Seekonk, MA

Greenbrier Residential & Apartment Community – Phase II

RI Seekonk Holdings LLC

January 2021

On Behalf of: RI Seekonk Holdings LLC

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

This permit application submitted on behalf of RI Seekonk Holdings LLC is for the construction of seven apartment buildings for Chapter 40 B affordable housing as the second phase of the Greenbrier Residential Condominium and Apartment project. This work shall consist of the construction of the apartment buildings, roadway and parking lot installation, new sidewalks, installation of multiple utilities, installation of temporary erosion control measures, and other associated work.

A map of the project area is shown in **Figure 1** – Locus Map.

2.0 EXISTING CONDITIONS

The proposed project is located on two parcels off Fall River Avenue in Seekonk, MA (Book/Page: 24861/322 and 15142/1) that are approximately 16.41 acres and 76.1 acres, respectively. The 76.1-acre parcel originally consisted of an abandoned gravel-removal operation site and woodlands but has recently been developed during Phase I of the Greenbrier Project and now consists of a 440-unit condominium and apartment complex. The 16-acre parcel comprises of an abandoned movie theater with associated parking lot with woodlands located at the back of the property. There are a number of existing utilities (both active and abandoned) on this site, including sanitary sewer and an extensive stormwater drainage system.

Both parcels are located in a Residence R-3 zoning district, which represents residential areas of low density within the Town of Seekonk. As a part of Phase I of the Greenbrier project, the 76-acre parcel was presented and approved by the Seekonk Zoning and Planning Board to rezone the parcel to a Multifamily Development Overlay District. The 16-acre parcel will be presented to the Zoning and Planning Board for approval as a part of Phase II of the Greenbrier project.

The site located within the 16-acre parcel is relatively flat around the developed portion of the site with the parking lot sloping from northeast to southwest towards Fall River Avenue. Beyond the parking lot, the elevation sharply rises to the undeveloped portion of the site, which is mainly woodlands. There are five isolated wetlands either within or adjacent to the parcel boundary that receive stormwater runoff from this undeveloped area. These wetlands were flagged by Caputo & Wick Ltd.

As stated previously, the 76-acre site has previously been developed into a 440-unit condominium and apartment complex. Stormwater from that development is captured by an extensive drainage network and discharges to several stormwater BMPs before ultimately discharging to the wetlands in the vicinity of the site.

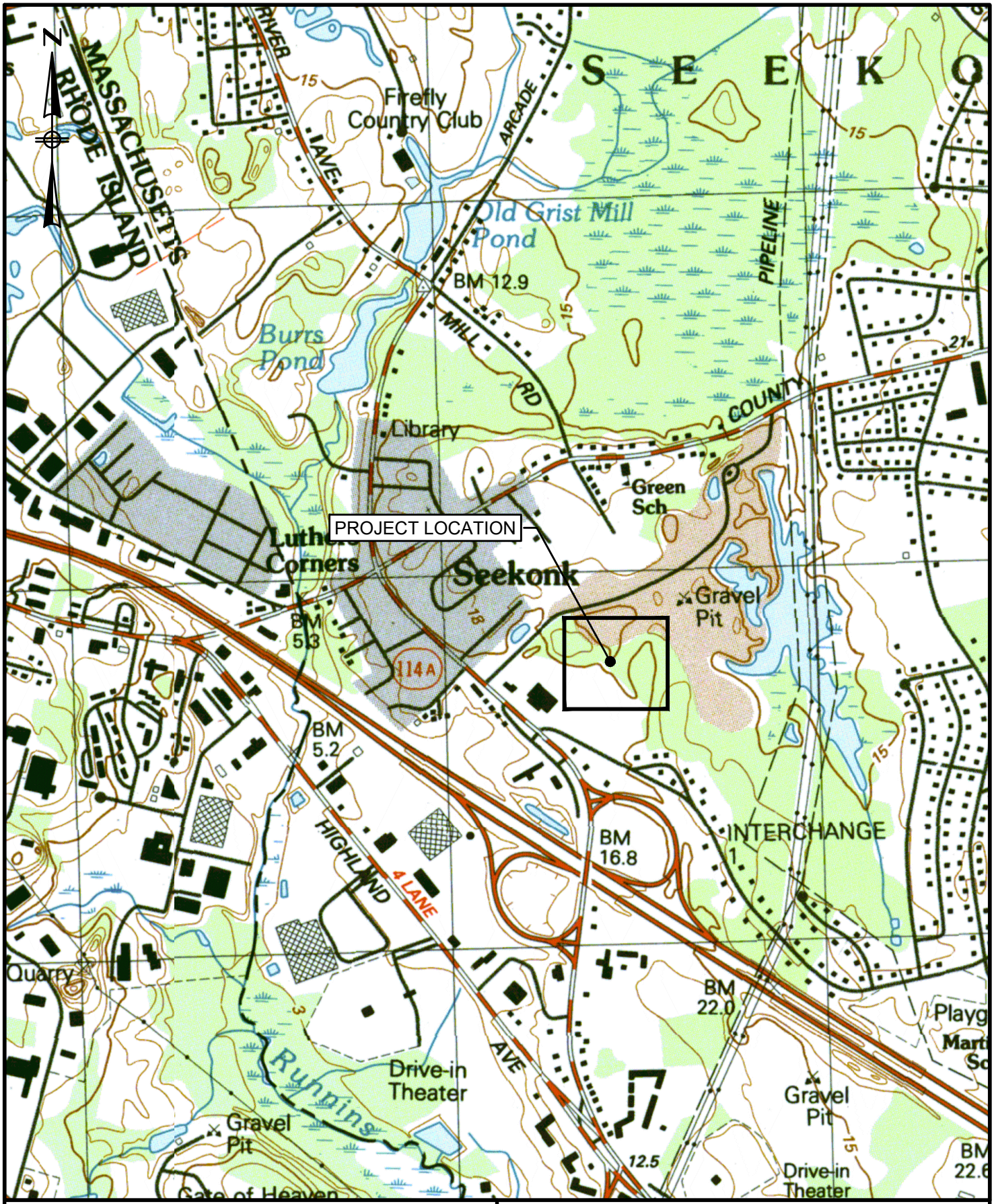

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FIGURE 1 - LOCUS MAP

GREENBRIER II

SEEKONK, MA

3.0 SITE PARAMETERS

3.1 Soil Classification

According to the *Web Soil Survey, Bristol County, Massachusetts (Northern Part),* prepared by the US Department of Agriculture, Soil Conservation Service, soils underlying and in the vicinity of the project area consist predominantly of Merrimac fine sandy loam, Pits-Udorthents complex, and Wareham loamy sand soils (see **Figure 2** – Soil Maps).

