometry
Inlet Elevation: 165.86 ft
Outlet Elevation: 165.21 ft
Culvert Length: 20.01 ft
Culvert Slope: 0.0325
Inlet Crest: 0.00 ft
Inlet Throat: 0.00 ft
Outlet Control: Profiles
Plot
Crossing Rating Curve
Culvert Performance Curve
Selected Water Profile
Water Surface Profile Data
Help
Flow Types...
Edit Input Data...
Energy Dissipation...
AOP...
Low Flow...
Export Report
Adobe PDF (*.pdf)
Close

Water Surface Profile Table - CULV C-3

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Length Full (ft)	Length Free (ft)
10.00	10.00	166.47	**0.61**	0.0*	1-S2n	0.00	20.00
17.72	17.72	166.76	**0.90**	0.0*	1-S2n	0.00	20.00
25.45	25.45	167.01	**1.15**	0.06	1-S2n	0.00	20.00
33.17	33.17	167.25	**1.39**	0.24	1-S2n	0.00	20.00
40.89	40.89	167.47	**1.61**	0.42	1-S2n	0.00	20.00
48.62	48.62	167.71	**1.85**	0.61	1-S2n	0.00	20.00
56.34	56.34	167.94	**2.08**	0.81	1-S2n	0.00	20.00
64.06	64.06	168.17	**2.31**	1.02	1-S2n	0.00	20.00
71.78	71.78	168.38	**2.52**	1.23	1-S2n	0.00	20.00
79.51	79.51	168.59	**2.73**	1.46	1-S2n	0.00	20.00
87.23	87.23	168.92	2.94	**3.06**	7-M2c	0.00	20.00

Display

- ○ Crossing Summary Table
- ○ Culvert Summary Table — CULV C-3
- ◉ Water Surface Profiles
- ○ Tapered Inlet Table
- ○ Customized Table — Options...

Geometry

Inlet Elevation:	165.86 ft
Outlet Elevation:	165.21 ft
Culvert Length:	20.01 ft
Culvert Slope:	0.0325
Inlet Crest:	0.00 ft
Inlet Throat:	0.00 ft
Outlet Control:	Profiles

Plot

- Crossing Rating Curve
- Culvert Performance Curve
- Selected Water Profile
- Water Surface Profile Data

* Full Flow Headwater elevation is below inlet invert.

Help | Flow Types... | Edit Input Data... | Energy Dissipation... | AOP... | Low Flow... | Export Report | Adobe PDF (*.pdf) | Close

Tapered Inlet Table - CULV C-3

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Crest Control Elev(ft)	Face Control Elev(ft)	Throat Control Elev(ft)	Tailwater Elevation (ft)
10.00	10.00	166.47	**0.61**	0.0*	1-S2n	0.00	0.00	0.00	165.34
17.72	17.72	166.76	**0.90**	0.0*	1-S2n	0.00	0.00	0.00	165.40
25.45	25.45	167.01	**1.15**	0.06	1-S2n	0.00	0.00	0.00	165.44
33.17	33.17	167.25	**1.39**	0.24	1-S2n	0.00	0.00	0.00	165.48
40.89	40.89	167.47	**1.61**	0.42	1-S2n	0.00	0.00	0.00	165.52
48.62	48.62	167.71	**1.85**	0.61	1-S2n	0.00	0.00	0.00	165.55
56.34	56.34	167.94	**2.08**	0.81	1-S2n	0.00	0.00	0.00	165.59
64.06	64.06	168.17	**2.31**	1.02	1-S2n	0.00	0.00	0.00	165.62
71.78	71.78	168.38	**2.52**	1.23	1-S2n	0.00	0.00	0.00	165.64
79.51	79.51	168.59	**2.73**	1.46	1-S2n	0.00	0.00	0.00	165.67
87.23	87.23	168.92	2.94	**3.06**	7-M2c	0.00	0.00	0.00	165.70

Display

- ○ Crossing Summary Table
- ○ Culvert Summary Table — CULV C-3
- ○ Water Surface Profiles
- ◉ Tapered Inlet Table
- ○ Customized Table — Options...

Geometry

Inlet Elevation:	165.86 ft
Outlet Elevation:	165.21 ft
Culvert Length:	20.01 ft
Culvert Slope:	0.0325
Inlet Crest:	0.00 ft
Inlet Throat:	0.00 ft
Outlet Control:	Profiles

Plot

- Crossing Rating Curve
- Culvert Performance Curve
- Selected Water Profile
- Water Surface Profile Data

* Full Flow Headwater elevation is below inlet invert.

Help | Flow Types... | Edit Input Data... | Energy Dissipation... | AOP... | Low Flow... | Export Report | Adobe PDF (*.pdf) | Close

Custom Table - CULV C-3

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Crest Control Elev(ft)	Face Control Elev(ft)	Throat Control Elev(ft)	Tailwater Elevation (ft)
10.00	10.00	166.47	0.61	0.0*	1-S2n	0.00	0.00	0.00	165.34
17.72	17.72	166.76	0.90	0.0*	1-S2n	0.00	0.00	0.00	165.40
25.45	25.45	167.01	1.15	0.06	1-S2n	0.00	0.00	0.00	165.44
33.17	33.17	167.25	1.39	0.24	1-S2n	0.00	0.00	0.00	165.48
40.89	40.89	167.47	1.61	0.42	1-S2n	0.00	0.00	0.00	165.52
48.62	48.62	167.71	1.85	0.61	1-S2n	0.00	0.00	0.00	165.55
56.34	56.34	167.94	2.08	0.81	1-S2n	0.00	0.00	0.00	165.59
64.06	64.06	168.17	2.31	1.02	1-S2n	0.00	0.00	0.00	165.62
71.78	71.78	168.38	2.52	1.23	1-S2n	0.00	0.00	0.00	165.64
79.51	79.51	168.59	2.73	1.46	1-S2n	0.00	0.00	0.00	165.67
87.23	87.23	168.92	2.94	3.06	7-M2c	0.00	0.00	0.00	165.70

Display

- ○ Crossing Summary Table
- ○ Culvert Summary Table — CULV C-3
- ○ Water Surface Profiles
- ○ Tapered Inlet Table
- ◉ Customized Table — Options...

Geometry

Inlet Elevation:	165.86 ft
Outlet Elevation:	165.21 ft
Culvert Length:	20.01 ft
Culvert Slope:	0.0325
Inlet Crest:	0.00 ft
Inlet Throat:	0.00 ft
Outlet Control:	Profiles

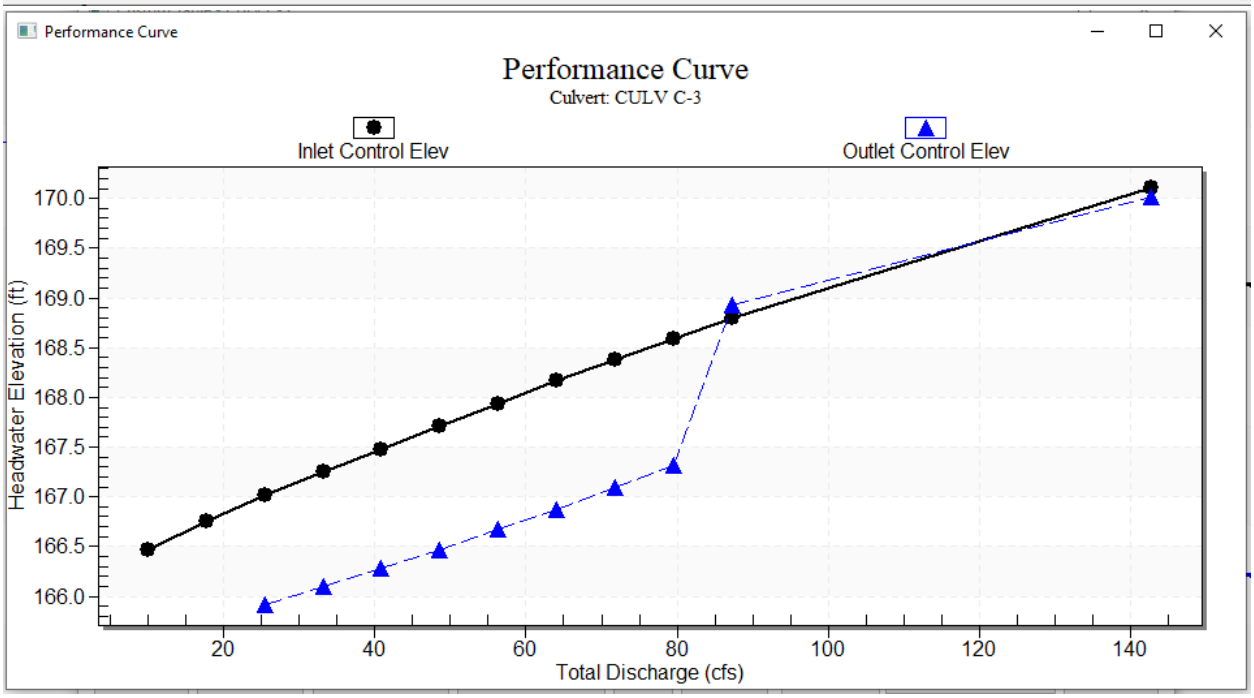
Plot

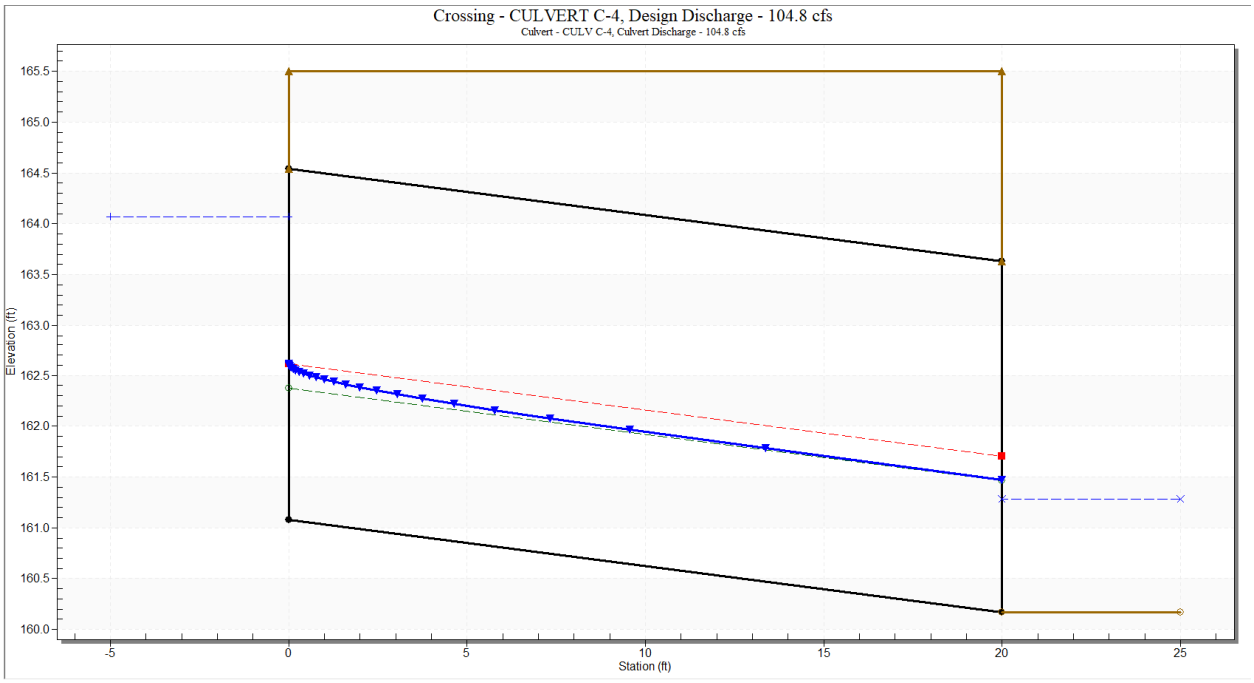
- Crossing Rating Curve
- Culvert Performance Curve
- Selected Water Profile
- Water Surface Profile Data

* Full Flow Headwater elevation is below inlet invert.

