

Engineering Design Report

IDALS FLO971628B Wetland
Floyd, IA

March 24, 2025

Project No. 23-30398

The logo for ISG Inc. consists of the letters "ISG" in a bold, sans-serif font, with the "I" and "S" joined together. The logo is white and is set against a dark gray square background.

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REPORT FOR:
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SIGNATURE SHEET

I HEREBY CERTIFY THAT THESE CALCULATIONS WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.

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IDALS FLO971628B
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Engineer's Project Number: 23-30398

Dated this 24th day of March, 2025

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PROJECT SUMMARY

Objective: Design and construction of a wetland to treat overland flow of water.

This will be accomplished by constructing a berm along a naturally occurring concentrated flow path. The berm will allow water to pond upstream of it, creating a wetland. The wetland elevation will be regulated by a sharp crested weir constructed from steel sheet piling. This weir will serve as the primary outlet of the wetland, while an overland flow path cut into the berm will serve as the secondary outlet. This wetland will allow for sedimentation and nutrient reduction, therefore reducing the overall pollution load to downstream waters. For this site, the receiving water is the Cedar River.

A sediment forebay is included in this project as an additional effort to aid in the reduction of sediment and sediment bound phosphorus before entering the wetland.

SITE LOCATION & ASSESSMENT

The project site is located in the SW $\frac{1}{4}$ of the NW $\frac{1}{4}$ of Section 28, T97N, R16W in Floyd County, Iowa. The site is situated to the West of the Canadian National Railway and East of Ocean Ave. The existing site receives overland flow from intermittent streams with a drainage area totaling 174 acres, of which approximately 100 acres are privately tiled. A desktop review and assessment using soil maps, historical aerial imagery, and LiDAR information was performed by ISG.

The initial site assessment included a review of survey, tile maps and information acquired from the landowner, and other site constraints identified by the landowner. Due to the landowner's desire to retain farmland on the North side of the site, the location of the berm and wetland pool was limited. Review of constraints led us to develop two initial wetland concepts for the project, one excavated and one natural concept.

SURVEY

A topographical survey was performed by ISG in March 2024. The survey was conducted using a base-rover GPS in Iowa Regional Coordinate System and NAVD 88. Control was established with RTK GPS methods. One (1) benchmark was set for control. Major features were collected, and general topo was made with a grid pattern approximately 50'x50' or adjusted based on natural change in elevation observed in the field. The topo grid included the dam footprint, proposed pool area, and existing stream. Topo survey was used for everything except planning and watershed delineation, in which LiDAR elevations were utilized. It is anticipated that additional temporary control will be set if machine control is requested by the hired contractor. ISG performed an additional survey to locate and document section corners for easement plat development in August 2024.

DESIGN SUMMARY

The design is for a nutrient removal wetland. During the initial landowner meeting and subsequent design meetings, the Landowner's and IDALS' goals were discussed, and input was given on the design approach. ISG prepared two (2) site concept options that were provided to IDALS for review and consideration. Due to the landowner's desire to retain farmland to the North of the proposed wetland, the second concept was agreed as the best approach. This concept is what ultimately led to the design of the site as shown in this report. During the preliminary design stage, ISG noted that the recommended wetland pool to watershed ratio of 0.5% was not being met with the current concept. To remedy this ISG provided IDALS with a "Expanded Pool" concept. Due to excess spoil wasting area on site, the benefit of this expanded pool was determined to be greater than the additional construction cost. During final design, the expanded pool concept was used.

A portion of the design of this project was dedicated to agricultural drain tiles. The landowner provided ISG with maps of private tile in both fields adjacent to the proposed wetland area. According to the materials provided and survey collected, the private tile outlets were located downstream of our proposed site. To ensure the proposed site would receive as much hydrology as possible, ISG designed private tile intercept lines on both the North and South sides of the site. The lines were designed assuming that all existing private tile has a maximum of 3-feet of cover depth from top of pipe. The proposed tile was calculated to have a drainage coefficient of at least 0.5 inches per day (in/day) and to outlet at least 1-foot above our permanent pool elevation.

There will be a drawdown structure included in the proposed design to allow for controlled drainage of the wetland in scenarios that may require, such as general maintenance or sediment removal.

Soils & On-Site Investigation

On August 22nd, 2024, Terracon performed soil boring at the site. The results of the soil borings showed that the site mostly consists of sandy lean clay with occasional sand seams with increasing stiffness with depth. Terracon noted that there are some areas of partly organic material, specifically in the designated borrow area. If material were to be utilized from this area, it would need to be properly mixed with sandy lean clay to be suitable for use.

The full geotechnical report from Terracon can be found in Appendix A.

Hydrology & Hydraulics

DESIGN PARAMETERS AND PROCEDURE

A study of site hydrology and hydraulics was completed prior to the development of the structural components of the FLO971628B wetland. As part of the study, the drainage area was reviewed, and stage storage analysis was completed based on a combination of survey and LIDAR data. Land use and management practices were determined through site visits and aerial photography. This wetland will treat the overland flow from approximately 174 acres of agricultural lands in Floyd County. All survey data for this project was gathered using the Iowa Regional Coordinate System, Zone 2 and vertical datum NAVD88.

The existing system and proposed wetland modifications were modeled using HydroCAD 10.20-3c software, due to the watershed size and expected model complexity. The system is represented through a series of nodes and links to represent the wetland, the intermittent streams, and their respective catchments.

The curve number for the catchments were assumed to be 85, which is based on the standard value for a field planted with straight row crops with a Hydrologic Soil Group of “C”. Time of concentration was calculated within HydroCAD for each catchment.

The storage volume for the wetland area was determined from Civil3D after final grading was completed. This volume includes the sediment forebay.

Design storms and rainfall data used to generate the NRCS 24-hour MSE3 rainfall distributions for the project area were obtained from the NRCS National Engineering Handbook Figure IA2-25. See Appendix C for more information. Runoff calculations in the model were performed using the SCS TR-20. Given rainfall data, HydroCAD models the rainfall events, and the resulting flows and water elevations are produced within HydroCAD. The storm events modeled include the 2-, 5-, 10-, 25-, 50-, and 100-year events.

Since the contributing catchments have low times of concentration due to their topography and surface type, the wetland was expected to have a large storm bounce relative to the upstream watershed. Freeboard to the top of the berm from the design storm elevation was provided, and a surface overflow is graded into the berm as an additional conservative measure. See Table 1 below for specifics.

See Appendix C for more information on model inputs.

Structural Design

EARTHEN EMBANKMENT/DIKE

The earthen embankment designed is considered a class IV dike per CPS 356 and is classified as a Class A Non-Inventory Dam per the National Engineering Manual. The maximum embankment height is 7.5 feet and in combination with total storage, is not subject to Iowa DNR Dam Safety. The primary spillway was designed to handle 100% of the flow up to the 25-year design storm. An auxiliary spillway was designed with its crest elevation slightly above the 25-year flood surface elevation as a conservative measure. The top of berm height was set to 1090', 2 feet above the auxiliary spillway crest elevation per CPS 378.

SHEET PILE WEIR

The primary spillway was designed as a sheet pile weir. In accordance with CPS 410, the freeboard for headwalls and sidewalls was set to 0.5' higher than the design discharge peak elevation. In this case the design discharge peak elevation used is the auxiliary spillway crest elevation which is 1087.99', therefore the top of the sidewalls was set to 1088.49'. CPS 410 also requires a minimum of 1.0 foot between the top of the sidewalls and the top of the settled embankment. With the top of the berm set to 1090', this leaves 1.51' between the two and satisfies CPS 410. The steel sheet pile weir was designed as a cantilevered wall in accordance with US Army Corp of Engineers technical guidance. The weir was designed with a FoS of 1.15 to retain liquid loading up to an elevation of 1089.01, slightly above the elevation of auxiliary spillway. The weir was designed to resist liquid loading and active soil pressures, soil properties used were taken from Terracon geotechnical engineering report 13245077 dated Dec 6th, 2024. The wall performance and required embedment was analyzed and required sheet pile properties and embedment elevations were calculated and are detailed in the construction drawings.

VERTICAL STRUCTURES

The water control structure is designed as vertical 48" aluminized CMP structure. The CMP structure will include stop logs welded to the interior of the riser that can be removed as needed to drain the wetland, most typically for cleaning purposes. To add weight to resist buoyancy and stress from flood flows, a concrete base and aggregate infill is proposed.

For the 100-year storm event, the high-water elevation within the wetland was determined to be 1188.24 feet.

See Table 1. Wetland Design Datasheet below for detailed design information. Refer to Appendix C for the HydroCAD report.

Table 1. Wetland Design Data Sheet

Design Parameter	Value(s)	Units
Drainage Area	174	Acres
Wetland Pool Area	1.63	Acres
Deep Water Area (>3 ft deep)	0.09	Acres
Normal Pool Elevation / Primary Spillway Elevation	1086.00 / 1086.00	Feet
Average Pool Depth	1.43	Feet
Maximum Pool Depth	6.50	Feet
Pool Storage	1.83	Acre-Feet
Berm Elevation	1090.00	Feet
Berm Storage	21.34	Acre-Feet
Length of Berm	425	Feet
Auxiliary Spillway Elevation	1088.00	Feet
Auxiliary Spillway Width	20	Feet
Weir Width	30	Feet
Drop Height (Primary Spillway Elevation – Stilling Basin Lowest Elevation)	7.5	Feet
Height of Dam (Berm Elevation – Stilling Basin Lowest Elevation)	9.50	Feet
Stilling Basin Length	30	Feet
Time of Concentration	1.03	Hours
Weighted Runoff Curve Number	85	----
25-year Storm Design Flow	310	CFS
100-year Storm Design Flow	447	CFS
100-year Flood Surf. Elevation	1088.24	Feet
Estimated Sediment Storage	99	Years
Total Easement Area	8.14	Acres

ANALYSIS OF UPSTREAM IMPACT

Due to the nature of the wetland design, there will be no upstream impacts with regard to peak flow and storm bounce. All private tiles in the fields adjacent to the wetland will be rerouted with a new intercept line acting as a header for the existing private tile. All private tile outlets will be a minimum of 1-foot above permanent pool elevation, include a CMP outlet to prevent damage during controlled burns, and include an animal guard to prevent animals from travelling up the pipe. This will not adversely affect the drainage of the existing private tile.

ANALYSIS OF DOWNSTREAM CHANNEL

The wetland will outlet via a sheet pile weir structure and flow west through an existing 4-foot by 8-foot reinforced concrete (RC) box culvert under Ocean Ave. This culvert then flows to an intermittent stream flow path and eventually to the Cedar Rider. The culvert under Ocean Avenue was analyzed for capacity and was determined to have excess capacity to handle flow from our proposed site. The proposed wetland will not significantly increase peak flow downstream from existing conditions.

Delivery of sediment and nutrients downstream to the Cedar River is expected to decrease due to the nature and design of the sediment and nutrient removal wetland.

Environmental Considerations

There are no anticipated negative impacts to threatened or endangered species as a result of the proposed project. The shallow pool will provide conditions favorable to wetland biota, and the easement area will be seeded with native grasses and forbs that will provide habitat benefits to wildlife and pollinators.

Waste material from the excavated area will be disposed of on-site, adjacent to the easement area.

Erosion Control & Seeding

Due to the amount of material to be excavated, it is necessary to provide measures for erosion control to prevent premature siltation of the wetland area and open ditch downstream of the site. During construction, silt fence will be installed along the stockpiling area. Storm drain inlet protection will be installed around the intake structures within the pool area and straw wattle installed downstream of the stilling basin in order to avoid transport of sediment to the open ditch downstream. Immediately following final grading, the easement area is to be seeded and fertilized in accordance with specification IA-06 to provide stability to slopes and bare earth. In addition, all excavated and earthfill areas with slope of 4:1 or greater are to be mulched and crimped to prevent erosion until establishment of the permanent vegetation.

Safety Considerations

The contractor is responsible for safety on the work site and providing all necessary safety measures for the protection of life, as required by regulating agencies. The contractor is to contact Iowa One Call for utility locations a minimum of two (2) business days prior to any excavation/construction. When not in operation, the contractor will be responsible for securing all equipment and materials stored on site.

Land Rights

The proposed easement area will consist of one parcel, owned by Jerad and Amber Stricker.

Permits

IDALS accepted responsibility of procuring any USACE Section 404 permits or other permits from regulatory agencies. The contractor will be responsible for obtaining a permit for construction activities occurring in Floyd County road right-of-way, if any.

Construction Oversight

A construction inspection plan is included within sheet C0-20 of the construction plans.

Operation & Maintenance Plan – Refer to Appendix B: Operation & Maintenance Plan

Appendix A: Soil Report/Log and Geotechnical 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 **Floyd County, Iowa**

FLO971628B



February 7, 2025

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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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

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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



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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 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Floyd County, Iowa
Survey Area Data: Version 30, Aug 29, 2024

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

Date(s) aerial images were photographed: Sep 5, 2021—Oct 15, 2021

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
84	Clyde silty clay loam, 0 to 3 percent slopes	7.1	86.8%
781C	Lourdes loam, 5 to 9 percent slopes	0.0	0.3%
783B	Cresco loam, 2 to 5 percent slopes	0.0	0.1%
798B	Protivin loam, 1 to 4 percent slopes	1.0	12.8%
Totals for Area of Interest		8.1	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.

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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.

Floyd County, Iowa

84—Clyde silty clay loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2shby
Elevation: 660 to 1,440 feet
Mean annual precipitation: 32 to 37 inches
Mean annual air temperature: 44 to 49 degrees F
Frost-free period: 155 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

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

Description of Clyde

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Erosional sediments fine-loamy till over loamy till

Typical profile

A - 0 to 17 inches: silty clay loam
AB - 17 to 23 inches: silty clay loam
Bg1 - 23 to 28 inches: clay loam
Bg2 - 28 to 41 inches: silty clay loam
Bg3 - 41 to 44 inches: sandy loam
2BCg - 44 to 62 inches: loam
2BC - 62 to 79 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 0.5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
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 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D

Custom Soil Resource Report

Ecological site: R104XY012IA - Wet Upland Drainageway Sedge Meadow
Forage suitability group: Level Swale, Neutral (G104XS001MN)
Other vegetative classification: Level Swale, Neutral (G104XS001MN)
Hydric soil rating: Yes

Minor Components

Clyde, frequently flooded

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Head slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R104XY012IA - Wet Upland Drainageway Sedge Meadow
Other vegetative classification: Level Swale, Neutral (G104XS001MN)
Hydric soil rating: Yes

Floyd

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R104XY005IA - Loamy Upland Prairie
Other vegetative classification: Ponded If Not Drained (G104XS013MN)
Hydric soil rating: No

Klossner

Percent of map unit: 5 percent
Landform: Fens on drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R104XY001IA - Organic Sedge Meadow
Other vegetative classification: Organic (G104XS014MN)
Hydric soil rating: Yes

781C—Lourdes loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: fmhs
Elevation: 950 to 1,400 feet
Mean annual precipitation: 29 to 37 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 145 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Lourdes and similar soils: 95 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lourdes

Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Loamy sediments over subglacial till

Typical profile

Ap - 0 to 8 inches: loam

E - 8 to 11 inches: loam

BE - 11 to 15 inches: loam

2Bt1 - 15 to 18 inches: loam

2Bt2 - 18 to 22 inches: clay loam

2Bt3 - 22 to 31 inches: clay loam

2Bt4 - 31 to 44 inches: clay loam

2BC - 44 to 51 inches: clay loam

2C - 51 to 76 inches: clay loam

Properties and qualities

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)

Depth to water table: About 48 to 72 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Ecological site: R104XY007IA - Loamy Upland Savanna

Hydric soil rating: No

Minor Components

Riceville

Percent of map unit: 5 percent

Landform: Hillslopes

Landform position (two-dimensional): Backslope, shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Linear

Ecological site: R104XY007IA - Loamy Upland Savanna

Hydric soil rating: No

783B—Cresco loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2y8pw

Elevation: 520 to 1,310 feet

Mean annual precipitation: 23 to 41 inches

Mean annual air temperature: 43 to 54 degrees F

Frost-free period: 135 to 210 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Cresco and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cresco

Setting

Landform: Interfluves

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Erosional sediments fine-loamy till over till

Typical profile

Ap - 0 to 8 inches: loam

A - 8 to 13 inches: loam

BA - 13 to 17 inches: loam

2Bw - 17 to 25 inches: loam

2Bt - 25 to 40 inches: clay loam

2BC - 40 to 47 inches: clay loam

2C - 47 to 60 inches: clay loam

Properties and qualities

Slope: 2 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Low

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 48 to 72 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R104XY005IA - Loamy Upland Prairie
Hydric soil rating: No

Minor Components

Protivin

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R104XY005IA - Loamy Upland Prairie
Hydric soil rating: No

Olin

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R104XY010IA - Sandy Upland Prairie
Hydric soil rating: No

798B—Protivin loam, 1 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2y8px
Elevation: 520 to 1,310 feet
Mean annual precipitation: 23 to 41 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 135 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Protivin and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Protivin

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve

Custom Soil Resource Report

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Erosional sediments fine-loamy till over till

Typical profile

Ap - 0 to 8 inches: loam

A1 - 8 to 11 inches: loam

A2 - 11 to 15 inches: loam

BA - 15 to 19 inches: loam

Bw - 19 to 23 inches: loam

2Bt1 - 23 to 35 inches: clay loam

2Bt2 - 35 to 40 inches: clay loam

2Bt3 - 40 to 45 inches: clay loam

2C - 45 to 60 inches: clay loam

Properties and qualities

Slope: 1 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Runoff class: Low

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 12 to 42 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C/D

Ecological site: R104XY005IA - Loamy Upland Prairie

Hydric soil rating: No

Minor Components

Clyde

Percent of map unit: 5 percent

Landform: Drainageways

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Linear

Across-slope shape: Concave

Ecological site: R104XY012IA - Wet Upland Drainageway Sedge Meadow

Hydric soil rating: Yes

Cerlin

Percent of map unit: 5 percent

Landform: Interfluves

Landform position (two-dimensional): Backslope, shoulder, summit

Landform position (three-dimensional): Crest

Down-slope shape: Convex

Across-slope shape: Linear

Ecological site: R104XY005IA - Loamy Upland Prairie

Hydric soil rating: No

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Appendix B: Operation & Maintenance Plan

**OPERATION AND MAINTENANCE PLAN
CONSTRUCTED WETLAND
CODE 656**

Landowner/Operator: Jerad & Amber M Stricker Date: _____

Address: 1275 470th Street St Ansgar, IA 50472

Job Location – County: Floyd Section: 28 Township: 97N Range: 16W

Prepared By: _____ Farm/Tract No.: _____

Operation and Maintenance Items

Operation and maintenance (O&M) is necessary for all conservation practices and is required for all practices installed with the Natural Resources Conservation Service assistance. The purpose is to create an artificial ecosystem with hydrophytic vegetation for water treatment. The land user is responsible for proper O&M for as long as the practice is used but no less than the life of the practice, 15 years, and as may be required by federal, state, or local laws or regulations.

Operation refers to operation of the practice in compliance with all laws, regulations, ordinances, and easements; and in such a manner that will result in the least adverse impact on the environment and will permit the practice to serve the purpose for which it was installed. Maintenance includes work to prevent deterioration of the practice, repairing damage, or replacing components which fail.

Necessary operation and maintenance items include:

1. Inspect after significant storm events and at least annually to identify repair and maintenance needs.
2. Inspect the downstream toe of the embankment annually. If there are wet areas or seeps at the downstream toe of the embankment, it could be a serious problem. Ask for assistance from a qualified professional to evaluate the seepage.
3. Clear accumulated trash away from water control structures, pipe inlets, rock riprap, and vegetated spillways.
4. Repair erosion at outlet of principal spillway pipe as needed.
5. Fill rills and gullies that occur on the embankments and in the vegetated spillway. Reseed the filled areas.
6. Check frequently for burrowing animals. When found, remove the burrowing animals, replace embankment materials, and reseed.
7. Maintain a vigorous vegetative cover by regular mowing and fertilization. Time the first mowing after nesting birds have hatched. Remove excess cut grass. Do not burn or overgraze. Operate mowing and other equipment on slopes in accordance with the machinery operation manual.
8. Prevent woody vegetation from growing on or around the embankment, abutment, or vegetated spillway areas. Control tree and bush growth by hand cutting, mowing, or chemicals. Avoid damaging grass with herbicide sprays.
9. Repair or replace damaged fences to keep livestock out of the wetland, where applicable.
10. Maintain a riparian filter around the perimeter of the wetland to trap sediment, where applicable.
11. Monitor and control invasive species.
12. Maintain a diverse stand of aquatic vegetation by manipulating water levels where applicable. Replace vegetation as needed. Specify timing and depth of dewatering and reflooding operations.
13. Control flow to the wetland according to the water budget. Monitor the wetland performance.
14. Sample effluent from the wetland for nutrients prior to utilization.

Other Recommendations and Notes:

Included within the project is a training/demonstration of lift station operation, to be provided by the pump supplier. The landowner should attend this training to better understand how to operate and maintain the lift station. In general, the lift station should always remain active and operational, including when the primary deep pool basin is full, to maximize nutrient treatment and removal.

Landowners will also need to consider the operation and maintenance requirements of the irrigation system that they install in the future as well.

When the pond is fully drawn down and emptied, visually inspect the wet well inlet to confirm no blockage. Remove blockage if necessary to ensure adequate flow for irrigation

Below is a recommended schedule for the establishment and maintenance of the wetland.

Establishment

YEAR 1

- Monitor wetland vegetation and perform replacement planting as necessary.
- Mow vegetation at 6-8 inches after a weed height of 12 inches is reached. Do not mow after August 1, or after weed height reaches 4+ feet high.
- Do not use broadleaf chemical spray.

YEAR 2

- Monitor wetland vegetation and perform replacement planting as necessary.
- Replace wetland vegetation to maintain at least 50% surface area coverage in wetland plants after the second growing season.
- Mow seedlings to a height of 6-8" when after a weed height of 12 inches is reached. Do not mow after August 1, or after weed height reaches 4+ feet high.
- Do not spot treat with broadleaf chemical spray.

YEAR 3

- Monitor wetland vegetation and perform replacement planting as necessary.
- Spot mow as necessary where weeds are prevalent.

Routine Maintenance

BI-MONTHLY

- Inspect inlet and outlet structures to confirm they are functioning as designed. Remove any debris or obstructions.

SEMI-ANNUALLY

- Inspect shallow areas on edge of wetland and upland areas and remove trees and shrubs.
- Inspect wetland and upland slopes for erosion or compromised slopes.

ANNUALLY

- Inspect auxiliary spillway (overland outlet) for obstructions or erosion. Remove any obstructions found.
- Identify any invasive vegetation or noxious weeds and remove where possible.
- Inspect outlet water control structure.

BI-ANNUALLY

- Maintain surrounding vegetation by means of mowing or controlled burning.

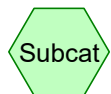
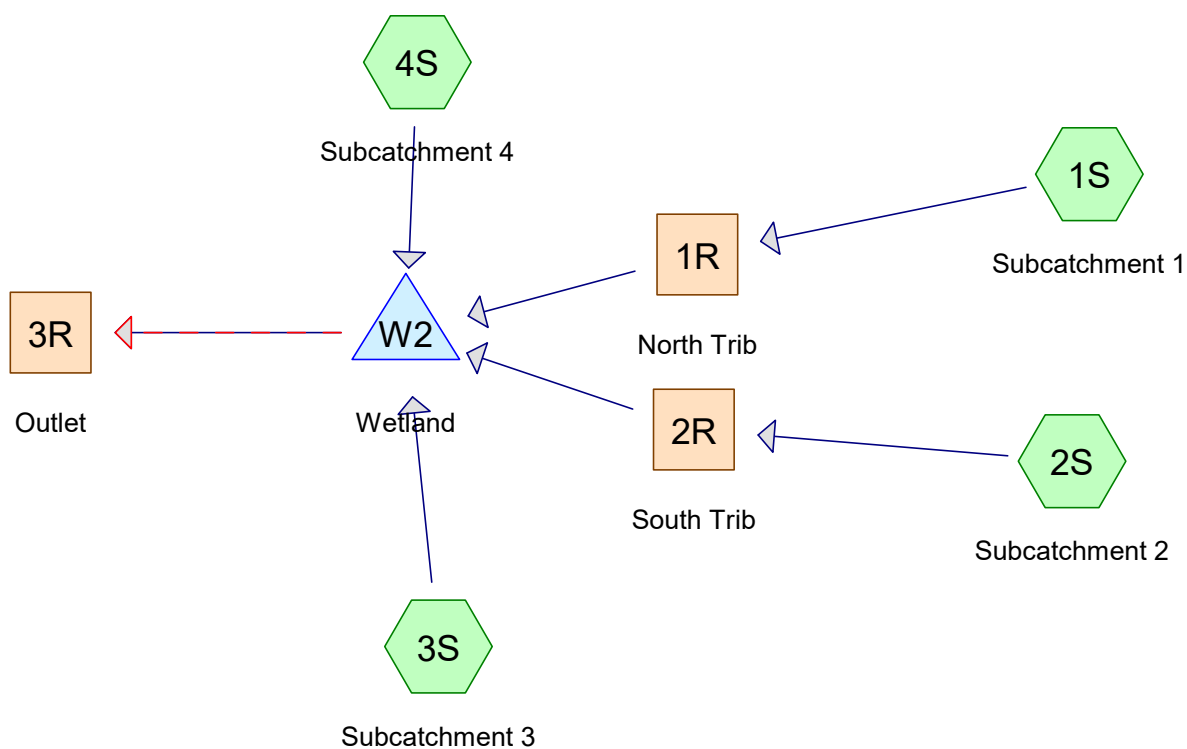
CONTACT YOUR LOCAL NATURAL RESOURCES CONSERVATION SERVICE (NRCS) OFFICE FOR ANY ADDITIONAL TECHNICAL ASSISTANCE YOU MIGHT NEED FOR IMPLEMENTATION OF THIS OPERATION AND MAINTENANCE PLAN.

Signatures:

Landowner/Operator: _____ Reviewer: _____ Date: _____

Appendix C: Hydrology & Hydraulic Calculations

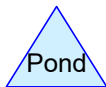
FLO971628B Wetland



Subcat



Reach



Pond



Link

Routing Diagram for FLO971628B_Proposed

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.10	2
2	5-year	Type III 24-hr		Default	24.00	1	3.80	2
3	10-year	Type III 24-hr		Default	24.00	1	4.50	2
4	25-year	Type III 24-hr		Default	24.00	1	5.60	2
5	50-year	Type III 24-hr		Default	24.00	1	6.50	2
6	100-year	Type III 24-hr		Default	24.00	1	7.50	2

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
167.124	85	Row crops, straight row, Good, HSG C (1S, 2S, 3S, 4S)
167.124	85	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
167.124	HSG C	1S, 2S, 3S, 4S
0.000	HSG D	
0.000	Other	
167.124		TOTAL AREA

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Ground Covers (selected 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	167.124	0.000	0.000	167.124	Row crops, straight row, Good	1S, 2S, 3S, 4S
0.000	0.000	167.124	0.000	0.000	167.124	TOTAL AREA	

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Type III 24-hr 2-year Rainfall=3.10"

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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

Subcatchment 1S: Subcatchment 1 Runoff Area=39.962 ac 0.00% Impervious Runoff Depth>1.66"
Flow Length=2,114' Slope=0.0119 '/' Tc=44.9 min CN=85 Runoff=36.30 cfs 5.518 af

Subcatchment 2S: Subcatchment 2 Runoff Area=70.008 ac 0.00% Impervious Runoff Depth>1.65"
Flow Length=2,685' Slope=0.0092 '/' Tc=61.9 min CN=85 Runoff=53.01 cfs 9.627 af

Subcatchment 3S: Subcatchment 3 Runoff Area=34.170 ac 0.00% Impervious Runoff Depth>1.65"
Flow Length=3,170' Slope=0.0150 '/' Tc=55.4 min CN=85 Runoff=27.63 cfs 4.706 af

Subcatchment 4S: Subcatchment 4 Runoff Area=22.984 ac 0.00% Impervious Runoff Depth>1.66"
Flow Length=2,742' Slope=0.0150 '/' Tc=49.3 min CN=85 Runoff=19.84 cfs 3.170 af

Reach 1R: North Trib Avg. Flow Depth=1.43' Max Vel=4.04 fps Inflow=36.30 cfs 5.518 af
n=0.030 L=571.4' S=0.0088 '/' Capacity=206.85 cfs Outflow=36.11 cfs 5.506 af

Reach 2R: South Trib Avg. Flow Depth=1.83' Max Vel=4.69 fps Inflow=53.01 cfs 9.627 af
n=0.030 L=551.5' S=0.0084 '/' Capacity=2,885.27 cfs Outflow=52.82 cfs 9.610 af

Reach 3R: Outlet Inflow=118.82 cfs 22.729 af
Outflow=118.82 cfs 22.729 af

Pond W2: Wetland Peak Elev=1,087.07' Storage=4.004 af Inflow=132.76 cfs 22.993 af
Primary=118.82 cfs 22.729 af Secondary=0.00 cfs 0.000 af Outflow=118.82 cfs 22.729 af

Total Runoff Area = 167.124 ac Runoff Volume = 23.022 af Average Runoff Depth = 1.65"
100.00% Pervious = 167.124 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 2-year Rainfall=3.10"

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Summary for Subcatchment 1S: Subcatchment 1

Runoff = 36.30 cfs @ 12.62 hrs, Volume= 5.518 af, Depth> 1.66"
Routed to Reach 1R : North Trib

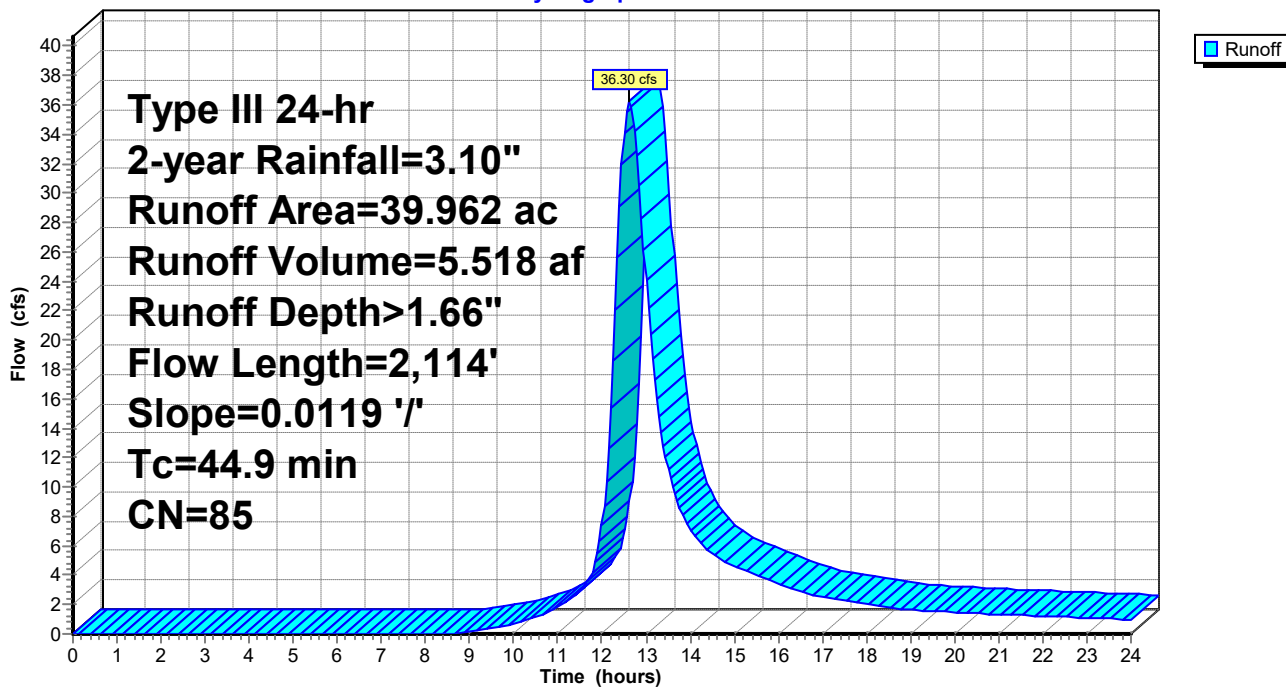
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (ac)	CN	Description
* 39.962	85	Row crops, straight row, Good, HSG C
39.962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.9	2,114	0.0119	0.78		Lag/CN Method,

Subcatchment 1S: Subcatchment 1

Hydrograph



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Type III 24-hr 2-year Rainfall=3.10"

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Summary for Subcatchment 2S: Subcatchment 2

Runoff = 53.01 cfs @ 12.85 hrs, Volume= 9.627 af, Depth> 1.65"
Routed to Reach 2R : South Trib