- Merrimac fine sandy loam, 0-3 percent slopes (254A) are typically deep, somewhat excessively drained soils found within backslopes, foot slopes, and summits. They are typically characterized by moderately high to very high permeability, low available water capacity, deep (> 80") seasonal groundwater tables, and are classified as hydrologic soil group A soils.

- Wareham loamy sand, 0-3 percent slopes (32A) are typically deep, poorly drained soils in terrace and foot slope areas. They are typically characterized by high to very high permeability, low available water capacity, shallow (0 to 6") seasonal groundwater tables and are classified as hydrologic soil group A/D soils.

- Pits-Udorthents complex, gravelly (617) areas consist of areas that have been excavated for sand and gravel. Depth of the excavations range from 5 to 25 feet, and some extend into the water table. In some areas the water table is at or near the surface. The unit is about 60 percent pits, 30 percent Udorthents, and 10 percent other soils.

3.2 Subsurface Investigation

A subsurface investigation was conducted specifically to determine soil permeability in the areas of the proposed stormwater BMPs. The test pit logs are included in Appendix E.

3.3 Flood Zone Classification

According to the Flood Insurance Rate Map (FIRM) for the Town of Seekonk (Community Panel Number 25005C0212F, dated 7/7/2009), the project area lies entirely within Zone X (see **Figure 3** – FEMA Flood Zones).

- Zone X land areas are areas within the 500-year (0.2% annual chance) flood plain.

4.0 PROJECT DESCRIPTION

During Phase II of the Greenbrier project, RI Seekonk Holdings LLC plans to construct seven apartment buildings for Chapter 40 B affordable housing, containing approximately 240 units, as well as a community center and associated utility buildings. The development will include the creation of an internal roadway network, ADA compliant pedestrian sidewalks, state roadway access, closed drainage systems, municipal water connection, and connection to the Phase I wastewater treatment facility. There will be a number of landscaping elements, including plantings along the internal roadway system as well as adjacent to the apartment buildings.

This Phase of construction will include the installation of two stormwater BMPs (infiltration basins) which will provide the required recharge and water quality treatment volumes for all proposed impervious area within the project limits. Pretreatment devices will be used prior to stormwater entering these BMPs.

This project will increase the overall impervious area within the project limits, however, with the proposed stormwater BMPs, the net stormwater discharge leaving the site will be reduced. in the watershed or near the resource areas, and the majority of the disturbance to the resource areas will be temporary in nature, only for the duration of the construction.

5.0 MITIGATION METHODS

The following measures will be taken to avoid or minimize disturbances to inland waters, wetland features and associated jurisdictional areas.

5.1 Soil Erosion and Sedimentation Controls

Soil erosion and sedimentation control issues have been incorporated in the design and construction planning process of the proposed project. A compost filter sock barrier is proposed along the downgradient limits of disturbance; the soil erosion and sedimentation control measures will be installed prior to the initiation of construction activities. Once established, these measures will be monitored weekly and maintained throughout the project until construction activities are complete.

The erosion controls will serve as the strict limits of disturbance for the project. No alterations, including vegetative clearing or surface disturbance, will occur beyond this line. The limits of clearing, grading, and disturbance will be kept to a minimum within the proposed area of construction. All areas outside of these limits, as depicted on the project site plans, will be totally undisturbed, to remain in a completely natural condition. After any significant rainstorm (i.e. greater than 1”), all sedimentation control measures will be inspected and replaced if failed.

6.0 CONFORMANCE WITH REGULATIONS

The project will occur within portions of various buffer zones associated with various isolated wetlands located adjacent to the project area. Any impacts to the buffer zones or resource area will be minimized to the maximum extent practicable while achieving the project purpose.

6.1 Natural Heritage and Endangered Species Program (NHESP)

After conducting a GIS investigation of the site, it has been concluded that the project area is not located within any Estimated and/or Priority Habitats as described by the NHESP.

7.0 STORMWATER MANAGEMENT STANDARDS

The project has been designed to meet the Stormwater Management Standards outlined in 310 CMR 10.05(6)(k). The project’s conformance with these standards is described below.

Standard 1: No New Untreated Discharges – Met

There will be no new untreated discharges to any adjacent wetlands as part of this project.

Standard 2: Peak Rate Control & Flood Prevention – Met
With the installation of the infiltration basins, the post-development peak discharge rates will be reduced compared to the pre-development discharge rates for the 2, 10, 25, and 100-year storms.

Standard 3: Recharge to Groundwater – Met
This standard has been met, the BMPs installed will cumulatively provide much greater groundwater recharge volume than required.

Standard 4: 80% TSS Removal – Met
With the implementation of deep-sump, hooded catch basins, Stormceptor pretreatment units and sediment forebays this standard has been met.

Another requirement for this standard is the preparation of a Construction Period Pollution Prevention Plan. Please refer to Appendix D.

Standard 5: LUHPPLs – Not applicable

Standard 6: Critical Areas – Not applicable

Standard 7: Redevelopment Projects – Not Applicable

Standard 8: Erosion and Sediment Control – Met
Soil and erosion control shall be provided during construction by means of compost filter sock and catch basin inlet devices as described earlier in the report. The Construction Period Pollution Prevention Plan has been included in Appendix D. The Construction Period Pollution Prevention and Erosion & Sediment Control Plan is attached to the Notice of Intent.

Standard 9: Operation and Maintenance Plan – Met
The Operation and Maintenance (O&M) Plan for the post-construction BMP's constructed under this project can be found in Appendix A. Implementation of the O&M plan for this project shall be the responsibility of the RI Seekonk Holdings LLC.

Standard 10: Illicit Discharges – Met
There are no known or suspected illicit discharges to the proposed stormwater conveyance system.

In summary, the project does not qualify as a limited and a redevelopment project, so the project must meet all of applicable the Stormwater Management Standards. This project meets Standards 1, 2, 3, 4, 7, 8, 9, and 10; standards 5 and 6 are not applicable to the project.

8.0 DRAINAGE ANALYSIS

8.1 Overall Watersheds

The project includes installing new catchment and conveyance structures located and sized to capture and convey storms up to and including the 25-year storm event. It will also incorporate stormwater pretreatment measures and BMPs to provide water quality treatment of stormwater

runoff. BMP selection was based on a variety of factors, including available land area, topography, underlying soil conditions, groundwater proximity, and vicinity of wetlands.

As the majority of the project area is currently undeveloped, BMPs were sized to prevent the increase of stormwater flows due to the large expansion of impervious area throughout the site. A large portion of stormwater flow that previously entered the existing drainage system at the 800 Fall River Avenue parking lot will be captured and routed to the proposed BMPs. Refer to Appendix C for existing and proposed Watershed Plans.

8.2 Proposed Conditions Watershed Analysis

The proposed conditions hydrologic analysis was performed using the Soil Conservation Service Technical Release 55 (SCS TR-55) methodology, using HydroCAD Version 10.0. The 2, 10, 25, and 100-year storm events were modeled for a 24-hour, Type III storm.