Help | Flow Types... | Edit Input Data... | Energy Dissipation... | AOP... | Low Flow... | Export Report | Adobe PDF (*.pdf) | Close

Performance Curve





Crossing Data - CULVERT C-4

Crossing Properties

Name: CULVERT C-4

Parameter	Value	Units
DISCHARGE DATA		
Discharge Method	Minimum, Design, and Maximum	
Minimum Flow	10.000	cfs
Design Flow	104.780	cfs
Maximum Flow	104.780	cfs
TAILWATER DATA		
Channel Type	Trapezoidal Channel	
Bottom Width	10.000	ft
Side Slope (H:V)	8.000	_:1
Channel Slope	0.0200	ft/ft
Manning's n (channel)	0.035	
Channel Invert Elevation	160.170	ft
Rating Curve	View...	
ROADWAY DATA		
Roadway Profile Shape	Constant Roadway Elevation	
First Roadway Station	0.000	ft
Crest Length	100.000	ft
Crest Elevation	165.500	ft
Roadway Surface	Gravel	
Top Width	20.000	ft

Culvert Properties

CULV C-4

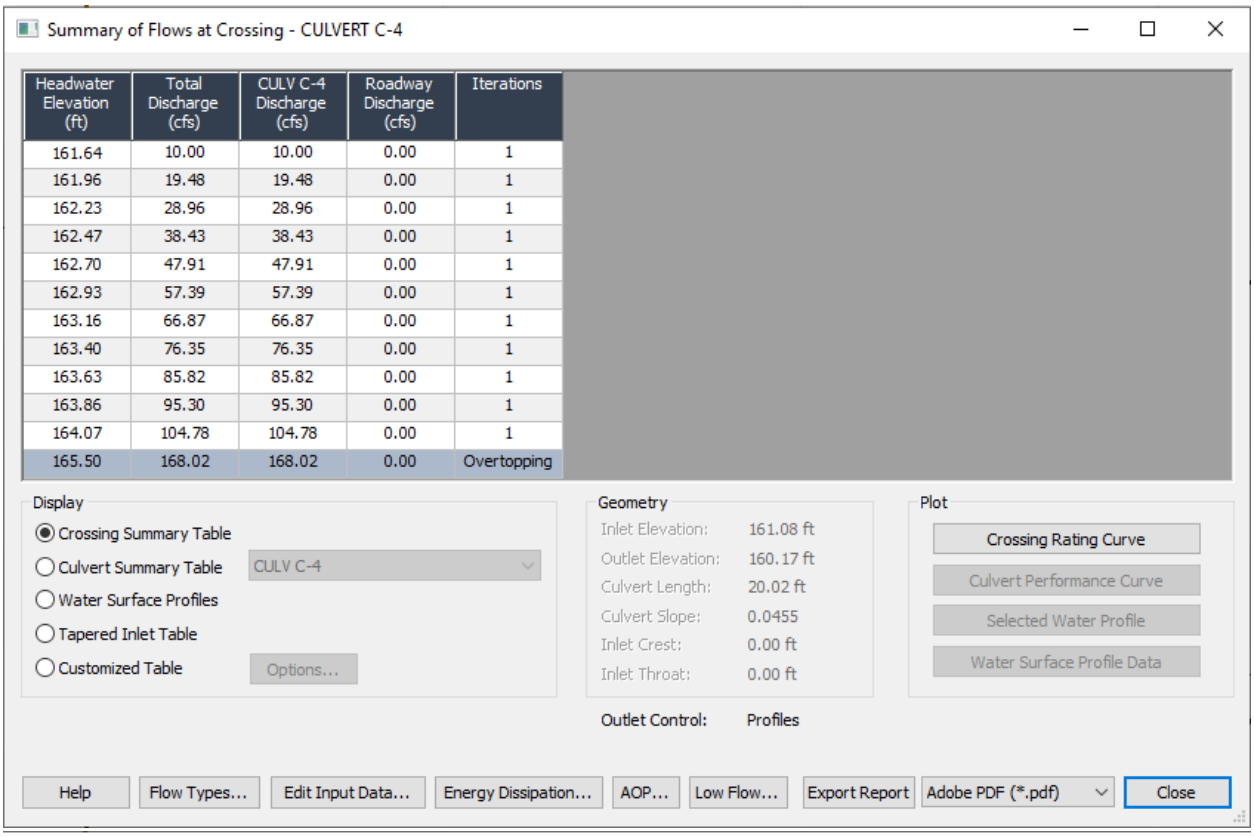
Add Culvert

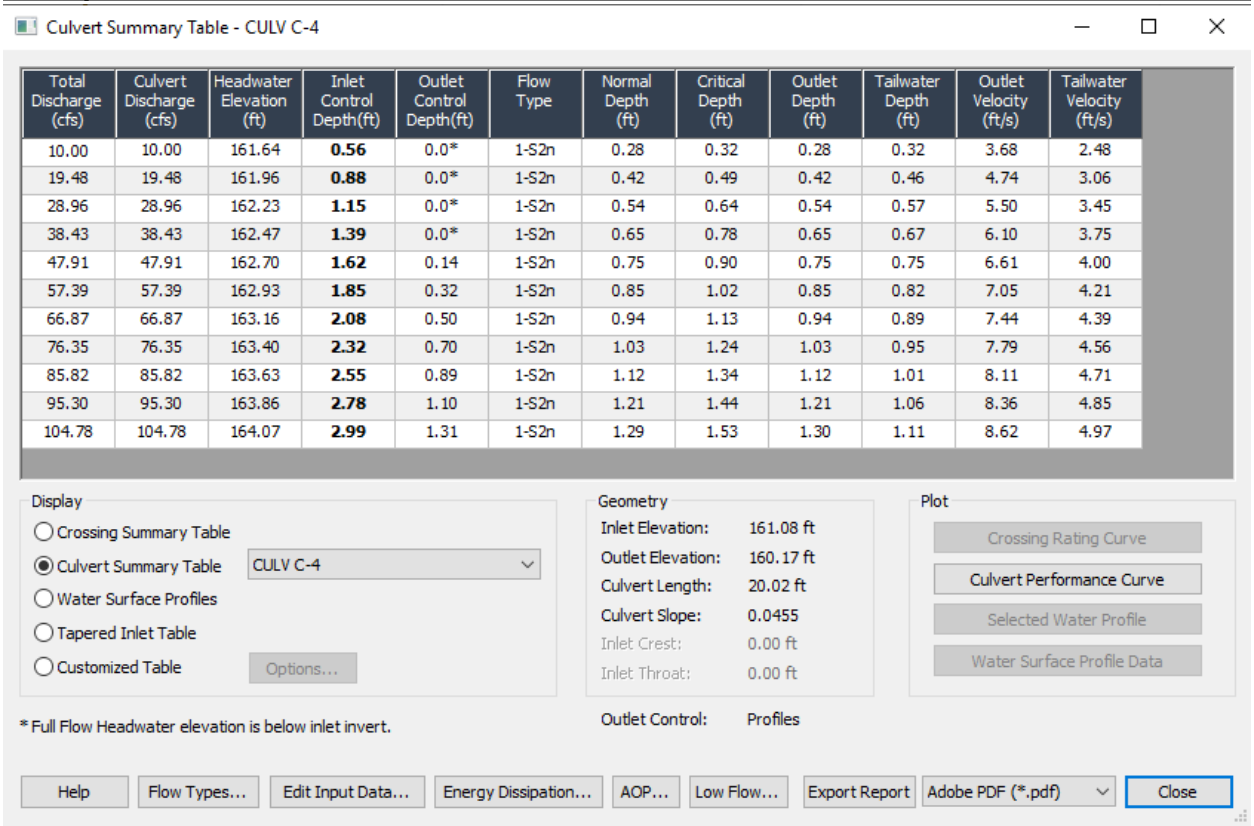
Duplicate Culvert

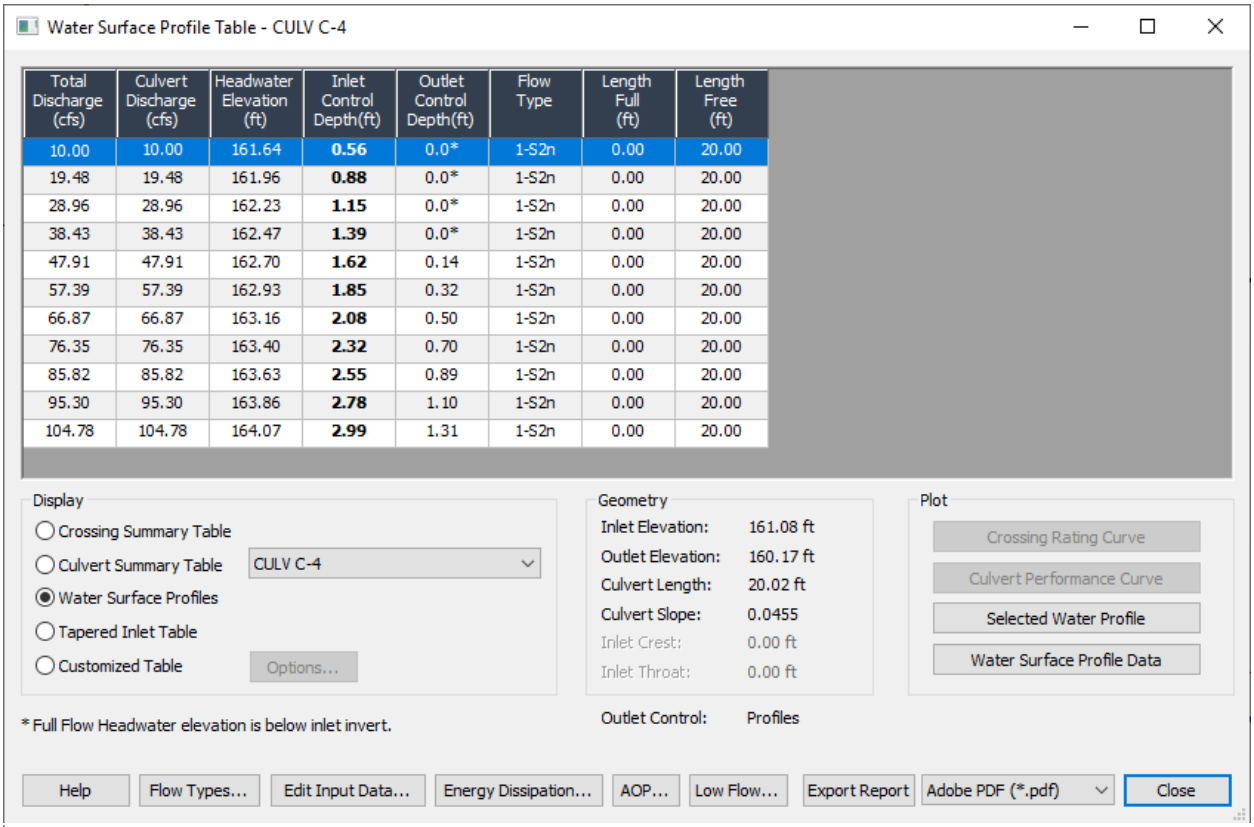
Delete Culvert

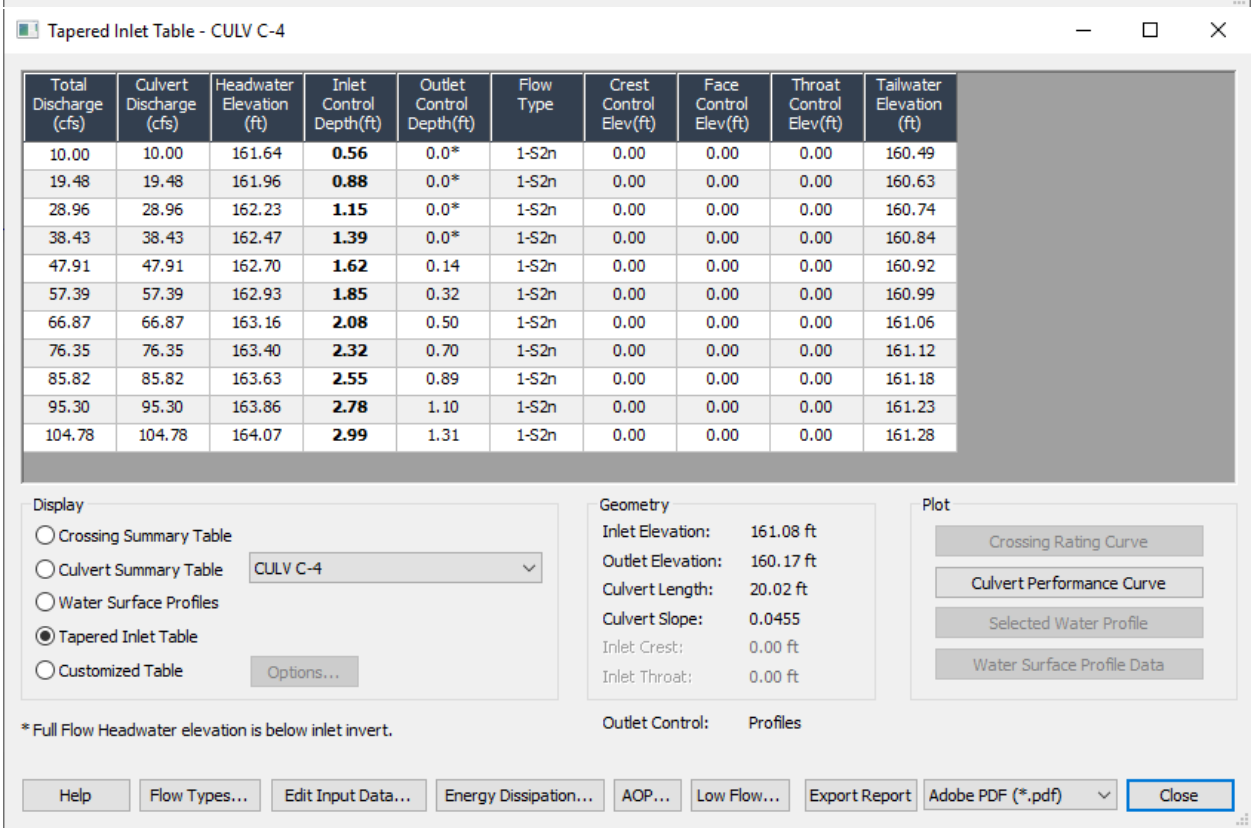
Parameter	Value	Units
CULVERT DATA		
Name	CULV C-4	
Shape	Arch, Open Bottom	
Material	Corrugated Steel	
Size	Define...	
Span	10.000	ft
Rise	3.458	ft
Embedment Depth	0.000	in
Manning's n (Top/Sides)	0.035	
Manning's n (Bottom)	0.035	
Culvert Type	Straight	
Inlet Configuration	Thin Edge Projecting	
Inlet Depression?	No	
SITE DATA		
Site Data Input Option	Culvert Invert Data	
Inlet Station	0.000	ft
Inlet Elevation	161.080	ft
Outlet Station	20.000	ft
Outlet Elevation	160.170	ft
Number of Barrels	1	

Help | Click on any icon for help on a specific topic | Low Flow | AOP | Energy Dissipation | Analyze Crossing | OK | Cancel


Summary of Flows at Crossing - CULVERT C-4
Headwater Elevation (ft) | Total Discharge (cfs) | CULV C-4 Discharge (cfs) | Roadway Discharge (cfs) | Iterations
161.64 | 10.00 | 10.00 | 0.00 | 1
161.96 | 19.48 | 19.48 | 0.00 | 1
162.23 | 28.96 | 28.96 | 0.00 | 1
162.47 | 38.43 | 38.43 | 0.00 | 1
162.70 | 47.91 | 47.91 | 0.00 | 1
162.93 | 57.39 | 57.39 | 0.00 | 1
163.16 | 66.87 | 66.87 | 0.00 | 1
163.40 | 76.35 | 76.35 | 0.00 | 1
163.63 | 85.82 | 85.82 | 0.00 | 1
163.86 | 95.30 | 95.30 | 0.00 | 1
164.07 | 104.78 | 104.78 | 0.00 | 1
165.50 | 168.02 | 168.02 | 0.00 | Overtopping
Display
Crossing Summary Table
Culvert Summary Table
CULV C-4
Water Surface Profiles
Tapered Inlet Table
Customized Table
Options...
Geometry
Inlet Elevation: 161.08 ft
Outlet Elevation: 160.17 ft
Culvert Length: 20.02 ft
Culvert Slope: 0.0455
Inlet Crest: 0.00 ft
Inlet Throat: 0.00 ft
Outlet Control: Profiles
Plot
Crossing Rating Curve
Culvert Performance Curve
Selected Water Profile
Water Surface Profile Data
Help
Flow Types...
Edit Input Data...
Energy Dissipation...
AOP...
Low Flow...
Export Report
Adobe PDF (*.pdf)
Close


Culvert Summary Table - CULV C-4
Total Discharge (cfs) | Culvert Discharge (cfs) | Headwater Elevation (ft) | Inlet Control Depth(ft) | Outlet Control Depth(ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | Tailwater Depth (ft) | Outlet Velocity (ft/s) | Tailwater Velocity (ft/s)