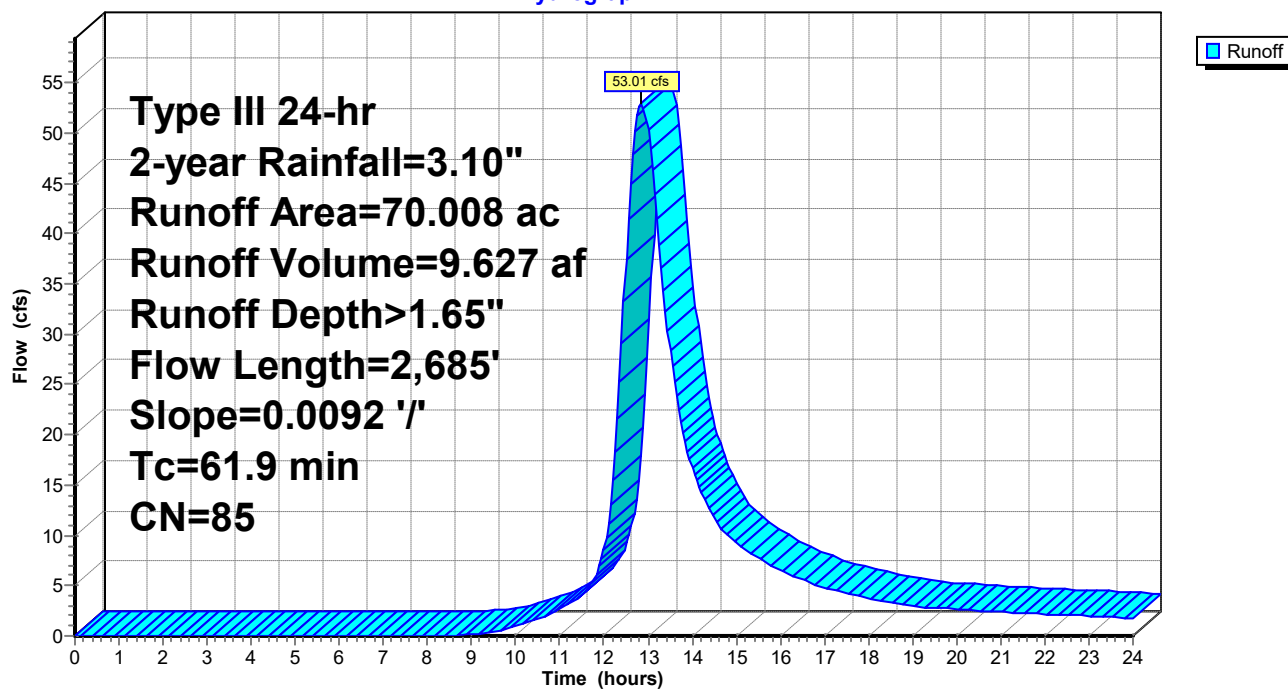
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (ac)	CN	Description
70.008	85	Row crops, straight row, Good, HSG C
70.008		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.9	2,685	0.0092	0.72		Lag/CN Method,

Subcatchment 2S: Subcatchment 2

Hydrograph



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Type III 24-hr 2-year Rainfall=3.10"

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Summary for Subcatchment 3S: Subcatchment 3

Runoff = 27.63 cfs @ 12.76 hrs, Volume= 4.706 af, Depth> 1.65"
Routed to Pond W2 : Wetland

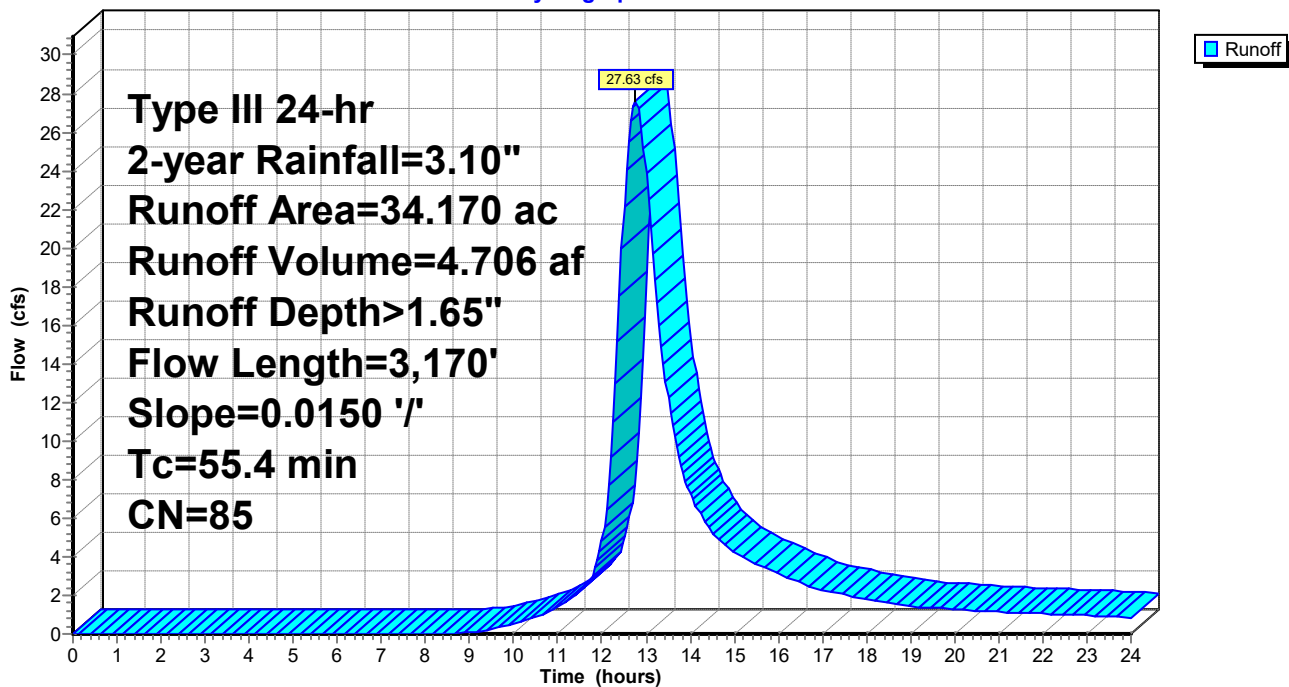
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (ac)	CN	Description
34.170	85	Row crops, straight row, Good, HSG C
34.170		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.4	3,170	0.0150	0.95		Lag/CN Method,

Subcatchment 3S: Subcatchment 3

Hydrograph



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Type III 24-hr 2-year Rainfall=3.10"

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Summary for Subcatchment 4S: Subcatchment 4

Runoff = 19.84 cfs @ 12.67 hrs, Volume= 3.170 af, Depth> 1.66"
Routed to Pond W2 : Wetland

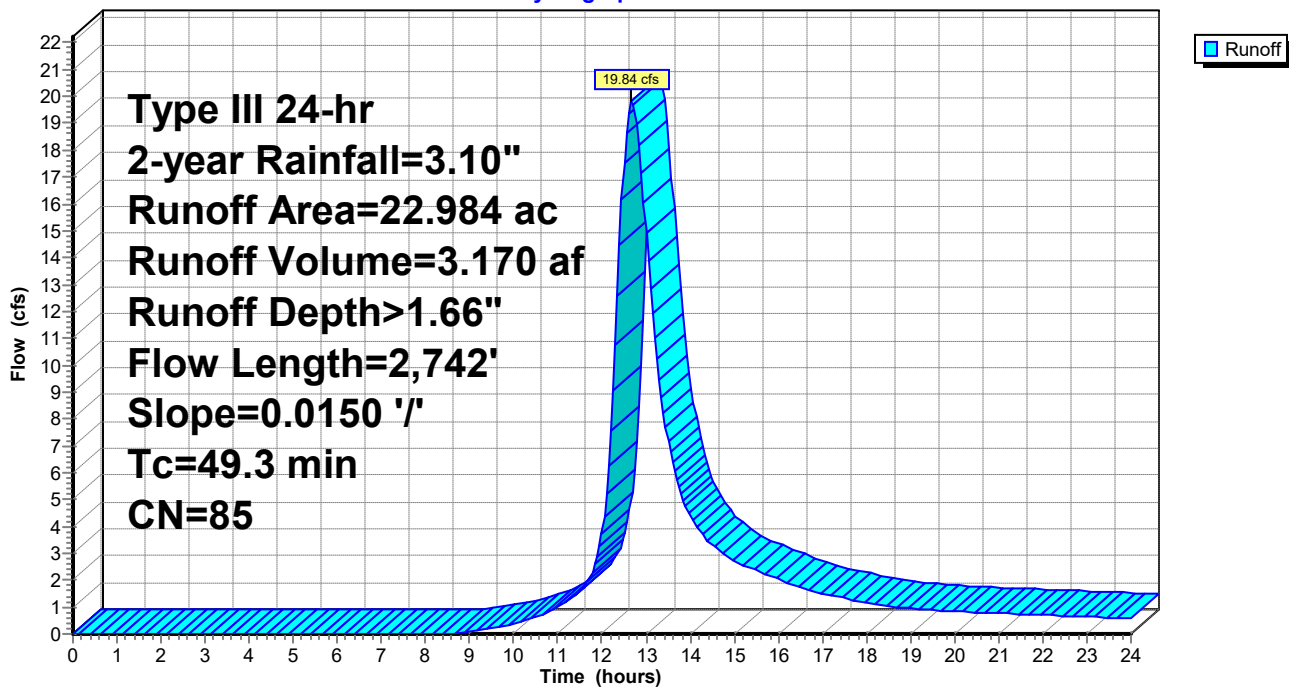
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (ac)	CN	Description
22.984	85	Row crops, straight row, Good, HSG C
22.984		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
49.3	2,742	0.0150	0.93		Lag/CN Method,

Subcatchment 4S: Subcatchment 4

Hydrograph



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Type III 24-hr 2-year Rainfall=3.10"

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Summary for Reach 1R: North Trib

Inflow Area = 39.962 ac, 0.00% Impervious, Inflow Depth > 1.66" for 2-year event
Inflow = 36.30 cfs @ 12.62 hrs, Volume= 5.518 af
Outflow = 36.11 cfs @ 12.69 hrs, Volume= 5.506 af, Atten= 1%, Lag= 4.3 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 4.04 fps, Min. Travel Time= 2.4 min

Avg. Velocity= 1.93 fps, Avg. Travel Time= 4.9 min

Peak Storage= 5,121 cf @ 12.65 hrs

Average Depth at Peak Storage= 1.43' , Surface Width= 10.56'

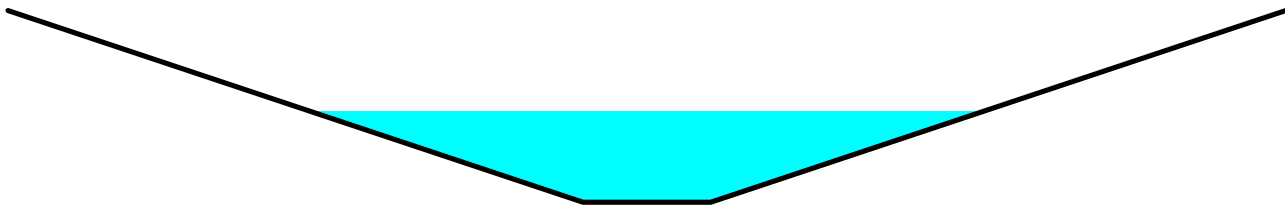
Bank-Full Depth= 3.00' Flow Area= 33.0 sf, Capacity= 206.85 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 3.0 '/' Top Width= 20.00'

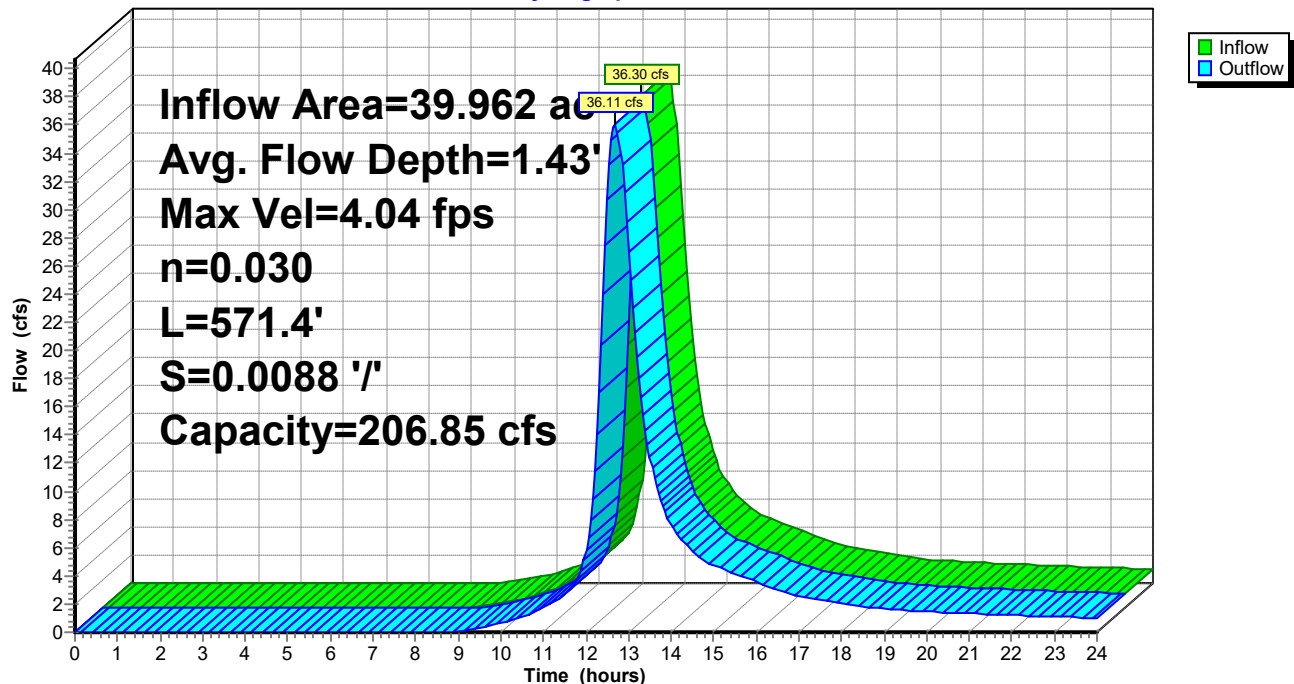
Length= 571.4' Slope= 0.0088 '/'

Inlet Invert= 1,092.36', Outlet Invert= 1,087.36'



Reach 1R: North Trib

Hydrograph



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Type III 24-hr 2-year Rainfall=3.10"

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Stage-Area-Storage for Reach 1R: North Trib

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,092.36	0.0	0	1,094.96	25.5	14,560
1,092.41	0.1	62	1,095.01	26.4	15,067
1,092.46	0.2	132	1,095.06	27.3	15,582
1,092.51	0.4	210	1,095.11	28.2	16,107
1,092.56	0.5	297	1,095.16	29.1	16,640
1,092.61	0.7	393	1,095.21	30.1	17,181
1,092.66	0.9	497	1,095.26	31.0	17,731
1,092.71	1.1	610	1,095.31	32.0	18,289
1,092.76	1.3	732	1,095.36	33.0	18,856
1,092.81	1.5	861			
1,092.86	1.8	1,000			
1,092.91	2.0	1,147			
1,092.96	2.3	1,303			
1,093.01	2.6	1,467			
1,093.06	2.9	1,640			
1,093.11	3.2	1,821			
1,093.16	3.5	2,012			
1,093.21	3.9	2,210			
1,093.26	4.2	2,417			
1,093.31	4.6	2,633			
1,093.36	5.0	2,857			
1,093.41	5.4	3,090			
1,093.46	5.8	3,332			
1,093.51	6.3	3,582			
1,093.56	6.7	3,840			
1,093.61	7.2	4,107			
1,093.66	7.7	4,383			
1,093.71	8.2	4,667			
1,093.76	8.7	4,960			
1,093.81	9.2	5,262			
1,093.86	9.8	5,571			
1,093.91	10.3	5,890			
1,093.96	10.9	6,217			
1,094.01	11.5	6,553			
1,094.06	12.1	6,897			
1,094.11	12.7	7,250			
1,094.16	13.3	7,611			
1,094.21	14.0	7,981			
1,094.26	14.6	8,360			
1,094.31	15.3	8,747			
1,094.36	16.0	9,143			
1,094.41	16.7	9,547			
1,094.46	17.4	9,960			
1,094.51	18.2	10,381			
1,094.56	18.9	10,811			
1,094.61	19.7	11,249			
1,094.66	20.5	11,697			
1,094.71	21.3	12,153			
1,094.76	22.1	12,617			
1,094.81	22.9	13,090			
1,094.86	23.8	13,571			
1,094.91	24.6	14,061			

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Type III 24-hr 2-year Rainfall=3.10"

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Summary for Reach 2R: South Trib

Inflow Area = 70.008 ac, 0.00% Impervious, Inflow Depth > 1.65" for 2-year event
Inflow = 53.01 cfs @ 12.85 hrs, Volume= 9.627 af
Outflow = 52.82 cfs @ 12.90 hrs, Volume= 9.610 af, Atten= 0%, Lag= 3.4 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 4.69 fps, Min. Travel Time= 2.0 min

Avg. Velocity = 2.35 fps, Avg. Travel Time= 3.9 min

Peak Storage= 6,214 cf @ 12.87 hrs

Average Depth at Peak Storage= 1.83' , Surface Width= 9.82'

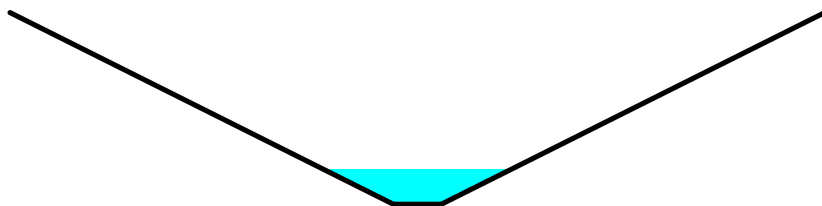
Bank-Full Depth= 10.00' Flow Area= 225.0 sf, Capacity= 2,885.27 cfs

2.50' x 10.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 2.0 '/' Top Width= 42.50'

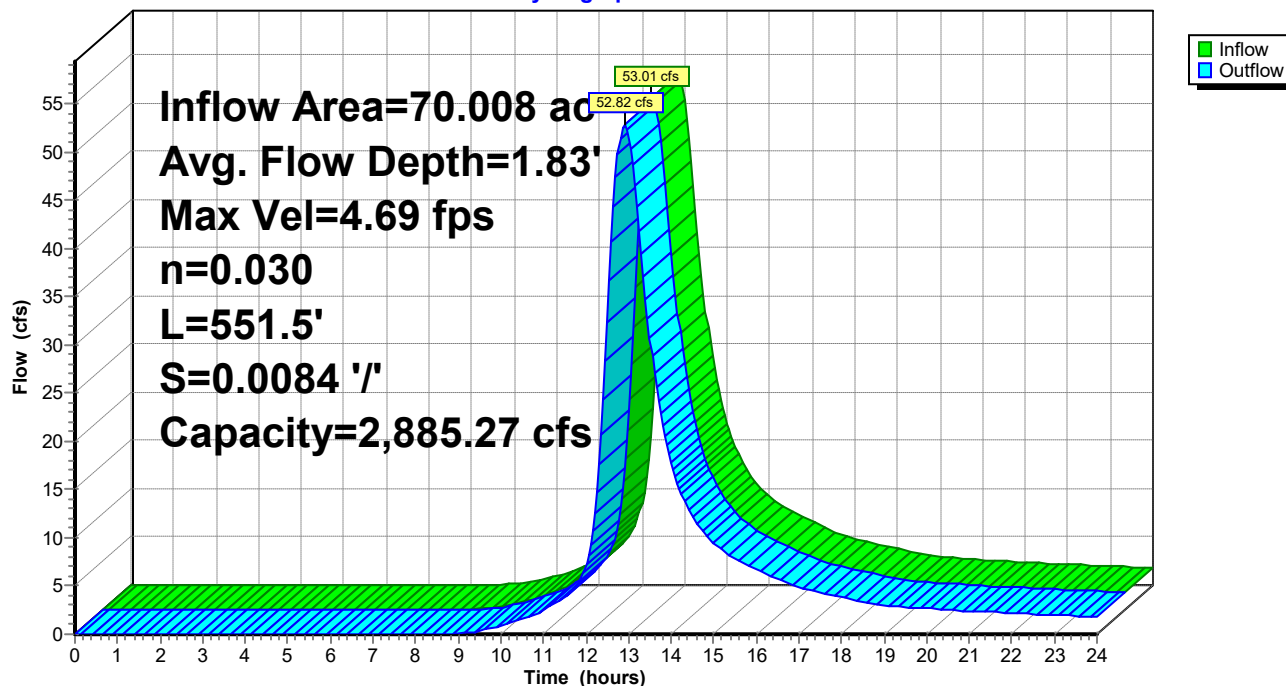
Length= 551.5' Slope= 0.0084 '/'

Inlet Invert= 1,091.97', Outlet Invert= 1,087.36'



Reach 2R: South Trib

Hydrograph



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Stage-Area-Storage for Reach 2R: South Trib

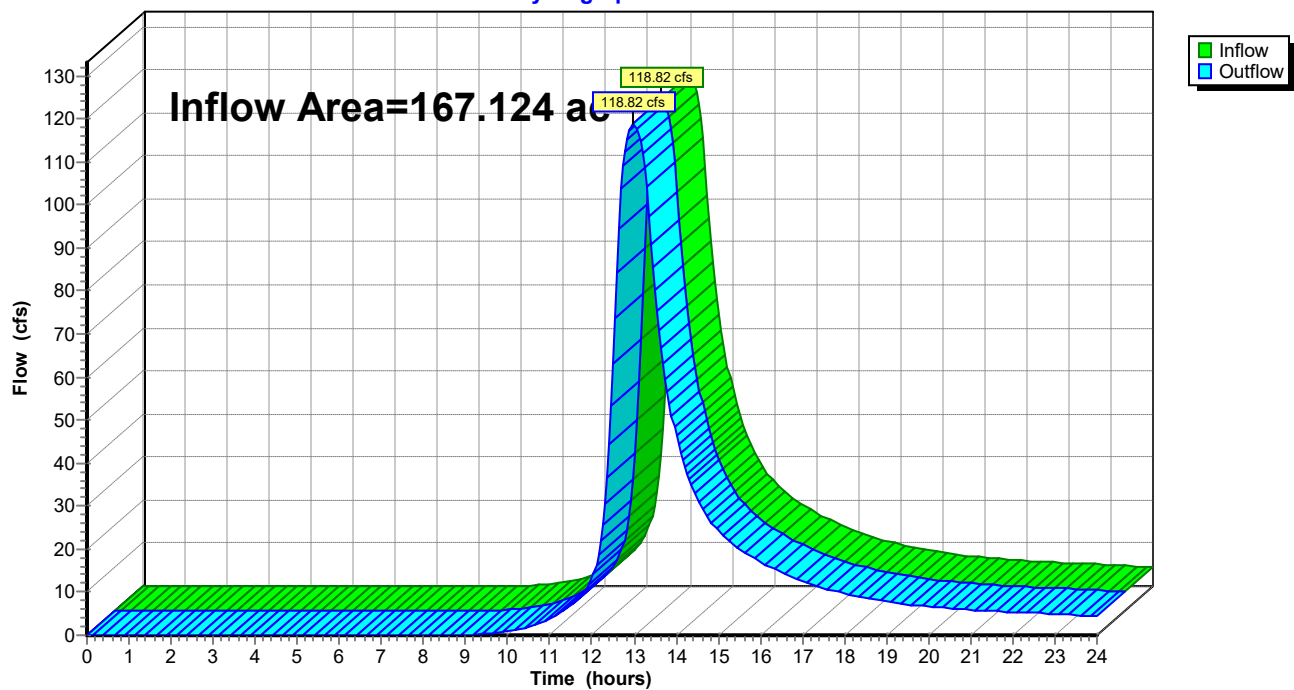
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,091.97	0.0	0	1,097.17	67.1	36,995
1,092.07	0.3	149	1,097.27	69.4	38,291
1,092.17	0.6	320	1,097.37	71.8	39,609
1,092.27	0.9	513	1,097.47	74.3	40,949
1,092.37	1.3	728	1,097.57	76.7	42,311
1,092.47	1.8	965	1,097.67	79.2	43,695
1,092.57	2.2	1,224	1,097.77	81.8	45,102
1,092.67	2.7	1,506	1,097.87	84.4	46,530
1,092.77	3.3	1,809	1,097.97	87.0	47,981
1,092.87	3.9	2,134	1,098.07	89.7	49,453
1,092.97	4.5	2,482	1,098.17	92.4	50,948
1,093.07	5.2	2,851	1,098.27	95.1	52,464
1,093.17	5.9	3,243	1,098.37	97.9	54,003
1,093.27	6.6	3,656	1,098.47	100.8	55,564
1,093.37	7.4	4,092	1,098.57	103.6	57,146
1,093.47	8.3	4,550	1,098.67	106.5	58,751
1,093.57	9.1	5,030	1,098.77	109.5	60,378
1,093.67	10.0	5,532	1,098.87	112.5	62,027
1,093.77	11.0	6,055	1,098.97	115.5	63,698
1,093.87	12.0	6,601	1,099.07	118.6	65,391
1,093.97	13.0	7,170	1,099.17	121.7	67,107
1,094.07	14.1	7,760	1,099.27	124.8	68,844
1,094.17	15.2	8,372	1,099.37	128.0	70,603
1,094.27	16.3	9,006	1,099.47	131.3	72,384
1,094.37	17.5	9,662	1,099.57	134.5	74,188
1,094.47	18.8	10,341	1,099.67	137.8	76,013
1,094.57	20.0	11,041	1,099.77	141.2	77,861
1,094.67	21.3	11,763	1,099.87	144.6	79,730
1,094.77	22.7	12,508	1,099.97	148.0	81,622
1,094.87	24.1	13,275	1,100.07	151.5	83,536
1,094.97	25.5	14,063	1,100.17	155.0	85,471
1,095.07	27.0	14,874	1,100.27	158.5	87,429
1,095.17	28.5	15,707	1,100.37	162.1	89,409
1,095.27	30.0	16,562	1,100.47	165.8	91,411
1,095.37	31.6	17,438	1,100.57	169.4	93,435
1,095.47	33.3	18,337	1,100.67	173.1	95,481
1,095.57	34.9	19,258	1,100.77	176.9	97,549
1,095.67	36.6	20,201	1,100.87	180.7	99,640
1,095.77	38.4	21,167	1,100.97	184.5	101,752
1,095.87	40.2	22,154	1,101.07	188.4	103,886
1,095.97	42.0	23,163	1,101.17	192.3	106,042
1,096.07	43.9	24,194	1,101.27	196.2	108,221
1,096.17	45.8	25,248	1,101.37	200.2	110,421
1,096.27	47.7	26,323	1,101.47	204.3	112,644
1,096.37	49.7	27,421	1,101.57	208.3	114,888
1,096.47	51.8	28,540	1,101.67	212.4	117,155
1,096.57	53.8	29,682	1,101.77	216.6	119,444
1,096.67	55.9	30,845	1,101.87	220.8	121,755
1,096.77	58.1	32,031	1,101.97	225.0	124,088
1,096.87	60.3	33,239			
1,096.97	62.5	34,469			
1,097.07	64.8	35,721			

Summary for Reach 3R: Outlet

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

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 1.63" for 2-year event
Inflow = 118.82 cfs @ 12.99 hrs, Volume= 22.729 af
Outflow = 118.82 cfs @ 12.99 hrs, Volume= 22.729 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 3R: Outlet**Hydrograph**

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Type III 24-hr 2-year Rainfall=3.10"

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Summary for Pond W2: Wetland

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 1.65" for 2-year event
 Inflow = 132.76 cfs @ 12.77 hrs, Volume= 22.993 af
 Outflow = 118.82 cfs @ 12.99 hrs, Volume= 22.729 af, Atten= 11%, Lag= 13.0 min
 Primary = 118.82 cfs @ 12.99 hrs, Volume= 22.729 af
 Routed to Reach 3R : Outlet
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 3R : Outlet

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Starting Elev= 1,086.00' Storage= 1.521 af
 Peak Elev= 1,087.07' @ 12.99 hrs Storage= 4.004 af (2.483 af above start)

Plug-Flow detention time= 67.2 min calculated for 21.208 af (92% of inflow)
 Center-of-Mass det. time= 16.5 min (884.9 - 868.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,080.00'	21.341 af	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,080.00	0.000	0.000
1,081.00	0.006	0.006
1,082.00	0.014	0.020
1,083.00	0.056	0.076
1,084.00	0.112	0.188
1,085.00	0.216	0.404
1,086.00	1.117	1.521
1,087.00	2.159	3.680
1,088.00	4.386	8.066
1,089.00	5.834	13.900
1,090.00	7.441	21.341

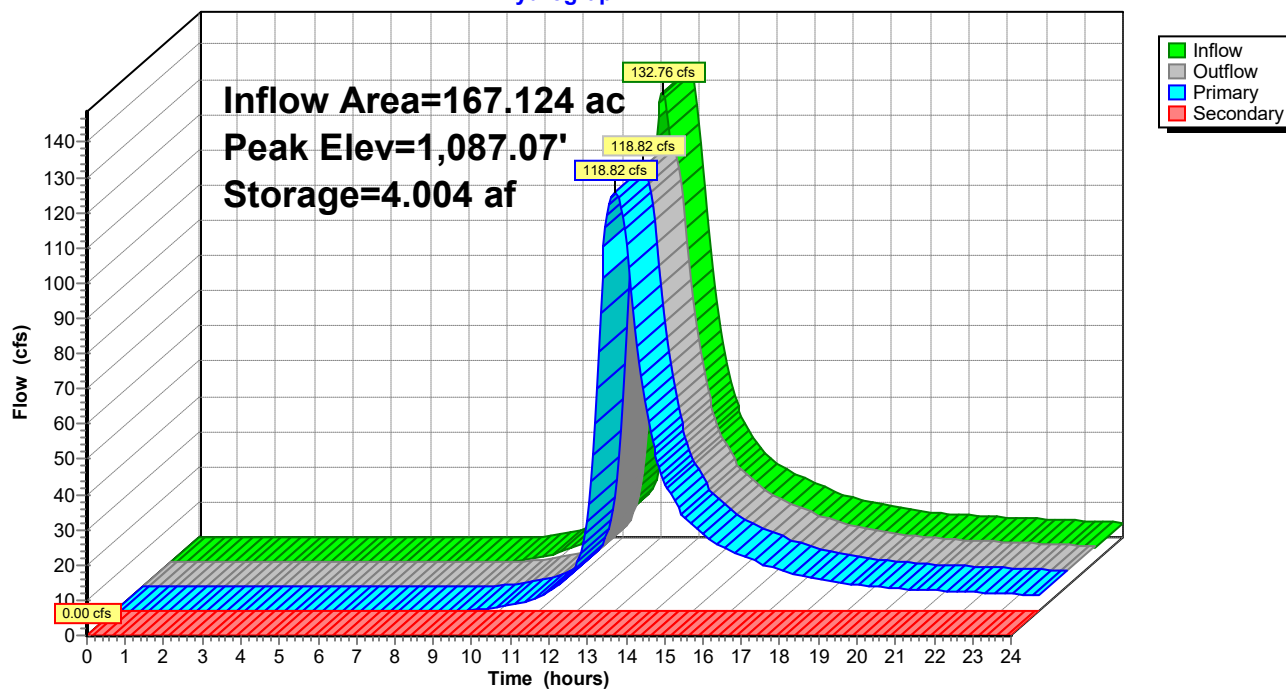
Device	Routing	Invert	Outlet Devices
#1	Primary	1,086.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 1.00 2.00 3.00 4.00 Width (feet) 30.00 36.00 42.00 48.00 54.00
#2	Secondary	1,087.82'	20.0' long + 3.0 ' SideZ x 21.1' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=118.64 cfs @ 12.99 hrs HW=1,087.07' (Free Discharge)
 ↑1=Custom Weir/Orifice (Weir Controls 118.64 cfs @ 3.33 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,086.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond W2: Wetland

Hydrograph



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Type III 24-hr 2-year Rainfall=3.10"

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Stage-Area-Storage for Pond W2: Wetland

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
1,080.00	0.000	1,085.20	0.627
1,080.10	0.001	1,085.30	0.739
1,080.20	0.001	1,085.40	0.851
1,080.30	0.002	1,085.50	0.962
1,080.40	0.002	1,085.60	1.074
1,080.50	0.003	1,085.70	1.186
1,080.60	0.004	1,085.80	1.298
1,080.70	0.004	1,085.90	1.409
1,080.80	0.005	1,086.00	1.521
1,080.90	0.005	1,086.10	1.737
1,081.00	0.006	1,086.20	1.953
1,081.10	0.007	1,086.30	2.169
1,081.20	0.009	1,086.40	2.385
1,081.30	0.010	1,086.50	2.600
1,081.40	0.012	1,086.60	2.816
1,081.50	0.013	1,086.70	3.032
1,081.60	0.014	1,086.80	3.248
1,081.70	0.016	1,086.90	3.464
1,081.80	0.017	1,087.00	3.680
1,081.90	0.019	1,087.10	4.119
1,082.00	0.020	1,087.20	4.557
1,082.10	0.026	1,087.30	4.996
1,082.20	0.031	1,087.40	5.434
1,082.30	0.037	1,087.50	5.873
1,082.40	0.042	1,087.60	6.312
1,082.50	0.048	1,087.70	6.750
1,082.60	0.054	1,087.80	7.189
1,082.70	0.059	1,087.90	7.627
1,082.80	0.065	1,088.00	8.066
1,082.90	0.070	1,088.10	8.649
1,083.00	0.076	1,088.20	9.233
1,083.10	0.087	1,088.30	9.816
1,083.20	0.098	1,088.40	10.400
1,083.30	0.110	1,088.50	10.983
1,083.40	0.121	1,088.60	11.566
1,083.50	0.132	1,088.70	12.150
1,083.60	0.143	1,088.80	12.733
1,083.70	0.154	1,088.90	13.317
1,083.80	0.166	1,089.00	13.900
1,083.90	0.177	1,089.10	14.644
1,084.00	0.188	1,089.20	15.388
1,084.10	0.210	1,089.30	16.132
1,084.20	0.231	1,089.40	16.876
1,084.30	0.253	1,089.50	17.620
1,084.40	0.274	1,089.60	18.365
1,084.50	0.296	1,089.70	19.109
1,084.60	0.318	1,089.80	19.853
1,084.70	0.339	1,089.90	20.597
1,084.80	0.361	1,090.00	21.341
1,084.90	0.382		
1,085.00	0.404		
1,085.10	0.516		

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Type III 24-hr 5-year Rainfall=3.80"

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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

Subcatchment 1S: Subcatchment 1 Runoff Area=39.962 ac 0.00% Impervious Runoff Depth>2.26"
Flow Length=2,114' Slope=0.0119 '/' Tc=44.9 min CN=85 Runoff=49.50 cfs 7.525 af