The stormwater management system for the project has been designed so that the post-development conditions result in no increase to peak runoff rates to the adjacent wetlands or parcels. There is a slight increase to Wetland C during the 25 year storm event. This increase is considered negligible and will not result in any negative impacts to the wetland.

Storm Event	2 Year		10 Year		25 Year		100 Year	
Development Condition	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Wetland 1	0.25	0.03	0.95	0.46	1.63	1.19	3.21	3.08
Wetland C	0.00	0.00	0.01	0.01	0.05	0.06	0.39	0.37
Wetland D	0.20	0.05	0.74	0.14	0.24	0.22	2.40	2.29
Wetland N	1.28	1.21	3.48	2.56	5.46	3.70	7.02	6.09
Wetland M	0.00	0.00	0.00	0.00	0.02	0.00	0.16	0.15
Showcase	22.79	18.26	37.43	31.34	48.89	42.61	72.09	67.64

8.3 Groundwater Recharge

The Required Recharge Volume equals a depth of runoff corresponding to the soil type times the net impervious areas covering that soil type at the post-development site.

Rv = F x impervious area

Rv = Required Recharge Volume, expressed in Ft3, cubic yards, or acre-feet
F = Target Depth Factor associated with each Hydrologic Soil Group
Impervious Area = net pavement and rooftop area on site

The groundwater recharge was calculated using a Target Depth Factor of 0.6 for Hydrologic Group A soils.

BMP NAME	Groundwater Recharge Required & Provided				
	Ex. Imp. Area to Remain (s.f.)	New Imp. Area (s.f.)	Recharge Required (c.f.)	Recharge Provided (c.f.)	Recharge Deficit (c.f.)
Overall Site	0	266,795	13,340	54,195	-40,855
Project	0	266,795	13,340	54,195	-40,855

Please note that in the Recharge Deficit/Surplus Column, positive values represent deficit recharge volumes, while negative values represent surplus.

All BMPs were sized using the "Static" method. The "Static" method assumes that there is no exfiltration until the entire recharge device is filled to the elevation associated with the Required Recharge Volume.

Recharge Calculations are included in Appendix B.

8.4 Water Quality Volume

The required water quality volume can be calculated using the following formula:
V_{WQ} = (D_{WQ}/12 inches/foot) * (A_{IMP} * 43,560 square feet/acre) ***Equation (1)***

V_{WQ} = *Required Water Quality Volume* (in cubic feet)
D_{WQ} = Water Quality Depth: one-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near another critical area, runoff from a LUHPPL, or exfiltration to soils with infiltration rate greater than 2.4 inches/hour or greater; ½-inch for discharges near or to other areas.

Impervious Area and Required Water Quality Volume			WQV Provided	
	Imp. Area (sf)	WQV (cf)	WQV (cf)	WQV Deficit (cf)
Watershed A (Captured & Treated)	266,795	11,116	54,195	-43,079
Totals	266,795	11,116	54,195	-43,079

8.5 Drawdown

The same infiltration rate that is used for sizing the infiltration BMP was used to confirm that the BMP will drain completely within 72 hours. The following formula was used:

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$

Where:
Rv = Storage Volume
K = Saturated Hydraulic Conductivity For "Static" and "Simple Dynamic" Methods, use Rawls Rate (see Table 2.3.3).
Bottom Area = Bottom Area of Recharge Structure

Provided BMP Drawdown		
BMP Name	K (in/hr) (Table 2.3.3)	Drawdown (Hours)
Infiltration Basin 1	2.41	16
Infiltration Basin 2	1.42	39

9.0 CONCLUSION

Phase II of the Greenbrier Residential Condominium and Apartment Community will develop two parcels to provide a significant amount of Chapter 40 B affordable housing in the town of Seekonk. It will also provide significant aesthetic benefits both for the tenants themselves, as well as the broader community, as the project area encompasses a former gravel-removal operation that had been previously abandoned.

As part of the project, the proposed stormwater management system has been designed in compliance with the Massachusetts Stormwater Handbook. The site design proposes the use of a number of effective and context-appropriate stormwater best management practices (BMPs) that will provide in excess of the groundwater recharge and prescribed water quality volume requirements for the site.

Figure 2
Soils Map

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 Bristol County, Massachusetts, Northern Part

January 7, 2021

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:4,350 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Bristol County, Massachusetts, Northern Part
Survey Area Data: Version 13, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 3, 2019—Aug 2, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
32A	Wareham loamy sand, 0 to 3 percent slopes	7.0	8.9%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	1.6	2.1%
245B	Hinckley loamy sand, 3 to 8 percent slopes	1.2	1.5%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	9.3	11.8%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	12.1	15.3%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	17.7	22.5%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	7.3	9.3%
617	Pits - Udorthents complex, gravelly	21.9	27.8%
656	Udorthents - Urban land complex	0.7	0.9%
Totals for Area of Interest		**78.9**	**100.0%**

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different

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

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

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

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

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

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

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

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

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

Bristol County, Massachusetts, Northern Part

32A—Wareham loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 999d
Elevation: 100 to 1,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Wareham

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loose sandy glaciofluvial deposits

Typical profile

H1 - 0 to 4 inches: loamy sand
H2 - 4 to 36 inches: loamy coarse sand
H3 - 36 to 60 inches: coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.1 inches)

Interpretive groups

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

Minor Components

Scarboro

Percent of map unit: 10 percent
Landform: Terraces
Hydric soil rating: Yes

Pipestone

Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

Walpole

Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

73A—Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w695
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Whitman, extremely stony, and similar soils: 81 percent
Minor components: 19 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Whitman, Extremely Stony

Setting

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

Typical profile

Oi - 0 to 1 inches: peat
A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam
Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY041MA - Very Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Ridgebury, extremely stony

Percent of map unit: 10 percent
Landform: Hills, ground moraines, depressions, drumlins, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, depressions, drainageways
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Swamps, bogs, marshes
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Woodbridge, extremely stony

Percent of map unit: 1 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

245B—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svm8
Elevation: 0 to 1,430 feet
Mean annual precipitation: 36 to 53 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Hinckley

Setting

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

Typical profile

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

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 8 percent
Landform: Eskers, moraines, outwash terraces, outwash deltas, kame terraces, outwash plains, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash deltas, kame terraces, outwash plains, moraines, outwash terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope, head slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Outwash terraces, outwash deltas, kame terraces, outwash plains, kames, eskers, moraines
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

254A—Merrimac fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqr
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Merrimac

Setting

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

Typical profile

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

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.6 inches)

Interpretive groups

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

Minor Components

Sudbury

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

Hinckley

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

Agawam

Percent of map unit: 3 percent
Landform: Eskers, moraines, outwash plains, outwash terraces, stream terraces, kames
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 2 percent
Landform: Outwash plains, outwash terraces, deltas, dunes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