10.00 | 10.00 | 161.64 | 0.56 | 0.0* | 1-S2n | 0.28 | 0.32 | 0.28 | 0.32 | 3.68 | 2.48
19.48 | 19.48 | 161.96 | 0.88 | 0.0* | 1-S2n | 0.42 | 0.49 | 0.42 | 0.46 | 4.74 | 3.06
28.96 | 28.96 | 162.23 | 1.15 | 0.0* | 1-S2n | 0.54 | 0.64 | 0.54 | 0.57 | 5.50 | 3.45
38.43 | 38.43 | 162.47 | 1.39 | 0.0* | 1-S2n | 0.65 | 0.78 | 0.65 | 0.67 | 6.10 | 3.75
47.91 | 47.91 | 162.70 | 1.62 | 0.14 | 1-S2n | 0.75 | 0.90 | 0.75 | 0.75 | 6.61 | 4.00
57.39 | 57.39 | 162.93 | 1.85 | 0.32 | 1-S2n | 0.85 | 1.02 | 0.85 | 0.82 | 7.05 | 4.21
66.87 | 66.87 | 163.16 | 2.08 | 0.50 | 1-S2n | 0.94 | 1.13 | 0.94 | 0.89 | 7.44 | 4.39
76.35 | 76.35 | 163.40 | 2.32 | 0.70 | 1-S2n | 1.03 | 1.24 | 1.03 | 0.95 | 7.79 | 4.56
85.82 | 85.82 | 163.63 | 2.55 | 0.89 | 1-S2n | 1.12 | 1.34 | 1.12 | 1.01 | 8.11 | 4.71
95.30 | 95.30 | 163.86 | 2.78 | 1.10 | 1-S2n | 1.21 | 1.44 | 1.21 | 1.06 | 8.36 | 4.85
104.78 | 104.78 | 164.07 | 2.99 | 1.31 | 1-S2n | 1.29 | 1.53 | 1.30 | 1.11 | 8.62 | 4.97
Display
Crossing Summary Table
Culvert Summary Table
CULV C-4
Water Surface Profiles
Tapered Inlet Table
Customized Table
Options...
Geometry
Inlet Elevation: 161.08 ft
Outlet Elevation: 160.17 ft
Culvert Length: 20.02 ft
Culvert Slope: 0.0455
Inlet Crest: 0.00 ft
Inlet Throat: 0.00 ft
Outlet Control: Profiles
Plot
Crossing Rating Curve
Culvert Performance Curve
Selected Water Profile
Water Surface Profile Data
* Full Flow Headwater elevation is below inlet invert.
Help
Flow Types...
Edit Input Data...
Energy Dissipation...
AOP...
Low Flow...
Export Report
Adobe PDF (*.pdf)
Close


Water Surface Profile Table - CULV C-4
Total Discharge (cfs) | Culvert Discharge (cfs) | Headwater Elevation (ft) | Inlet Control Depth(ft) | Outlet Control Depth(ft) | Flow Type | Length Full (ft) | Length Free (ft)
10.00 | 10.00 | 161.64 | 0.56 | 0.0* | 1-S2n | 0.00 | 20.00
19.48 | 19.48 | 161.96 | 0.88 | 0.0* | 1-S2n | 0.00 | 20.00
28.96 | 28.96 | 162.23 | 1.15 | 0.0* | 1-S2n | 0.00 | 20.00
38.43 | 38.43 | 162.47 | 1.39 | 0.0* | 1-S2n | 0.00 | 20.00
47.91 | 47.91 | 162.70 | 1.62 | 0.14 | 1-S2n | 0.00 | 20.00
57.39 | 57.39 | 162.93 | 1.85 | 0.32 | 1-S2n | 0.00 | 20.00
66.87 | 66.87 | 163.16 | 2.08 | 0.50 | 1-S2n | 0.00 | 20.00
76.35 | 76.35 | 163.40 | 2.32 | 0.70 | 1-S2n | 0.00 | 20.00
85.82 | 85.82 | 163.63 | 2.55 | 0.89 | 1-S2n | 0.00 | 20.00
95.30 | 95.30 | 163.86 | 2.78 | 1.10 | 1-S2n | 0.00 | 20.00
104.78 | 104.78 | 164.07 | 2.99 | 1.31 | 1-S2n | 0.00 | 20.00
Display
Crossing Summary Table
Culvert Summary Table
CULV C-4
Water Surface Profiles
Tapered Inlet Table
Customized Table
Options...
Geometry
Inlet Elevation: 161.08 ft
Outlet Elevation: 160.17 ft
Culvert Length: 20.02 ft
Culvert Slope: 0.0455
Inlet Crest: 0.00 ft
Inlet Throat: 0.00 ft
Outlet Control: Profiles
Plot
Crossing Rating Curve
Culvert Performance Curve
Selected Water Profile
Water Surface Profile Data
* Full Flow Headwater elevation is below inlet invert.
Help
Flow Types...
Edit Input Data...
Energy Dissipation...
AOP...
Low Flow...
Export Report
Adobe PDF (*.pdf)
Close