Subcatchment 2S: Subcatchment 2 Runoff Area=70.008 ac 0.00% Impervious Runoff Depth>2.25"
Flow Length=2,685' Slope=0.0092 '/' Tc=61.9 min CN=85 Runoff=72.36 cfs 13.134 af

Subcatchment 3S: Subcatchment 3 Runoff Area=34.170 ac 0.00% Impervious Runoff Depth>2.25"
Flow Length=3,170' Slope=0.0150 '/' Tc=55.4 min CN=85 Runoff=37.72 cfs 6.420 af

Subcatchment 4S: Subcatchment 4 Runoff Area=22.984 ac 0.00% Impervious Runoff Depth>2.26"
Flow Length=2,742' Slope=0.0150 '/' Tc=49.3 min CN=85 Runoff=27.08 cfs 4.324 af

Reach 1R: North Trib Avg. Flow Depth=1.64' Max Vel=4.37 fps Inflow=49.50 cfs 7.525 af
n=0.030 L=571.4' S=0.0088 '/' Capacity=206.85 cfs Outflow=49.25 cfs 7.511 af

Reach 2R: South Trib Avg. Flow Depth=2.11' Max Vel=5.08 fps Inflow=72.36 cfs 13.134 af
n=0.030 L=551.5' S=0.0084 '/' Capacity=2,885.27 cfs Outflow=72.11 cfs 13.113 af

Reach 3R: Outlet Inflow=159.04 cfs 31.058 af
Outflow=159.04 cfs 31.058 af

Pond W2: Wetland Peak Elev=1,087.29' Storage=4.956 af Inflow=181.35 cfs 31.368 af
Primary=159.04 cfs 31.058 af Secondary=0.00 cfs 0.000 af Outflow=159.04 cfs 31.058 af

Total Runoff Area = 167.124 ac Runoff Volume = 31.403 af Average Runoff Depth = 2.25"
100.00% Pervious = 167.124 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 5-year Rainfall=3.80"

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Summary for Subcatchment 1S: Subcatchment 1

Runoff = 49.50 cfs @ 12.61 hrs, Volume= 7.525 af, Depth> 2.26"
Routed to Reach 1R : North Trib

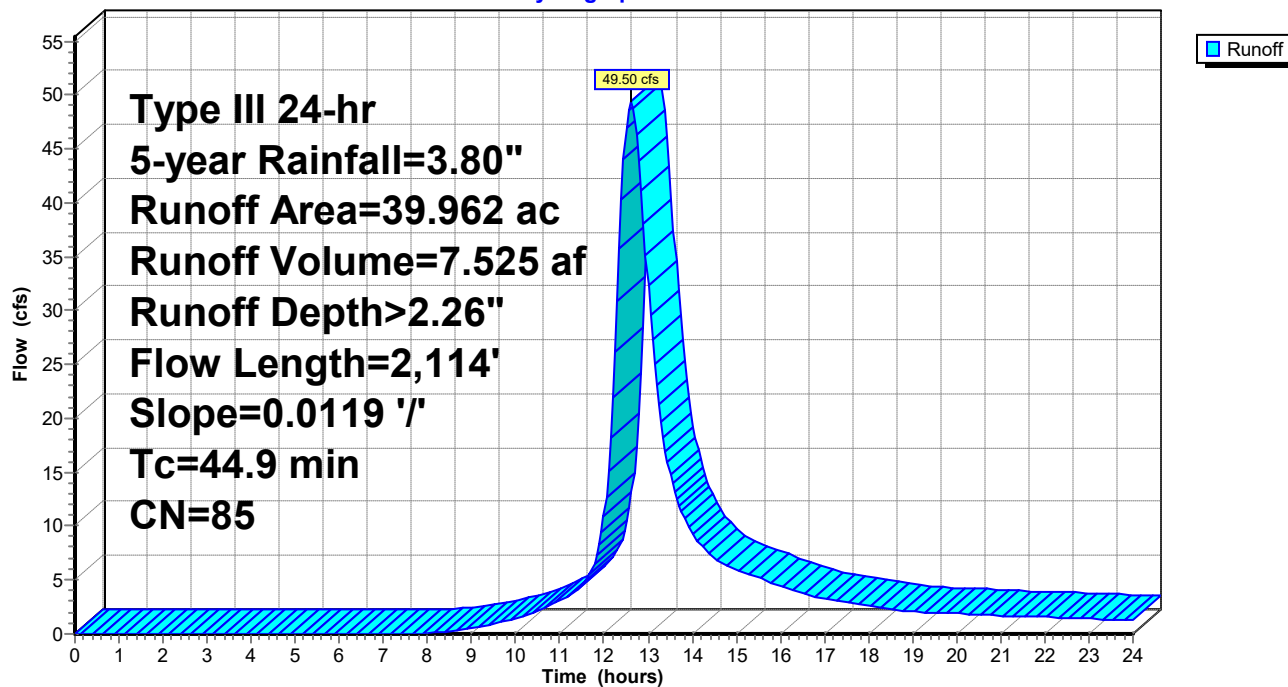
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=3.80"

Area (ac)	CN	Description
* 39.962	85	Row crops, straight row, Good, HSG C
39.962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.9	2,114	0.0119	0.78		Lag/CN Method,

Subcatchment 1S: Subcatchment 1

Hydrograph



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Type III 24-hr 5-year Rainfall=3.80"

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Summary for Subcatchment 2S: Subcatchment 2

Runoff = 72.36 cfs @ 12.84 hrs, Volume= 13.134 af, Depth> 2.25"
Routed to Reach 2R : South Trib

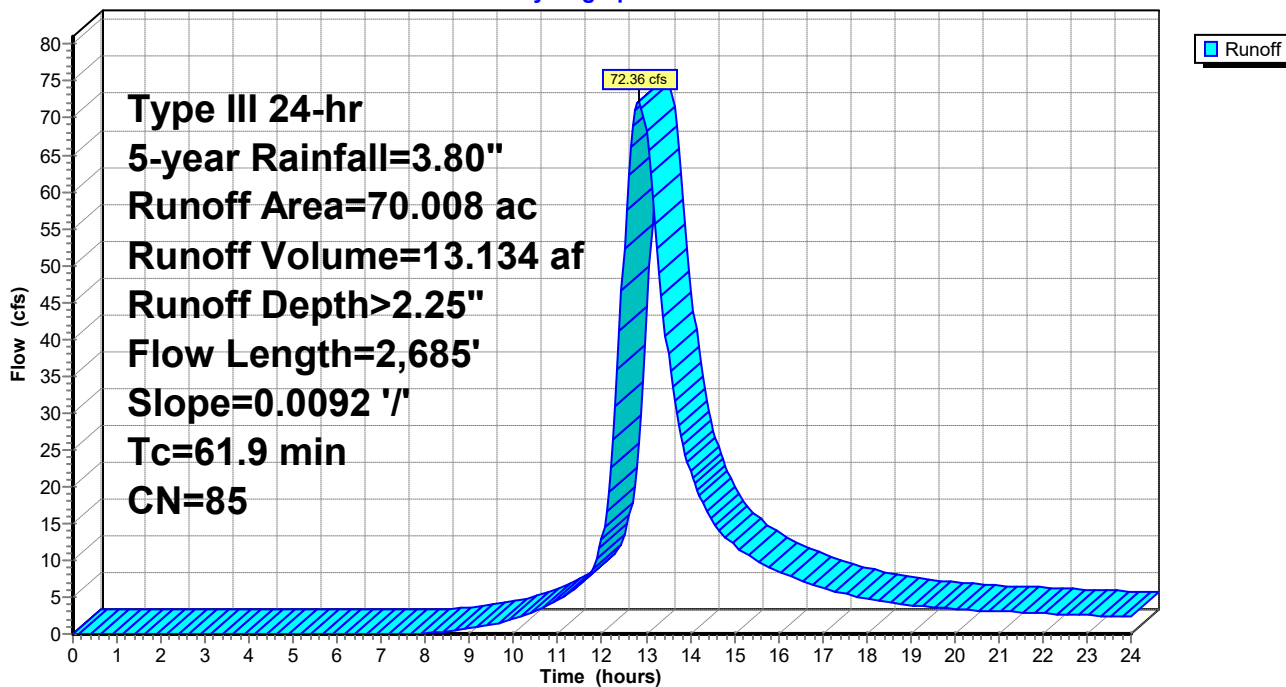
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=3.80"

Area (ac)	CN	Description
70.008	85	Row crops, straight row, Good, HSG C
70.008		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.9	2,685	0.0092	0.72		Lag/CN Method,

Subcatchment 2S: Subcatchment 2

Hydrograph



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Summary for Subcatchment 3S: Subcatchment 3

Runoff = 37.72 cfs @ 12.75 hrs, Volume= 6.420 af, Depth> 2.25"
Routed to Pond W2 : Wetland

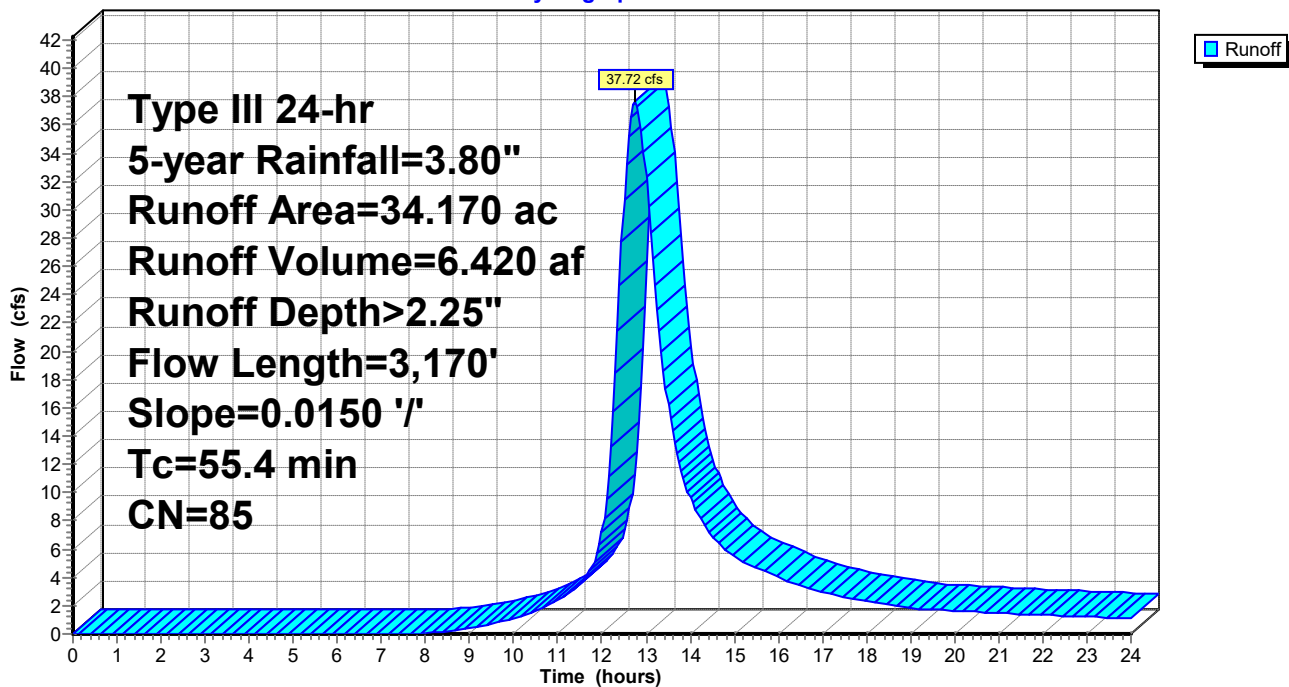
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=3.80"

Area (ac)	CN	Description
34.170	85	Row crops, straight row, Good, HSG C
34.170		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.4	3,170	0.0150	0.95		Lag/CN Method,

Subcatchment 3S: Subcatchment 3

Hydrograph



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Type III 24-hr 5-year Rainfall=3.80"

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Summary for Subcatchment 4S: Subcatchment 4

Runoff = 27.08 cfs @ 12.67 hrs, Volume= 4.324 af, Depth> 2.26"
Routed to Pond W2 : Wetland

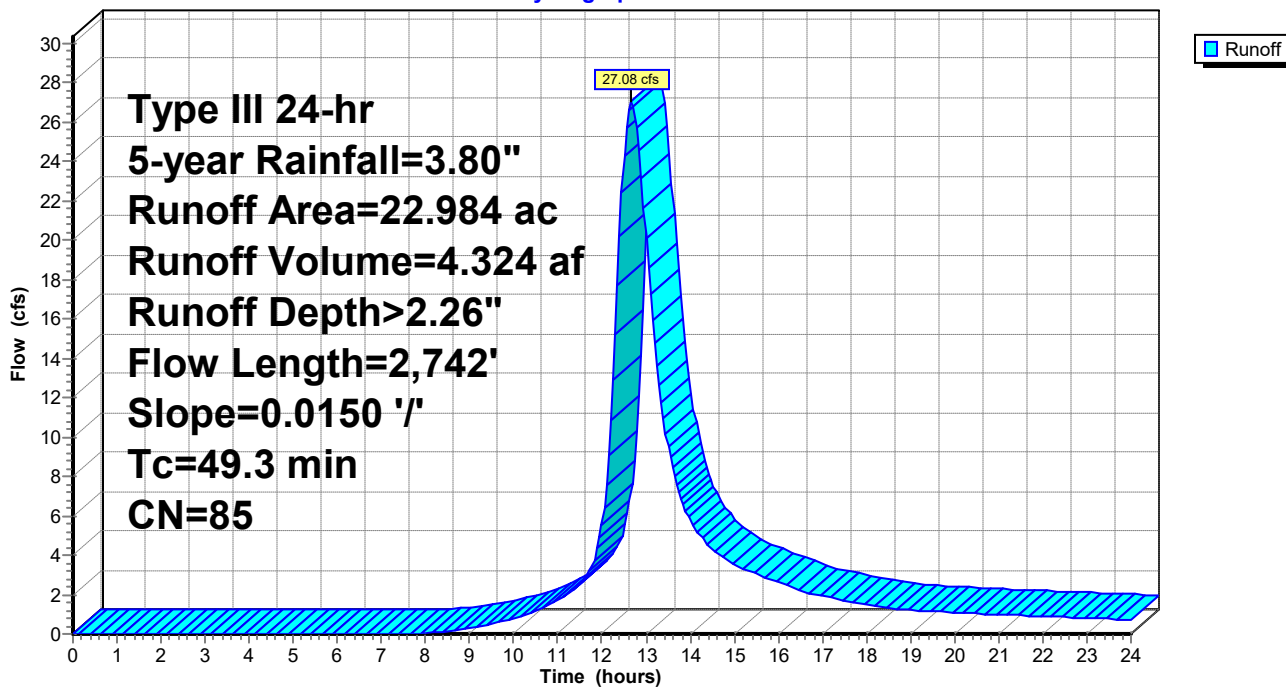
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=3.80"

Area (ac)	CN	Description
22.984	85	Row crops, straight row, Good, HSG C
22.984		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
49.3	2,742	0.0150	0.93		Lag/CN Method,

Subcatchment 4S: Subcatchment 4

Hydrograph



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Type III 24-hr 5-year Rainfall=3.80"

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Summary for Reach 1R: North Trib

Inflow Area = 39.962 ac, 0.00% Impervious, Inflow Depth > 2.26" for 5-year event
Inflow = 49.50 cfs @ 12.61 hrs, Volume= 7.525 af
Outflow = 49.25 cfs @ 12.68 hrs, Volume= 7.511 af, Atten= 1%, Lag= 3.9 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 4.37 fps, Min. Travel Time= 2.2 min

Avg. Velocity = 2.06 fps, Avg. Travel Time= 4.6 min

Peak Storage= 6,456 cf @ 12.64 hrs

Average Depth at Peak Storage= 1.64' , Surface Width= 11.81'

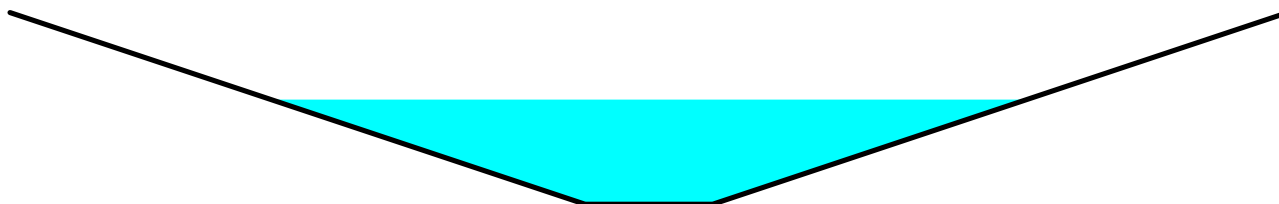
Bank-Full Depth= 3.00' Flow Area= 33.0 sf, Capacity= 206.85 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 3.0 '/' Top Width= 20.00'

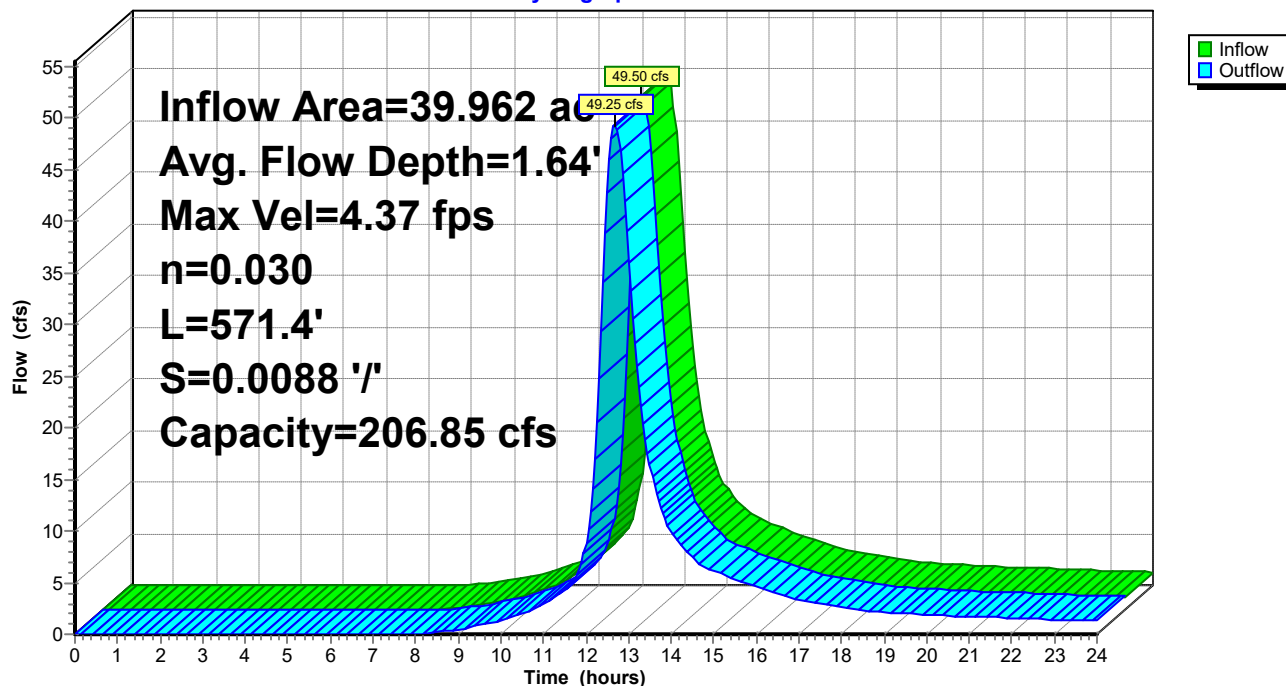
Length= 571.4' Slope= 0.0088 '/'

Inlet Invert= 1,092.36', Outlet Invert= 1,087.36'



Reach 1R: North Trib

Hydrograph



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Type III 24-hr 5-year Rainfall=3.80"

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Stage-Area-Storage for Reach 1R: North Trib

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,092.36	0.0	0	1,094.96	25.5	14,560
1,092.41	0.1	62	1,095.01	26.4	15,067
1,092.46	0.2	132	1,095.06	27.3	15,582
1,092.51	0.4	210	1,095.11	28.2	16,107
1,092.56	0.5	297	1,095.16	29.1	16,640
1,092.61	0.7	393	1,095.21	30.1	17,181
1,092.66	0.9	497	1,095.26	31.0	17,731
1,092.71	1.1	610	1,095.31	32.0	18,289
1,092.76	1.3	732	1,095.36	33.0	18,856
1,092.81	1.5	861			
1,092.86	1.8	1,000			
1,092.91	2.0	1,147			
1,092.96	2.3	1,303			
1,093.01	2.6	1,467			
1,093.06	2.9	1,640			
1,093.11	3.2	1,821			
1,093.16	3.5	2,012			
1,093.21	3.9	2,210			
1,093.26	4.2	2,417			
1,093.31	4.6	2,633			
1,093.36	5.0	2,857			
1,093.41	5.4	3,090			
1,093.46	5.8	3,332			
1,093.51	6.3	3,582			
1,093.56	6.7	3,840			
1,093.61	7.2	4,107			
1,093.66	7.7	4,383			
1,093.71	8.2	4,667			
1,093.76	8.7	4,960			
1,093.81	9.2	5,262			
1,093.86	9.8	5,571			
1,093.91	10.3	5,890			
1,093.96	10.9	6,217			
1,094.01	11.5	6,553			
1,094.06	12.1	6,897			
1,094.11	12.7	7,250			
1,094.16	13.3	7,611			
1,094.21	14.0	7,981			
1,094.26	14.6	8,360			
1,094.31	15.3	8,747			
1,094.36	16.0	9,143			
1,094.41	16.7	9,547			
1,094.46	17.4	9,960			
1,094.51	18.2	10,381			
1,094.56	18.9	10,811			
1,094.61	19.7	11,249			
1,094.66	20.5	11,697			
1,094.71	21.3	12,153			
1,094.76	22.1	12,617			
1,094.81	22.9	13,090			
1,094.86	23.8	13,571			
1,094.91	24.6	14,061			

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Type III 24-hr 5-year Rainfall=3.80"

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Summary for Reach 2R: South Trib

Inflow Area = 70.008 ac, 0.00% Impervious, Inflow Depth > 2.25" for 5-year event
Inflow = 72.36 cfs @ 12.84 hrs, Volume= 13.134 af
Outflow = 72.11 cfs @ 12.89 hrs, Volume= 13.113 af, Atten= 0%, Lag= 3.0 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.08 fps, Min. Travel Time= 1.8 min

Avg. Velocity = 2.50 fps, Avg. Travel Time= 3.7 min

Peak Storage= 7,835 cf @ 12.86 hrs

Average Depth at Peak Storage= 2.11', Surface Width= 10.95'

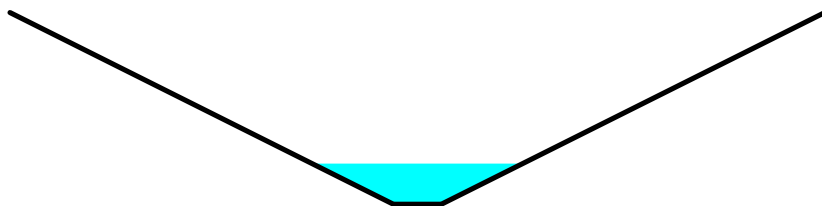
Bank-Full Depth= 10.00' Flow Area= 225.0 sf, Capacity= 2,885.27 cfs

2.50' x 10.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 2.0 '/' Top Width= 42.50'

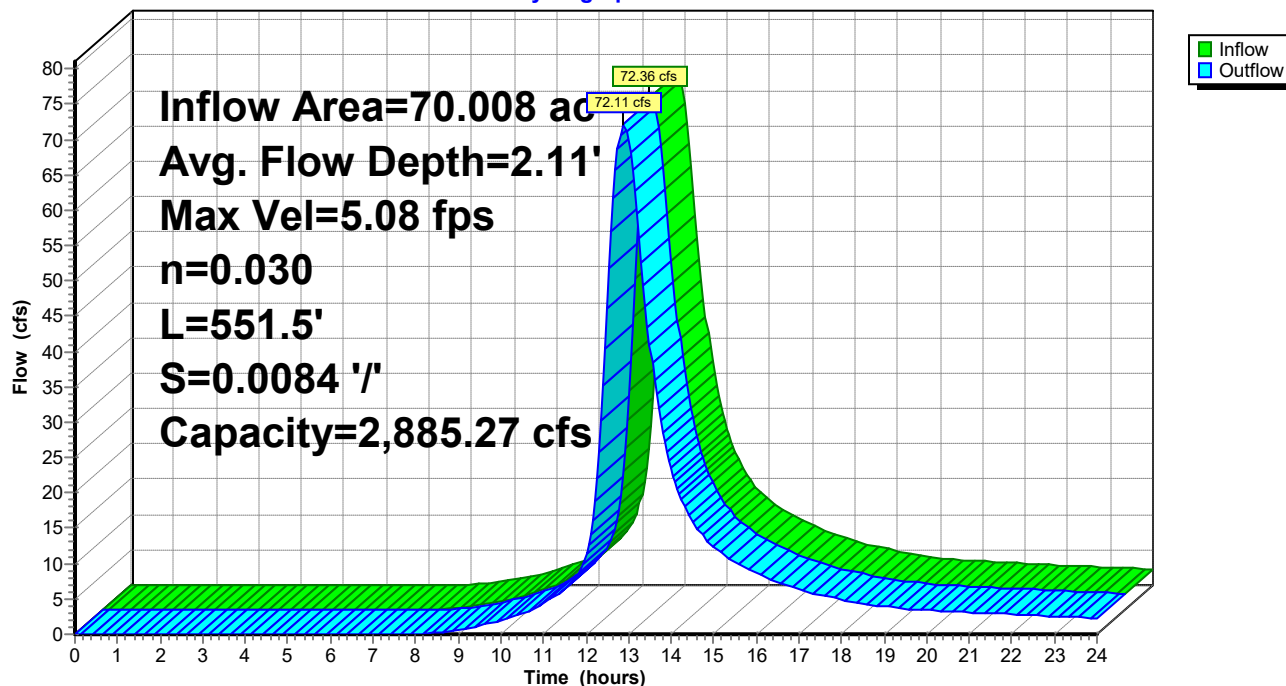
Length= 551.5' Slope= 0.0084 '/'

Inlet Invert= 1,091.97', Outlet Invert= 1,087.36'



Reach 2R: South Trib

Hydrograph



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Type III 24-hr 5-year Rainfall=3.80"

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Stage-Area-Storage for Reach 2R: South Trib

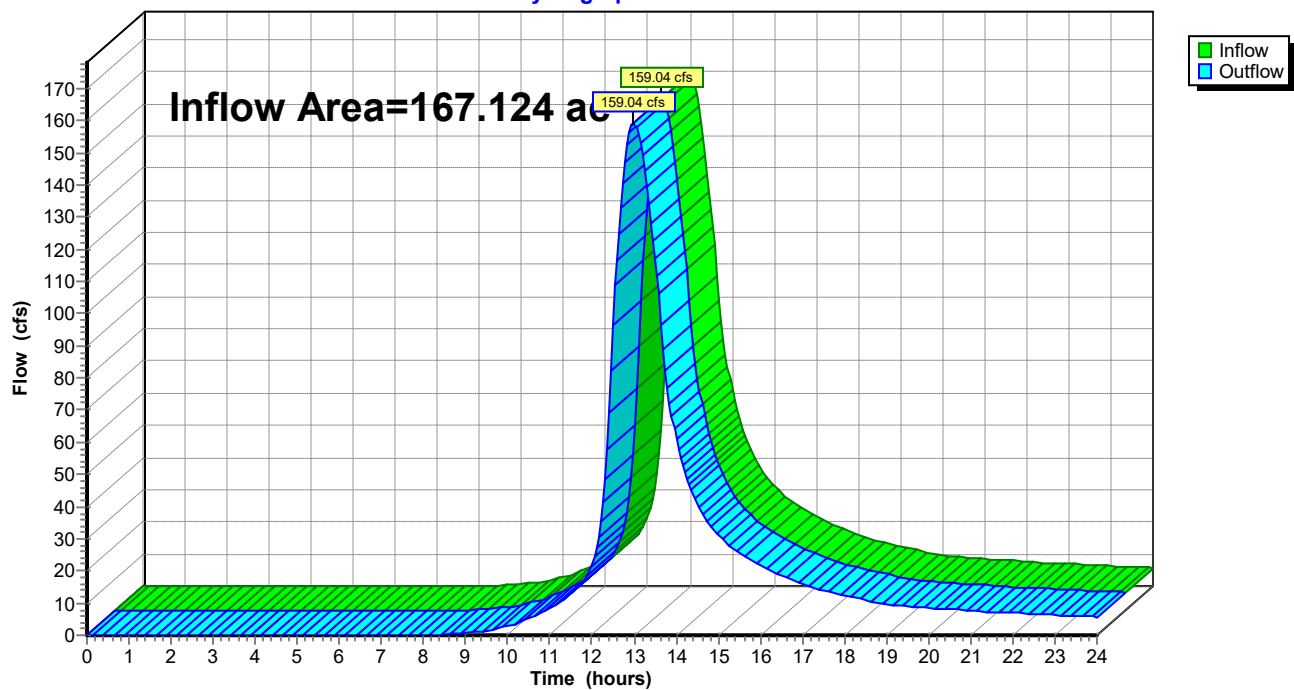
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,091.97	0.0	0	1,097.17	67.1	36,995
1,092.07	0.3	149	1,097.27	69.4	38,291
1,092.17	0.6	320	1,097.37	71.8	39,609
1,092.27	0.9	513	1,097.47	74.3	40,949
1,092.37	1.3	728	1,097.57	76.7	42,311
1,092.47	1.8	965	1,097.67	79.2	43,695
1,092.57	2.2	1,224	1,097.77	81.8	45,102
1,092.67	2.7	1,506	1,097.87	84.4	46,530
1,092.77	3.3	1,809	1,097.97	87.0	47,981
1,092.87	3.9	2,134	1,098.07	89.7	49,453
1,092.97	4.5	2,482	1,098.17	92.4	50,948
1,093.07	5.2	2,851	1,098.27	95.1	52,464
1,093.17	5.9	3,243	1,098.37	97.9	54,003
1,093.27	6.6	3,656	1,098.47	100.8	55,564
1,093.37	7.4	4,092	1,098.57	103.6	57,146
1,093.47	8.3	4,550	1,098.67	106.5	58,751
1,093.57	9.1	5,030	1,098.77	109.5	60,378
1,093.67	10.0	5,532	1,098.87	112.5	62,027
1,093.77	11.0	6,055	1,098.97	115.5	63,698
1,093.87	12.0	6,601	1,099.07	118.6	65,391
1,093.97	13.0	7,170	1,099.17	121.7	67,107
1,094.07	14.1	7,760	1,099.27	124.8	68,844
1,094.17	15.2	8,372	1,099.37	128.0	70,603
1,094.27	16.3	9,006	1,099.47	131.3	72,384
1,094.37	17.5	9,662	1,099.57	134.5	74,188
1,094.47	18.8	10,341	1,099.67	137.8	76,013
1,094.57	20.0	11,041	1,099.77	141.2	77,861
1,094.67	21.3	11,763	1,099.87	144.6	79,730
1,094.77	22.7	12,508	1,099.97	148.0	81,622
1,094.87	24.1	13,275	1,100.07	151.5	83,536
1,094.97	25.5	14,063	1,100.17	155.0	85,471
1,095.07	27.0	14,874	1,100.27	158.5	87,429
1,095.17	28.5	15,707	1,100.37	162.1	89,409
1,095.27	30.0	16,562	1,100.47	165.8	91,411
1,095.37	31.6	17,438	1,100.57	169.4	93,435
1,095.47	33.3	18,337	1,100.67	173.1	95,481
1,095.57	34.9	19,258	1,100.77	176.9	97,549
1,095.67	36.6	20,201	1,100.87	180.7	99,640
1,095.77	38.4	21,167	1,100.97	184.5	101,752
1,095.87	40.2	22,154	1,101.07	188.4	103,886
1,095.97	42.0	23,163	1,101.17	192.3	106,042
1,096.07	43.9	24,194	1,101.27	196.2	108,221
1,096.17	45.8	25,248	1,101.37	200.2	110,421
1,096.27	47.7	26,323	1,101.47	204.3	112,644
1,096.37	49.7	27,421	1,101.57	208.3	114,888
1,096.47	51.8	28,540	1,101.67	212.4	117,155
1,096.57	53.8	29,682	1,101.77	216.6	119,444
1,096.67	55.9	30,845	1,101.87	220.8	121,755
1,096.77	58.1	32,031	1,101.97	225.0	124,088
1,096.87	60.3	33,239			
1,096.97	62.5	34,469			
1,097.07	64.8	35,721			

Summary for Reach 3R: Outlet

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

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 2.23" for 5-year event
Inflow = 159.04 cfs @ 13.00 hrs, Volume= 31.058 af
Outflow = 159.04 cfs @ 13.00 hrs, Volume= 31.058 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 3R: Outlet**Hydrograph**

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Type III 24-hr 5-year Rainfall=3.80"

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Summary for Pond W2: Wetland

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 2.25" for 5-year event
 Inflow = 181.35 cfs @ 12.76 hrs, Volume= 31.368 af
 Outflow = 159.04 cfs @ 13.00 hrs, Volume= 31.058 af, Atten= 12%, Lag= 14.1 min
 Primary = 159.04 cfs @ 13.00 hrs, Volume= 31.058 af
 Routed to Reach 3R : Outlet
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 3R : Outlet

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Starting Elev= 1,086.00' Storage= 1.521 af
 Peak Elev= 1,087.29' @ 13.00 hrs Storage= 4.956 af (3.435 af above start)

Plug-Flow detention time= 56.4 min calculated for 29.476 af (94% of inflow)
 Center-of-Mass det. time= 15.9 min (875.6 - 859.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,080.00'	21.341 af	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,080.00	0.000	0.000
1,081.00	0.006	0.006
1,082.00	0.014	0.020
1,083.00	0.056	0.076
1,084.00	0.112	0.188
1,085.00	0.216	0.404
1,086.00	1.117	1.521
1,087.00	2.159	3.680
1,088.00	4.386	8.066
1,089.00	5.834	13.900
1,090.00	7.441	21.341