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

Map Unit Composition

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

Description of Merrimac

Setting

Landform: Outwash terraces, outwash plains, kames, eskers, moraines
Landform position (two-dimensional): Backslope, footslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

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

Properties and qualities

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

Interpretive groups

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

Minor Components

Sudbury

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

Hinckley

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

Windsor

Percent of map unit: 3 percent
Landform: Deltas, dunes, outwash terraces, outwash plains

Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Agawam

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

256A—Deerfield loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2xfg8
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Deerfield

Setting

Landform: Kame terraces, outwash plains, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear, concave
Across-slope shape: Concave, linear, convex
Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

Typical profile

Ap - 0 to 9 inches: loamy fine sand
Bw - 9 to 25 inches: loamy fine sand
BC - 25 to 33 inches: fine sand
Cg - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water capacity: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 7 percent
Landform: Outwash deltas, kame terraces, outwash terraces, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave, convex
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Wareham

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

Sudbury

Percent of map unit: 2 percent
Landform: Kame terraces, outwash plains, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear, concave
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Ninigret

Percent of map unit: 1 percent
Landform: Outwash terraces, outwash plains, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex
Across-slope shape: Concave, convex
Hydric soil rating: No

306B—Paxton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w673
Elevation: 0 to 1,340 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Paxton, Very Stony

Setting

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

Typical profile

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

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

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

Ridgebury, very stony
Percent of map unit: 4 percent
Landform: Ground moraines, hills, depressions, drainageways, drumlins
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

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

617—Pits - Udorthents complex, gravelly

Map Unit Setting
National map unit symbol: tghf
Elevation: 0 to 3,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Pits, gravelly: 60 percent
Udorthents, gravelly, and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, Gravelly

Typical profile

H1 - 0 to 6 inches: extremely gravelly sand
H2 - 6 to 60 inches: very gravelly coarse sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Description of Udorthents, Gravelly

Typical profile

H1 - 0 to 6 inches: variable
H2 - 6 to 60 inches: variable

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: Unranked

656—Udorthents - Urban land complex

Map Unit Setting

National map unit symbol: tghg
Elevation: 0 to 250 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 55 percent
Urban land: 45 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Soil Information for All Uses

Soil Properties and Qualities

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

Soil Qualities and Features

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

Hydrologic Soil Group

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

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

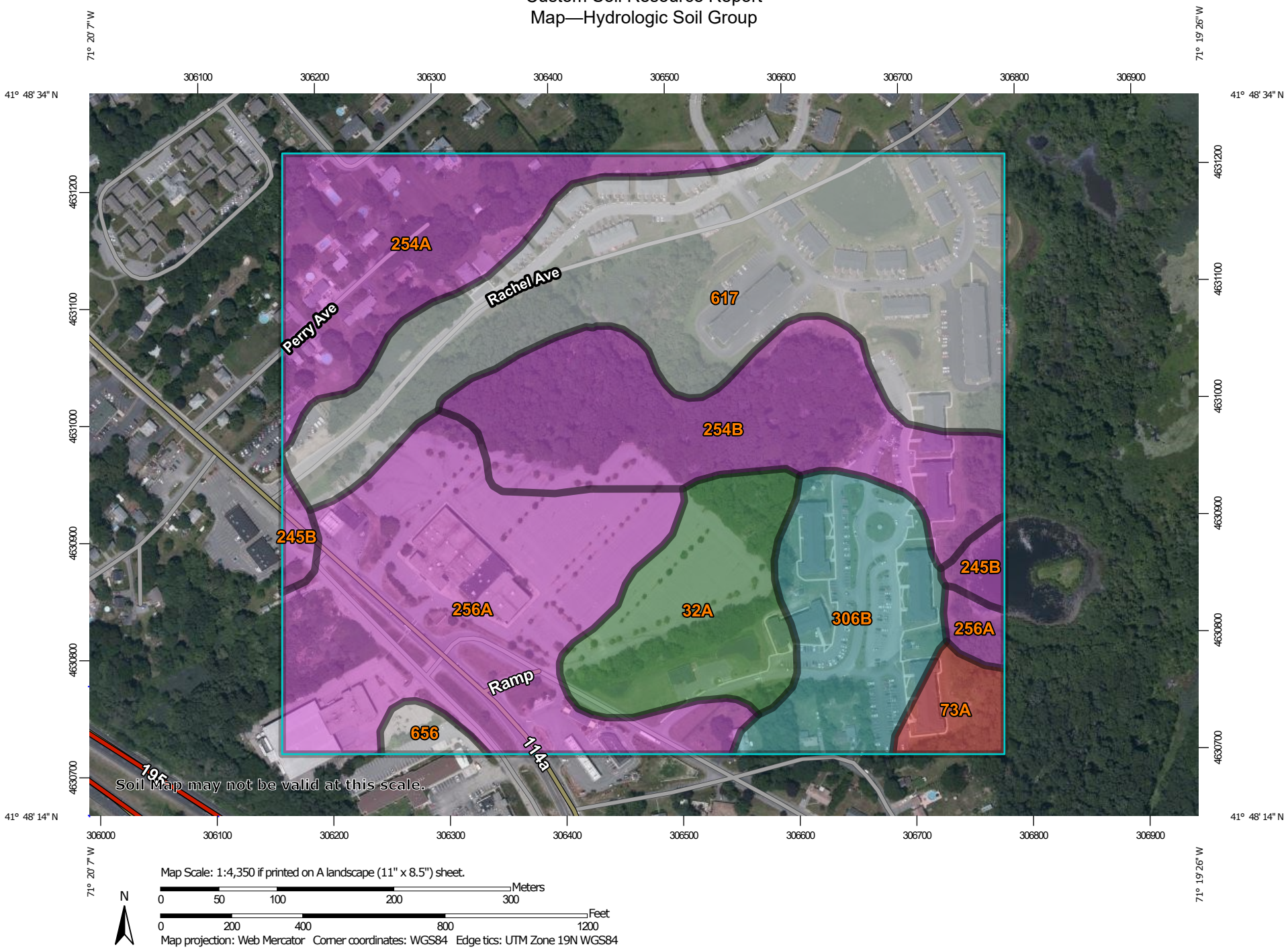
Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

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

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

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

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



Map Scale: 1:4,350 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Bristol County, Massachusetts, Northern Part
Survey Area Data: Version 13, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 3, 2019—Aug 2, 2019