Tapered Inlet Table - CULV C-4
Total Discharge (cfs) | Culvert Discharge (cfs) | Headwater Elevation (ft) | Inlet Control Depth(ft) | Outlet Control Depth(ft) | Flow Type | Crest Control Elev(ft) | Face Control Elev(ft) | Throat Control Elev(ft) | Tailwater Elevation (ft)
10.00 | 10.00 | 161.64 | 0.56 | 0.0* | 1-S2n | 0.00 | 0.00 | 0.00 | 160.49
19.48 | 19.48 | 161.96 | 0.88 | 0.0* | 1-S2n | 0.00 | 0.00 | 0.00 | 160.63
28.96 | 28.96 | 162.23 | 1.15 | 0.0* | 1-S2n | 0.00 | 0.00 | 0.00 | 160.74
38.43 | 38.43 | 162.47 | 1.39 | 0.0* | 1-S2n | 0.00 | 0.00 | 0.00 | 160.84
47.91 | 47.91 | 162.70 | 1.62 | 0.14 | 1-S2n | 0.00 | 0.00 | 0.00 | 160.92
57.39 | 57.39 | 162.93 | 1.85 | 0.32 | 1-S2n | 0.00 | 0.00 | 0.00 | 160.99
66.87 | 66.87 | 163.16 | 2.08 | 0.50 | 1-S2n | 0.00 | 0.00 | 0.00 | 161.06
76.35 | 76.35 | 163.40 | 2.32 | 0.70 | 1-S2n | 0.00 | 0.00 | 0.00 | 161.12
85.82 | 85.82 | 163.63 | 2.55 | 0.89 | 1-S2n | 0.00 | 0.00 | 0.00 | 161.18
95.30 | 95.30 | 163.86 | 2.78 | 1.10 | 1-S2n | 0.00 | 0.00 | 0.00 | 161.23
104.78 | 104.78 | 164.07 | 2.99 | 1.31 | 1-S2n | 0.00 | 0.00 | 0.00 | 161.28
Display
Crossing Summary Table
Culvert Summary Table
CULV C-4
Water Surface Profiles
Tapered Inlet Table
Customized Table
Options...
Geometry
Inlet Elevation: 161.08 ft
Outlet Elevation: 160.17 ft
Culvert Length: 20.02 ft
Culvert Slope: 0.0455
Inlet Crest: 0.00 ft
Inlet Throat: 0.00 ft
Outlet Control: Profiles
Plot
Crossing Rating Curve
Culvert Performance Curve
Selected Water Profile
Water Surface Profile Data
* Full Flow Headwater elevation is below inlet invert.
Help
Flow Types...
Edit Input Data...
Energy Dissipation...
AOP...
Low Flow...
Export Report
Adobe PDF (*.pdf)
Close

Custom Table - CULV C-4

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Crest Control Elev(ft)	Face Control Elev(ft)	Throat Control Elev(ft)	Tailwater Elevation (ft)
10.00	10.00	161.64	0.56	0.0*	1-S2n	0.00	0.00	0.00	160.49
19.48	19.48	161.96	0.88	0.0*	1-S2n	0.00	0.00	0.00	160.63
28.96	28.96	162.23	1.15	0.0*	1-S2n	0.00	0.00	0.00	160.74
38.43	38.43	162.47	1.39	0.0*	1-S2n	0.00	0.00	0.00	160.84
47.91	47.91	162.70	1.62	0.14	1-S2n	0.00	0.00	0.00	160.92
57.39	57.39	162.93	1.85	0.32	1-S2n	0.00	0.00	0.00	160.99
66.87	66.87	163.16	2.08	0.50	1-S2n	0.00	0.00	0.00	161.06
76.35	76.35	163.40	2.32	0.70	1-S2n	0.00	0.00	0.00	161.12
85.82	85.82	163.63	2.55	0.89	1-S2n	0.00	0.00	0.00	161.18
95.30	95.30	163.86	2.78	1.10	1-S2n	0.00	0.00	0.00	161.23
104.78	104.78	164.07	2.99	1.31	1-S2n	0.00	0.00	0.00	161.28

Display

- ○ Crossing Summary Table
- ○ Culvert Summary Table — CULV C-4
- ○ Water Surface Profiles
- ○ Tapered Inlet Table
- ◉ Customized Table — Options...

Geometry

Inlet Elevation:	161.08 ft
Outlet Elevation:	160.17 ft
Culvert Length:	20.02 ft
Culvert Slope:	0.0455
Inlet Crest:	0.00 ft
Inlet Throat:	0.00 ft
Outlet Control:	Profiles

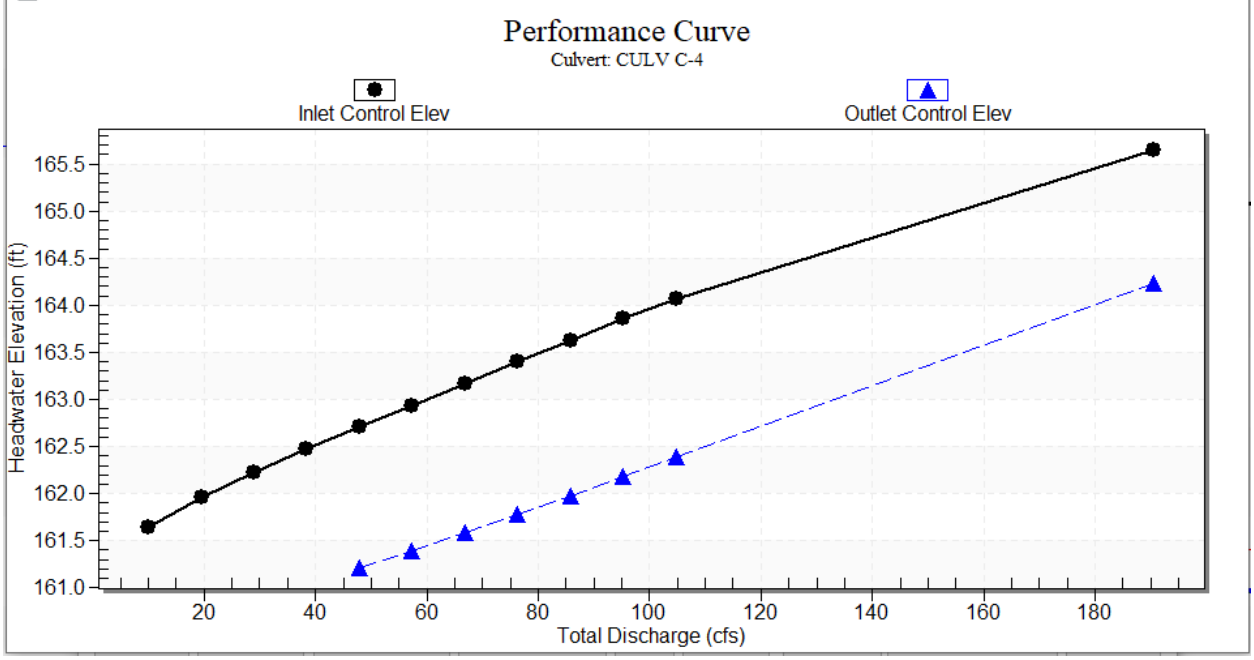
Plot

- Crossing Rating Curve
- Culvert Performance Curve
- Selected Water Profile
- Water Surface Profile Data

* Full Flow Headwater elevation is below inlet invert.

Help | Flow Types... | Edit Input Data... | Energy Dissipation... | AOP... | Low Flow... | Export Report | Adobe PDF (*.pdf) | Close

Performance Curve



Culvert Report

Culvert D1A

Invert Elev Dn (ft)	=	126.00
Pipe Length (ft)	=	69.00
Slope (%)	=	0.93
Invert Elev Up (ft)	=	126.64
Rise (in)	=	12.0
Shape	=	Circular
Span (in)	=	12.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

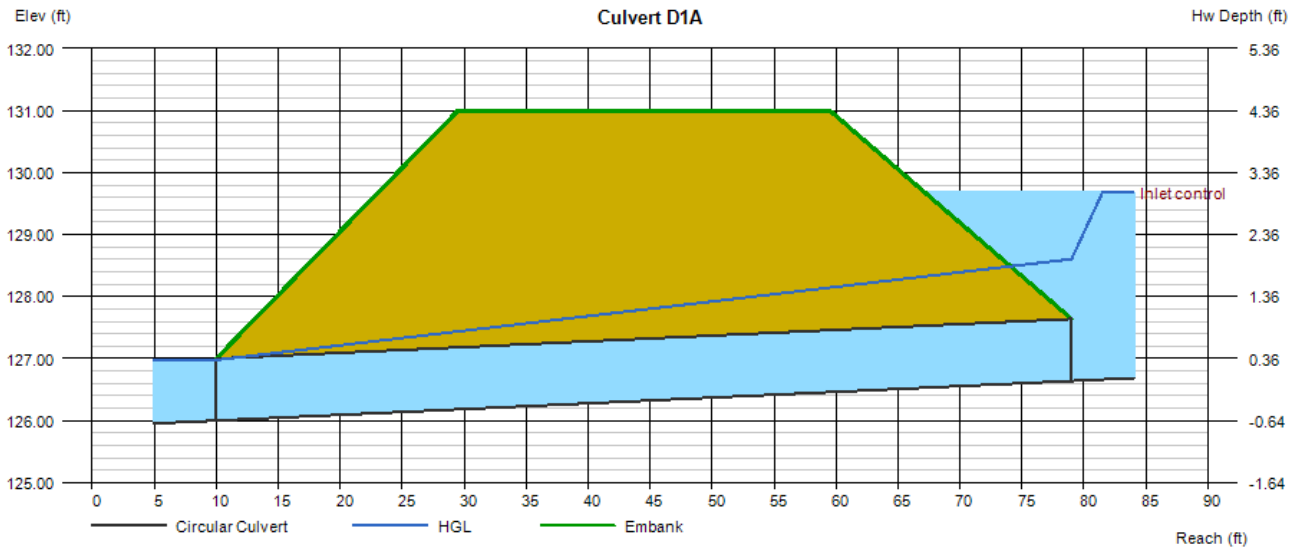
Top Elevation (ft)	=	131.00
Top Width (ft)	=	30.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	6.07
Qmax (cfs)	=	6.07
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	6.07
Qpipe (cfs)	=	6.07
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.77
Veloc Up (ft/s)	=	7.73
HGL Dn (ft)	=	126.98
HGL Up (ft)	=	128.60
Hw Elev (ft)	=	129.68
Hw/D (ft)	=	3.04
Flow Regime	=	Inlet Control



Stonington Solar Array Facility
North Stonington, CT
SRC

6/17/2021

Ditch Calculations

Storm Event: 100-yr 24-hr (Conveyance Protection, per DEEP storm manual 2004 Table 7-1)

Manning's "n": 0.025
Desired Freeboard: 3"