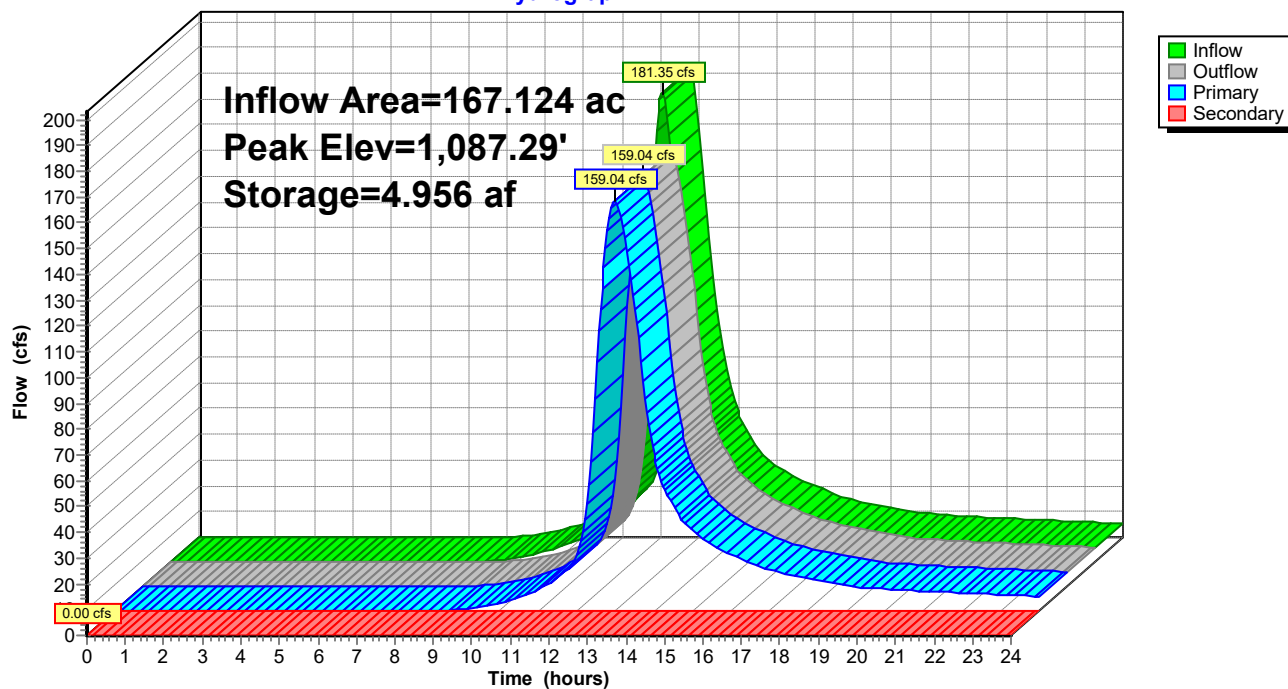
Device	Routing	Invert	Outlet Devices
#1	Primary	1,086.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 1.00 2.00 3.00 4.00 Width (feet) 30.00 36.00 42.00 48.00 54.00
#2	Secondary	1,087.82'	20.0' long + 3.0 ' SideZ x 21.1' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=158.97 cfs @ 13.00 hrs HW=1,087.29' (Free Discharge)
 ↑1=Custom Weir/Orifice (Weir Controls 158.97 cfs @ 3.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,086.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond W2: Wetland

Hydrograph



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Type III 24-hr 5-year Rainfall=3.80"

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Stage-Area-Storage for Pond W2: Wetland

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
1,080.00	0.000	1,085.20	0.627
1,080.10	0.001	1,085.30	0.739
1,080.20	0.001	1,085.40	0.851
1,080.30	0.002	1,085.50	0.962
1,080.40	0.002	1,085.60	1.074
1,080.50	0.003	1,085.70	1.186
1,080.60	0.004	1,085.80	1.298
1,080.70	0.004	1,085.90	1.409
1,080.80	0.005	1,086.00	1.521
1,080.90	0.005	1,086.10	1.737
1,081.00	0.006	1,086.20	1.953
1,081.10	0.007	1,086.30	2.169
1,081.20	0.009	1,086.40	2.385
1,081.30	0.010	1,086.50	2.600
1,081.40	0.012	1,086.60	2.816
1,081.50	0.013	1,086.70	3.032
1,081.60	0.014	1,086.80	3.248
1,081.70	0.016	1,086.90	3.464
1,081.80	0.017	1,087.00	3.680
1,081.90	0.019	1,087.10	4.119
1,082.00	0.020	1,087.20	4.557
1,082.10	0.026	1,087.30	4.996
1,082.20	0.031	1,087.40	5.434
1,082.30	0.037	1,087.50	5.873
1,082.40	0.042	1,087.60	6.312
1,082.50	0.048	1,087.70	6.750
1,082.60	0.054	1,087.80	7.189
1,082.70	0.059	1,087.90	7.627
1,082.80	0.065	1,088.00	8.066
1,082.90	0.070	1,088.10	8.649
1,083.00	0.076	1,088.20	9.233
1,083.10	0.087	1,088.30	9.816
1,083.20	0.098	1,088.40	10.400
1,083.30	0.110	1,088.50	10.983
1,083.40	0.121	1,088.60	11.566
1,083.50	0.132	1,088.70	12.150
1,083.60	0.143	1,088.80	12.733
1,083.70	0.154	1,088.90	13.317
1,083.80	0.166	1,089.00	13.900
1,083.90	0.177	1,089.10	14.644
1,084.00	0.188	1,089.20	15.388
1,084.10	0.210	1,089.30	16.132
1,084.20	0.231	1,089.40	16.876
1,084.30	0.253	1,089.50	17.620
1,084.40	0.274	1,089.60	18.365
1,084.50	0.296	1,089.70	19.109
1,084.60	0.318	1,089.80	19.853
1,084.70	0.339	1,089.90	20.597
1,084.80	0.361	1,090.00	21.341
1,084.90	0.382		
1,085.00	0.404		
1,085.10	0.516		

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Prepared by I&S Group, Inc

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Type III 24-hr 10-year Rainfall=4.50"

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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

Subcatchment 1S: Subcatchment 1 Runoff Area=39.962 ac 0.00% Impervious Runoff Depth>2.88"
Flow Length=2,114' Slope=0.0119 '/' Tc=44.9 min CN=85 Runoff=62.99 cfs 9.606 af

Subcatchment 2S: Subcatchment 2 Runoff Area=70.008 ac 0.00% Impervious Runoff Depth>2.87"
Flow Length=2,685' Slope=0.0092 '/' Tc=61.9 min CN=85 Runoff=92.12 cfs 16.768 af

Subcatchment 3S: Subcatchment 3 Runoff Area=34.170 ac 0.00% Impervious Runoff Depth>2.88"
Flow Length=3,170' Slope=0.0150 '/' Tc=55.4 min CN=85 Runoff=48.02 cfs 8.196 af

Subcatchment 4S: Subcatchment 4 Runoff Area=22.984 ac 0.00% Impervious Runoff Depth>2.88"
Flow Length=2,742' Slope=0.0150 '/' Tc=49.3 min CN=85 Runoff=34.47 cfs 5.520 af

Reach 1R: North Trib Avg. Flow Depth=1.82' Max Vel=4.64 fps Inflow=62.99 cfs 9.606 af
n=0.030 L=571.4' S=0.0088 '/' Capacity=206.85 cfs Outflow=62.69 cfs 9.590 af

Reach 2R: South Trib Avg. Flow Depth=2.36' Max Vel=5.41 fps Inflow=92.12 cfs 16.768 af
n=0.030 L=551.5' S=0.0084 '/' Capacity=2,885.27 cfs Outflow=91.83 cfs 16.745 af

Reach 3R: Outlet Inflow=203.20 cfs 39.694 af
Outflow=203.20 cfs 39.694 af

Pond W2: Wetland Peak Elev=1,087.50' Storage=5.894 af Inflow=230.98 cfs 40.050 af
Primary=203.20 cfs 39.694 af Secondary=0.00 cfs 0.000 af Outflow=203.20 cfs 39.694 af

Total Runoff Area = 167.124 ac Runoff Volume = 40.090 af Average Runoff Depth = 2.88"
100.00% Pervious = 167.124 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 10-year Rainfall=4.50"

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Summary for Subcatchment 1S: Subcatchment 1

Runoff = 62.99 cfs @ 12.61 hrs, Volume= 9.606 af, Depth> 2.88"
Routed to Reach 1R : North Trib

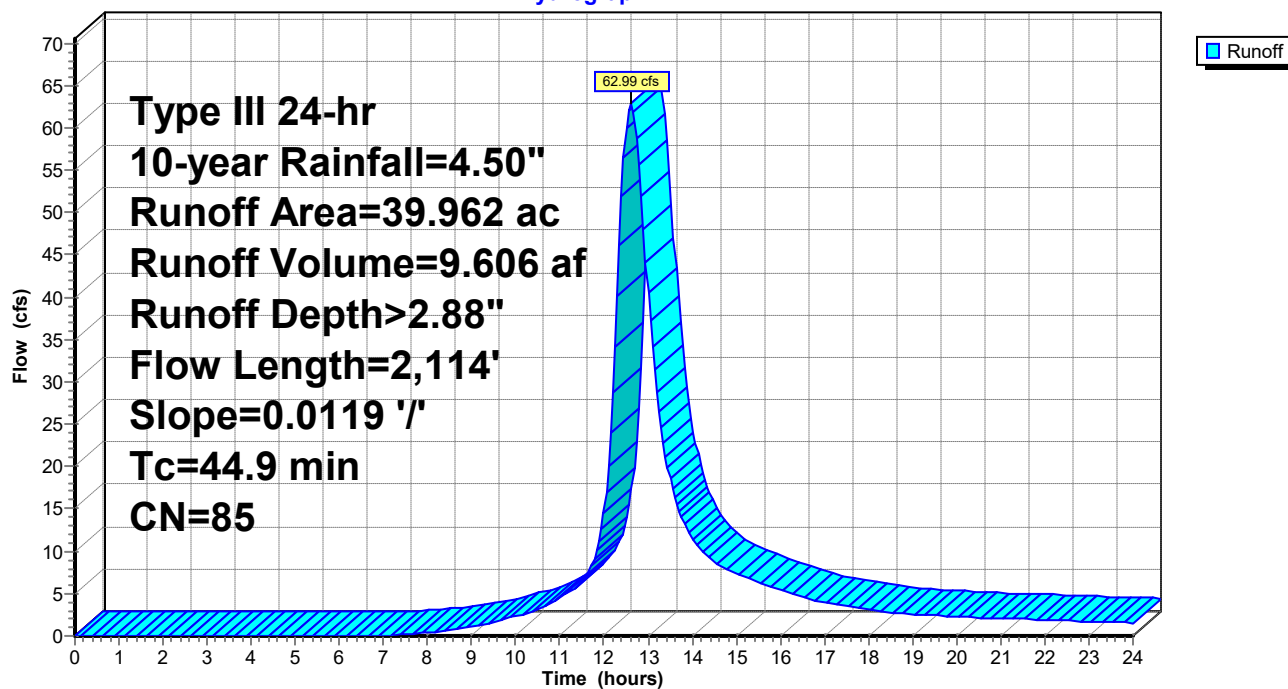
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (ac)	CN	Description
* 39.962	85	Row crops, straight row, Good, HSG C
39.962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.9	2,114	0.0119	0.78		Lag/CN Method,

Subcatchment 1S: Subcatchment 1

Hydrograph



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Type III 24-hr 10-year Rainfall=4.50"

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Summary for Subcatchment 2S: Subcatchment 2

Runoff = 92.12 cfs @ 12.83 hrs, Volume= 16.768 af, Depth> 2.87"
Routed to Reach 2R : South Trib

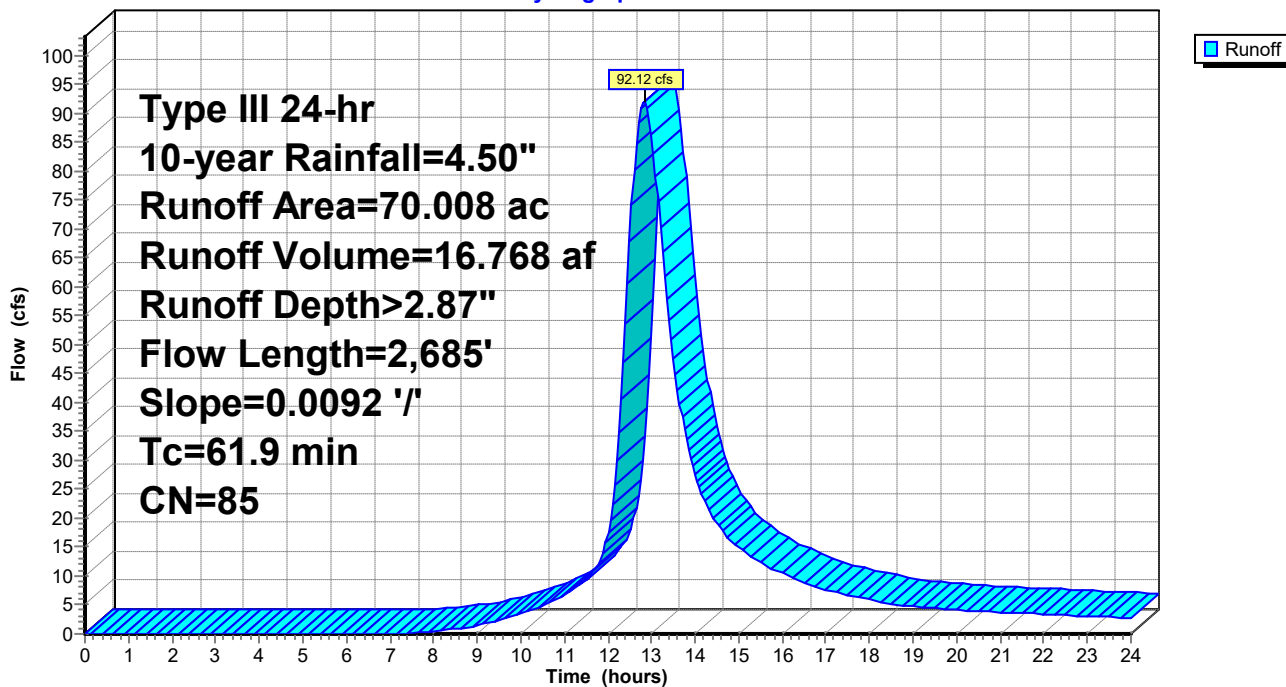
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (ac)	CN	Description
70.008	85	Row crops, straight row, Good, HSG C
70.008		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.9	2,685	0.0092	0.72		Lag/CN Method,

Subcatchment 2S: Subcatchment 2

Hydrograph



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Type III 24-hr 10-year Rainfall=4.50"

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Summary for Subcatchment 3S: Subcatchment 3

Runoff = 48.02 cfs @ 12.74 hrs, Volume= 8.196 af, Depth> 2.88"
Routed to Pond W2 : Wetland

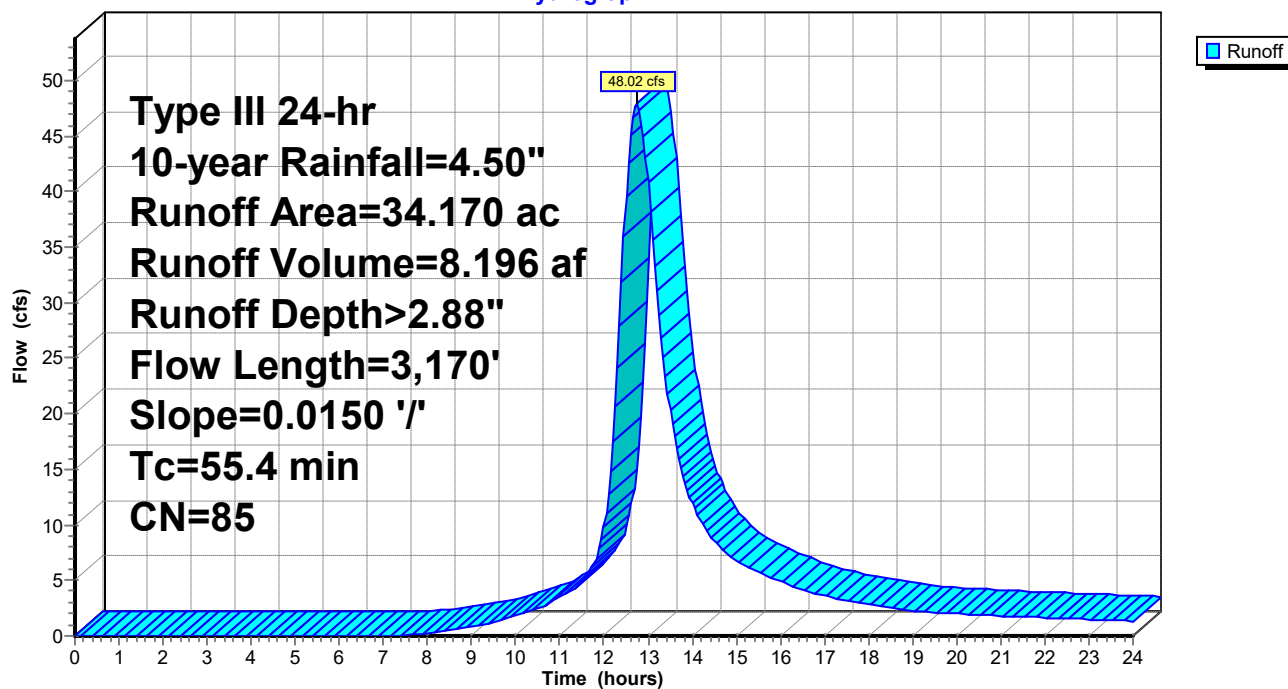
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (ac)	CN	Description
34.170	85	Row crops, straight row, Good, HSG C
34.170		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.4	3,170	0.0150	0.95		Lag/CN Method,

Subcatchment 3S: Subcatchment 3

Hydrograph



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Type III 24-hr 10-year Rainfall=4.50"

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Summary for Subcatchment 4S: Subcatchment 4

Runoff = 34.47 cfs @ 12.66 hrs, Volume= 5.520 af, Depth> 2.88"
Routed to Pond W2 : Wetland

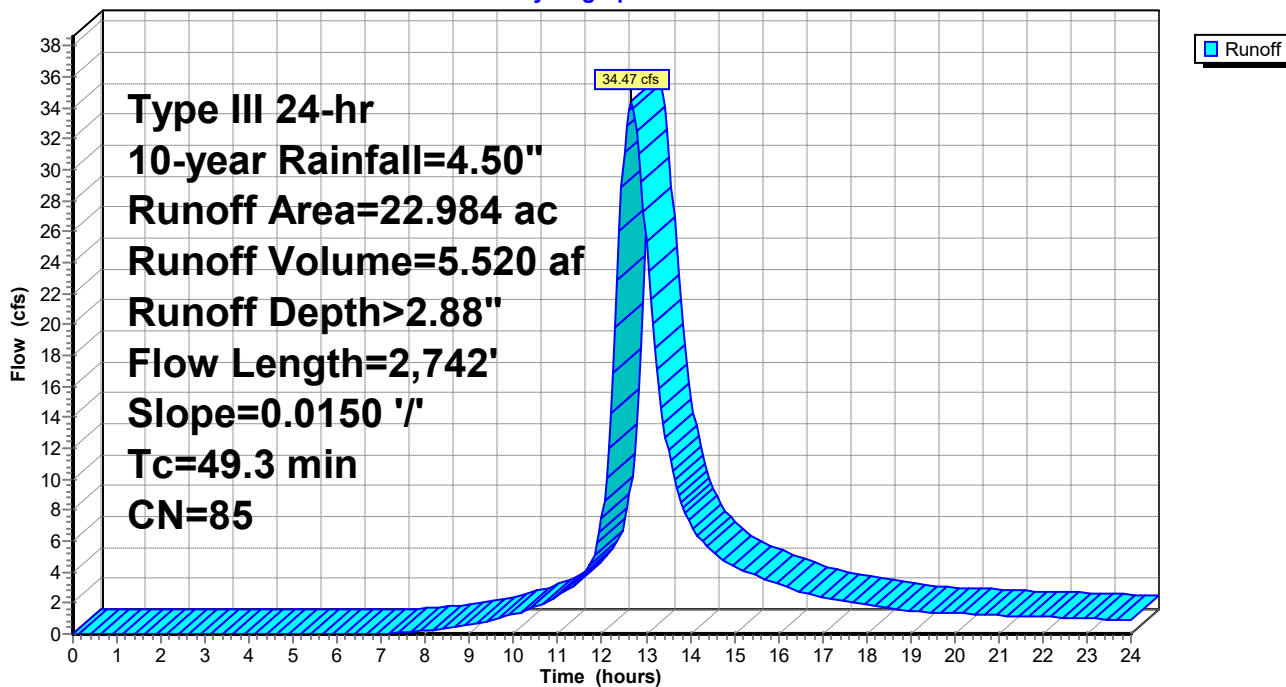
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (ac)	CN	Description
22.984	85	Row crops, straight row, Good, HSG C
22.984		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
49.3	2,742	0.0150	0.93		Lag/CN Method,

Subcatchment 4S: Subcatchment 4

Hydrograph



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Type III 24-hr 10-year Rainfall=4.50"

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Summary for Reach 1R: North Trib

Inflow Area = 39.962 ac, 0.00% Impervious, Inflow Depth > 2.88" for 10-year event
Inflow = 62.99 cfs @ 12.61 hrs, Volume= 9.606 af
Outflow = 62.69 cfs @ 12.67 hrs, Volume= 9.590 af, Atten= 0%, Lag= 3.6 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 4.64 fps, Min. Travel Time= 2.1 min

Avg. Velocity = 2.16 fps, Avg. Travel Time= 4.4 min

Peak Storage= 7,730 cf @ 12.64 hrs

Average Depth at Peak Storage= 1.82' , Surface Width= 12.90'

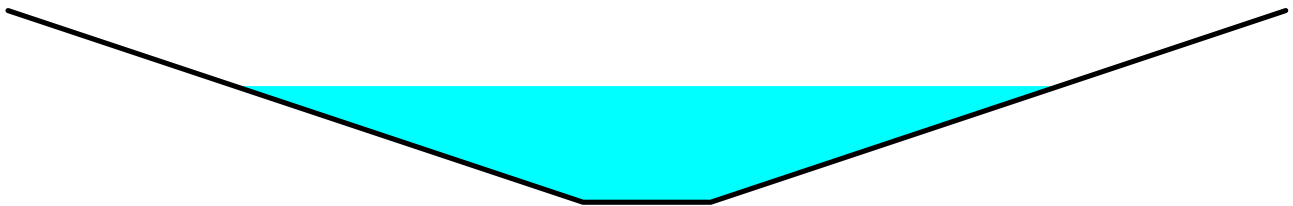
Bank-Full Depth= 3.00' Flow Area= 33.0 sf, Capacity= 206.85 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 3.0 '/' Top Width= 20.00'

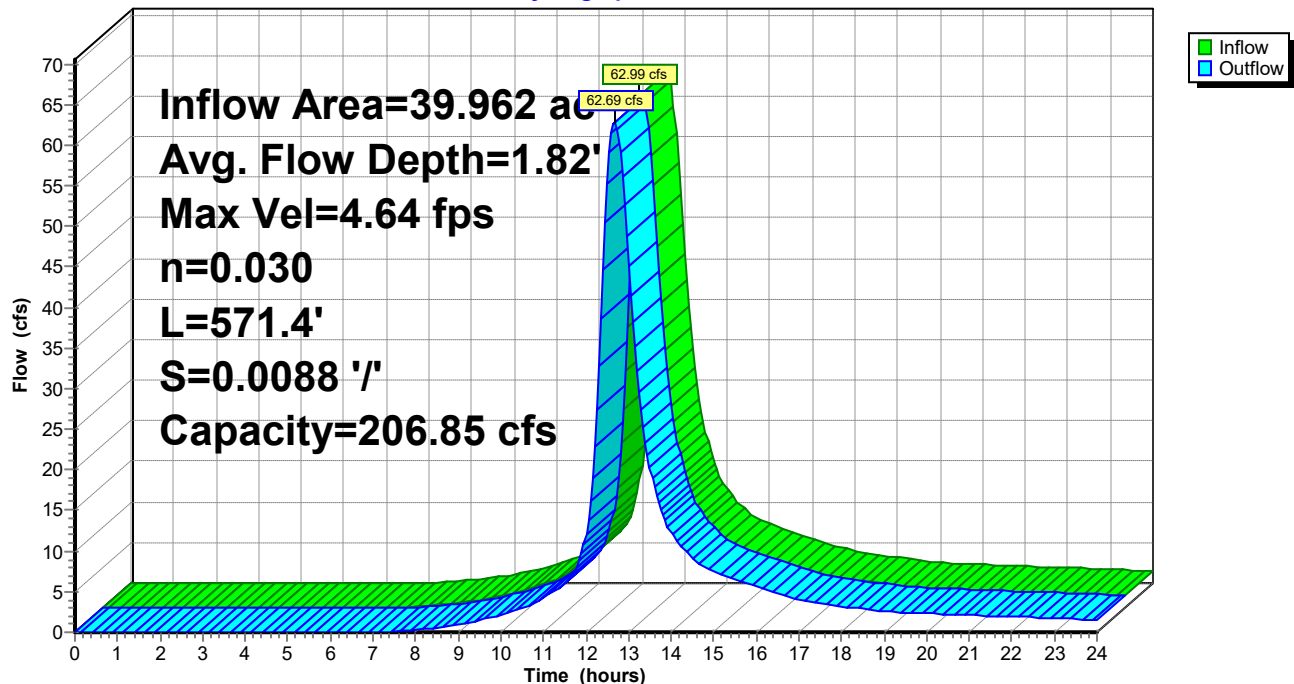
Length= 571.4' Slope= 0.0088 '/'

Inlet Invert= 1,092.36', Outlet Invert= 1,087.36'



Reach 1R: North Trib

Hydrograph



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Type III 24-hr 10-year Rainfall=4.50"

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Stage-Area-Storage for Reach 1R: North Trib

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,092.36	0.0	0	1,094.96	25.5	14,560
1,092.41	0.1	62	1,095.01	26.4	15,067
1,092.46	0.2	132	1,095.06	27.3	15,582
1,092.51	0.4	210	1,095.11	28.2	16,107
1,092.56	0.5	297	1,095.16	29.1	16,640
1,092.61	0.7	393	1,095.21	30.1	17,181
1,092.66	0.9	497	1,095.26	31.0	17,731
1,092.71	1.1	610	1,095.31	32.0	18,289
1,092.76	1.3	732	1,095.36	33.0	18,856
1,092.81	1.5	861			
1,092.86	1.8	1,000			
1,092.91	2.0	1,147			
1,092.96	2.3	1,303			
1,093.01	2.6	1,467			
1,093.06	2.9	1,640			
1,093.11	3.2	1,821			
1,093.16	3.5	2,012			
1,093.21	3.9	2,210			
1,093.26	4.2	2,417			
1,093.31	4.6	2,633			
1,093.36	5.0	2,857			
1,093.41	5.4	3,090			
1,093.46	5.8	3,332			
1,093.51	6.3	3,582			
1,093.56	6.7	3,840			
1,093.61	7.2	4,107			
1,093.66	7.7	4,383			
1,093.71	8.2	4,667			
1,093.76	8.7	4,960			
1,093.81	9.2	5,262			
1,093.86	9.8	5,571			
1,093.91	10.3	5,890			
1,093.96	10.9	6,217			
1,094.01	11.5	6,553			
1,094.06	12.1	6,897			
1,094.11	12.7	7,250			
1,094.16	13.3	7,611			
1,094.21	14.0	7,981			
1,094.26	14.6	8,360			
1,094.31	15.3	8,747			
1,094.36	16.0	9,143			
1,094.41	16.7	9,547			
1,094.46	17.4	9,960			
1,094.51	18.2	10,381			
1,094.56	18.9	10,811			
1,094.61	19.7	11,249			
1,094.66	20.5	11,697			
1,094.71	21.3	12,153			
1,094.76	22.1	12,617			
1,094.81	22.9	13,090			
1,094.86	23.8	13,571			
1,094.91	24.6	14,061			

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Type III 24-hr 10-year Rainfall=4.50"

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Summary for Reach 2R: South Trib

Inflow Area = 70.008 ac, 0.00% Impervious, Inflow Depth > 2.87" for 10-year event
Inflow = 92.12 cfs @ 12.83 hrs, Volume= 16.768 af
Outflow = 91.83 cfs @ 12.88 hrs, Volume= 16.745 af, Atten= 0%, Lag= 2.8 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.41 fps, Min. Travel Time= 1.7 min

Avg. Velocity = 2.63 fps, Avg. Travel Time= 3.5 min

Peak Storage= 9,381 cf @ 12.85 hrs

Average Depth at Peak Storage= 2.36' , Surface Width= 11.93'

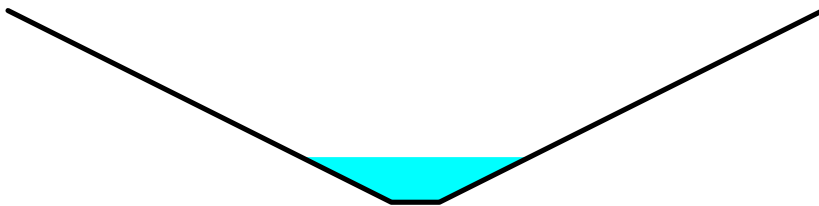
Bank-Full Depth= 10.00' Flow Area= 225.0 sf, Capacity= 2,885.27 cfs

2.50' x 10.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 2.0 '/' Top Width= 42.50'

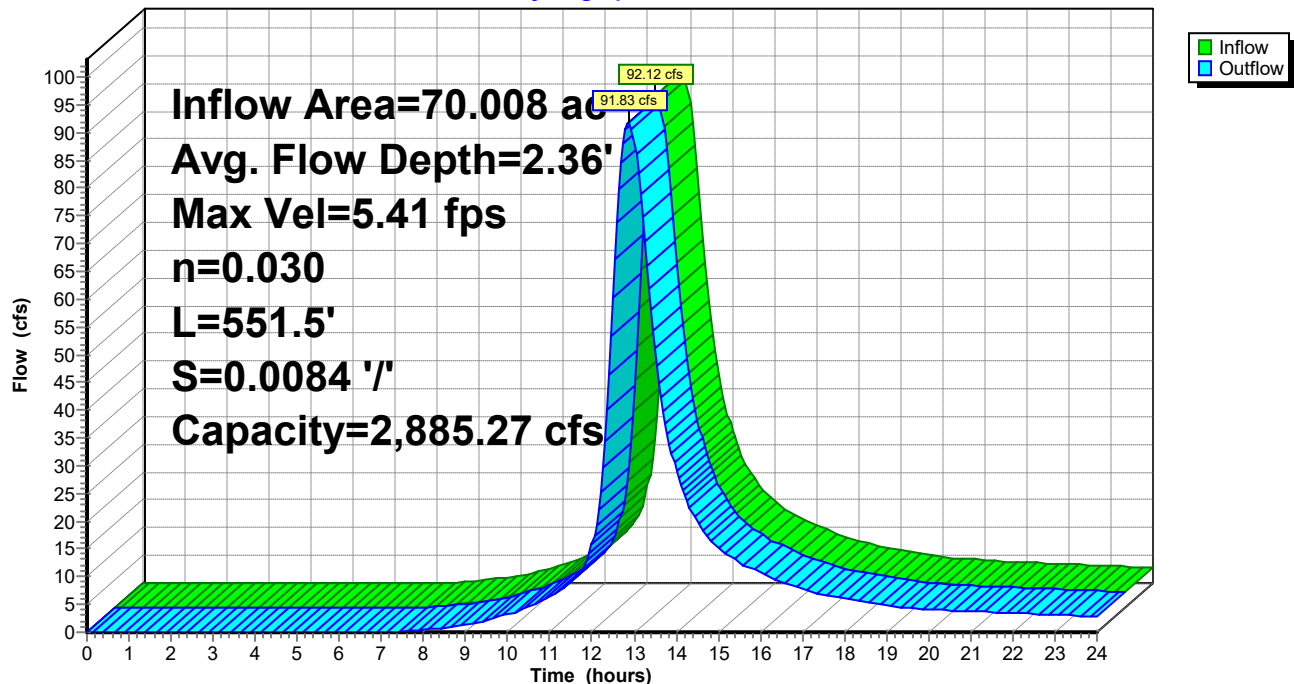
Length= 551.5' Slope= 0.0084 '/'

Inlet Invert= 1,091.97', Outlet Invert= 1,087.36'



Reach 2R: South Trib

Hydrograph



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Type III 24-hr 10-year Rainfall=4.50"

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Stage-Area-Storage for Reach 2R: South Trib