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
32A	Wareham loamy sand, 0 to 3 percent slopes	A/D	7.0	8.9%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	1.6	2.1%
245B	Hinckley loamy sand, 3 to 8 percent slopes	A	1.2	1.5%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	A	9.3	11.8%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	12.1	15.3%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	A	17.7	22.5%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	C	7.3	9.3%
617	Pits - Udorthents complex, gravelly		21.9	27.8%
656	Udorthents - Urban land complex		0.7	0.9%
Totals for Area of Interest			**78.9**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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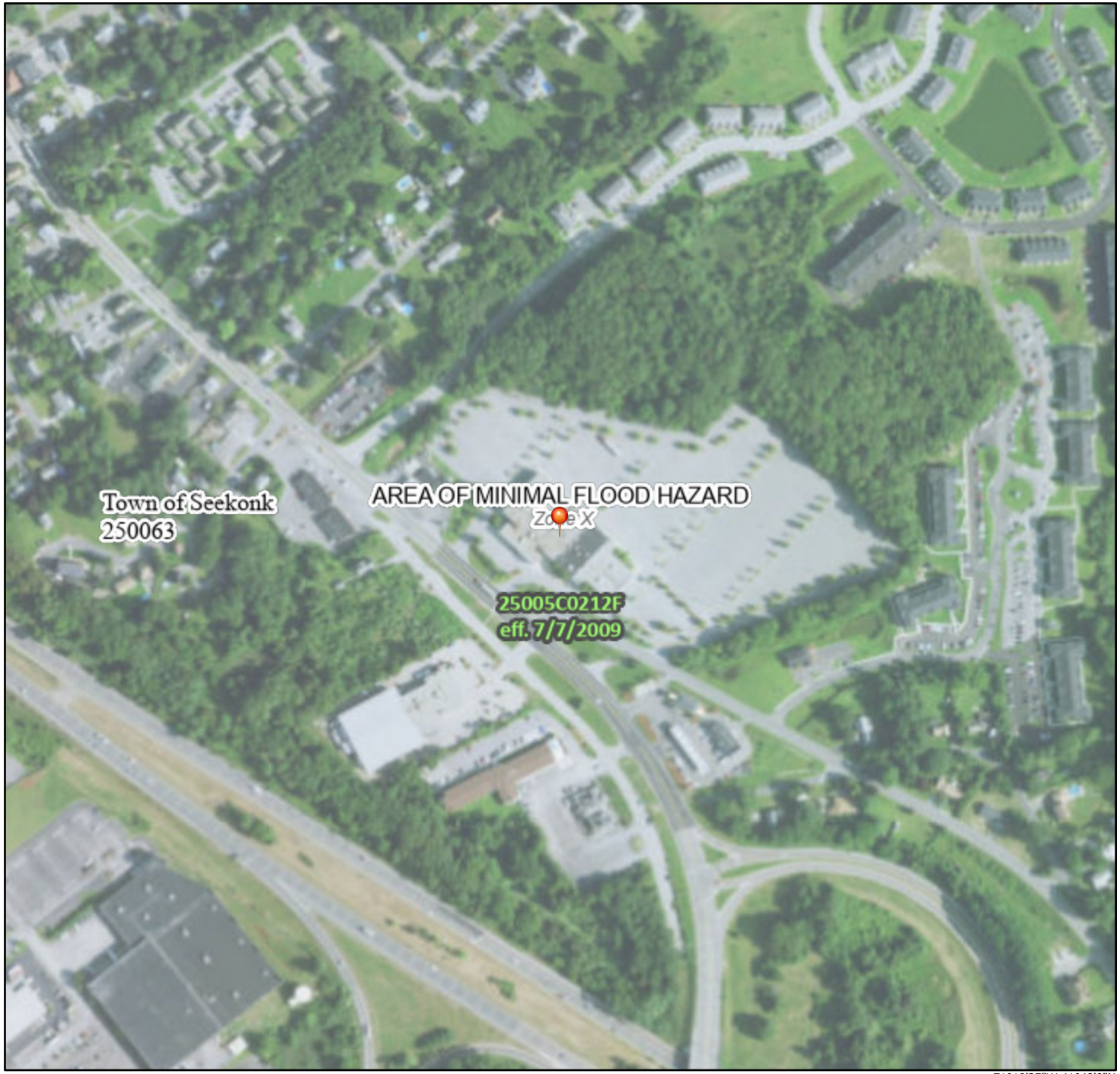
Figure 3
FEMA Flood Zones

National Flood Hazard Layer FIRMette

FEMA

71°20'12"W 41°48'35"N



71°19'35"W 41°48'8"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/20/2021 at 4:46 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix A
Operation & Maintenance Plan

Seekonk, MA

Greenbrier Residential Condominium and Apartment Community – Phase II

January, 2021

STORMWATER MANAGEMENT SYSTEM AND OPERATION & MAINTENANCE PLAN

www.BETA-Inc.com

TABLE OF CONTENTS

LIST OF FIGURES:

APPENDICES:

INTRODUCTION

On behalf of RI Seekonk Holdings LLC, BETA Group, Inc., (BETA) has prepared the following Stormwater Management System Operation and Maintenance (O&M) Plan for the proposed Stormwater Management System associated with the Greenbrier Residential Condominium and Apartment Community. This plan has been prepared in accordance with the guidance provided in the Massachusetts Stormwater Handbook.

I – GENERAL INFORMATION

I-A - Applicant

RI Seekonk Holdings LLC
44 Davis Street
Seekonk, MA 02771
Project Contact: H. Charles Tapalian
(401) 447-0847 Phone

I-B - Site Plan / Stormwater Management Designer

BETA Group, Inc.
701 George Washington Highway
Lincoln, RI 02865
Project Manager: Todd Undzis, P.E.
(401) 333-2382 Phone
(401) 333-9225 Fax

I-C - Address of Site

800 Fall River Avenue, Seekonk, MA

I-D - Locus Map

Please refer to Figure I-1 – Locus Map.

II – STORMWATER MANAGEMENT SYSTEM SUMMARY

The Stormwater Management System developed for the Greenbrier Residential Condominium and Apartment Project consists of the following components that require routine inspection and periodic maintenance:

Stormwater Collection & Conveyance	Stormwater Mitigation and Treatment
Deep-Sump Catch Basins	Stormceptor Pretreatment Unit
Drain Manholes	Sediment Forebay
	Infiltration Basin

The overall system has been designed to conform (to the maximum extent practicable) to the applicable requirements of the Massachusetts Department of Environmental Protection (MassDEP) for environmental and stormwater quality elements. The implementation of this O&M plan will have significant bearing on the proper function and overall life cycle of the stormwater management system, and must be adhered to in its entirety to insure that the system will operate as intended.

III - OPERATION AND MAINTENANCE PLAN

All components of the stormwater management system within the project area, whether new, rehabilitated, or existing to remain, shall be owned by RI Seekonk Holdings LLC, and shall be the responsibility of the RI Seekonk Holdings LLC, its heirs, assigns or duly authorized agents to operate and

maintain. The following summarizes the actions specific to this project that will be part of operation and maintenance plan of the Greenbrier Community Drainage System.