Drainage Area and Design Flow						Ditch Slope					Ditch Dims and Results							
Drainage Area	Grading Area	Total Peak Runoff 100-yr Event (cfs)	Ditch	% of Drainage Area	Weighted Peak Runoff 100-yr Event (cfs)	Length	Starting Inv.	Ending Inv.	Fall (ft)	Avg. Slope (%)	Shape	Side Slope z:1	Bott. (ft)	Depth (ft)	Top Width (ft)	Flow Depth (ft)	Free-board (ft)	Free-board (in)
1A	A	19.22	1A	33%	6.37	289	129.5	127.5	2	0.69%	Trap.	3	1	1	7	0.73	0.27	3.24
1B	A	19.96	1B	51%	10.15	515	129	127.5	1.5	0.29%	Trap.	3	1.5	1.25	9	1	0.25	3.00
1C	A	52.94	1C1	23%	12.06	790	137.5	123.5	14	1.77%	Trap.	3	1.5	1	7.5	0.73	0.27	3.24
	A		1C2	43%	22.91	377	124.5	120	4.5	1.19%	Trap.	3	2	1.25	9.5	1	0.25	3
2	D	17.23	2A	29%	4.97	221	200	179	21	9.50%	Tri.	3	0	1	6	0.49	0.51	6.12
			2B	15%	2.65	165	198	181	17	10.30%	Tri.	3	0	1	6	0.39	0.61	7.32
4	B	40.93	4A	10%	4.29	275	141	127	14	5.09%	Tri.	3	0	1	6	0.53	0.47	5.64
			4B	43%	17.75	672	141	129	12	1.79%	Trap.	3	3	1	9	0.71	0.29	3.48
5	F	76.83	5A	29%	22.23	793	168	137	31	3.91%	Trap.	3	2	1	8	0.75	0.25	3
			5B	10%	7.52	861	176	133	43	4.99%	Tri.	3	0	1	6	0.65	0.35	4.2

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jun 23 2021

Ditch 1A

Trapezoidal

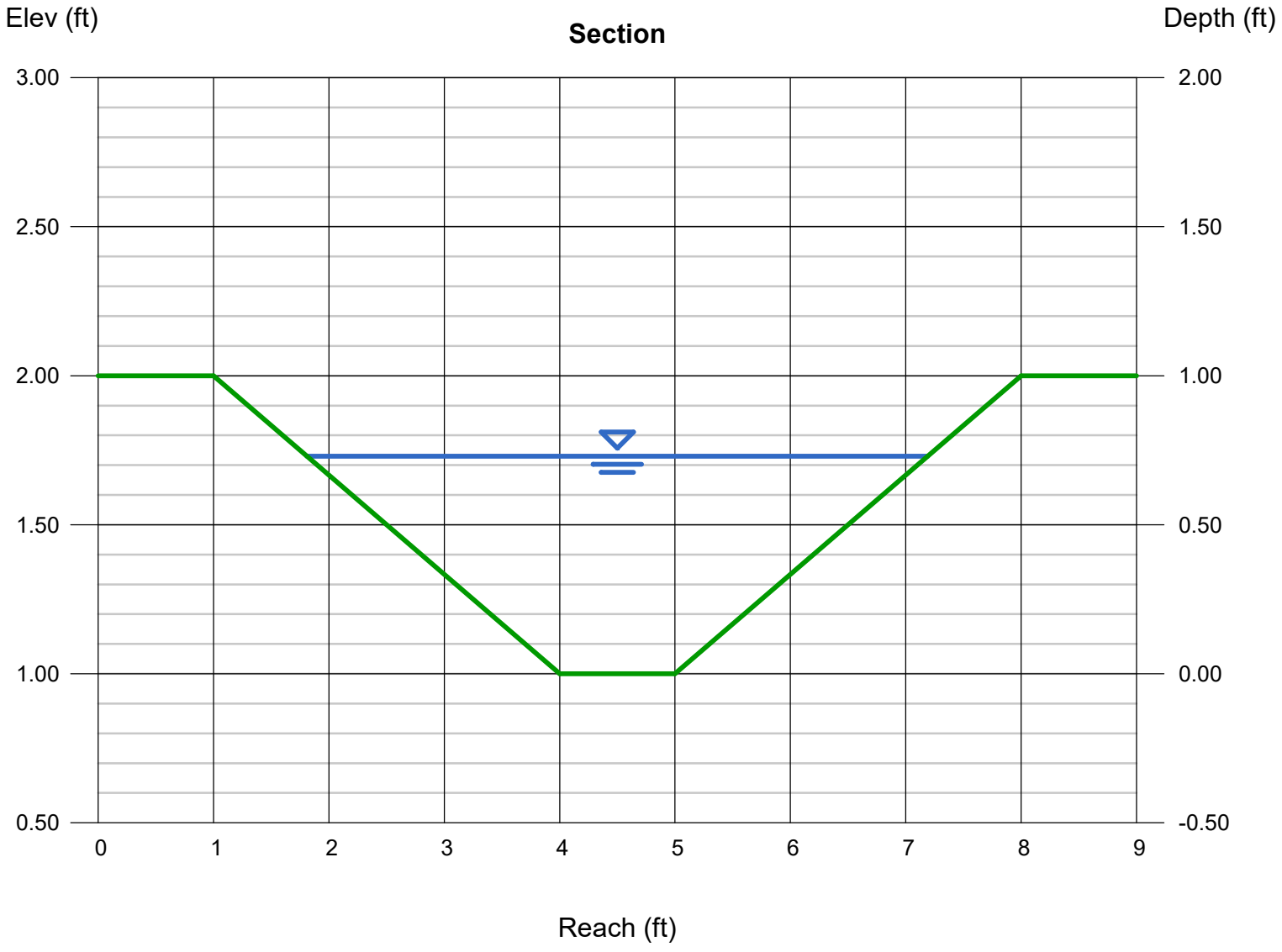
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.69
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.37

Highlighted

Depth (ft)	= 0.73
Q (cfs)	= 6.370
Area (sqft)	= 2.33
Velocity (ft/s)	= 2.74
Wetted Perim (ft)	= 5.62
Crit Depth, Yc (ft)	= 0.63
Top Width (ft)	= 5.38
EGL (ft)	= 0.85



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jun 23 2021

Ditch 1B

Trapezoidal

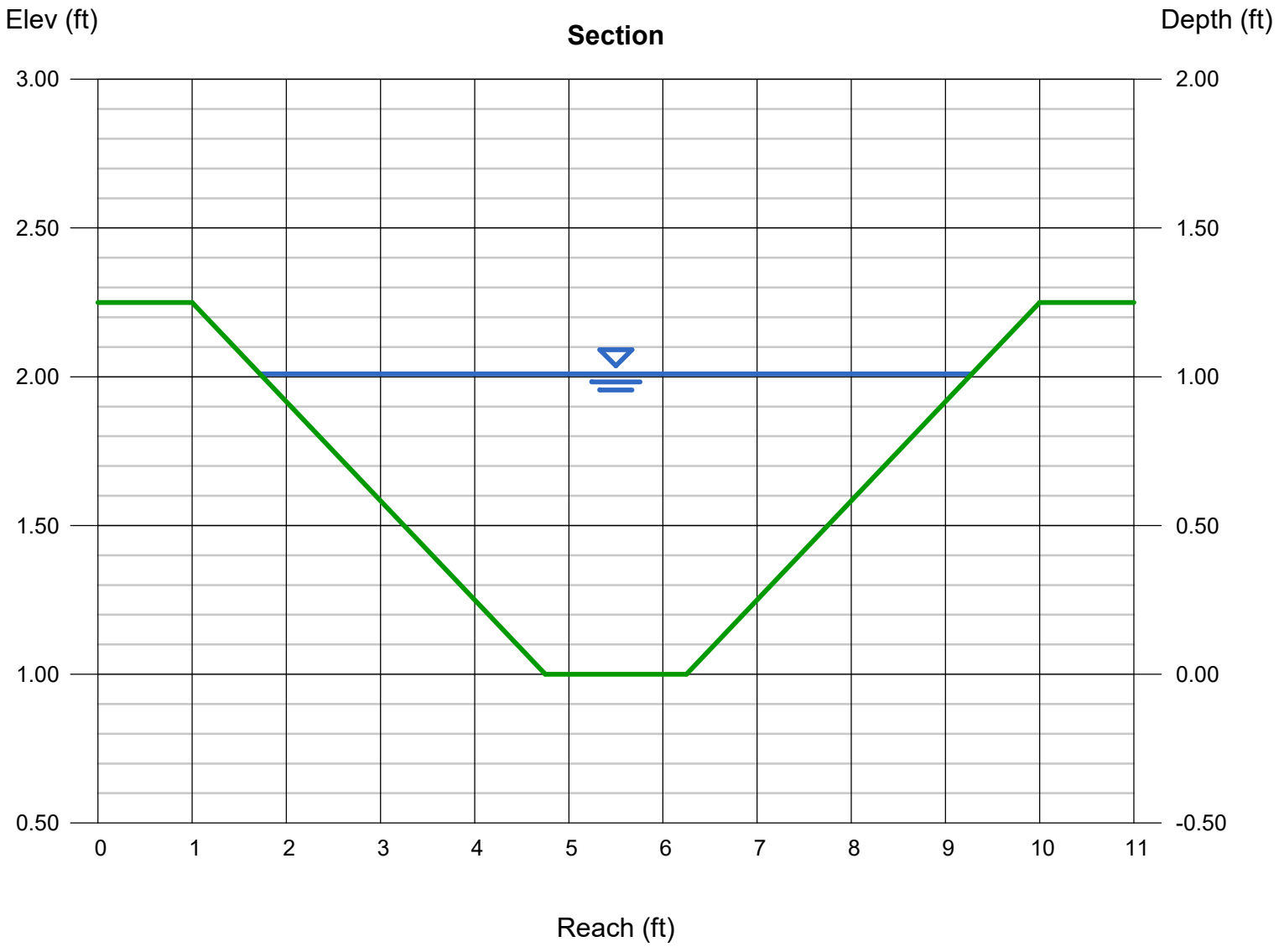
Bottom Width (ft)	= 1.50
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.25
Invert Elev (ft)	= 1.00
Slope (%)	= 0.29
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.15

Highlighted

Depth (ft)	= 1.01
Q (cfs)	= 10.15
Area (sqft)	= 4.58
Velocity (ft/s)	= 2.22
Wetted Perim (ft)	= 7.89
Crit Depth, Yc (ft)	= 0.73
Top Width (ft)	= 7.56
EGL (ft)	= 1.09