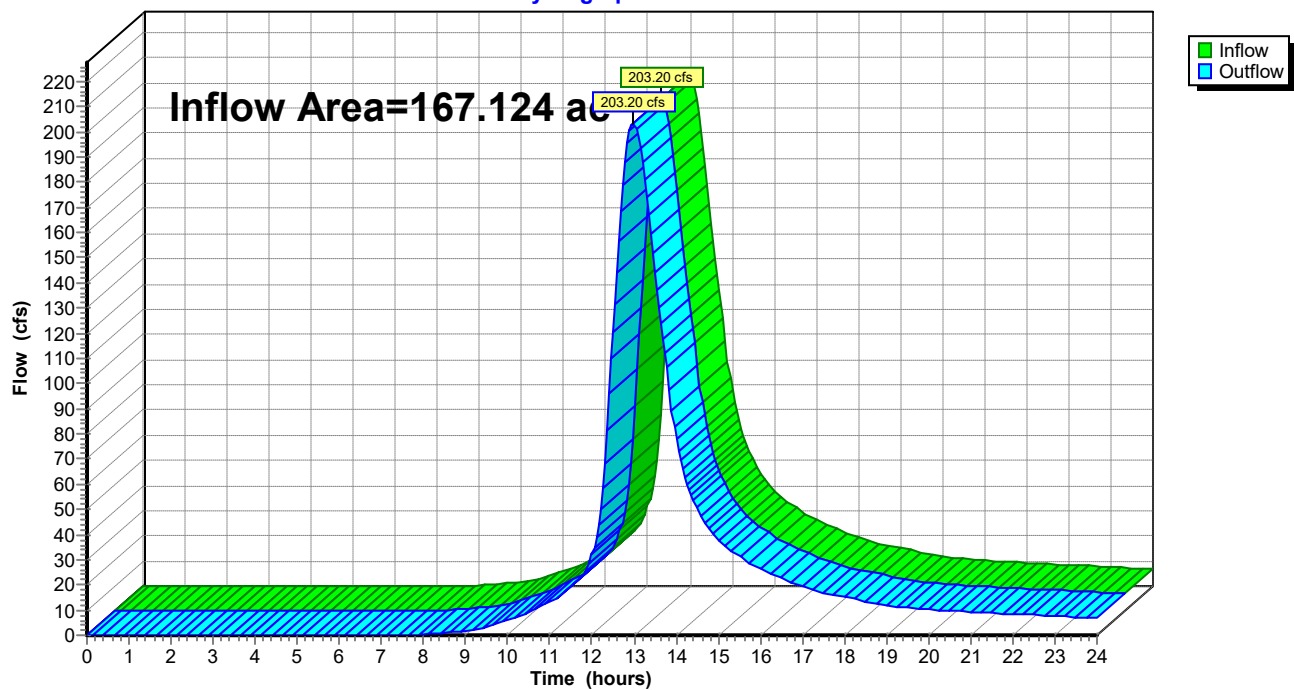
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,091.97	0.0	0	1,097.17	67.1	36,995
1,092.07	0.3	149	1,097.27	69.4	38,291
1,092.17	0.6	320	1,097.37	71.8	39,609
1,092.27	0.9	513	1,097.47	74.3	40,949
1,092.37	1.3	728	1,097.57	76.7	42,311
1,092.47	1.8	965	1,097.67	79.2	43,695
1,092.57	2.2	1,224	1,097.77	81.8	45,102
1,092.67	2.7	1,506	1,097.87	84.4	46,530
1,092.77	3.3	1,809	1,097.97	87.0	47,981
1,092.87	3.9	2,134	1,098.07	89.7	49,453
1,092.97	4.5	2,482	1,098.17	92.4	50,948
1,093.07	5.2	2,851	1,098.27	95.1	52,464
1,093.17	5.9	3,243	1,098.37	97.9	54,003
1,093.27	6.6	3,656	1,098.47	100.8	55,564
1,093.37	7.4	4,092	1,098.57	103.6	57,146
1,093.47	8.3	4,550	1,098.67	106.5	58,751
1,093.57	9.1	5,030	1,098.77	109.5	60,378
1,093.67	10.0	5,532	1,098.87	112.5	62,027
1,093.77	11.0	6,055	1,098.97	115.5	63,698
1,093.87	12.0	6,601	1,099.07	118.6	65,391
1,093.97	13.0	7,170	1,099.17	121.7	67,107
1,094.07	14.1	7,760	1,099.27	124.8	68,844
1,094.17	15.2	8,372	1,099.37	128.0	70,603
1,094.27	16.3	9,006	1,099.47	131.3	72,384
1,094.37	17.5	9,662	1,099.57	134.5	74,188
1,094.47	18.8	10,341	1,099.67	137.8	76,013
1,094.57	20.0	11,041	1,099.77	141.2	77,861
1,094.67	21.3	11,763	1,099.87	144.6	79,730
1,094.77	22.7	12,508	1,099.97	148.0	81,622
1,094.87	24.1	13,275	1,100.07	151.5	83,536
1,094.97	25.5	14,063	1,100.17	155.0	85,471
1,095.07	27.0	14,874	1,100.27	158.5	87,429
1,095.17	28.5	15,707	1,100.37	162.1	89,409
1,095.27	30.0	16,562	1,100.47	165.8	91,411
1,095.37	31.6	17,438	1,100.57	169.4	93,435
1,095.47	33.3	18,337	1,100.67	173.1	95,481
1,095.57	34.9	19,258	1,100.77	176.9	97,549
1,095.67	36.6	20,201	1,100.87	180.7	99,640
1,095.77	38.4	21,167	1,100.97	184.5	101,752
1,095.87	40.2	22,154	1,101.07	188.4	103,886
1,095.97	42.0	23,163	1,101.17	192.3	106,042
1,096.07	43.9	24,194	1,101.27	196.2	108,221
1,096.17	45.8	25,248	1,101.37	200.2	110,421
1,096.27	47.7	26,323	1,101.47	204.3	112,644
1,096.37	49.7	27,421	1,101.57	208.3	114,888
1,096.47	51.8	28,540	1,101.67	212.4	117,155
1,096.57	53.8	29,682	1,101.77	216.6	119,444
1,096.67	55.9	30,845	1,101.87	220.8	121,755
1,096.77	58.1	32,031	1,101.97	225.0	124,088
1,096.87	60.3	33,239			
1,096.97	62.5	34,469			
1,097.07	64.8	35,721			

Summary for Reach 3R: Outlet

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

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 2.85" for 10-year event
Inflow = 203.20 cfs @ 12.99 hrs, Volume= 39.694 af
Outflow = 203.20 cfs @ 12.99 hrs, Volume= 39.694 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 3R: Outlet**Hydrograph**

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Type III 24-hr 10-year Rainfall=4.50"

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Summary for Pond W2: Wetland

[61] Hint: Exceeded Reach 1R outlet invert by 0.14' @ 13.00 hrs

[61] Hint: Exceeded Reach 2R outlet invert by 0.14' @ 13.00 hrs

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 2.88" for 10-year event
 Inflow = 230.98 cfs @ 12.75 hrs, Volume= 40.050 af
 Outflow = 203.20 cfs @ 12.99 hrs, Volume= 39.694 af, Atten= 12%, Lag= 13.9 min
 Primary = 203.20 cfs @ 12.99 hrs, Volume= 39.694 af
 Routed to Reach 3R : Outlet
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 3R : Outlet

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Starting Elev= 1,086.00' Storage= 1.521 af

Peak Elev= 1,087.50' @ 12.99 hrs Storage= 5.894 af (4.373 af above start)

Plug-Flow detention time= 49.8 min calculated for 38.094 af (95% of inflow)

Center-of-Mass det. time= 15.5 min (868.3 - 852.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,080.00'	21.341 af	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,080.00	0.000	0.000
1,081.00	0.006	0.006
1,082.00	0.014	0.020
1,083.00	0.056	0.076
1,084.00	0.112	0.188
1,085.00	0.216	0.404
1,086.00	1.117	1.521
1,087.00	2.159	3.680
1,088.00	4.386	8.066
1,089.00	5.834	13.900
1,090.00	7.441	21.341

Device	Routing	Invert	Outlet Devices
#1	Primary	1,086.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 1.00 2.00 3.00 4.00 Width (feet) 30.00 36.00 42.00 48.00 54.00
#2	Secondary	1,087.82'	20.0' long + 3.0 ' SideZ x 21.1' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=202.97 cfs @ 12.99 hrs HW=1,087.50' (Free Discharge)

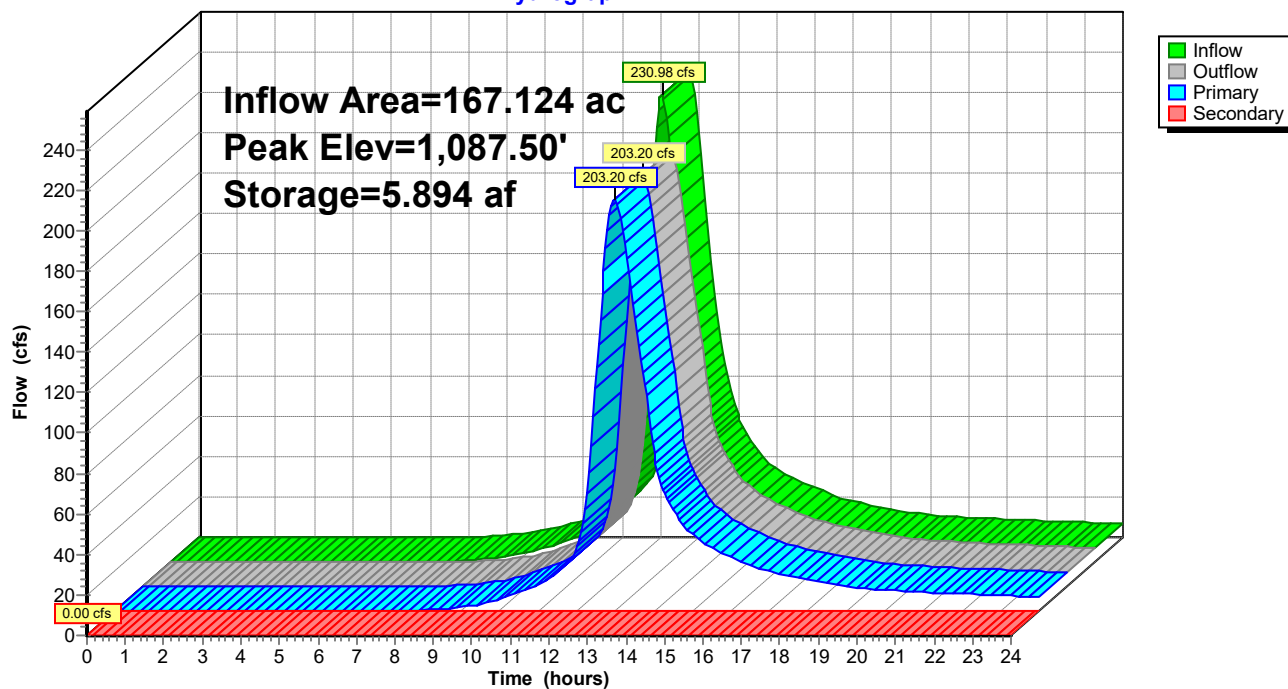
↑1=Custom Weir/Orifice (Weir Controls 202.97 cfs @ 3.91 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,086.00' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond W2: Wetland

Hydrograph



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Type III 24-hr 10-year Rainfall=4.50"

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Stage-Area-Storage for Pond W2: Wetland

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
1,080.00	0.000	1,085.20	0.627
1,080.10	0.001	1,085.30	0.739
1,080.20	0.001	1,085.40	0.851
1,080.30	0.002	1,085.50	0.962
1,080.40	0.002	1,085.60	1.074
1,080.50	0.003	1,085.70	1.186
1,080.60	0.004	1,085.80	1.298
1,080.70	0.004	1,085.90	1.409
1,080.80	0.005	1,086.00	1.521
1,080.90	0.005	1,086.10	1.737
1,081.00	0.006	1,086.20	1.953
1,081.10	0.007	1,086.30	2.169
1,081.20	0.009	1,086.40	2.385
1,081.30	0.010	1,086.50	2.600
1,081.40	0.012	1,086.60	2.816
1,081.50	0.013	1,086.70	3.032
1,081.60	0.014	1,086.80	3.248
1,081.70	0.016	1,086.90	3.464
1,081.80	0.017	1,087.00	3.680
1,081.90	0.019	1,087.10	4.119
1,082.00	0.020	1,087.20	4.557
1,082.10	0.026	1,087.30	4.996
1,082.20	0.031	1,087.40	5.434
1,082.30	0.037	1,087.50	5.873
1,082.40	0.042	1,087.60	6.312
1,082.50	0.048	1,087.70	6.750
1,082.60	0.054	1,087.80	7.189
1,082.70	0.059	1,087.90	7.627
1,082.80	0.065	1,088.00	8.066
1,082.90	0.070	1,088.10	8.649
1,083.00	0.076	1,088.20	9.233
1,083.10	0.087	1,088.30	9.816
1,083.20	0.098	1,088.40	10.400
1,083.30	0.110	1,088.50	10.983
1,083.40	0.121	1,088.60	11.566
1,083.50	0.132	1,088.70	12.150
1,083.60	0.143	1,088.80	12.733
1,083.70	0.154	1,088.90	13.317
1,083.80	0.166	1,089.00	13.900
1,083.90	0.177	1,089.10	14.644
1,084.00	0.188	1,089.20	15.388
1,084.10	0.210	1,089.30	16.132
1,084.20	0.231	1,089.40	16.876
1,084.30	0.253	1,089.50	17.620
1,084.40	0.274	1,089.60	18.365
1,084.50	0.296	1,089.70	19.109
1,084.60	0.318	1,089.80	19.853
1,084.70	0.339	1,089.90	20.597
1,084.80	0.361	1,090.00	21.341
1,084.90	0.382		
1,085.00	0.404		
1,085.10	0.516		

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Type III 24-hr 25-year Rainfall=5.60"

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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

Subcatchment 1S: Subcatchment 1 Runoff Area=39.962 ac 0.00% Impervious Runoff Depth>3.90"
Flow Length=2,114' Slope=0.0119 '/' Tc=44.9 min CN=85 Runoff=84.42 cfs 12.971 af

Subcatchment 2S: Subcatchment 2 Runoff Area=70.008 ac 0.00% Impervious Runoff Depth>3.88"
Flow Length=2,685' Slope=0.0092 '/' Tc=61.9 min CN=85 Runoff=123.55 cfs 22.646 af

Subcatchment 3S: Subcatchment 3 Runoff Area=34.170 ac 0.00% Impervious Runoff Depth>3.89"
Flow Length=3,170' Slope=0.0150 '/' Tc=55.4 min CN=85 Runoff=64.39 cfs 11.068 af

Subcatchment 4S: Subcatchment 4 Runoff Area=22.984 ac 0.00% Impervious Runoff Depth>3.89"
Flow Length=2,742' Slope=0.0150 '/' Tc=49.3 min CN=85 Runoff=46.22 cfs 7.454 af

Reach 1R: North Trib Avg. Flow Depth=2.06' Max Vel=5.00 fps Inflow=84.42 cfs 12.971 af
n=0.030 L=571.4' S=0.0088 '/' Capacity=206.85 cfs Outflow=84.04 cfs 12.952 af

Reach 2R: South Trib Avg. Flow Depth=2.69' Max Vel=5.82 fps Inflow=123.55 cfs 22.646 af
n=0.030 L=551.5' S=0.0084 '/' Capacity=2,885.27 cfs Outflow=123.18 cfs 22.619 af

Reach 3R: Outlet Inflow=276.30 cfs 53.667 af
Outflow=276.30 cfs 53.667 af

Pond W2: Wetland Peak Elev=1,087.82' Storage=7.276 af Inflow=309.93 cfs 54.092 af
Primary=276.30 cfs 53.667 af Secondary=0.00 cfs 0.000 af Outflow=276.30 cfs 53.667 af

Total Runoff Area = 167.124 ac Runoff Volume = 54.139 af Average Runoff Depth = 3.89"
100.00% Pervious = 167.124 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 25-year Rainfall=5.60"

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Summary for Subcatchment 1S: Subcatchment 1

Runoff = 84.42 cfs @ 12.60 hrs, Volume= 12.971 af, Depth> 3.90"
Routed to Reach 1R : North Trib

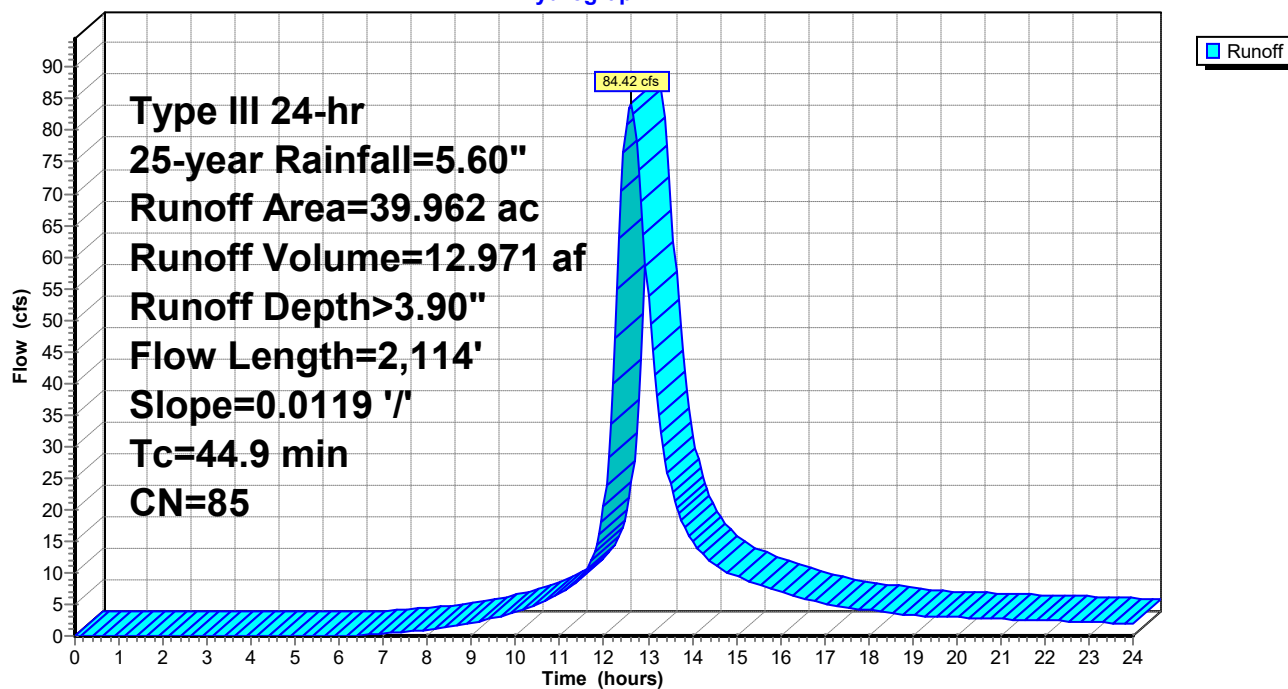
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.60"

Area (ac)	CN	Description
* 39.962	85	Row crops, straight row, Good, HSG C
39.962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.9	2,114	0.0119	0.78		Lag/CN Method,

Subcatchment 1S: Subcatchment 1

Hydrograph



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Type III 24-hr 25-year Rainfall=5.60"

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Summary for Subcatchment 2S: Subcatchment 2

Runoff = 123.55 cfs @ 12.83 hrs, Volume= 22.646 af, Depth> 3.88"
Routed to Reach 2R : South Trib

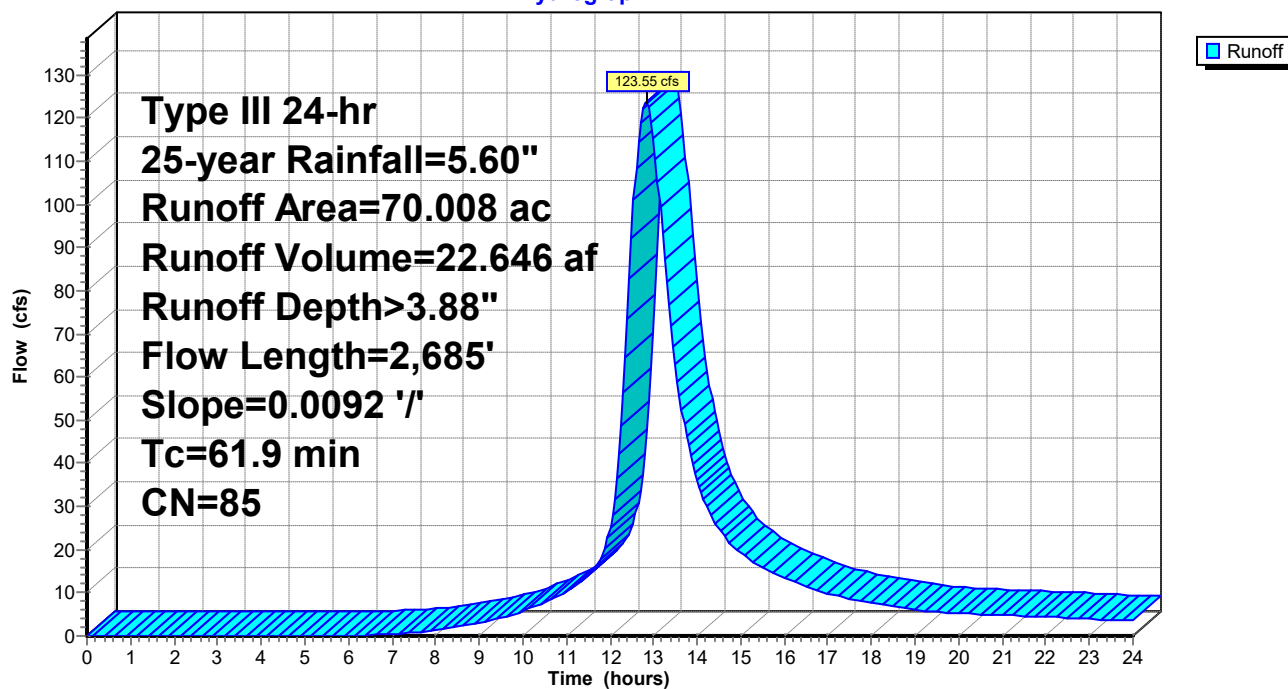
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.60"

Area (ac)	CN	Description
70.008	85	Row crops, straight row, Good, HSG C
70.008		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.9	2,685	0.0092	0.72		Lag/CN Method,

Subcatchment 2S: Subcatchment 2

Hydrograph



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Type III 24-hr 25-year Rainfall=5.60"

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Summary for Subcatchment 3S: Subcatchment 3

Runoff = 64.39 cfs @ 12.74 hrs, Volume= 11.068 af, Depth> 3.89"
Routed to Pond W2 : Wetland

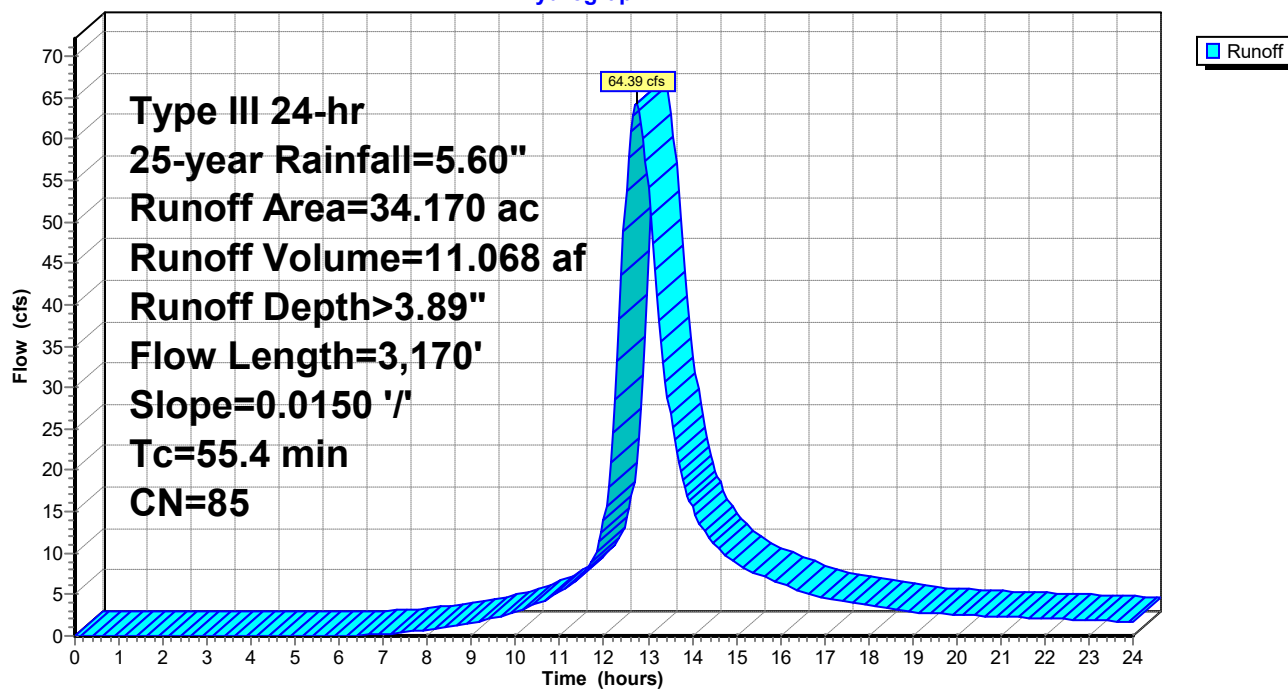
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.60"

Area (ac)	CN	Description
34.170	85	Row crops, straight row, Good, HSG C
34.170		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.4	3,170	0.0150	0.95		Lag/CN Method,

Subcatchment 3S: Subcatchment 3

Hydrograph



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Type III 24-hr 25-year Rainfall=5.60"

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Summary for Subcatchment 4S: Subcatchment 4

Runoff = 46.22 cfs @ 12.66 hrs, Volume= 7.454 af, Depth> 3.89"
Routed to Pond W2 : Wetland

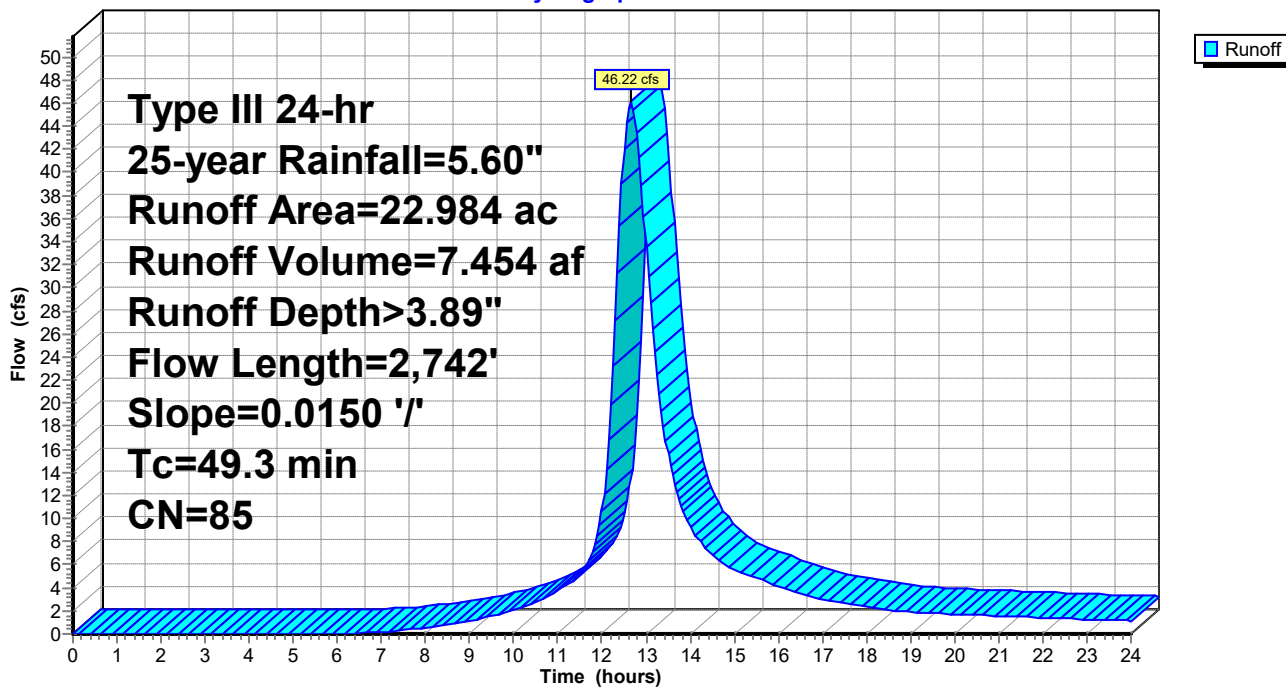
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.60"

Area (ac)	CN	Description
22.984	85	Row crops, straight row, Good, HSG C
22.984		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
49.3	2,742	0.0150	0.93		Lag/CN Method,

Subcatchment 4S: Subcatchment 4

Hydrograph



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Type III 24-hr 25-year Rainfall=5.60"

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Summary for Reach 1R: North Trib

Inflow Area = 39.962 ac, 0.00% Impervious, Inflow Depth > 3.90" for 25-year event
Inflow = 84.42 cfs @ 12.60 hrs, Volume= 12.971 af
Outflow = 84.04 cfs @ 12.66 hrs, Volume= 12.952 af, Atten= 0%, Lag= 3.4 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.00 fps, Min. Travel Time= 1.9 min

Avg. Velocity = 2.30 fps, Avg. Travel Time= 4.1 min

Peak Storage= 9,623 cf @ 12.63 hrs

Average Depth at Peak Storage= 2.06' , Surface Width= 14.36'

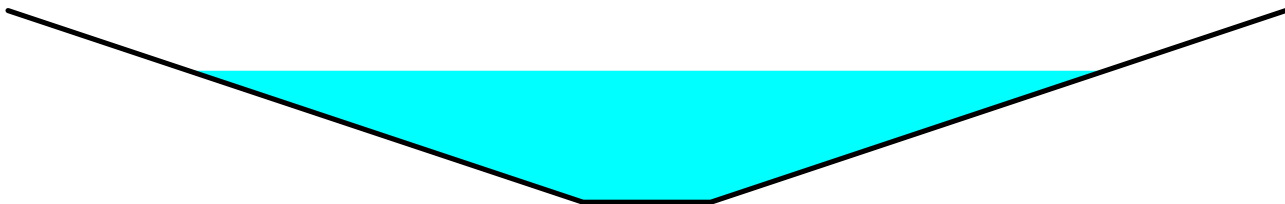
Bank-Full Depth= 3.00' Flow Area= 33.0 sf, Capacity= 206.85 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 3.0 '/' Top Width= 20.00'

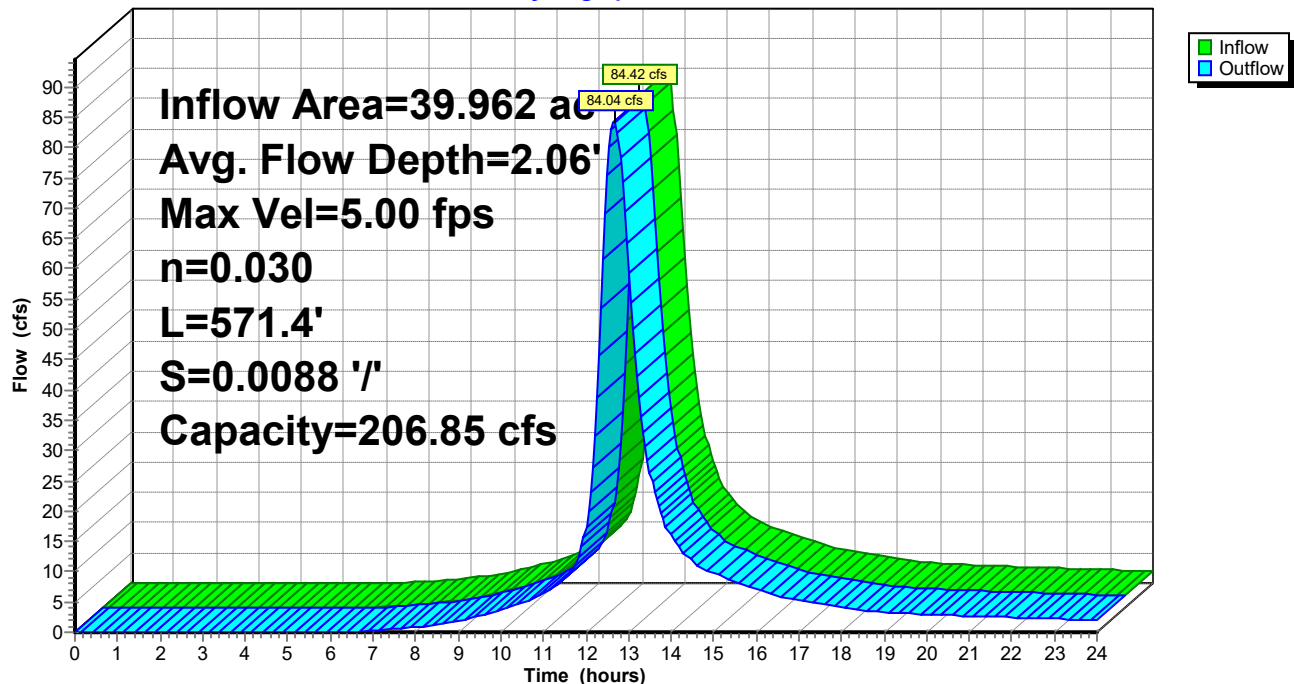
Length= 571.4' Slope= 0.0088 '/'

Inlet Invert= 1,092.36', Outlet Invert= 1,087.36'



Reach 1R: North Trib

Hydrograph



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Stage-Area-Storage for Reach 1R: North Trib