III-A GENERAL:

III-A.1 Inspections

Inspections shall assess the following for all components of the stormwater management system:

Structural Elements – The condition of all elements of the particular component being inspected shall be assessed, and if deemed to be deficient or compromised by routine wear and deterioration, shall be scheduled for repair or replacement as soon as possible.

Accumulated Materials – The volume and nature of accumulated materials shall be noted during all inspections. The accumulation of excessive levels of materials (sediments, trash and other debris) and/or the presence of atypical materials or contaminants within the structure shall be cause for further inspection of the stormwater system and/or the land area tributary thereto, to locate and identify the source of the excessive or atypical material and to correct the cause of same.

III-A.2 Cleaning

Cleaning shall include completely removing all accumulated material (e.g. sediments, trash, debris, and organic material) by means appropriate to the particular component of the stormwater system and legally disposing of the material at an off-site location.

In the case of atypical materials or contaminants in the stormwater system, said materials may require additional sampling, testing and analysis to determine the nature of the contamination and the appropriate methods of handling and disposal for same.

III-A.3 Access & Safety

Access to the stormwater management system for inspections and cleaning shall be made at the designated locations for same, and shall be made in a manner that avoids or minimizes interference with the operation of the roadway and the stormwater management system.

Inspections and cleaning of all elements of the stormwater management system shall be performed by properly-trained personnel using appropriate tools and equipment, and shall at all times be performed in a manner which prioritizes safety for both the personnel performing the inspections and/or cleaning, as well as the travelling public.

In instances where impacts to roadway or the stormwater management system cannot be avoided during inspections and/or cleaning, all reasonable measures and precautions shall be taken to protect the personnel performing the inspections and/or cleaning as well as the travelling public using the roadway. Such measures may include, but not be limited to:

Roadway Impacts:

- Warning signage;
- Attenuator boards;
- Barriers;

Stormwater Management System Impacts:

- Temporary stormwater flow diversion;
- Bypass pumping

III-B EASEMENTS:
For the purposes of this project, the stormwater management system associated with Greenbrier Residential Condominium and Apartment Community is located on and within RI Seekonk Holdings LLC property. Therefore, there will be no easements or land acquisition by the owner

III-C SPECIFIC COMPONENTS:

III-C.1 – Stormceptor Pretreatment Unit

Inspections: For the first year of operation, the Pretreatment Units shall be inspected quarterly, then two (2) times per year in the following years.

Scheduled Maintenance:

- Pretreatment Units shall be cleaned a minimum of one (1) time per year; any accumulated material shall be removed completely to ensure that the filtration capacity of the unit is maintained or restored in all locations. The accumulated material shall be legally disposed of at an off-site location.

Corrective Maintenance:

- Refer to Manufacturer's Specifications for all corrective maintenance.

III-C.2 – Infiltration Basins/Swales

Inspections: Infiltration basins and swales shall be inspected a minimum of two (2) times per year, preferably once in the spring and once in the fall. In addition, the infiltration swales shall be inspected after any storm greater than or equal to the 1-year storm event.

Scheduled Maintenance:

- Infiltration basin/swale grass shall be mowed two (2) to four (4) times per year (as needed) to maintain the height of the grass between four (4) inches and ten (10) inches.
- Work within infiltration basins/swales shall be performed manually or by motorized equipment with sufficient reach to operate from outside of the basins/swales. Under no circumstances should heavy equipment (motorized or otherwise) or materials be driven or placed within infiltration BMP's, as the weight of same shall over-compact the infiltration media within the basin and reduce the stormwater uptake capacity of the basin/swale.

Corrective Maintenance:

- If concentrated stormwater flows result in erosion along any portion of the infiltration basin/swale, the impacted areas shall be immediately loamed, reseeded and/or replanted with appropriate wetland vegetation and stabilized (straw mulch, bio-degradable erosion control blanket, etc.) until such time as the new vegetation has sufficiently established itself.
- If standing water remains on the surface for 48 hours after a storm event, the top six (6) inches of soils on bottom of the infiltration basin shall be removed, and the material beneath roto-tilled to a depth of twelve (12) inches. The material removed shall be legally disposed of at an off-site location, and the affected area re-loamed, reseeded and stabilized until such time as an acceptable level of growth has been established.

III-C.3 – Deep-Sump Catch Basins

Inspections: Catch basins shall be inspected a minimum of two (2) times per year preferably once in the spring and once in the fall.

Corrective Maintenance: If sediment depth within the catch basin is greater than or equal to two (2) feet, the sediments and any accumulated material (e.g. trash, debris, and organic material) shall be removed and legally disposed of at an off-site location.

Scheduled Maintenance: Catch basins shall be cleaned a minimum of one (1) time per year. Cleaning shall include removing any accumulated material (e.g. sediments, trash, debris, and organic material) and legally disposing the material at an off-site location.

III-C.4 – Drain Manholes

Inspections: Drain manholes shall be inspected a minimum of two (2) times per year, typically simultaneously with the inspection of catch basins.

Scheduled Maintenance: Drain manholes do not typically require routine cleaning when used in conjunction with off-line deep-sump catch basins with hoods, assuming that the catch basins are functioning properly.

Corrective Maintenance: Any sediments or accumulated material (e.g. trash, debris, and organic material) discovered in drain manholes shall be immediately removed and legally disposed of at an off-site location. In addition, the source of the sediments or materials shall be located and repaired or otherwise corrected.