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jun 23 2021

Ditch 1C1

Trapezoidal

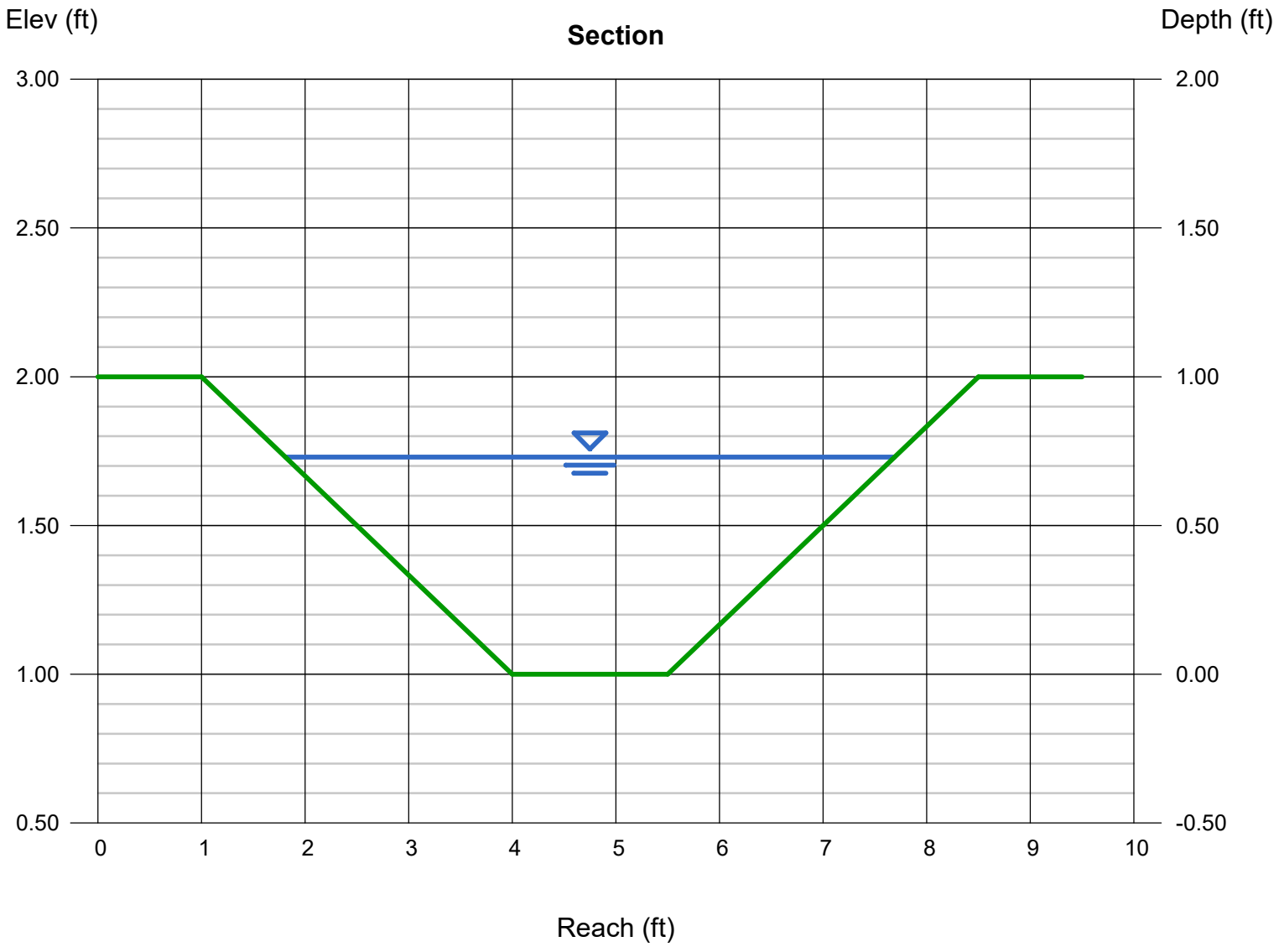
Bottom Width (ft)	= 1.50
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.77
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.06

Highlighted

Depth (ft)	= 0.73
Q (cfs)	= 12.06
Area (sqft)	= 2.69
Velocity (ft/s)	= 4.48
Wetted Perim (ft)	= 6.12
Crit Depth, Yc (ft)	= 0.79
Top Width (ft)	= 5.88
EGL (ft)	= 1.04



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jun 23 2021

Ditch 1C2

Trapezoidal

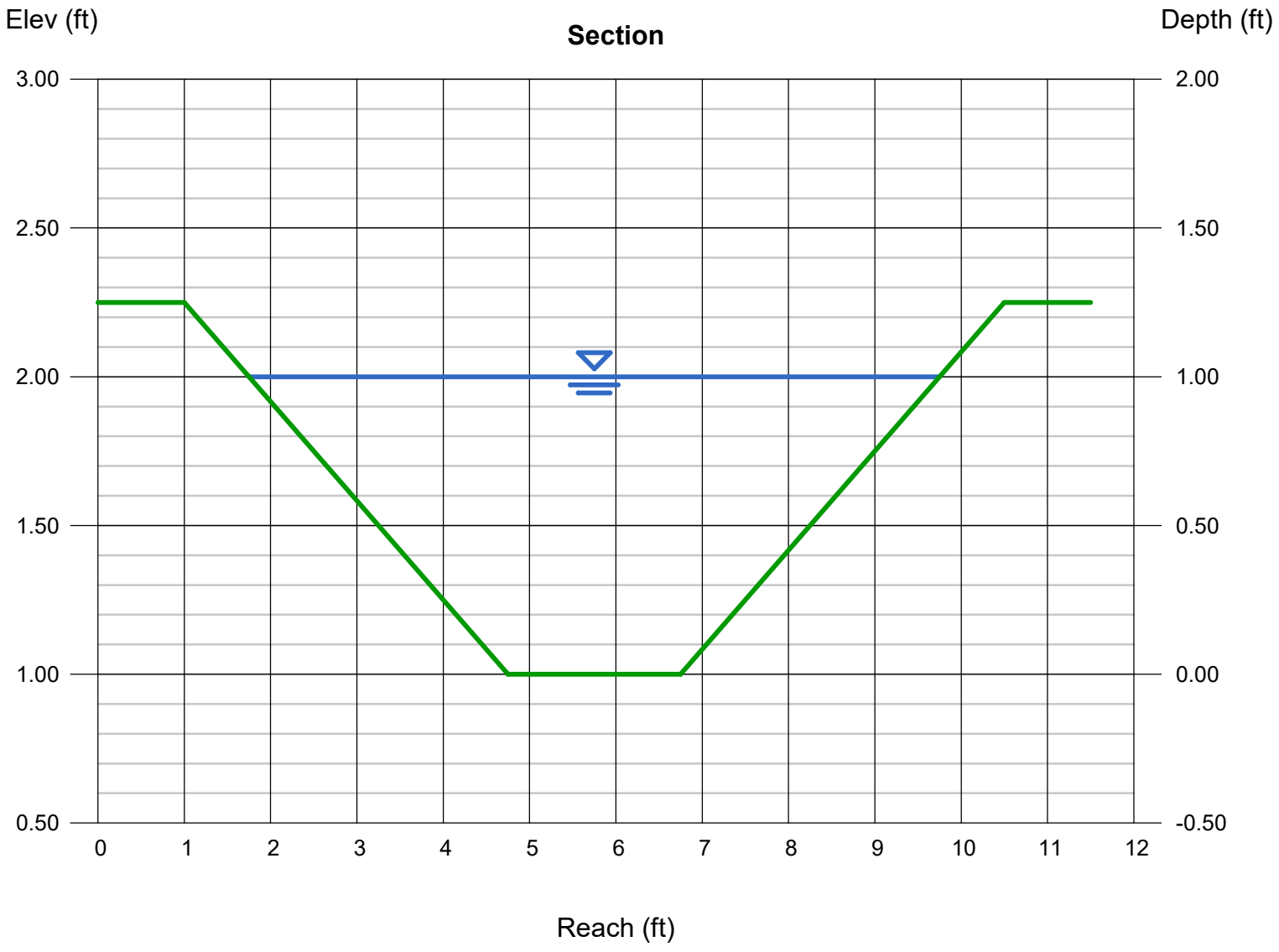
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.25
Invert Elev (ft)	= 1.00
Slope (%)	= 1.19
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 22.91

Highlighted

Depth (ft)	= 1.00
Q (cfs)	= 22.91
Area (sqft)	= 5.00
Velocity (ft/s)	= 4.58
Wetted Perim (ft)	= 8.32
Crit Depth, Yc (ft)	= 1.02
Top Width (ft)	= 8.00
EGL (ft)	= 1.33



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jun 23 2021

Ditch 2A

Triangular

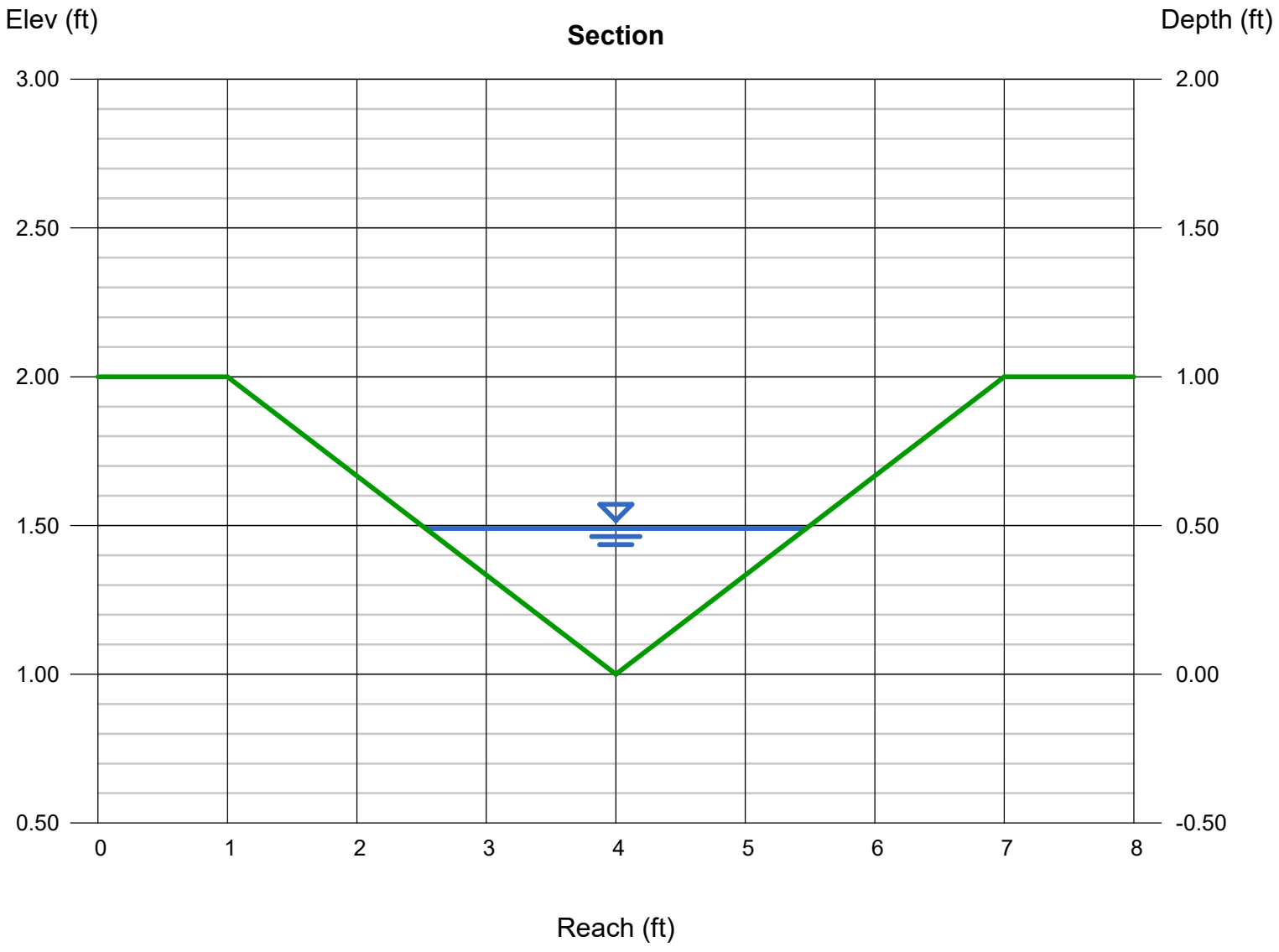
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 9.50
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.97