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,092.36	0.0	0	1,094.96	25.5	14,560
1,092.41	0.1	62	1,095.01	26.4	15,067
1,092.46	0.2	132	1,095.06	27.3	15,582
1,092.51	0.4	210	1,095.11	28.2	16,107
1,092.56	0.5	297	1,095.16	29.1	16,640
1,092.61	0.7	393	1,095.21	30.1	17,181
1,092.66	0.9	497	1,095.26	31.0	17,731
1,092.71	1.1	610	1,095.31	32.0	18,289
1,092.76	1.3	732	1,095.36	33.0	18,856
1,092.81	1.5	861			
1,092.86	1.8	1,000			
1,092.91	2.0	1,147			
1,092.96	2.3	1,303			
1,093.01	2.6	1,467			
1,093.06	2.9	1,640			
1,093.11	3.2	1,821			
1,093.16	3.5	2,012			
1,093.21	3.9	2,210			
1,093.26	4.2	2,417			
1,093.31	4.6	2,633			
1,093.36	5.0	2,857			
1,093.41	5.4	3,090			
1,093.46	5.8	3,332			
1,093.51	6.3	3,582			
1,093.56	6.7	3,840			
1,093.61	7.2	4,107			
1,093.66	7.7	4,383			
1,093.71	8.2	4,667			
1,093.76	8.7	4,960			
1,093.81	9.2	5,262			
1,093.86	9.8	5,571			
1,093.91	10.3	5,890			
1,093.96	10.9	6,217			
1,094.01	11.5	6,553			
1,094.06	12.1	6,897			
1,094.11	12.7	7,250			
1,094.16	13.3	7,611			
1,094.21	14.0	7,981			
1,094.26	14.6	8,360			
1,094.31	15.3	8,747			
1,094.36	16.0	9,143			
1,094.41	16.7	9,547			
1,094.46	17.4	9,960			
1,094.51	18.2	10,381			
1,094.56	18.9	10,811			
1,094.61	19.7	11,249			
1,094.66	20.5	11,697			
1,094.71	21.3	12,153			
1,094.76	22.1	12,617			
1,094.81	22.9	13,090			
1,094.86	23.8	13,571			
1,094.91	24.6	14,061			

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Type III 24-hr 25-year Rainfall=5.60"

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Summary for Reach 2R: South Trib

Inflow Area = 70.008 ac, 0.00% Impervious, Inflow Depth > 3.88" for 25-year event
Inflow = 123.55 cfs @ 12.83 hrs, Volume= 22.646 af
Outflow = 123.18 cfs @ 12.87 hrs, Volume= 22.619 af, Atten= 0%, Lag= 2.5 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.82 fps, Min. Travel Time= 1.6 min

Avg. Velocity = 2.80 fps, Avg. Travel Time= 3.3 min

Peak Storage= 11,683 cf @ 12.84 hrs

Average Depth at Peak Storage= 2.69' , Surface Width= 13.26'

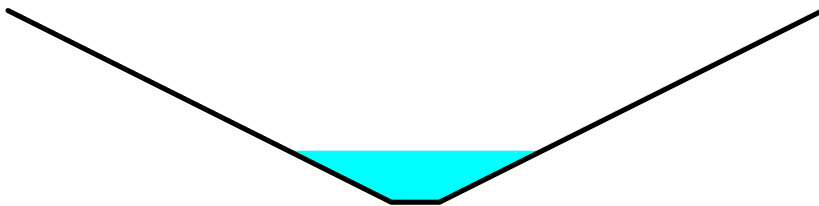
Bank-Full Depth= 10.00' Flow Area= 225.0 sf, Capacity= 2,885.27 cfs

2.50' x 10.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 2.0 '/' Top Width= 42.50'

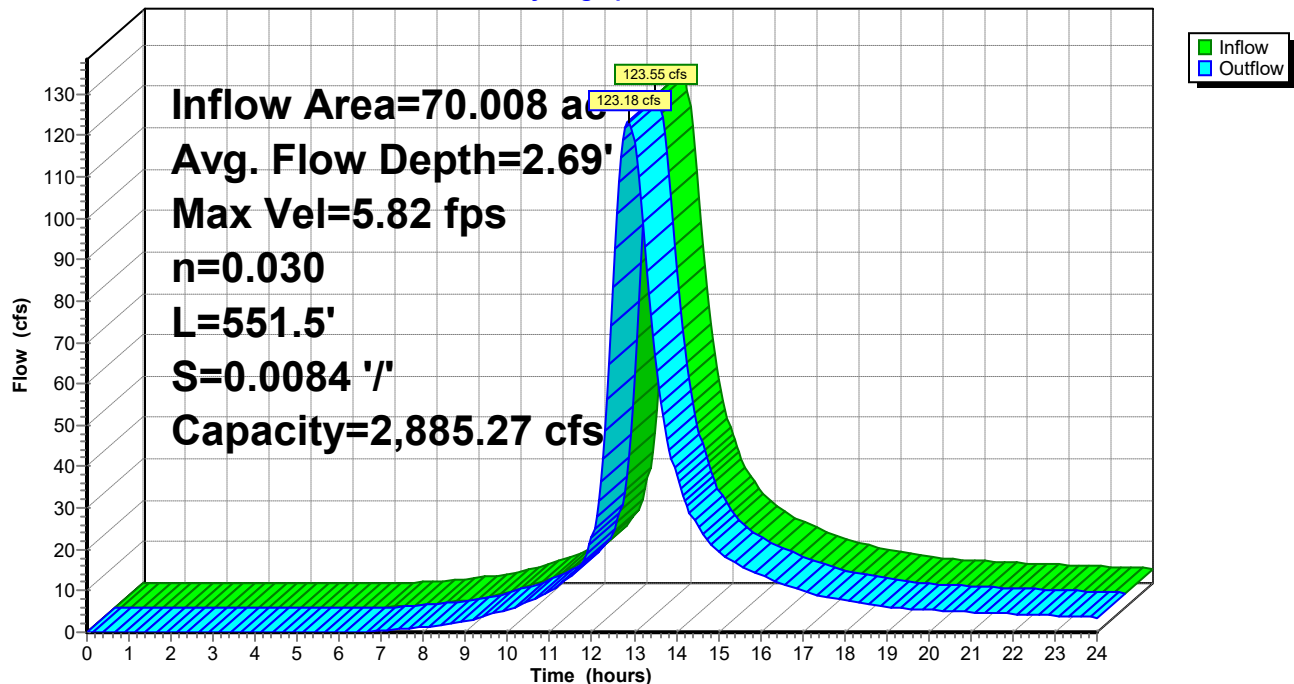
Length= 551.5' Slope= 0.0084 '/'

Inlet Invert= 1,091.97', Outlet Invert= 1,087.36'



Reach 2R: South Trib

Hydrograph



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Type III 24-hr 25-year Rainfall=5.60"

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Stage-Area-Storage for Reach 2R: South Trib

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,091.97	0.0	0	1,097.17	67.1	36,995
1,092.07	0.3	149	1,097.27	69.4	38,291
1,092.17	0.6	320	1,097.37	71.8	39,609
1,092.27	0.9	513	1,097.47	74.3	40,949
1,092.37	1.3	728	1,097.57	76.7	42,311
1,092.47	1.8	965	1,097.67	79.2	43,695
1,092.57	2.2	1,224	1,097.77	81.8	45,102
1,092.67	2.7	1,506	1,097.87	84.4	46,530
1,092.77	3.3	1,809	1,097.97	87.0	47,981
1,092.87	3.9	2,134	1,098.07	89.7	49,453
1,092.97	4.5	2,482	1,098.17	92.4	50,948
1,093.07	5.2	2,851	1,098.27	95.1	52,464
1,093.17	5.9	3,243	1,098.37	97.9	54,003
1,093.27	6.6	3,656	1,098.47	100.8	55,564
1,093.37	7.4	4,092	1,098.57	103.6	57,146
1,093.47	8.3	4,550	1,098.67	106.5	58,751
1,093.57	9.1	5,030	1,098.77	109.5	60,378
1,093.67	10.0	5,532	1,098.87	112.5	62,027
1,093.77	11.0	6,055	1,098.97	115.5	63,698
1,093.87	12.0	6,601	1,099.07	118.6	65,391
1,093.97	13.0	7,170	1,099.17	121.7	67,107
1,094.07	14.1	7,760	1,099.27	124.8	68,844
1,094.17	15.2	8,372	1,099.37	128.0	70,603
1,094.27	16.3	9,006	1,099.47	131.3	72,384
1,094.37	17.5	9,662	1,099.57	134.5	74,188
1,094.47	18.8	10,341	1,099.67	137.8	76,013
1,094.57	20.0	11,041	1,099.77	141.2	77,861
1,094.67	21.3	11,763	1,099.87	144.6	79,730
1,094.77	22.7	12,508	1,099.97	148.0	81,622
1,094.87	24.1	13,275	1,100.07	151.5	83,536
1,094.97	25.5	14,063	1,100.17	155.0	85,471
1,095.07	27.0	14,874	1,100.27	158.5	87,429
1,095.17	28.5	15,707	1,100.37	162.1	89,409
1,095.27	30.0	16,562	1,100.47	165.8	91,411
1,095.37	31.6	17,438	1,100.57	169.4	93,435
1,095.47	33.3	18,337	1,100.67	173.1	95,481
1,095.57	34.9	19,258	1,100.77	176.9	97,549
1,095.67	36.6	20,201	1,100.87	180.7	99,640
1,095.77	38.4	21,167	1,100.97	184.5	101,752
1,095.87	40.2	22,154	1,101.07	188.4	103,886
1,095.97	42.0	23,163	1,101.17	192.3	106,042
1,096.07	43.9	24,194	1,101.27	196.2	108,221
1,096.17	45.8	25,248	1,101.37	200.2	110,421
1,096.27	47.7	26,323	1,101.47	204.3	112,644
1,096.37	49.7	27,421	1,101.57	208.3	114,888
1,096.47	51.8	28,540	1,101.67	212.4	117,155
1,096.57	53.8	29,682	1,101.77	216.6	119,444
1,096.67	55.9	30,845	1,101.87	220.8	121,755
1,096.77	58.1	32,031	1,101.97	225.0	124,088
1,096.87	60.3	33,239			
1,096.97	62.5	34,469			
1,097.07	64.8	35,721			

Summary for Reach 3R: Outlet

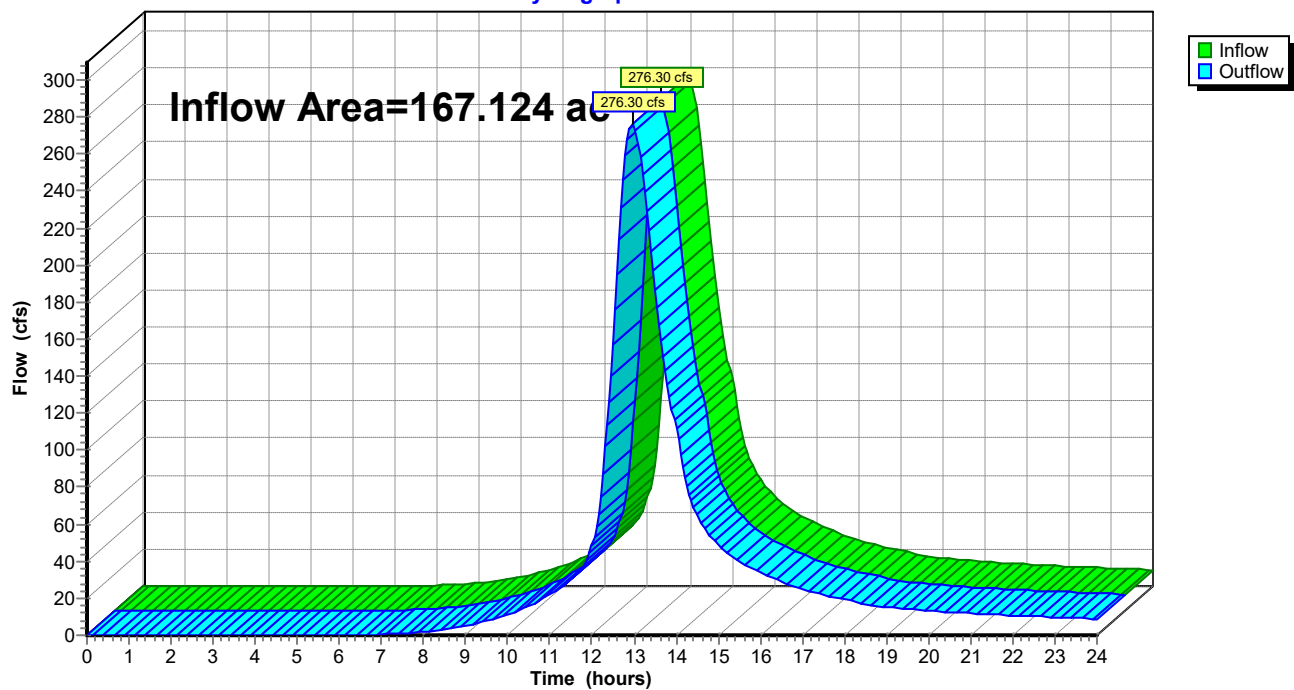
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 3.85" for 25-year event

Inflow = 276.30 cfs @ 12.96 hrs, Volume= 53.667 af

Outflow = 276.30 cfs @ 12.96 hrs, Volume= 53.667 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 3R: Outlet**Hydrograph**

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Type III 24-hr 25-year Rainfall=5.60"

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Summary for Pond W2: Wetland

[61] Hint: Exceeded Reach 1R outlet invert by 0.46' @ 12.95 hrs

[61] Hint: Exceeded Reach 2R outlet invert by 0.46' @ 12.95 hrs

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 3.88" for 25-year event
 Inflow = 309.93 cfs @ 12.75 hrs, Volume= 54.092 af
 Outflow = 276.30 cfs @ 12.96 hrs, Volume= 53.667 af, Atten= 11%, Lag= 13.0 min
 Primary = 276.30 cfs @ 12.96 hrs, Volume= 53.667 af
 Routed to Reach 3R : Outlet
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 3R : Outlet

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Starting Elev= 1,086.00' Storage= 1.521 af

Peak Elev= 1,087.82' @ 12.96 hrs Storage= 7.276 af (5.755 af above start)

Plug-Flow detention time= 42.9 min calculated for 52.038 af (96% of inflow)

Center-of-Mass det. time= 14.9 min (859.3 - 844.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,080.00'	21.341 af	Custom Stage Data Listed below

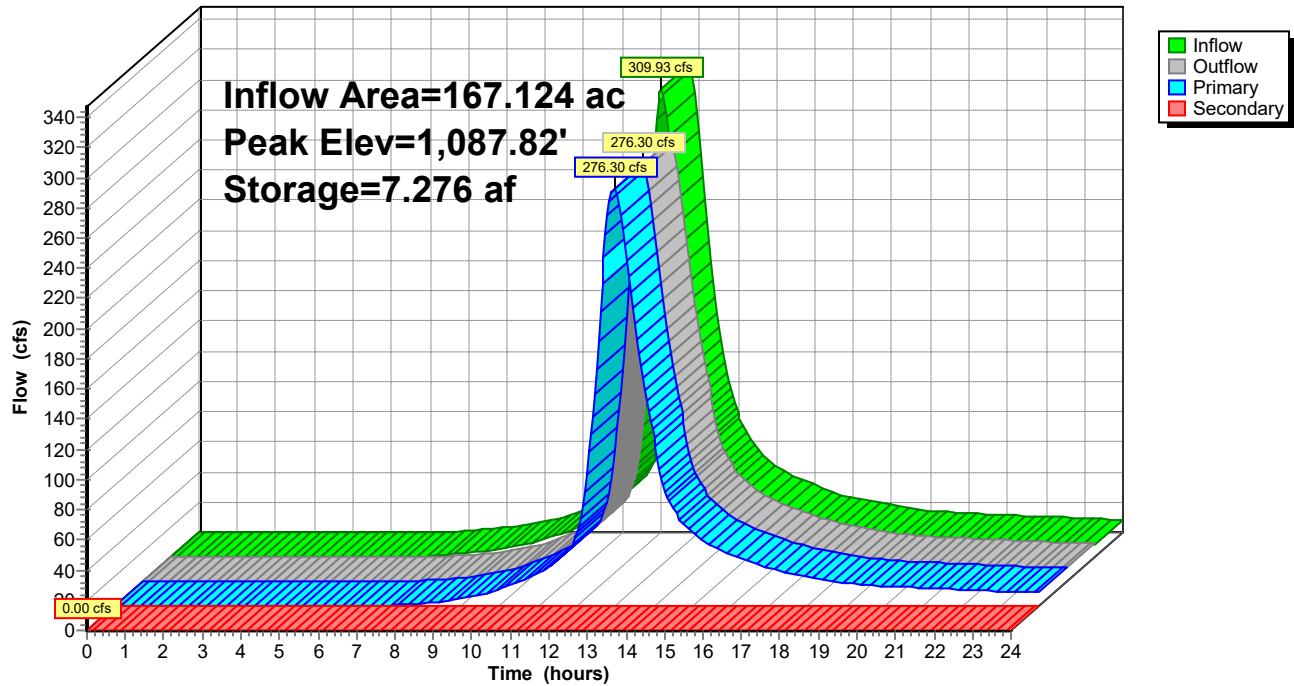
Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,080.00	0.000	0.000
1,081.00	0.006	0.006
1,082.00	0.014	0.020
1,083.00	0.056	0.076
1,084.00	0.112	0.188
1,085.00	0.216	0.404
1,086.00	1.117	1.521
1,087.00	2.159	3.680
1,088.00	4.386	8.066
1,089.00	5.834	13.900
1,090.00	7.441	21.341

Device	Routing	Invert	Outlet Devices
#1	Primary	1,086.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 1.00 2.00 3.00 4.00 Width (feet) 30.00 36.00 42.00 48.00 54.00
#2	Secondary	1,087.82'	20.0' long + 3.0 ' SideZ x 21.1' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=276.01 cfs @ 12.96 hrs HW=1,087.82' (Free Discharge)↑**1=Custom Weir/Orifice** (Weir Controls 276.01 cfs @ 4.28 fps)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=1,086.00' (Free Discharge)↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond W2: Wetland

Hydrograph



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Type III 24-hr 25-year Rainfall=5.60"

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Stage-Area-Storage for Pond W2: Wetland

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
1,080.00	0.000	1,085.20	0.627
1,080.10	0.001	1,085.30	0.739
1,080.20	0.001	1,085.40	0.851
1,080.30	0.002	1,085.50	0.962
1,080.40	0.002	1,085.60	1.074
1,080.50	0.003	1,085.70	1.186
1,080.60	0.004	1,085.80	1.298
1,080.70	0.004	1,085.90	1.409
1,080.80	0.005	1,086.00	1.521
1,080.90	0.005	1,086.10	1.737
1,081.00	0.006	1,086.20	1.953
1,081.10	0.007	1,086.30	2.169
1,081.20	0.009	1,086.40	2.385
1,081.30	0.010	1,086.50	2.600
1,081.40	0.012	1,086.60	2.816
1,081.50	0.013	1,086.70	3.032
1,081.60	0.014	1,086.80	3.248
1,081.70	0.016	1,086.90	3.464
1,081.80	0.017	1,087.00	3.680
1,081.90	0.019	1,087.10	4.119
1,082.00	0.020	1,087.20	4.557
1,082.10	0.026	1,087.30	4.996
1,082.20	0.031	1,087.40	5.434
1,082.30	0.037	1,087.50	5.873
1,082.40	0.042	1,087.60	6.312
1,082.50	0.048	1,087.70	6.750
1,082.60	0.054	1,087.80	7.189
1,082.70	0.059	1,087.90	7.627
1,082.80	0.065	1,088.00	8.066
1,082.90	0.070	1,088.10	8.649
1,083.00	0.076	1,088.20	9.233
1,083.10	0.087	1,088.30	9.816
1,083.20	0.098	1,088.40	10.400
1,083.30	0.110	1,088.50	10.983
1,083.40	0.121	1,088.60	11.566
1,083.50	0.132	1,088.70	12.150
1,083.60	0.143	1,088.80	12.733
1,083.70	0.154	1,088.90	13.317
1,083.80	0.166	1,089.00	13.900
1,083.90	0.177	1,089.10	14.644
1,084.00	0.188	1,089.20	15.388
1,084.10	0.210	1,089.30	16.132
1,084.20	0.231	1,089.40	16.876
1,084.30	0.253	1,089.50	17.620
1,084.40	0.274	1,089.60	18.365
1,084.50	0.296	1,089.70	19.109
1,084.60	0.318	1,089.80	19.853
1,084.70	0.339	1,089.90	20.597
1,084.80	0.361	1,090.00	21.341
1,084.90	0.382		
1,085.00	0.404		
1,085.10	0.516		

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Type III 24-hr 50-year Rainfall=6.50"

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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

Subcatchment 1S: Subcatchment 1 Runoff Area=39.962 ac 0.00% Impervious Runoff Depth>4.74"
Flow Length=2,114' Slope=0.0119 '/' Tc=44.9 min CN=85 Runoff=102.02 cfs 15.781 af

Subcatchment 2S: Subcatchment 2 Runoff Area=70.008 ac 0.00% Impervious Runoff Depth>4.72"
Flow Length=2,685' Slope=0.0092 '/' Tc=61.9 min CN=85 Runoff=149.38 cfs 27.556 af

Subcatchment 3S: Subcatchment 3 Runoff Area=34.170 ac 0.00% Impervious Runoff Depth>4.73"
Flow Length=3,170' Slope=0.0150 '/' Tc=55.4 min CN=85 Runoff=77.84 cfs 13.467 af

Subcatchment 4S: Subcatchment 4 Runoff Area=22.984 ac 0.00% Impervious Runoff Depth>4.73"
Flow Length=2,742' Slope=0.0150 '/' Tc=49.3 min CN=85 Runoff=55.87 cfs 9.069 af

Reach 1R: North Trib Avg. Flow Depth=2.23' Max Vel=5.24 fps Inflow=102.02 cfs 15.781 af
n=0.030 L=571.4' S=0.0088 '/' Capacity=206.85 cfs Outflow=101.57 cfs 15.760 af

Reach 2R: South Trib Avg. Flow Depth=2.92' Max Vel=6.11 fps Inflow=149.38 cfs 27.556 af
n=0.030 L=551.5' S=0.0084 '/' Capacity=2,885.27 cfs Outflow=148.97 cfs 27.525 af

Reach 3R: Outlet Inflow=338.32 cfs 65.351 af
Outflow=338.32 cfs 65.351 af

Pond W2: Wetland Peak Elev=1,088.04' Storage=8.288 af Inflow=374.82 cfs 65.820 af
Primary=332.60 cfs 65.181 af Secondary=5.73 cfs 0.170 af Outflow=338.32 cfs 65.351 af

Total Runoff Area = 167.124 ac Runoff Volume = 65.873 af Average Runoff Depth = 4.73"
100.00% Pervious = 167.124 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 50-year Rainfall=6.50"

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Summary for Subcatchment 1S: Subcatchment 1

Runoff = 102.02 cfs @ 12.60 hrs, Volume= 15.781 af, Depth> 4.74"
Routed to Reach 1R : North Trib

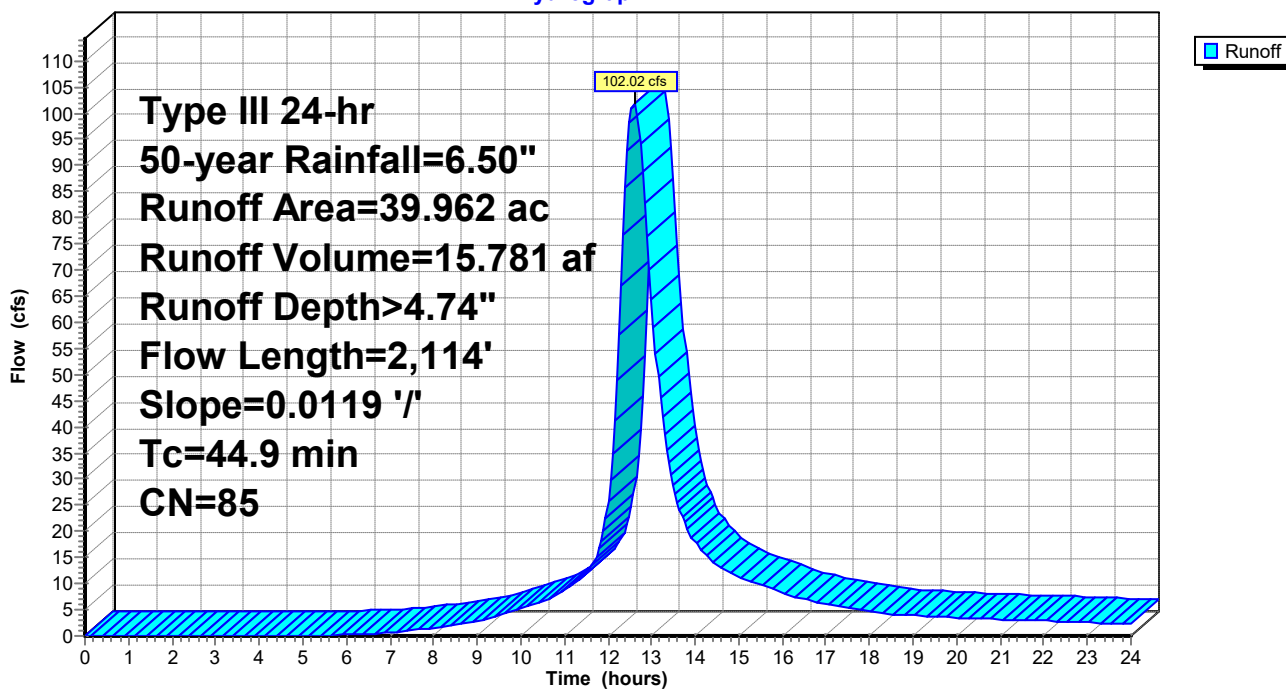
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Rainfall=6.50"

Area (ac)	CN	Description
* 39.962	85	Row crops, straight row, Good, HSG C
39.962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.9	2,114	0.0119	0.78		Lag/CN Method,

Subcatchment 1S: Subcatchment 1

Hydrograph



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Type III 24-hr 50-year Rainfall=6.50"

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Summary for Subcatchment 2S: Subcatchment 2

Runoff = 149.38 cfs @ 12.83 hrs, Volume= 27.556 af, Depth> 4.72"
Routed to Reach 2R : South Trib

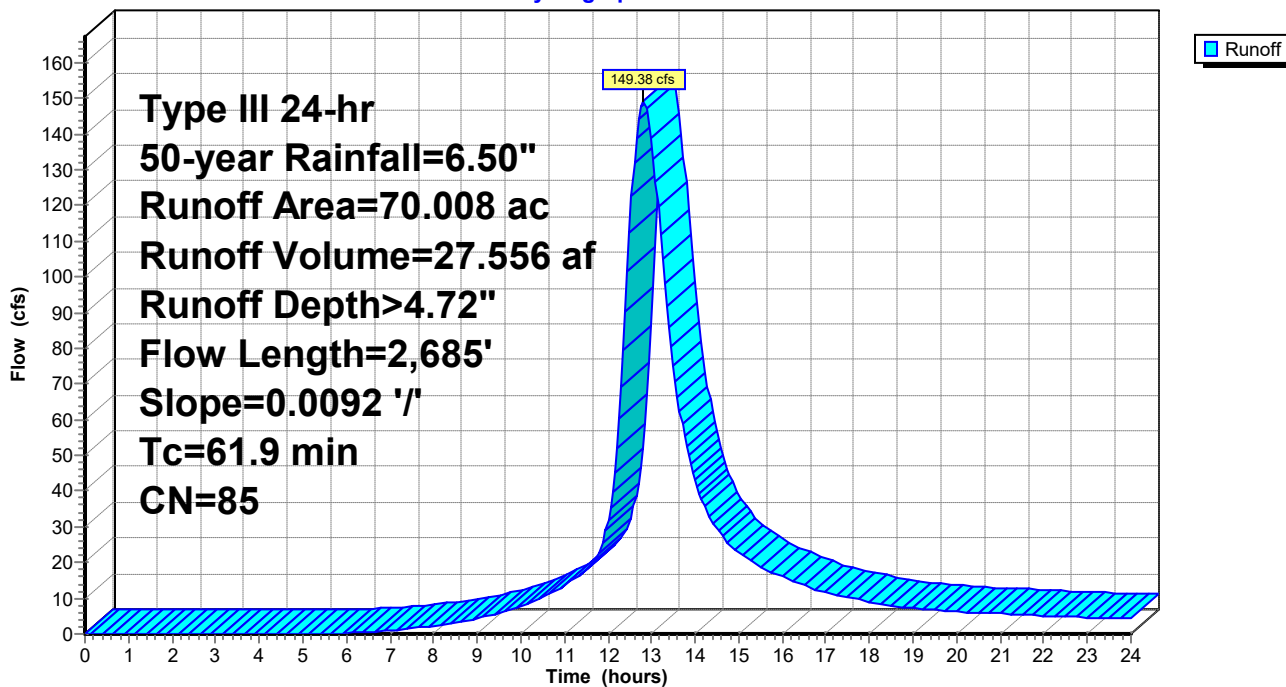
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Rainfall=6.50"

Area (ac)	CN	Description
70.008	85	Row crops, straight row, Good, HSG C
70.008		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.9	2,685	0.0092	0.72		Lag/CN Method,

Subcatchment 2S: Subcatchment 2

Hydrograph



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Type III 24-hr 50-year Rainfall=6.50"

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Summary for Subcatchment 3S: Subcatchment 3

Runoff = 77.84 cfs @ 12.74 hrs, Volume= 13.467 af, Depth> 4.73"
Routed to Pond W2 : Wetland

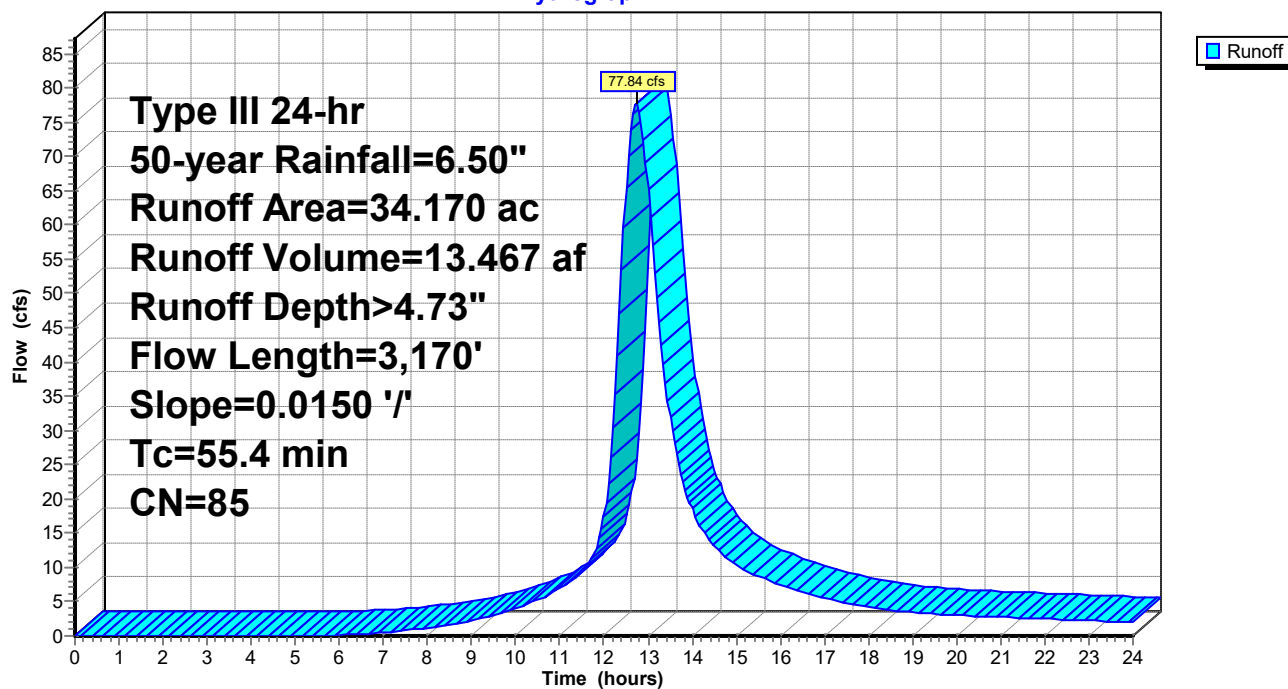
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Rainfall=6.50"

Area (ac)	CN	Description
34.170	85	Row crops, straight row, Good, HSG C
34.170		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.4	3,170	0.0150	0.95		Lag/CN Method,

Subcatchment 3S: Subcatchment 3

Hydrograph



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Type III 24-hr 50-year Rainfall=6.50"

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Summary for Subcatchment 4S: Subcatchment 4

Runoff = 55.87 cfs @ 12.65 hrs, Volume= 9.069 af, Depth> 4.73"
Routed to Pond W2 : Wetland

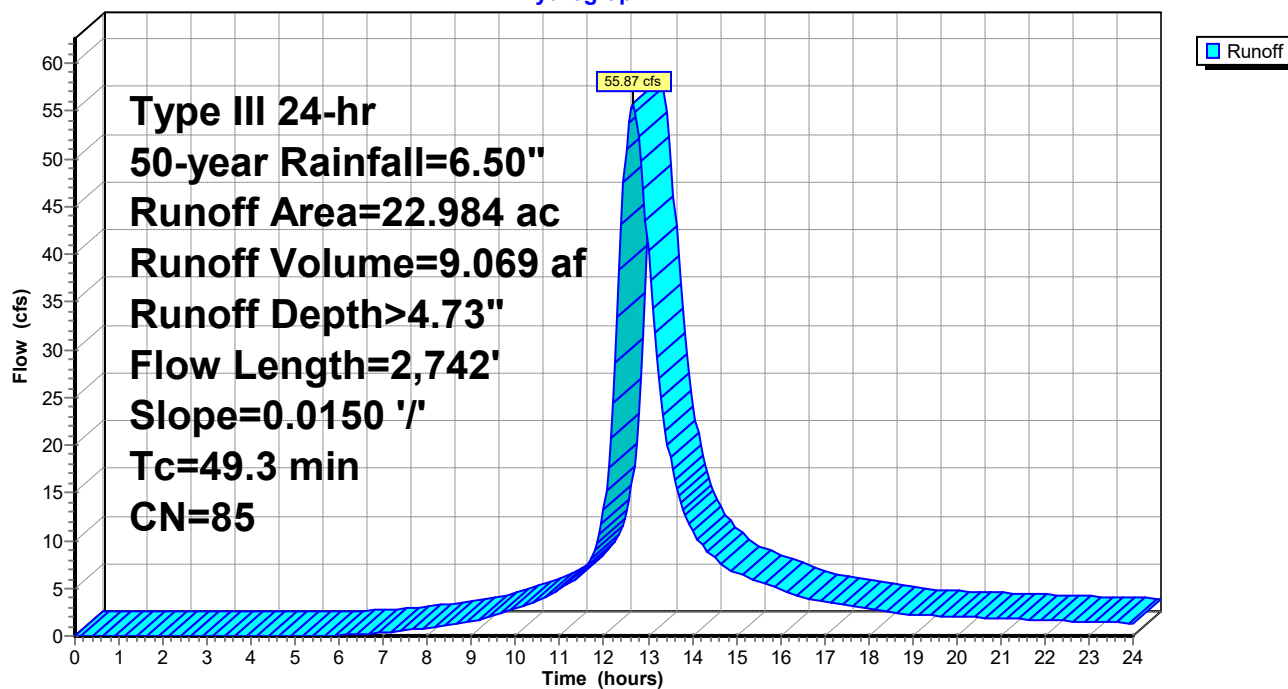
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Rainfall=6.50"