Highlighted

Depth (ft)	= 0.49
Q (cfs)	= 4.970
Area (sqft)	= 0.72
Velocity (ft/s)	= 6.90
Wetted Perim (ft)	= 3.10
Crit Depth, Yc (ft)	= 0.71
Top Width (ft)	= 2.94
EGL (ft)	= 1.23



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jun 23 2021

Ditch 2B

Triangular

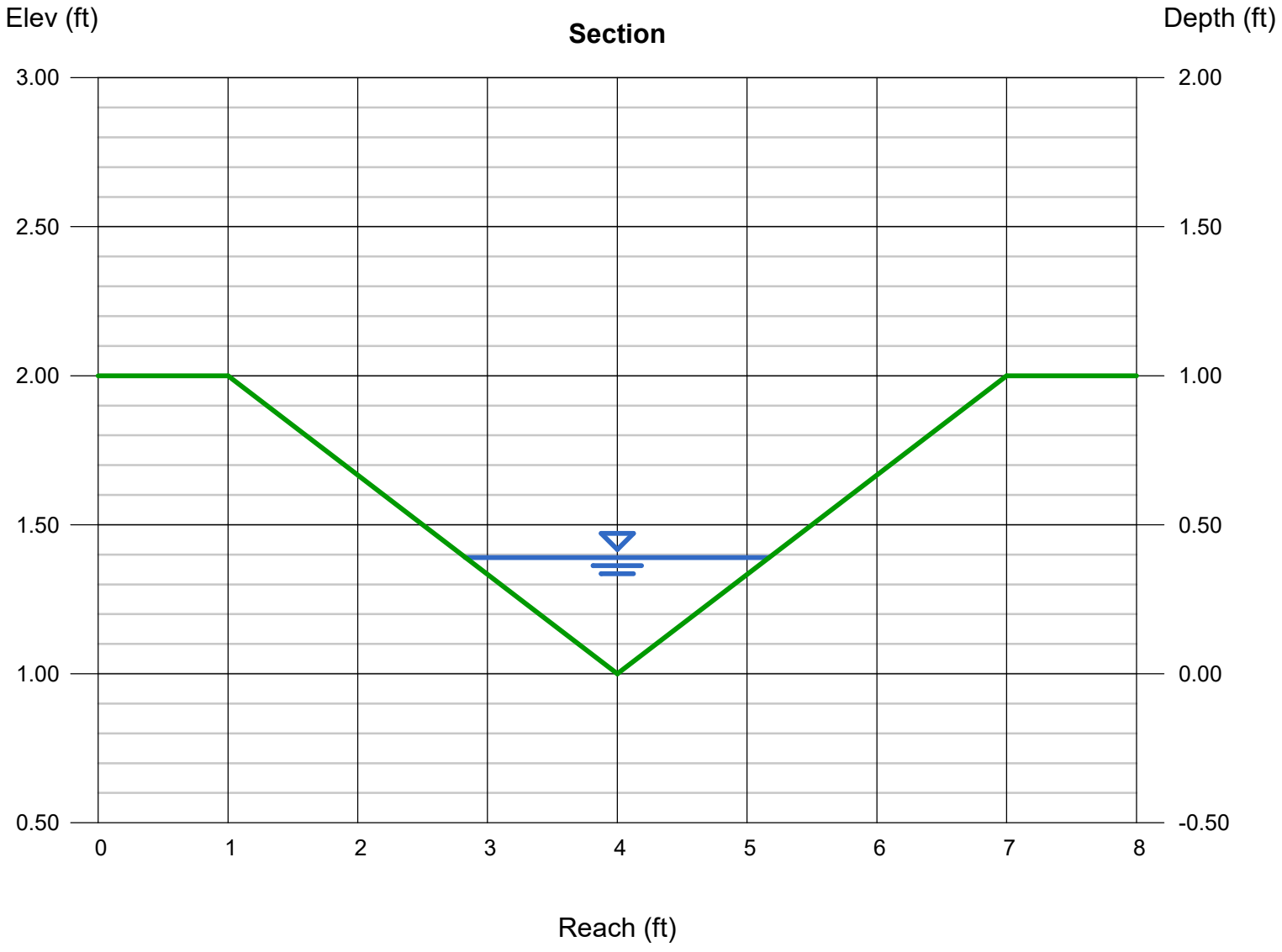
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 10.30
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.65

Highlighted

Depth (ft)	= 0.39
Q (cfs)	= 2.650
Area (sqft)	= 0.46
Velocity (ft/s)	= 5.81
Wetted Perim (ft)	= 2.47
Crit Depth, Yc (ft)	= 0.55
Top Width (ft)	= 2.34
EGL (ft)	= 0.91



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jun 23 2021

Ditch 4A

Triangular

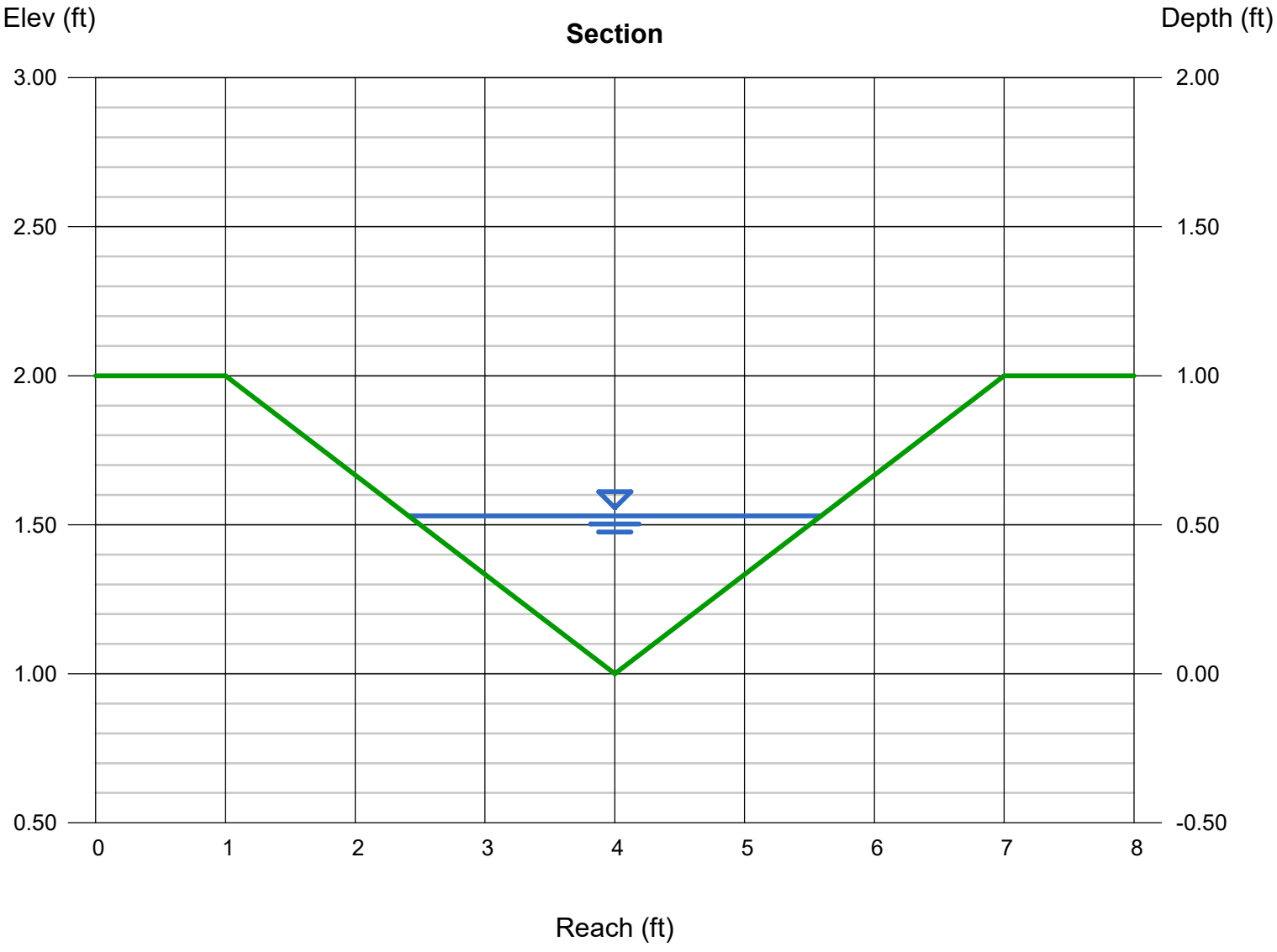
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 5.09
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.29

Highlighted

Depth (ft)	= 0.53
Q (cfs)	= 4.290
Area (sqft)	= 0.84
Velocity (ft/s)	= 5.09
Wetted Perim (ft)	= 3.35
Crit Depth, Yc (ft)	= 0.67
Top Width (ft)	= 3.18
EGL (ft)	= 0.93



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jun 23 2021

Ditch 4B

Trapezoidal

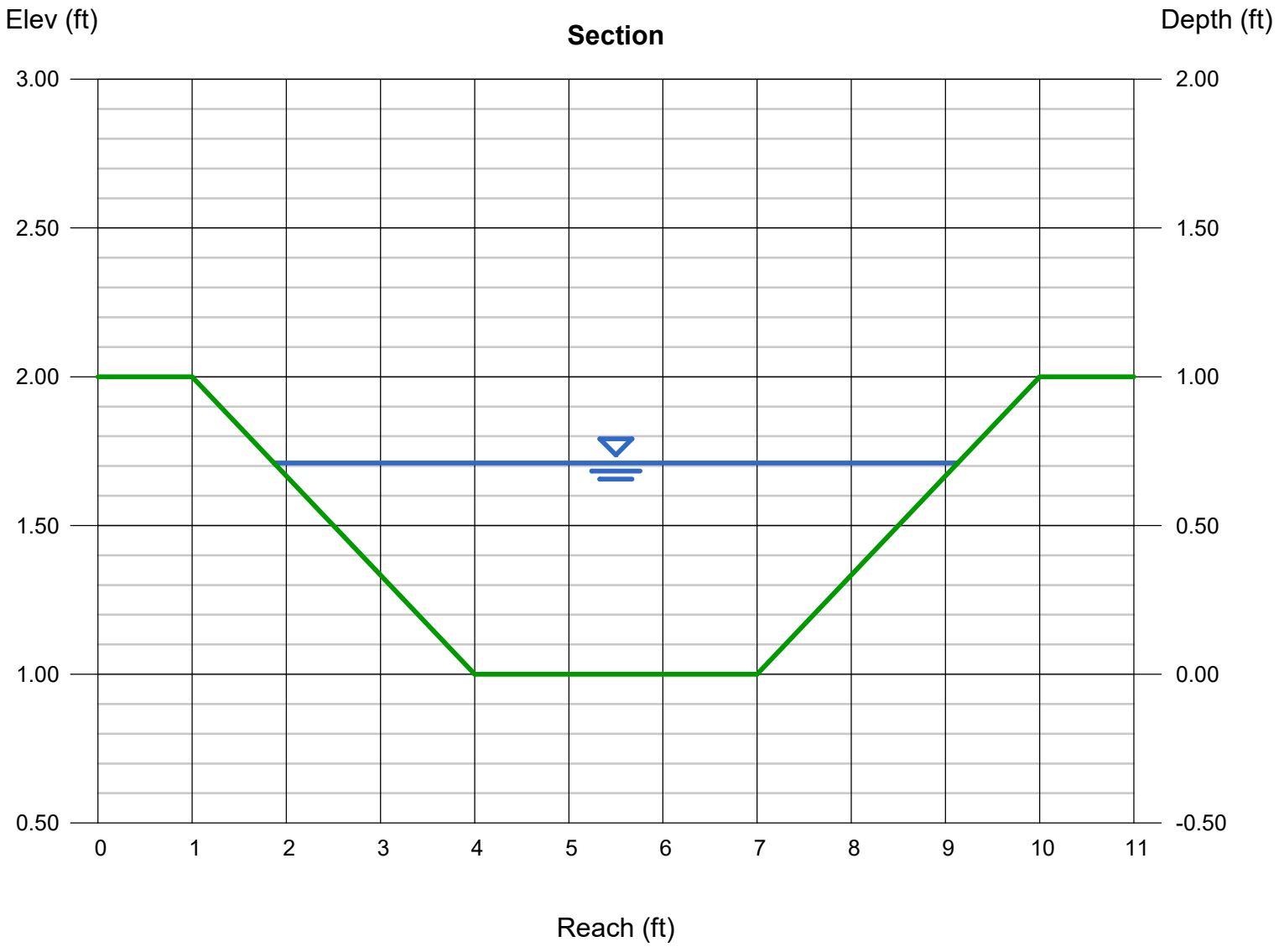
Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.79
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 17.75