Area (ac)	CN	Description
22.984	85	Row crops, straight row, Good, HSG C
22.984		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
49.3	2,742	0.0150	0.93		Lag/CN Method,

Subcatchment 4S: Subcatchment 4

Hydrograph



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Type III 24-hr 50-year Rainfall=6.50"

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Summary for Reach 1R: North Trib

Inflow Area = 39.962 ac, 0.00% Impervious, Inflow Depth > 4.74" for 50-year event
Inflow = 102.02 cfs @ 12.60 hrs, Volume= 15.781 af
Outflow = 101.57 cfs @ 12.65 hrs, Volume= 15.760 af, Atten= 0%, Lag= 3.2 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.24 fps, Min. Travel Time= 1.8 min

Avg. Velocity = 2.40 fps, Avg. Travel Time= 4.0 min

Peak Storage= 11,091 cf @ 12.62 hrs

Average Depth at Peak Storage= 2.23' , Surface Width= 15.39'

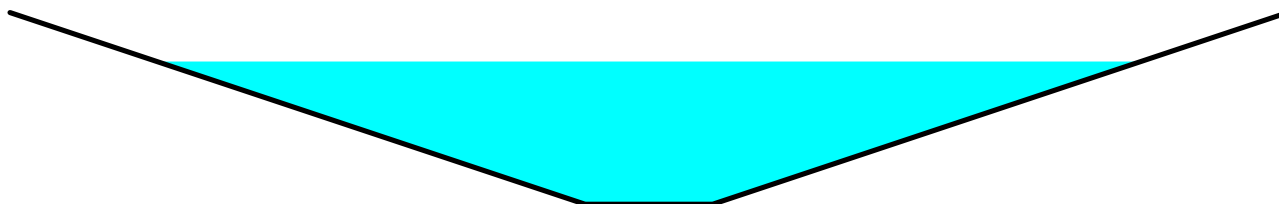
Bank-Full Depth= 3.00' Flow Area= 33.0 sf, Capacity= 206.85 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 3.0 '/' Top Width= 20.00'

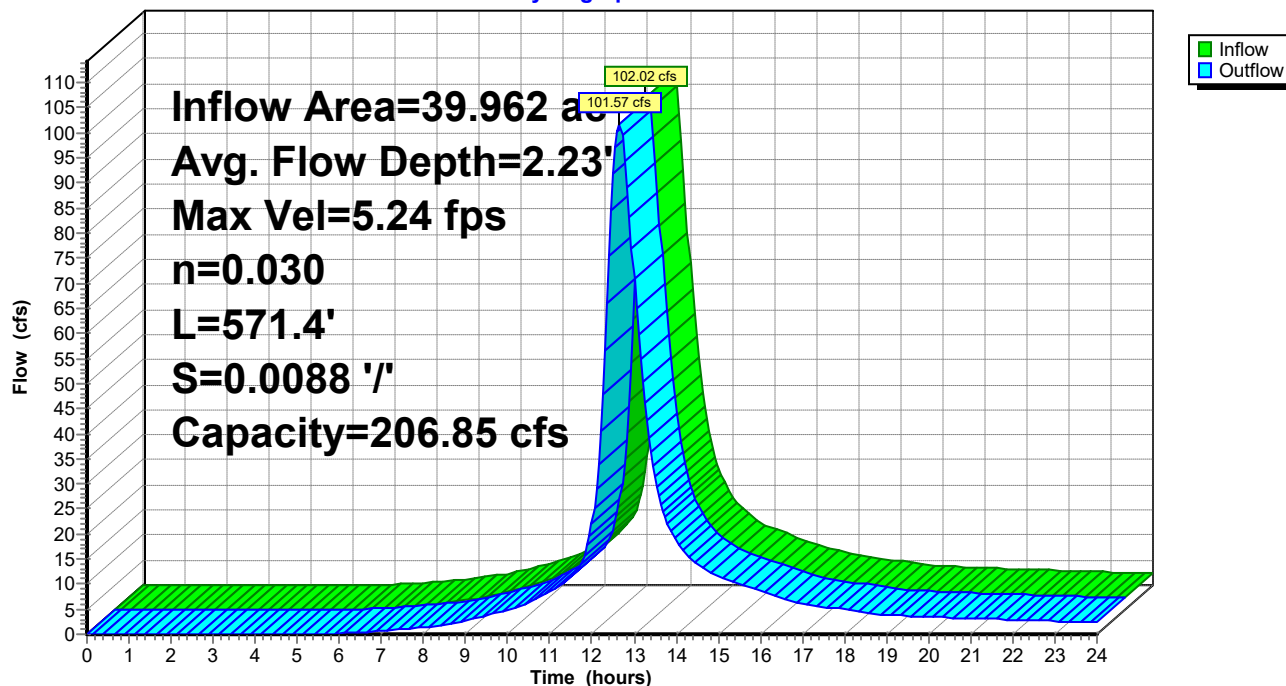
Length= 571.4' Slope= 0.0088 '/'

Inlet Invert= 1,092.36', Outlet Invert= 1,087.36'



Reach 1R: North Trib

Hydrograph



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Type III 24-hr 50-year Rainfall=6.50"

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Stage-Area-Storage for Reach 1R: North Trib

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,092.36	0.0	0	1,094.96	25.5	14,560
1,092.41	0.1	62	1,095.01	26.4	15,067
1,092.46	0.2	132	1,095.06	27.3	15,582
1,092.51	0.4	210	1,095.11	28.2	16,107
1,092.56	0.5	297	1,095.16	29.1	16,640
1,092.61	0.7	393	1,095.21	30.1	17,181
1,092.66	0.9	497	1,095.26	31.0	17,731
1,092.71	1.1	610	1,095.31	32.0	18,289
1,092.76	1.3	732	1,095.36	33.0	18,856
1,092.81	1.5	861			
1,092.86	1.8	1,000			
1,092.91	2.0	1,147			
1,092.96	2.3	1,303			
1,093.01	2.6	1,467			
1,093.06	2.9	1,640			
1,093.11	3.2	1,821			
1,093.16	3.5	2,012			
1,093.21	3.9	2,210			
1,093.26	4.2	2,417			
1,093.31	4.6	2,633			
1,093.36	5.0	2,857			
1,093.41	5.4	3,090			
1,093.46	5.8	3,332			
1,093.51	6.3	3,582			
1,093.56	6.7	3,840			
1,093.61	7.2	4,107			
1,093.66	7.7	4,383			
1,093.71	8.2	4,667			
1,093.76	8.7	4,960			
1,093.81	9.2	5,262			
1,093.86	9.8	5,571			
1,093.91	10.3	5,890			
1,093.96	10.9	6,217			
1,094.01	11.5	6,553			
1,094.06	12.1	6,897			
1,094.11	12.7	7,250			
1,094.16	13.3	7,611			
1,094.21	14.0	7,981			
1,094.26	14.6	8,360			
1,094.31	15.3	8,747			
1,094.36	16.0	9,143			
1,094.41	16.7	9,547			
1,094.46	17.4	9,960			
1,094.51	18.2	10,381			
1,094.56	18.9	10,811			
1,094.61	19.7	11,249			
1,094.66	20.5	11,697			
1,094.71	21.3	12,153			
1,094.76	22.1	12,617			
1,094.81	22.9	13,090			
1,094.86	23.8	13,571			
1,094.91	24.6	14,061			

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Type III 24-hr 50-year Rainfall=6.50"

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Summary for Reach 2R: South Trib

Inflow Area = 70.008 ac, 0.00% Impervious, Inflow Depth > 4.72" for 50-year event
Inflow = 149.38 cfs @ 12.83 hrs, Volume= 27.556 af
Outflow = 148.97 cfs @ 12.86 hrs, Volume= 27.525 af, Atten= 0%, Lag= 2.2 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 6.11 fps, Min. Travel Time= 1.5 min

Avg. Velocity = 2.92 fps, Avg. Travel Time= 3.2 min

Peak Storage= 13,465 cf @ 12.84 hrs

Average Depth at Peak Storage= 2.92', Surface Width= 14.20'

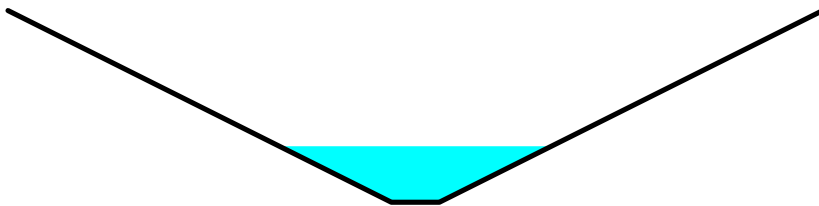
Bank-Full Depth= 10.00' Flow Area= 225.0 sf, Capacity= 2,885.27 cfs

2.50' x 10.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 2.0 '/' Top Width= 42.50'

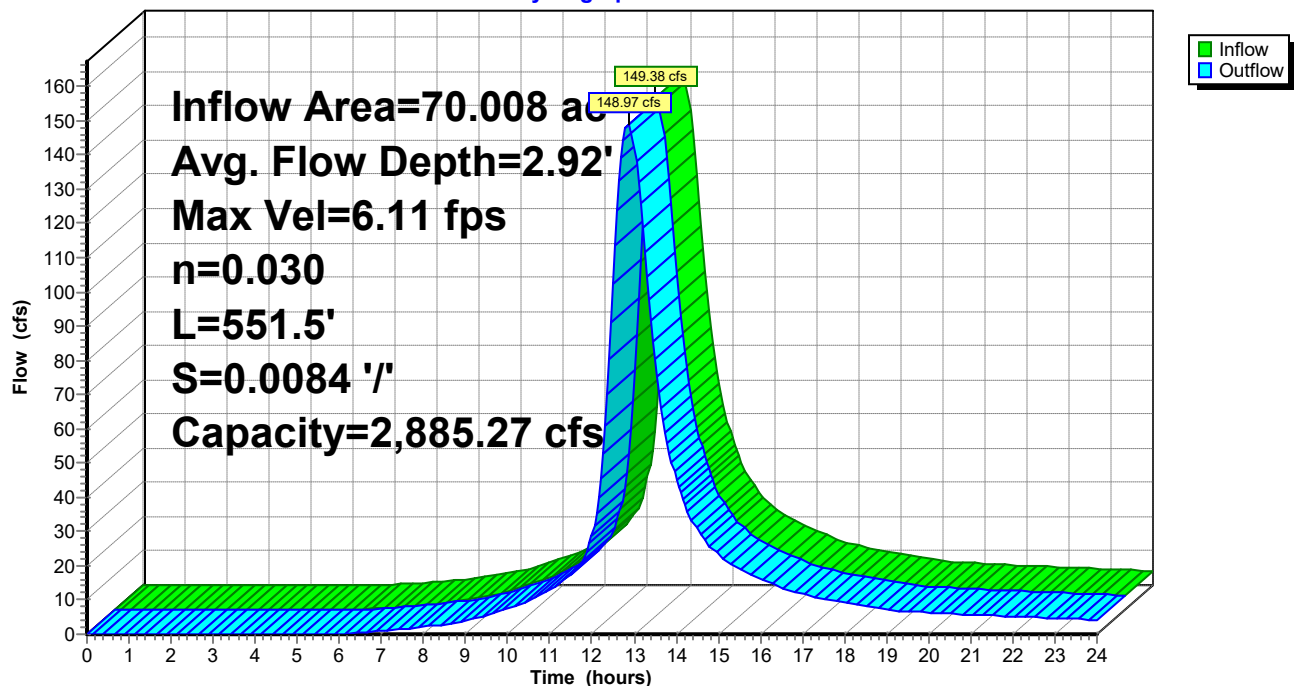
Length= 551.5' Slope= 0.0084 '/'

Inlet Invert= 1,091.97', Outlet Invert= 1,087.36'



Reach 2R: South Trib

Hydrograph



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Type III 24-hr 50-year Rainfall=6.50"

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Stage-Area-Storage for Reach 2R: South Trib

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,091.97	0.0	0	1,097.17	67.1	36,995
1,092.07	0.3	149	1,097.27	69.4	38,291
1,092.17	0.6	320	1,097.37	71.8	39,609
1,092.27	0.9	513	1,097.47	74.3	40,949
1,092.37	1.3	728	1,097.57	76.7	42,311
1,092.47	1.8	965	1,097.67	79.2	43,695
1,092.57	2.2	1,224	1,097.77	81.8	45,102
1,092.67	2.7	1,506	1,097.87	84.4	46,530
1,092.77	3.3	1,809	1,097.97	87.0	47,981
1,092.87	3.9	2,134	1,098.07	89.7	49,453
1,092.97	4.5	2,482	1,098.17	92.4	50,948
1,093.07	5.2	2,851	1,098.27	95.1	52,464
1,093.17	5.9	3,243	1,098.37	97.9	54,003
1,093.27	6.6	3,656	1,098.47	100.8	55,564
1,093.37	7.4	4,092	1,098.57	103.6	57,146
1,093.47	8.3	4,550	1,098.67	106.5	58,751
1,093.57	9.1	5,030	1,098.77	109.5	60,378
1,093.67	10.0	5,532	1,098.87	112.5	62,027
1,093.77	11.0	6,055	1,098.97	115.5	63,698
1,093.87	12.0	6,601	1,099.07	118.6	65,391
1,093.97	13.0	7,170	1,099.17	121.7	67,107
1,094.07	14.1	7,760	1,099.27	124.8	68,844
1,094.17	15.2	8,372	1,099.37	128.0	70,603
1,094.27	16.3	9,006	1,099.47	131.3	72,384
1,094.37	17.5	9,662	1,099.57	134.5	74,188
1,094.47	18.8	10,341	1,099.67	137.8	76,013
1,094.57	20.0	11,041	1,099.77	141.2	77,861
1,094.67	21.3	11,763	1,099.87	144.6	79,730
1,094.77	22.7	12,508	1,099.97	148.0	81,622
1,094.87	24.1	13,275	1,100.07	151.5	83,536
1,094.97	25.5	14,063	1,100.17	155.0	85,471
1,095.07	27.0	14,874	1,100.27	158.5	87,429
1,095.17	28.5	15,707	1,100.37	162.1	89,409
1,095.27	30.0	16,562	1,100.47	165.8	91,411
1,095.37	31.6	17,438	1,100.57	169.4	93,435
1,095.47	33.3	18,337	1,100.67	173.1	95,481
1,095.57	34.9	19,258	1,100.77	176.9	97,549
1,095.67	36.6	20,201	1,100.87	180.7	99,640
1,095.77	38.4	21,167	1,100.97	184.5	101,752
1,095.87	40.2	22,154	1,101.07	188.4	103,886
1,095.97	42.0	23,163	1,101.17	192.3	106,042
1,096.07	43.9	24,194	1,101.27	196.2	108,221
1,096.17	45.8	25,248	1,101.37	200.2	110,421
1,096.27	47.7	26,323	1,101.47	204.3	112,644
1,096.37	49.7	27,421	1,101.57	208.3	114,888
1,096.47	51.8	28,540	1,101.67	212.4	117,155
1,096.57	53.8	29,682	1,101.77	216.6	119,444
1,096.67	55.9	30,845	1,101.87	220.8	121,755
1,096.77	58.1	32,031	1,101.97	225.0	124,088
1,096.87	60.3	33,239			
1,096.97	62.5	34,469			
1,097.07	64.8	35,721			

Summary for Reach 3R: Outlet

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

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 4.69" for 50-year event

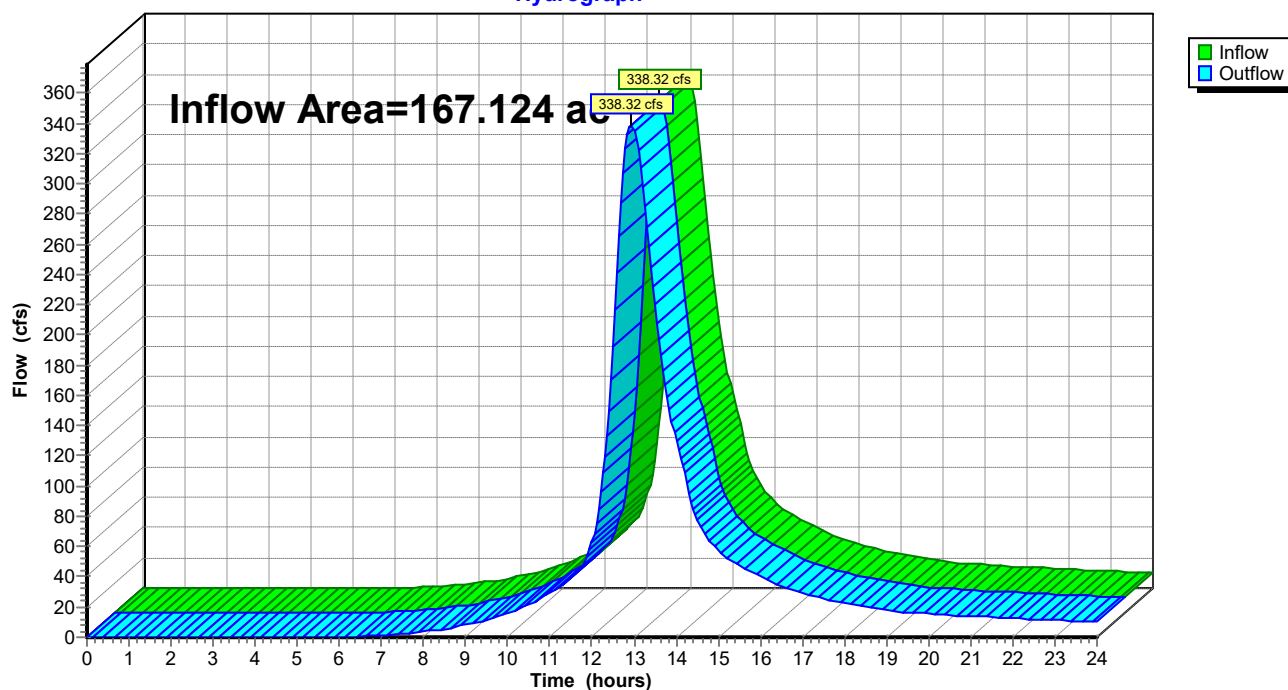
Inflow = 338.32 cfs @ 12.94 hrs, Volume= 65.351 af

Outflow = 338.32 cfs @ 12.94 hrs, Volume= 65.351 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 3R: Outlet

Hydrograph



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Type III 24-hr 50-year Rainfall=6.50"

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Summary for Pond W2: Wetland

[61] Hint: Exceeded Reach 1R outlet invert by 0.68' @ 12.95 hrs

[61] Hint: Exceeded Reach 2R outlet invert by 0.68' @ 12.95 hrs

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 4.73" for 50-year event
 Inflow = 374.82 cfs @ 12.74 hrs, Volume= 65.820 af
 Outflow = 338.32 cfs @ 12.94 hrs, Volume= 65.351 af, Atten= 10%, Lag= 12.2 min
 Primary = 332.60 cfs @ 12.94 hrs, Volume= 65.181 af
 Routed to Reach 3R : Outlet
 Secondary = 5.73 cfs @ 12.94 hrs, Volume= 0.170 af
 Routed to Reach 3R : Outlet

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Starting Elev= 1,086.00' Storage= 1.521 af

Peak Elev= 1,088.04' @ 12.94 hrs Storage= 8.288 af (6.767 af above start)

Plug-Flow detention time= 39.0 min calculated for 63.697 af (97% of inflow)

Center-of-Mass det. time= 14.5 min (853.5 - 839.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,080.00'	21.341 af	Custom Stage Data Listed below

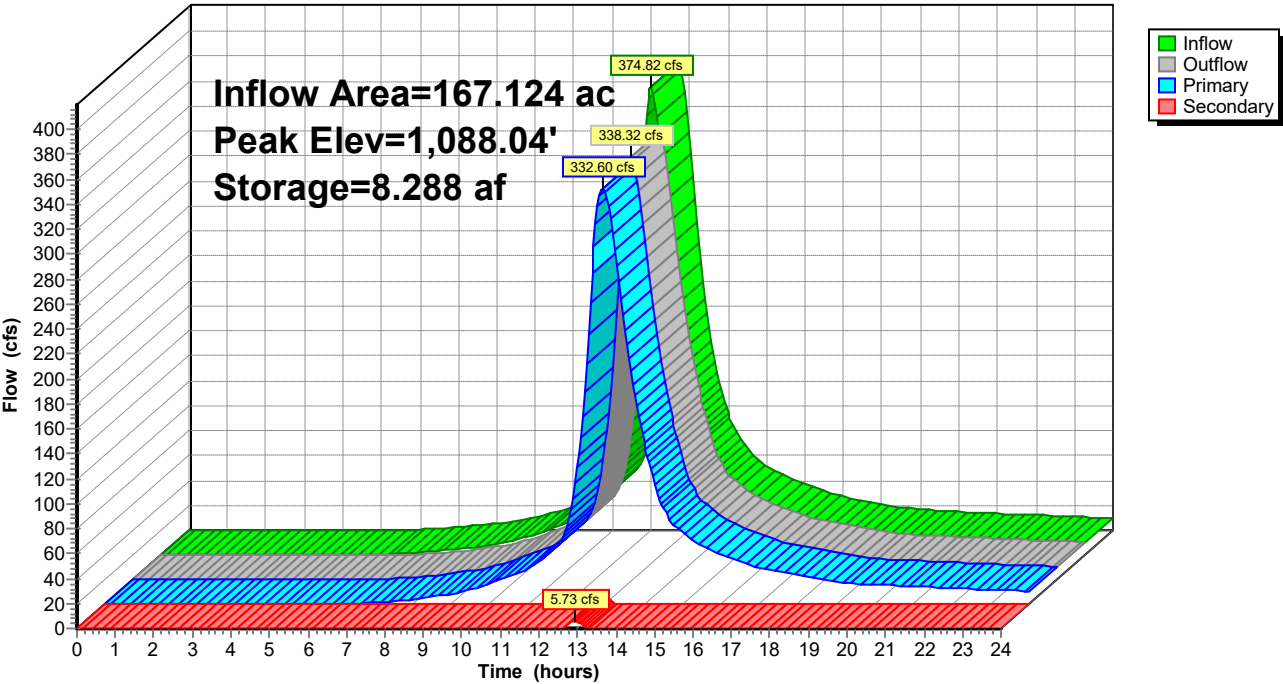
Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,080.00	0.000	0.000
1,081.00	0.006	0.006
1,082.00	0.014	0.020
1,083.00	0.056	0.076
1,084.00	0.112	0.188
1,085.00	0.216	0.404
1,086.00	1.117	1.521
1,087.00	2.159	3.680
1,088.00	4.386	8.066
1,089.00	5.834	13.900
1,090.00	7.441	21.341

Device	Routing	Invert	Outlet Devices
#1	Primary	1,086.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 1.00 2.00 3.00 4.00 Width (feet) 30.00 36.00 42.00 48.00 54.00
#2	Secondary	1,087.82'	20.0' long + 3.0 ' SideZ x 21.1' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=332.31 cfs @ 12.94 hrs HW=1,088.04' (Free Discharge)↑**1=Custom Weir/Orifice** (Weir Controls 332.31 cfs @ 4.52 fps)**Secondary OutFlow** Max=5.58 cfs @ 12.94 hrs HW=1,088.04' (Free Discharge)↑**2=Broad-Crested Rectangular Weir** (Weir Controls 5.58 cfs @ 1.24 fps)

Pond W2: Wetland

Hydrograph



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Type III 24-hr 50-year Rainfall=6.50"

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Stage-Area-Storage for Pond W2: Wetland

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
1,080.00	0.000	1,085.20	0.627
1,080.10	0.001	1,085.30	0.739
1,080.20	0.001	1,085.40	0.851
1,080.30	0.002	1,085.50	0.962
1,080.40	0.002	1,085.60	1.074
1,080.50	0.003	1,085.70	1.186
1,080.60	0.004	1,085.80	1.298
1,080.70	0.004	1,085.90	1.409
1,080.80	0.005	1,086.00	1.521
1,080.90	0.005	1,086.10	1.737
1,081.00	0.006	1,086.20	1.953
1,081.10	0.007	1,086.30	2.169
1,081.20	0.009	1,086.40	2.385
1,081.30	0.010	1,086.50	2.600
1,081.40	0.012	1,086.60	2.816
1,081.50	0.013	1,086.70	3.032
1,081.60	0.014	1,086.80	3.248
1,081.70	0.016	1,086.90	3.464
1,081.80	0.017	1,087.00	3.680
1,081.90	0.019	1,087.10	4.119
1,082.00	0.020	1,087.20	4.557
1,082.10	0.026	1,087.30	4.996
1,082.20	0.031	1,087.40	5.434
1,082.30	0.037	1,087.50	5.873
1,082.40	0.042	1,087.60	6.312
1,082.50	0.048	1,087.70	6.750
1,082.60	0.054	1,087.80	7.189
1,082.70	0.059	1,087.90	7.627
1,082.80	0.065	1,088.00	8.066
1,082.90	0.070	1,088.10	8.649
1,083.00	0.076	1,088.20	9.233
1,083.10	0.087	1,088.30	9.816
1,083.20	0.098	1,088.40	10.400
1,083.30	0.110	1,088.50	10.983
1,083.40	0.121	1,088.60	11.566
1,083.50	0.132	1,088.70	12.150
1,083.60	0.143	1,088.80	12.733
1,083.70	0.154	1,088.90	13.317
1,083.80	0.166	1,089.00	13.900
1,083.90	0.177	1,089.10	14.644
1,084.00	0.188	1,089.20	15.388
1,084.10	0.210	1,089.30	16.132
1,084.20	0.231	1,089.40	16.876
1,084.30	0.253	1,089.50	17.620
1,084.40	0.274	1,089.60	18.365
1,084.50	0.296	1,089.70	19.109
1,084.60	0.318	1,089.80	19.853
1,084.70	0.339	1,089.90	20.597
1,084.80	0.361	1,090.00	21.341
1,084.90	0.382		
1,085.00	0.404		
1,085.10	0.516		

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Type III 24-hr 100-year Rainfall=7.50"

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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

Subcatchment 1S: Subcatchment 1 Runoff Area=39.962 ac 0.00% Impervious Runoff Depth>5.69"
Flow Length=2,114' Slope=0.0119 '/' Tc=44.9 min CN=85 Runoff=121.56 cfs 18.944 af

Subcatchment 2S: Subcatchment 2 Runoff Area=70.008 ac 0.00% Impervious Runoff Depth>5.67"
Flow Length=2,685' Slope=0.0092 '/' Tc=61.9 min CN=85 Runoff=177.94 cfs 33.081 af

Subcatchment 3S: Subcatchment 3 Runoff Area=34.170 ac 0.00% Impervious Runoff Depth>5.68"
Flow Length=3,170' Slope=0.0150 '/' Tc=55.4 min CN=85 Runoff=92.79 cfs 16.166 af

Subcatchment 4S: Subcatchment 4 Runoff Area=22.984 ac 0.00% Impervious Runoff Depth>5.68"
Flow Length=2,742' Slope=0.0150 '/' Tc=49.3 min CN=85 Runoff=66.59 cfs 10.887 af

Reach 1R: North Trib Avg. Flow Depth=2.40' Max Vel=5.48 fps Inflow=121.56 cfs 18.944 af
n=0.030 L=571.4' S=0.0088 '/' Capacity=206.85 cfs Outflow=121.05 cfs 18.920 af

Reach 2R: South Trib Avg. Flow Depth=3.16' Max Vel=6.39 fps Inflow=177.94 cfs 33.081 af
n=0.030 L=551.5' S=0.0084 '/' Capacity=2,885.27 cfs Outflow=177.61 cfs 33.046 af

Reach 3R: Outlet Inflow=403.69 cfs 78.501 af
Outflow=403.69 cfs 78.501 af

Pond W2: Wetland Peak Elev=1,088.24' Storage=9.460 af Inflow=446.91 cfs 79.019 af
Primary=388.23 cfs 77.868 af Secondary=15.47 cfs 0.633 af Outflow=403.69 cfs 78.501 af

Total Runoff Area = 167.124 ac Runoff Volume = 79.078 af Average Runoff Depth = 5.68"
100.00% Pervious = 167.124 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 100-year Rainfall=7.50"

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Summary for Subcatchment 1S: Subcatchment 1

Runoff = 121.56 cfs @ 12.60 hrs, Volume= 18.944 af, Depth> 5.69"
Routed to Reach 1R : North Trib

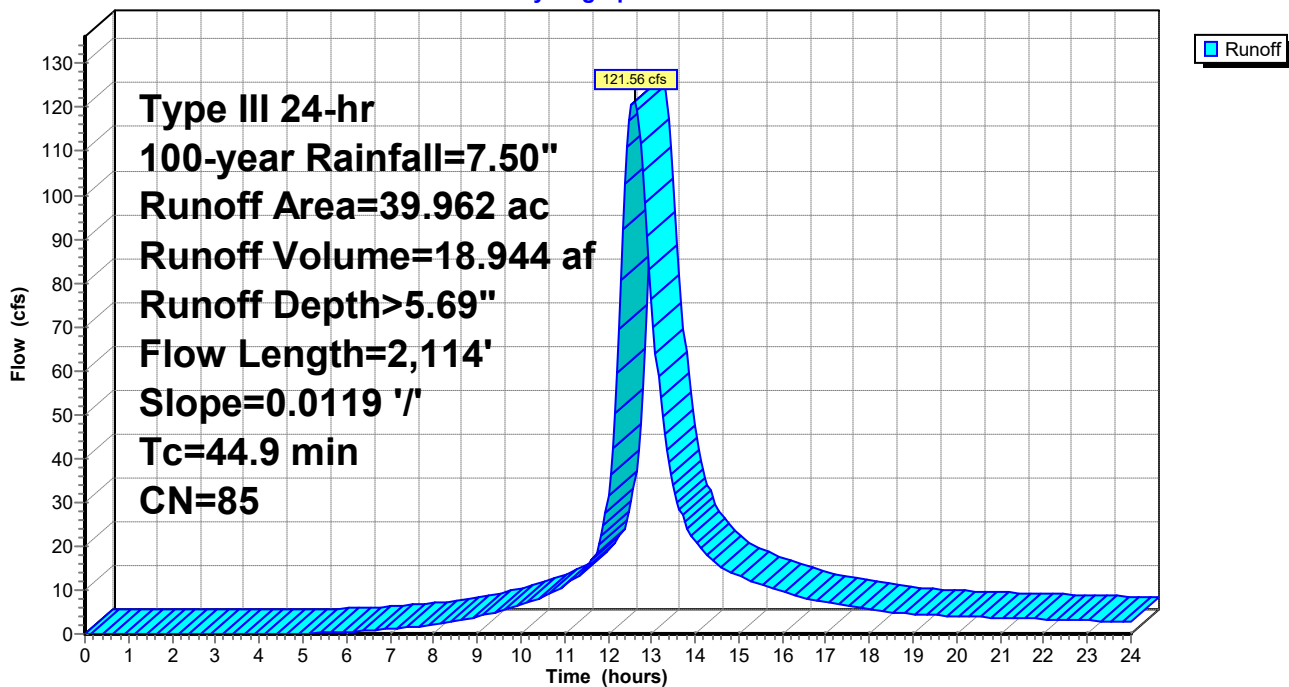
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.50"

Area (ac)	CN	Description
* 39.962	85	Row crops, straight row, Good, HSG C
39.962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.9	2,114	0.0119	0.78		Lag/CN Method,

Subcatchment 1S: Subcatchment 1

Hydrograph



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Type III 24-hr 100-year Rainfall=7.50"

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Summary for Subcatchment 2S: Subcatchment 2

Runoff = 177.94 cfs @ 12.82 hrs, Volume= 33.081 af, Depth> 5.67"
Routed to Reach 2R : South Trib

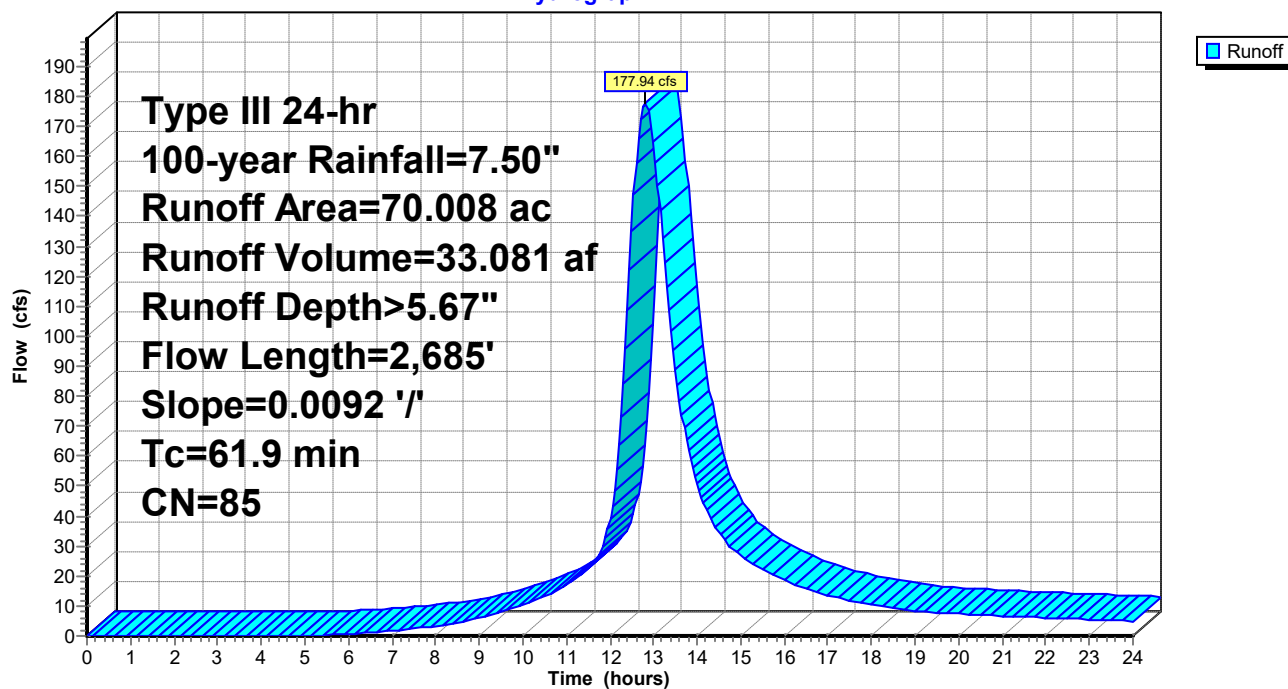
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.50"

Area (ac)	CN	Description
70.008	85	Row crops, straight row, Good, HSG C
70.008		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.9	2,685	0.0092	0.72		Lag/CN Method,

Subcatchment 2S: Subcatchment 2

Hydrograph



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Type III 24-hr 100-year Rainfall=7.50"

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Summary for Subcatchment 3S: Subcatchment 3

Runoff = 92.79 cfs @ 12.73 hrs, Volume= 16.166 af, Depth> 5.68"
Routed to Pond W2 : Wetland

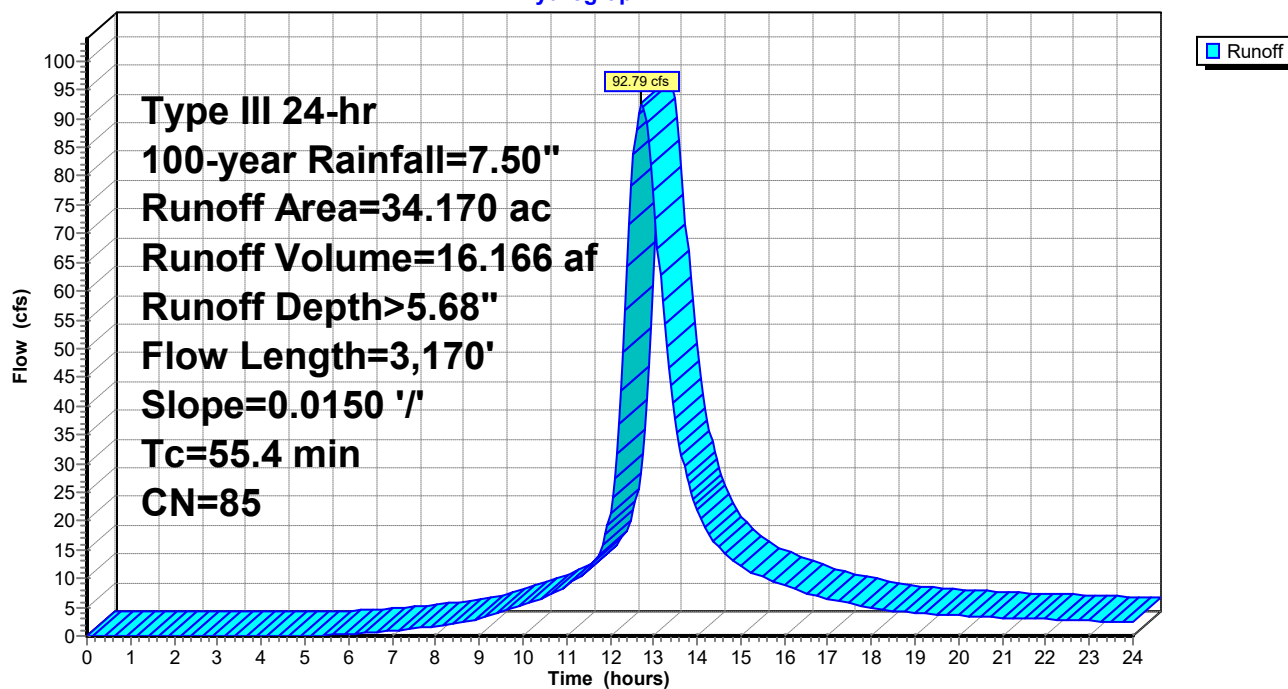
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.50"

Area (ac)	CN	Description
34.170	85	Row crops, straight row, Good, HSG C
34.170		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.4	3,170	0.0150	0.95		Lag/CN Method,

Subcatchment 3S: Subcatchment 3

Hydrograph



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Type III 24-hr 100-year Rainfall=7.50"

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Summary for Subcatchment 4S: Subcatchment 4

Runoff = 66.59 cfs @ 12.65 hrs, Volume= 10.887 af, Depth> 5.68"
Routed to Pond W2 : Wetland

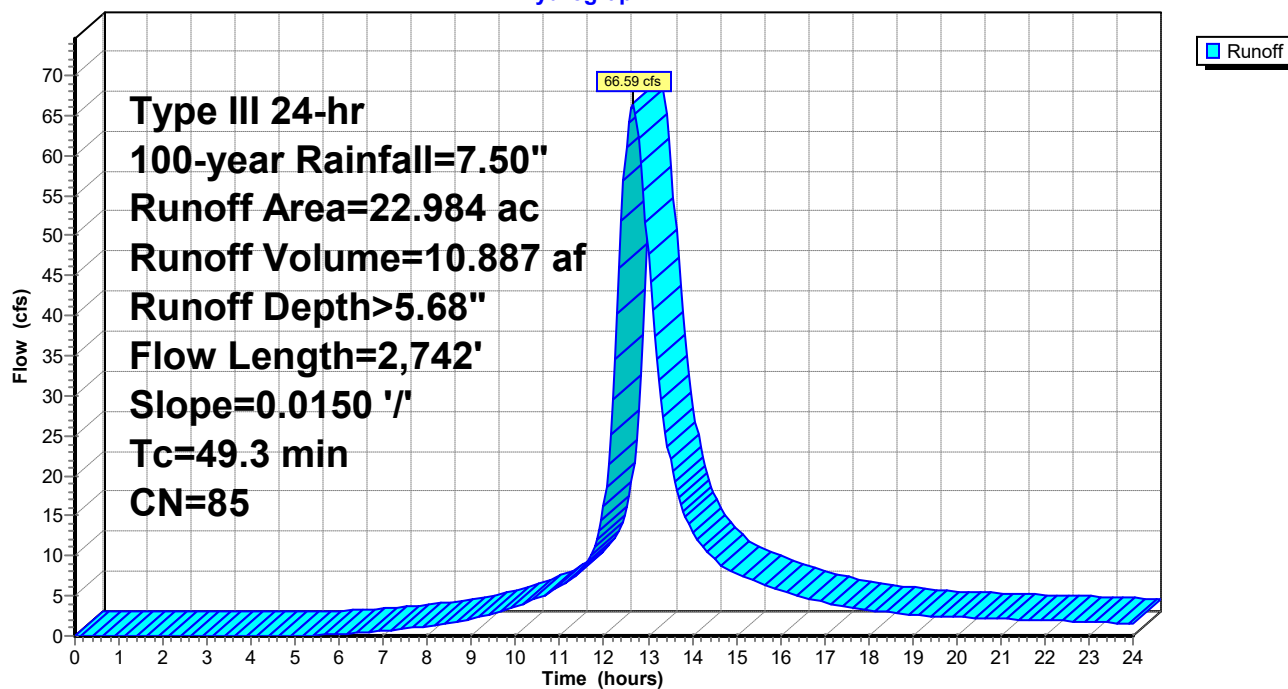
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.50"

Area (ac)	CN	Description
22.984	85	Row crops, straight row, Good, HSG C
22.984		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
49.3	2,742	0.0150	0.93		Lag/CN Method,

Subcatchment 4S: Subcatchment 4

Hydrograph



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Type III 24-hr 100-year Rainfall=7.50"

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Summary for Reach 1R: North Trib

Inflow Area = 39.962 ac, 0.00% Impervious, Inflow Depth > 5.69" for 100-year event
Inflow = 121.56 cfs @ 12.60 hrs, Volume= 18.944 af
Outflow = 121.05 cfs @ 12.65 hrs, Volume= 18.920 af, Atten= 0%, Lag= 3.1 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.48 fps, Min. Travel Time= 1.7 min

Avg. Velocity = 2.50 fps, Avg. Travel Time= 3.8 min

Peak Storage= 12,647 cf @ 12.62 hrs

Average Depth at Peak Storage= 2.40' , Surface Width= 16.42'

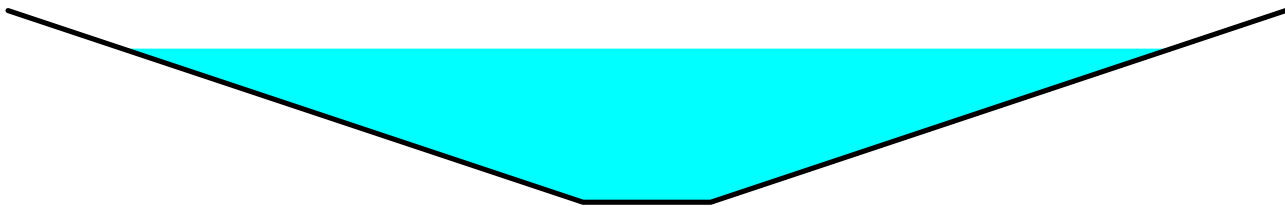
Bank-Full Depth= 3.00' Flow Area= 33.0 sf, Capacity= 206.85 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 3.0 '/' Top Width= 20.00'

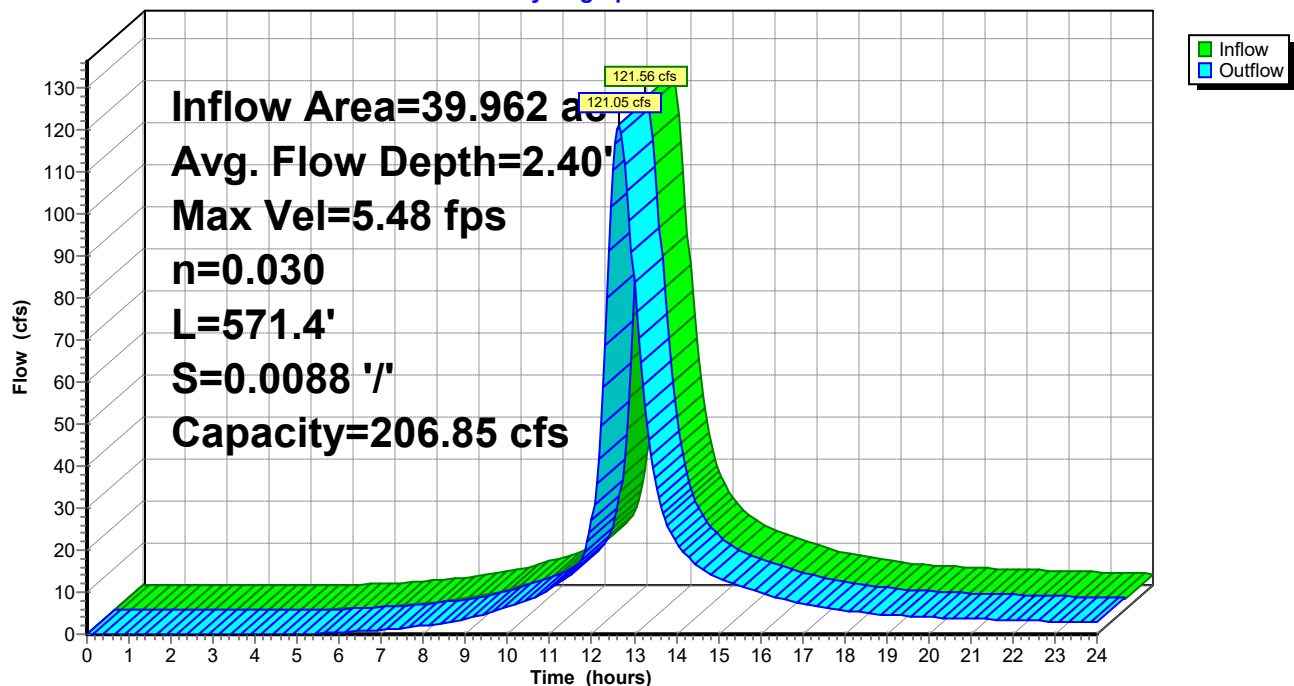
Length= 571.4' Slope= 0.0088 '/'

Inlet Invert= 1,092.36', Outlet Invert= 1,087.36'



Reach 1R: North Trib

Hydrograph



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Type III 24-hr 100-year Rainfall=7.50"

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Stage-Area-Storage for Reach 1R: North Trib

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,092.36	0.0	0	1,094.96	25.5	14,560
1,092.41	0.1	62	1,095.01	26.4	15,067
1,092.46	0.2	132	1,095.06	27.3	15,582
1,092.51	0.4	210	1,095.11	28.2	16,107
1,092.56	0.5	297	1,095.16	29.1	16,640
1,092.61	0.7	393	1,095.21	30.1	17,181
1,092.66	0.9	497	1,095.26	31.0	17,731
1,092.71	1.1	610	1,095.31	32.0	18,289
1,092.76	1.3	732	1,095.36	33.0	18,856
1,092.81	1.5	861			
1,092.86	1.8	1,000			
1,092.91	2.0	1,147			
1,092.96	2.3	1,303			
1,093.01	2.6	1,467			
1,093.06	2.9	1,640			
1,093.11	3.2	1,821			
1,093.16	3.5	2,012			
1,093.21	3.9	2,210			
1,093.26	4.2	2,417			
1,093.31	4.6	2,633			
1,093.36	5.0	2,857			
1,093.41	5.4	3,090			
1,093.46	5.8	3,332			
1,093.51	6.3	3,582			
1,093.56	6.7	3,840			
1,093.61	7.2	4,107			
1,093.66	7.7	4,383			
1,093.71	8.2	4,667			
1,093.76	8.7	4,960			
1,093.81	9.2	5,262			
1,093.86	9.8	5,571			
1,093.91	10.3	5,890			
1,093.96	10.9	6,217			
1,094.01	11.5	6,553			
1,094.06	12.1	6,897			
1,094.11	12.7	7,250			
1,094.16	13.3	7,611			
1,094.21	14.0	7,981			
1,094.26	14.6	8,360			
1,094.31	15.3	8,747			
1,094.36	16.0	9,143			
1,094.41	16.7	9,547			
1,094.46	17.4	9,960			
1,094.51	18.2	10,381			
1,094.56	18.9	10,811			
1,094.61	19.7	11,249			
1,094.66	20.5	11,697			
1,094.71	21.3	12,153			
1,094.76	22.1	12,617			
1,094.81	22.9	13,090			
1,094.86	23.8	13,571			
1,094.91	24.6	14,061			

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Type III 24-hr 100-year Rainfall=7.50"

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Summary for Reach 2R: South Trib

Inflow Area = 70.008 ac, 0.00% Impervious, Inflow Depth > 5.67" for 100-year event
Inflow = 177.94 cfs @ 12.82 hrs, Volume= 33.081 af
Outflow = 177.61 cfs @ 12.86 hrs, Volume= 33.046 af, Atten= 0%, Lag= 2.2 min
Routed to Pond W2 : Wetland

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 6.39 fps, Min. Travel Time= 1.4 min

Avg. Velocity= 3.04 fps, Avg. Travel Time= 3.0 min

Peak Storage= 15,357 cf @ 12.83 hrs

Average Depth at Peak Storage= 3.16' , Surface Width= 15.13'

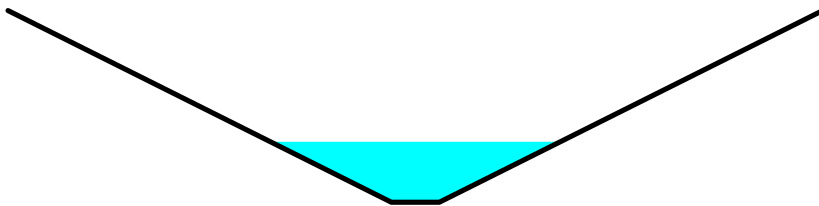
Bank-Full Depth= 10.00' Flow Area= 225.0 sf, Capacity= 2,885.27 cfs

2.50' x 10.00' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 2.0 '/' Top Width= 42.50'

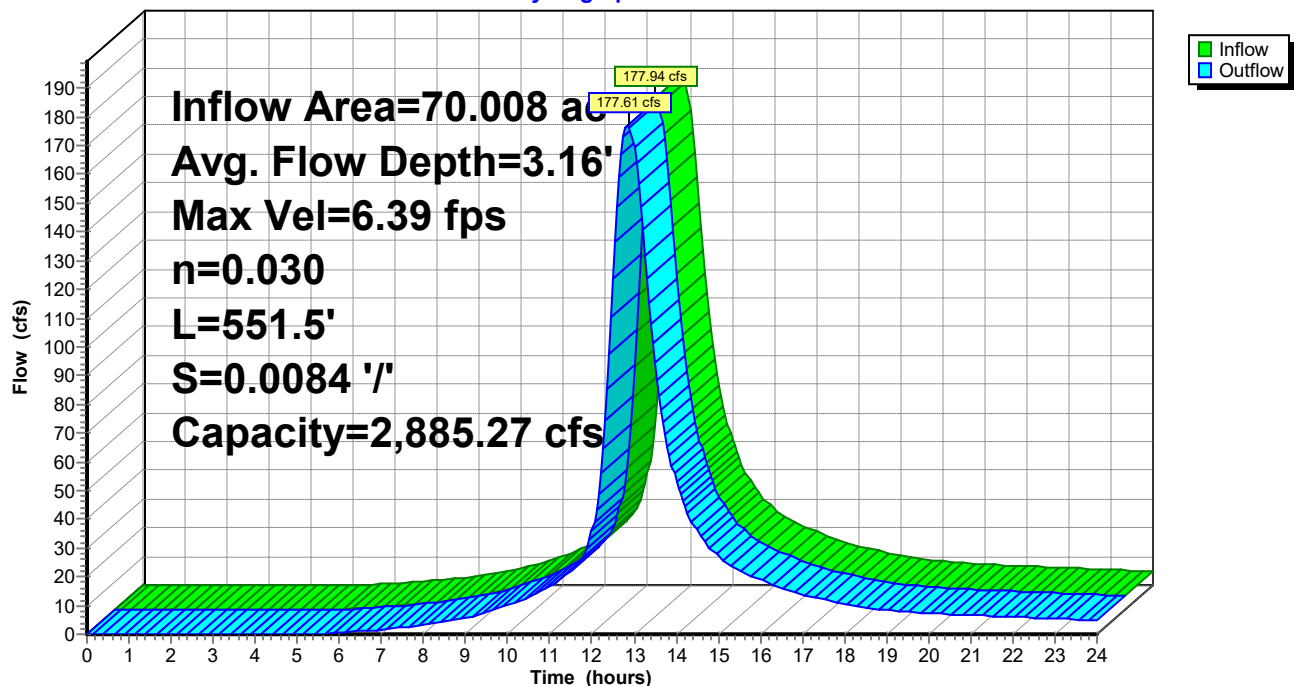
Length= 551.5' Slope= 0.0084 '/'

Inlet Invert= 1,091.97', Outlet Invert= 1,087.36'



Reach 2R: South Trib

Hydrograph



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Type III 24-hr 100-year Rainfall=7.50"

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Stage-Area-Storage for Reach 2R: South Trib

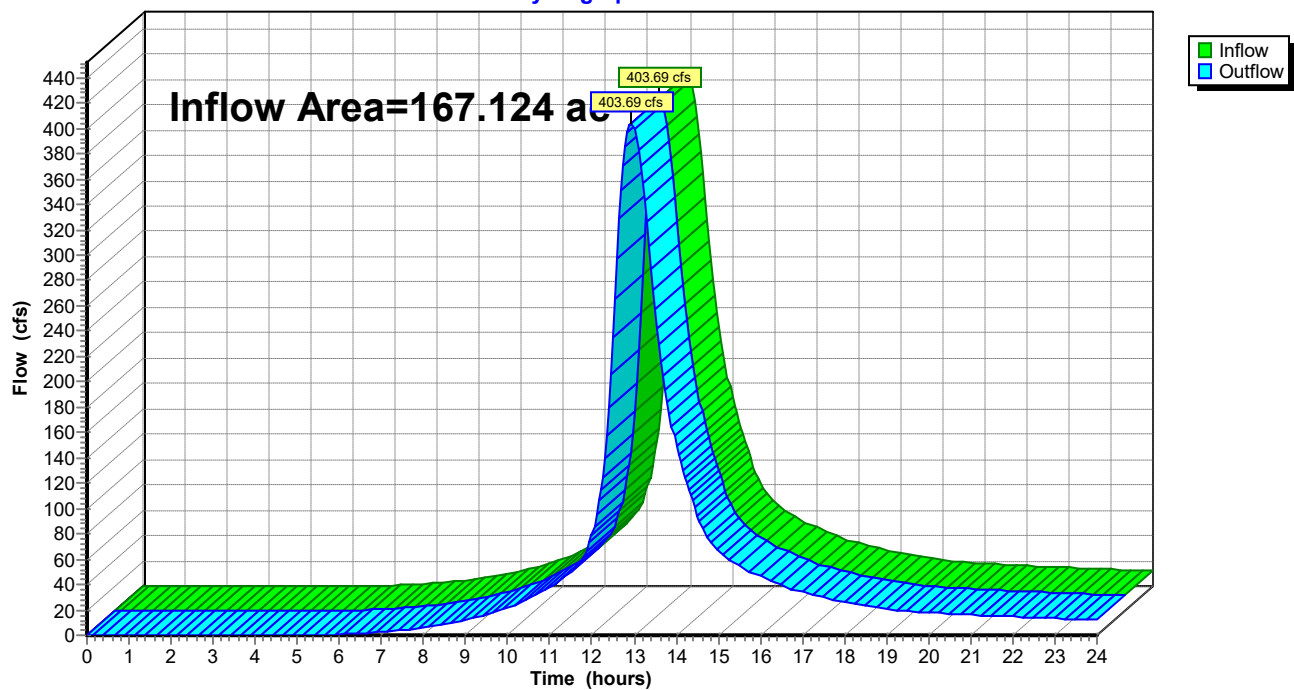
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
1,091.97	0.0	0	1,097.17	67.1	36,995
1,092.07	0.3	149	1,097.27	69.4	38,291
1,092.17	0.6	320	1,097.37	71.8	39,609
1,092.27	0.9	513	1,097.47	74.3	40,949
1,092.37	1.3	728	1,097.57	76.7	42,311
1,092.47	1.8	965	1,097.67	79.2	43,695
1,092.57	2.2	1,224	1,097.77	81.8	45,102
1,092.67	2.7	1,506	1,097.87	84.4	46,530
1,092.77	3.3	1,809	1,097.97	87.0	47,981
1,092.87	3.9	2,134	1,098.07	89.7	49,453
1,092.97	4.5	2,482	1,098.17	92.4	50,948
1,093.07	5.2	2,851	1,098.27	95.1	52,464
1,093.17	5.9	3,243	1,098.37	97.9	54,003
1,093.27	6.6	3,656	1,098.47	100.8	55,564
1,093.37	7.4	4,092	1,098.57	103.6	57,146
1,093.47	8.3	4,550	1,098.67	106.5	58,751
1,093.57	9.1	5,030	1,098.77	109.5	60,378
1,093.67	10.0	5,532	1,098.87	112.5	62,027
1,093.77	11.0	6,055	1,098.97	115.5	63,698
1,093.87	12.0	6,601	1,099.07	118.6	65,391
1,093.97	13.0	7,170	1,099.17	121.7	67,107
1,094.07	14.1	7,760	1,099.27	124.8	68,844
1,094.17	15.2	8,372	1,099.37	128.0	70,603
1,094.27	16.3	9,006	1,099.47	131.3	72,384
1,094.37	17.5	9,662	1,099.57	134.5	74,188
1,094.47	18.8	10,341	1,099.67	137.8	76,013
1,094.57	20.0	11,041	1,099.77	141.2	77,861
1,094.67	21.3	11,763	1,099.87	144.6	79,730
1,094.77	22.7	12,508	1,099.97	148.0	81,622
1,094.87	24.1	13,275	1,100.07	151.5	83,536
1,094.97	25.5	14,063	1,100.17	155.0	85,471
1,095.07	27.0	14,874	1,100.27	158.5	87,429
1,095.17	28.5	15,707	1,100.37	162.1	89,409
1,095.27	30.0	16,562	1,100.47	165.8	91,411
1,095.37	31.6	17,438	1,100.57	169.4	93,435
1,095.47	33.3	18,337	1,100.67	173.1	95,481
1,095.57	34.9	19,258	1,100.77	176.9	97,549
1,095.67	36.6	20,201	1,100.87	180.7	99,640
1,095.77	38.4	21,167	1,100.97	184.5	101,752
1,095.87	40.2	22,154	1,101.07	188.4	103,886
1,095.97	42.0	23,163	1,101.17	192.3	106,042
1,096.07	43.9	24,194	1,101.27	196.2	108,221
1,096.17	45.8	25,248	1,101.37	200.2	110,421
1,096.27	47.7	26,323	1,101.47	204.3	112,644
1,096.37	49.7	27,421	1,101.57	208.3	114,888
1,096.47	51.8	28,540	1,101.67	212.4	117,155
1,096.57	53.8	29,682	1,101.77	216.6	119,444
1,096.67	55.9	30,845	1,101.87	220.8	121,755
1,096.77	58.1	32,031	1,101.97	225.0	124,088
1,096.87	60.3	33,239			
1,096.97	62.5	34,469			
1,097.07	64.8	35,721			

Summary for Reach 3R: Outlet

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

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 5.64" for 100-year event
Inflow = 403.69 cfs @ 12.94 hrs, Volume= 78.501 af
Outflow = 403.69 cfs @ 12.94 hrs, Volume= 78.501 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 3R: Outlet**Hydrograph**

Summary for Pond W2: Wetland

[61] Hint: Exceeded Reach 1R outlet invert by 0.88' @ 12.95 hrs

[61] Hint: Exceeded Reach 2R outlet invert by 0.88' @ 12.95 hrs

Inflow Area = 167.124 ac, 0.00% Impervious, Inflow Depth > 5.67" for 100-year event
 Inflow = 446.91 cfs @ 12.74 hrs, Volume= 79.019 af
 Outflow = 403.69 cfs @ 12.94 hrs, Volume= 78.501 af, Atten= 10%, Lag= 12.1 min
 Primary = 388.23 cfs @ 12.94 hrs, Volume= 77.868 af
 Routed to Reach 3R : Outlet
 Secondary = 15.47 cfs @ 12.94 hrs, Volume= 0.633 af
 Routed to Reach 3R : Outlet

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Starting Elev= 1,086.00' Storage= 1.521 af

Peak Elev= 1,088.24' @ 12.94 hrs Storage= 9.460 af (7.939 af above start)

Plug-Flow detention time= 35.8 min calculated for 76.820 af (97% of inflow)

Center-of-Mass det. time= 14.2 min (848.2 - 834.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,080.00'	21.341 af	Custom Stage Data Listed below

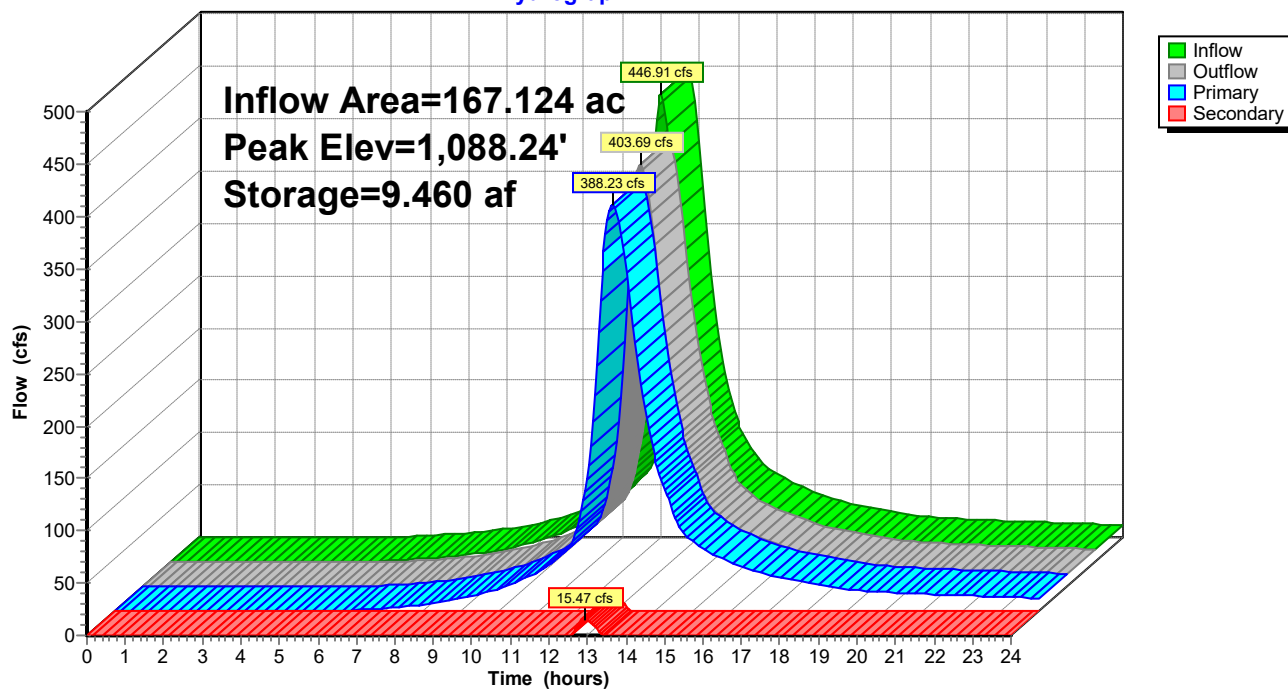
Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,080.00	0.000	0.000
1,081.00	0.006	0.006
1,082.00	0.014	0.020
1,083.00	0.056	0.076
1,084.00	0.112	0.188
1,085.00	0.216	0.404
1,086.00	1.117	1.521
1,087.00	2.159	3.680
1,088.00	4.386	8.066
1,089.00	5.834	13.900
1,090.00	7.441	21.341

Device	Routing	Invert	Outlet Devices
#1	Primary	1,086.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 1.00 2.00 3.00 4.00 Width (feet) 30.00 36.00 42.00 48.00 54.00
#2	Secondary	1,087.82'	20.0' long + 3.0 ' SideZ x 21.1' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=387.77 cfs @ 12.94 hrs HW=1,088.24' (Free Discharge)↑**1=Custom Weir/Orifice** (Weir Controls 387.77 cfs @ 4.72 fps)**Secondary OutFlow** Max=15.31 cfs @ 12.94 hrs HW=1,088.24' (Free Discharge)↑**2=Broad-Crested Rectangular Weir** (Weir Controls 15.31 cfs @ 1.72 fps)

Pond W2: Wetland

Hydrograph



FLO971628B_Proposed

Prepared by I&S Group, Inc

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Type III 24-hr 100-year Rainfall=7.50"

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Stage-Area-Storage for Pond W2: Wetland

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
1,080.00	0.000	1,085.20	0.627
1,080.10	0.001	1,085.30	0.739
1,080.20	0.001	1,085.40	0.851
1,080.30	0.002	1,085.50	0.962
1,080.40	0.002	1,085.60	1.074
1,080.50	0.003	1,085.70	1.186
1,080.60	0.004	1,085.80	1.298
1,080.70	0.004	1,085.90	1.409
1,080.80	0.005	1,086.00	1.521
1,080.90	0.005	1,086.10	1.737
1,081.00	0.006	1,086.20	1.953
1,081.10	0.007	1,086.30	2.169
1,081.20	0.009	1,086.40	2.385
1,081.30	0.010	1,086.50	2.600
1,081.40	0.012	1,086.60	2.816
1,081.50	0.013	1,086.70	3.032
1,081.60	0.014	1,086.80	3.248
1,081.70	0.016	1,086.90	3.464
1,081.80	0.017	1,087.00	3.680
1,081.90	0.019	1,087.10	4.119
1,082.00	0.020	1,087.20	4.557
1,082.10	0.026	1,087.30	4.996
1,082.20	0.031	1,087.40	5.434
1,082.30	0.037	1,087.50	5.873
1,082.40	0.042	1,087.60	6.312
1,082.50	0.048	1,087.70	6.750
1,082.60	0.054	1,087.80	7.189
1,082.70	0.059	1,087.90	7.627
1,082.80	0.065	1,088.00	8.066
1,082.90	0.070	1,088.10	8.649
1,083.00	0.076	1,088.20	9.233
1,083.10	0.087	1,088.30	9.816
1,083.20	0.098	1,088.40	10.400
1,083.30	0.110	1,088.50	10.983
1,083.40	0.121	1,088.60	11.566
1,083.50	0.132	1,088.70	12.150
1,083.60	0.143	1,088.80	12.733
1,083.70	0.154	1,088.90	13.317
1,083.80	0.166	1,089.00	13.900
1,083.90	0.177	1,089.10	14.644
1,084.00	0.188	1,089.20	15.388
1,084.10	0.210	1,089.30	16.132
1,084.20	0.231	1,089.40	16.876
1,084.30	0.253	1,089.50	17.620
1,084.40	0.274	1,089.60	18.365
1,084.50	0.296	1,089.70	19.109
1,084.60	0.318	1,089.80	19.853
1,084.70	0.339	1,089.90	20.597
1,084.80	0.361	1,090.00	21.341
1,084.90	0.382		
1,085.00	0.404		
1,085.10	0.516		