Highlighted

Depth (ft)	= 0.71
Q (cfs)	= 17.75
Area (sqft)	= 3.64
Velocity (ft/s)	= 4.87
Wetted Perim (ft)	= 7.49
Crit Depth, Yc (ft)	= 0.79
Top Width (ft)	= 7.26
EGL (ft)	= 1.08



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jun 23 2021

Ditch 5A

Trapezoidal

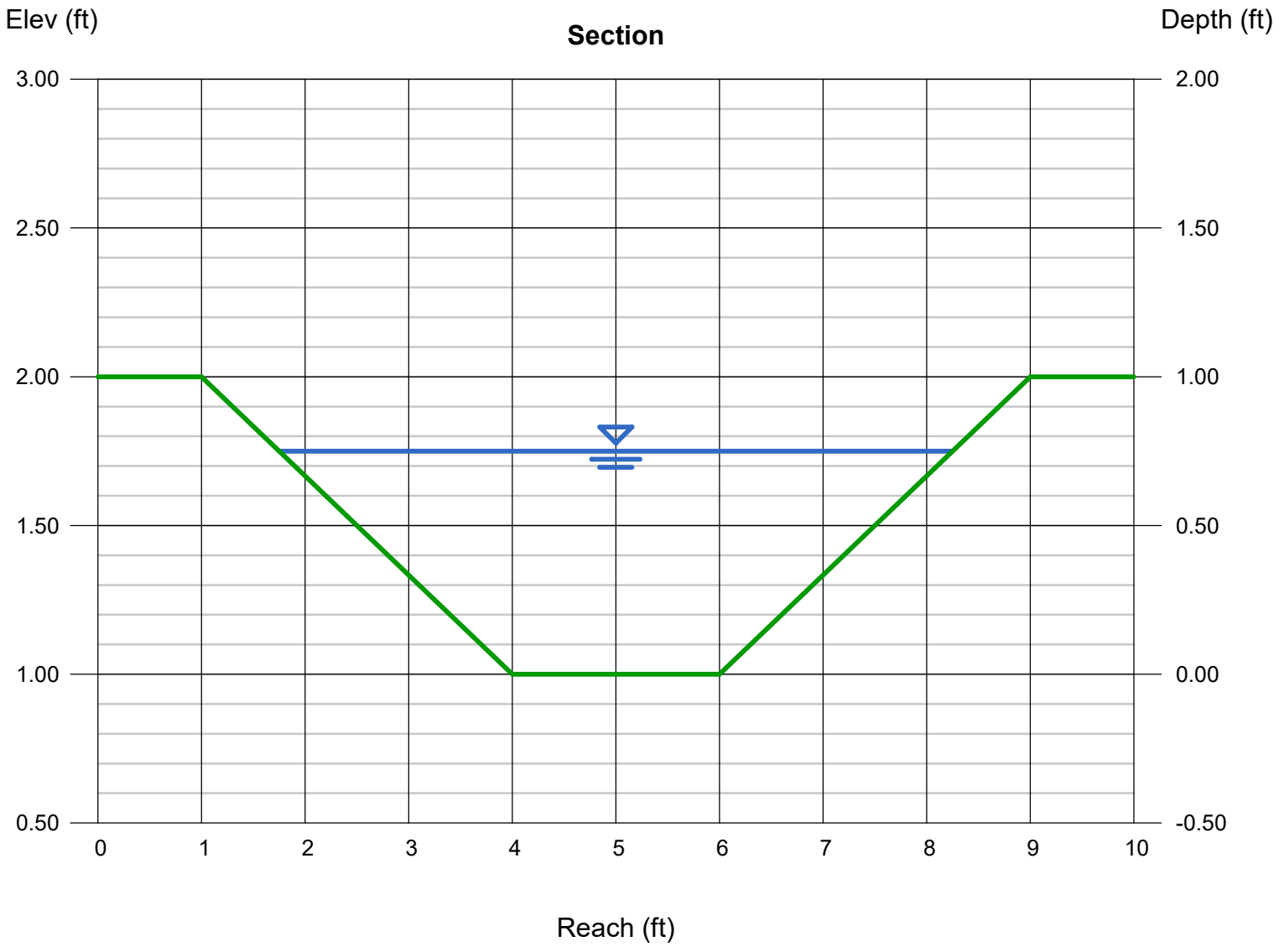
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 3.91
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 22.23

Highlighted

Depth (ft)	= 0.75
Q (cfs)	= 22.23
Area (sqft)	= 3.19
Velocity (ft/s)	= 6.97
Wetted Perim (ft)	= 6.74
Crit Depth, Yc (ft)	= 1.00
Top Width (ft)	= 6.50
EGL (ft)	= 1.51



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jun 23 2021

Ditch 5B

Triangular

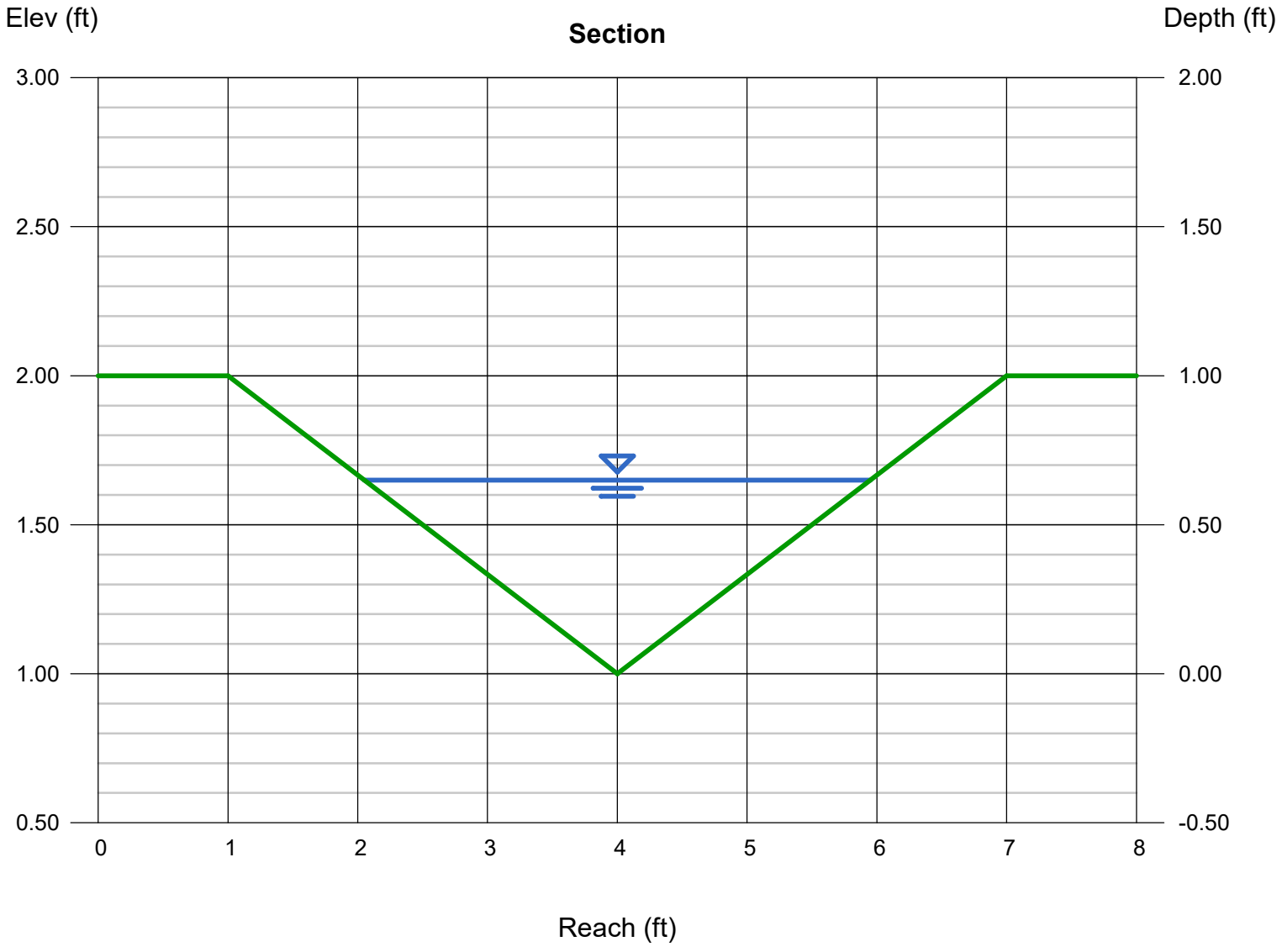
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 4.99
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 7.52

Highlighted

Depth (ft)	= 0.65
Q (cfs)	= 7.520
Area (sqft)	= 1.27
Velocity (ft/s)	= 5.93
Wetted Perim (ft)	= 4.11
Crit Depth, Yc (ft)	= 0.83
Top Width (ft)	= 3.90
EGL (ft)	= 1.20



Stonington Solar Array Facility
North Stonington, CT
SRC

Water Quality Calculations

WQV = (1")(R)(A)/12

I = % Impervious Cover
R = Volumetric Runoff Coeff. = 0.05 + 0.009 (I)
A = Site Area (Ac)

Drainage Area	Area (A) (Ac)	Imp. Cover (I) (%)	Vol. Runoff Coeff. (R)	Required WQV (Ac-ft)	Required WQV (Cu-ft)	Provided WQV (Cu-ft)	Provided WQV (Ac-ft)	Pond Stage Elev.
1A	4.19	31%	0.327	0.11	4,975	5,226	0.12	125.80
1B	4.57	43%	0.436	0.17	7,233	7,519	0.17	120.20
1C	11.85	50%	0.502	0.50	21,589	21,863	0.50	115.70
2	3.66	29%	0.308	0.09	4,095	4,440	0.10	170.50
4	9.02	18%	0.215	0.16	7,028	7,405	0.17	121.00
5	15.22	35%	0.368	0.47	20,306	21,233	0.49	121.30