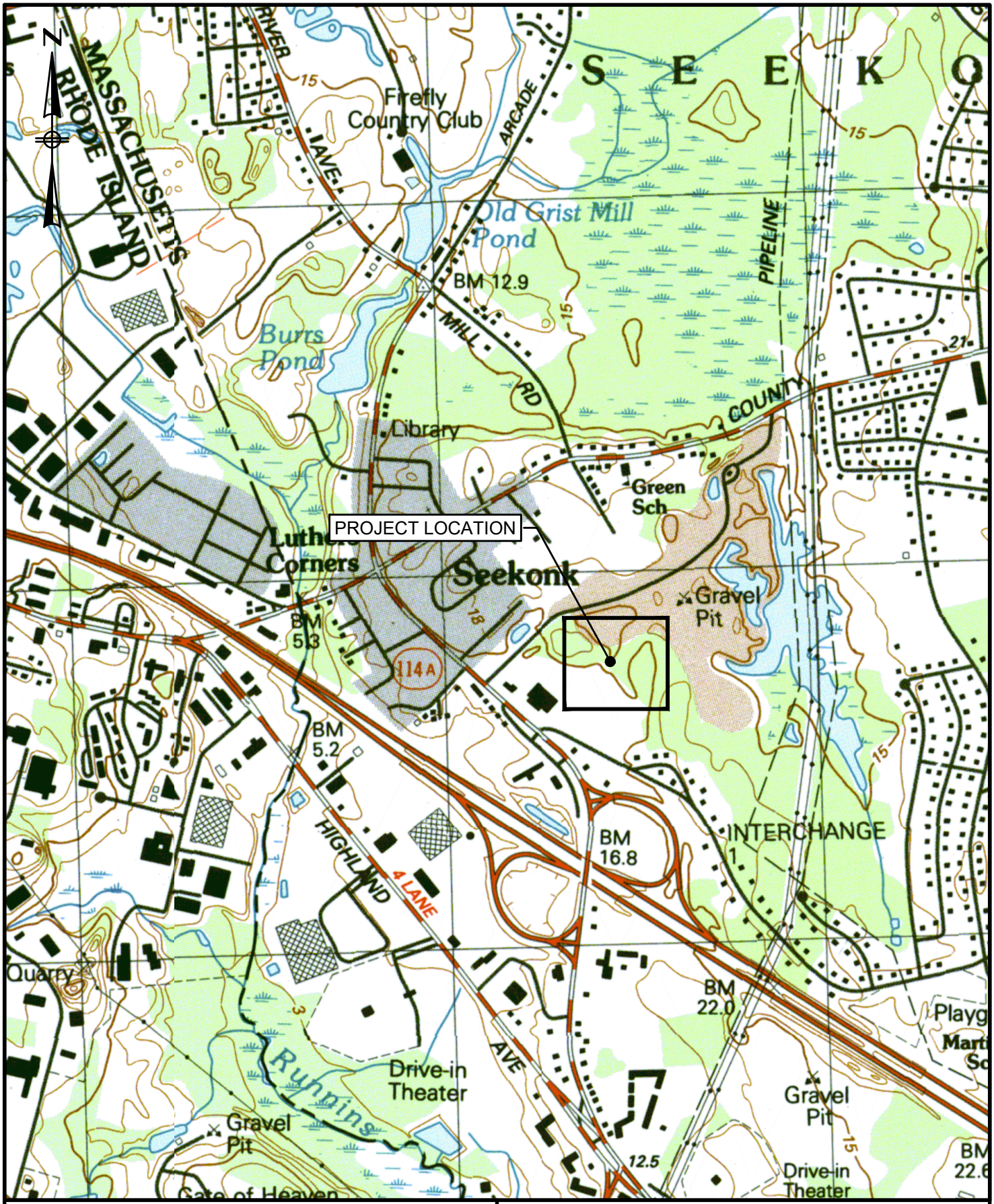


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FIGURE 1 - LOCUS MAP

GREENBRIER II

SEEKONK, MA

O&M Appendix A
Inspection Logs

Stormwater Management System **Operation & Maintenance Inspection Sheet**
Best Management Practice (BMP) **Catch Basins**

LOCATION (STREET ADDRESS / POLE #): _____

MUNICIPALITY: _____

DATE & TIME: _____

INSPECTOR/AGENCY:

MAINTENANCE ITEM	SATIS-FACTORY	UNSATIS-FACTORY	COMMENTS
1. Structural Condition			
Frame & Grate			
Brick & Mortar Leveling			
Steps			
Walls & Section Joints			
Pipes & Outlet Hood			
2. Sediment Cleaning			
Accumulated Sediment in Sump			
Greater than 50% of storage volume remaining			
No evidence of contaminated material/stormwater			

Comments:

Actions to be Taken:

Stormwater Management System **Operation & Maintenance Inspection Sheet**
Best Management Practice (BMP) **Infiltration System**

LOCATION (STREET ADDRESS / POLE #): _____

MUNICIPALITY: _____

DATE & TIME: _____

INSPECTOR/AGENCY:

MAINTENANCE ITEM	SATIS-FACTORY	UNSATIS-FACTORY	COMMENTS
1. Debris Cleanout			
Trench/chamber or basin surface clear of debris			
Inflow pipes clear of debris			
Overflow spillway clear of debris			
Inlet area clear of debris			
2. Sediment Traps or Forebays			
Obviously trapping sediment			
Greater than 50% of storage volume remaining			
3. Dewatering			
Trench/chamber or basin dewaters between storms			
4. Sediment Cleanout of Trench/Chamber or Basin			
No evidence of sedimentation in trench/chamber or basin			
Sediment accumulation doesn't yet require cleanout			
5. Inlets			
Good condition			
No evidence of erosion			
6. Outlet/Overflow Spillway			
Good condition, no need for repair			
No evidence of erosion			
Surface of aggregate clean			
Top layer of stone does not need replacement			
Trench/Chamber or basin does not need rehabilitation			

Comments:

Actions to be Taken:

Stormwater Management System **Operation & Maintenance Inspection Sheet**
Best Management Practice (BMP) **Bioretention Basins/Swales**

LOCATION (STREET ADDRESS / POLE #): _____

MUNICIPALITY: _____

DATE & TIME: _____

INSPECTOR/AGENCY:

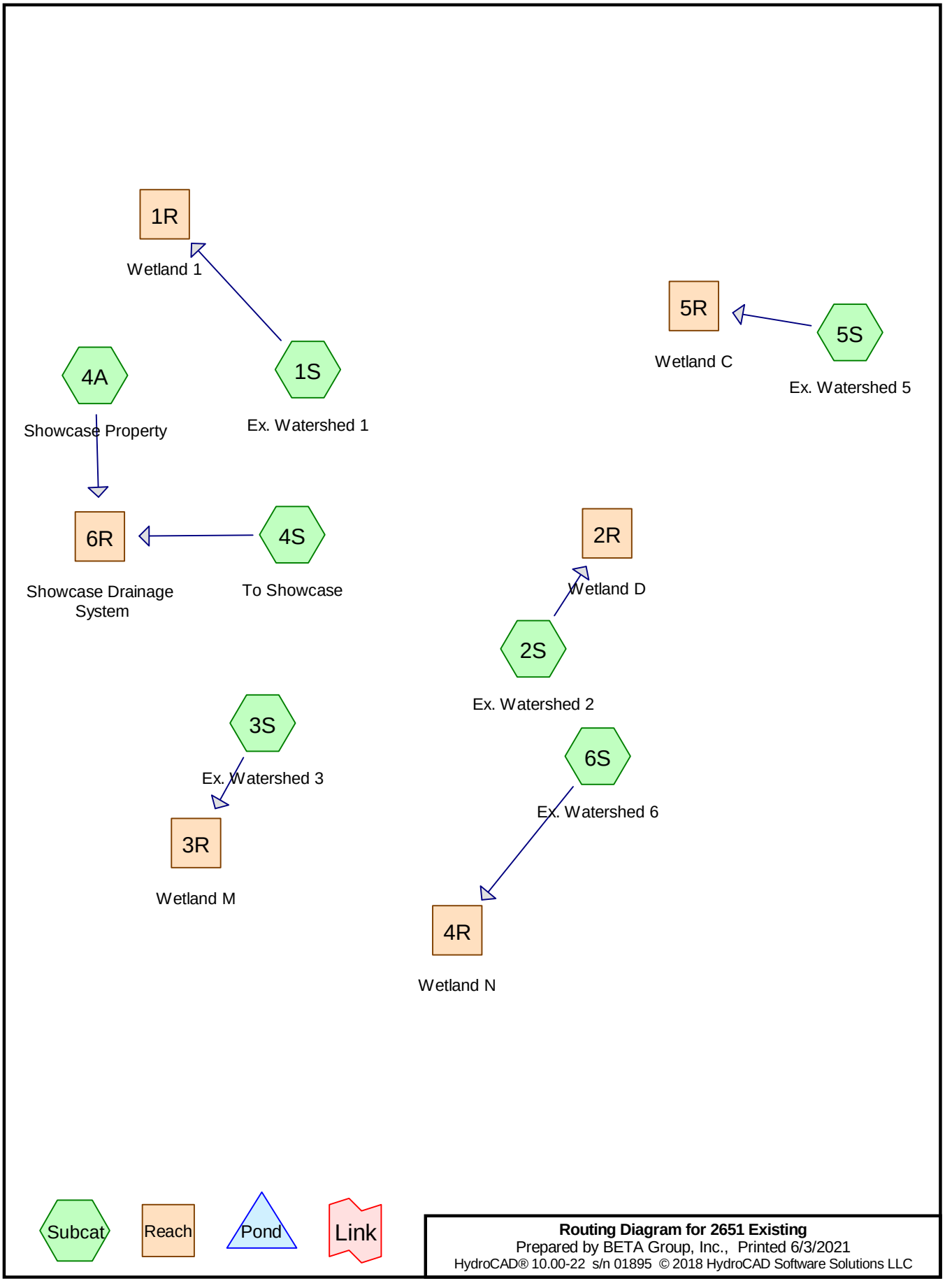
MAINTENANCE ITEM	SATIS-FACTORY	UNSATIS-FACTORY	COMMENTS
1. Debris Cleanout			
Bioretention and contributing areas clean of debris			
No dumping of yard wastes into practice			
Litter (branches, etc.) have been removed			
2. Vegetation			
Plant height not less than design water depth			
Fertilized per specifications			
Plant composition according to approved plans			
No placement of inappropriate plants			
Grass height not greater than 10 inches			
No evidence of erosion			
3. Check Dams/Energy Dissipaters/Sumps			
No evidence of sediment buildup			
Sumps < 50% full of sediment			
No evidence of erosion at downstream toe of drop structure			
4. Dewatering			
Dewaters between storms			
No evidence of standing water			
5. Sediment Deposition			
Swale clean of sediments			
Sediments < 20% of swale design depth			
6. Outflow/Overflow Spillway			
Good condition, no need for repair			
No evidence of erosion			
No evidence of any blockages			
7. Integrity of Filter Bed			
Filter bed has not been blocked or filled inappropriately			

Comments:

Actions to be Taken:

Appendix B
Stormwater Analysis

Section B-1
HydroCAD Printouts – Existing Conditions


1R
Wetland 1
1S
Ex. Watershed 1
4A
Showcase Property
5R
Wetland C
5S
Ex. Watershed 5
6R
Showcase Drainage System
4S
To Showcase
2R
Wetland D
2S
Ex. Watershed 2
3S
Ex. Watershed 3
3R
Wetland M
6S
Ex. Watershed 6
4R
Wetland N
Subcat
Reach
Pond
Link
Routing Diagram for 2651 Existing
Prepared by BETA Group, Inc., Printed 6/3/2021
HydroCAD® 10.00-22 s/n 01895 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
4,860	39	>75% Grass cover, Good, HSG A (3S)
454,392	98	Paved roads w/curbs & sewers, HSG A (4A, 4S)
125,849	36	Woods, Fair, HSG A (4S, 5S)
66,095	60	Woods, Fair, HSG B (1S, 2S)
117,367	66	Woods, Poor, HSG B (6S)
27,341	65	Woods/grass comb., Fair, HSG B (4A)
795,904	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
585,101	HSG A	3S, 4A, 4S, 5S
210,803	HSG B	1S, 2S, 4A, 6S
0	HSG C	
0	HSG D	
0	Other	
795,904		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Nu
4,860	0	0	0	0	4,860	>75% Grass cover, Good	
454,392	0	0	0	0	454,392	Paved roads w/curbs & sewers	
125,849	66,095	0	0	0	191,944	Woods, Fair	
0	117,367	0	0	0	117,367	Woods, Poor	
0	27,341	0	0	0	27,341	Woods/grass comb., Fair	
585,101	**210,803**	**0**	**0**	**0**	**795,904**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Ex. Watershed 1 Runoff Area=44,735 sf 0.00% Impervious Runoff Depth=0.45"
Flow Length=220' Tc=18.0 min CN=60 Runoff=0.25 cfs 1,670 cf

Subcatchment 2S: Ex. Watershed 2 Runoff Area=21,360 sf 0.00% Impervious Runoff Depth=0.45"
Flow Length=183' Tc=5.5 min CN=60 Runoff=0.20 cfs 797 cf

Subcatchment 3S: Ex. Watershed 3 Runoff Area=4,860 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 1 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=2.64"
Tc=5.0 min CN=94 Runoff=17.31 cfs 51,012 cf

Subcatchment 4S: To Showcase Runoff Area=341,348 sf 73.22% Impervious Runoff Depth=1.55"
Flow Length=737' Tc=19.5 min CN=81 Runoff=9.77 cfs 44,037 cf

Subcatchment 5S: Ex. Watershed 5 Runoff Area=34,445 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=199' Tc=23.0 min CN=36 Runoff=0.00 cfs 0 cf

Subcatchment 6S: Ex. Watershed 6 Runoff Area=117,367 sf 0.00% Impervious Runoff Depth=0.69"
Flow Length=309' Slope=0.0350 '/' Tc=19.0 min CN=66 Runoff=1.28 cfs 6,789 cf

Reach 1R: Wetland 1 Inflow=0.25 cfs 1,670 cf
Outflow=0.25 cfs 1,670 cf

Reach 2R: Wetland D Inflow=0.20 cfs 797 cf
Outflow=0.20 cfs 797 cf

Reach 3R: Wetland M Inflow=0.00 cfs 1 cf
Outflow=0.00 cfs 1 cf

Reach 4R: Wetland N Inflow=1.28 cfs 6,789 cf
Outflow=1.28 cfs 6,789 cf

Reach 5R: Wetland C Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 6R: Showcase Drainage System Inflow=22.79 cfs 95,049 cf
Outflow=22.79 cfs 95,049 cf

Total Runoff Area = 795,904 sf Runoff Volume = 104,306 cf Average Runoff Depth = 1.57"
42.91% Pervious = 341,512 sf 57.09% Impervious = 454,392 sf

Summary for Subcatchment 1S: Ex. Watershed 1

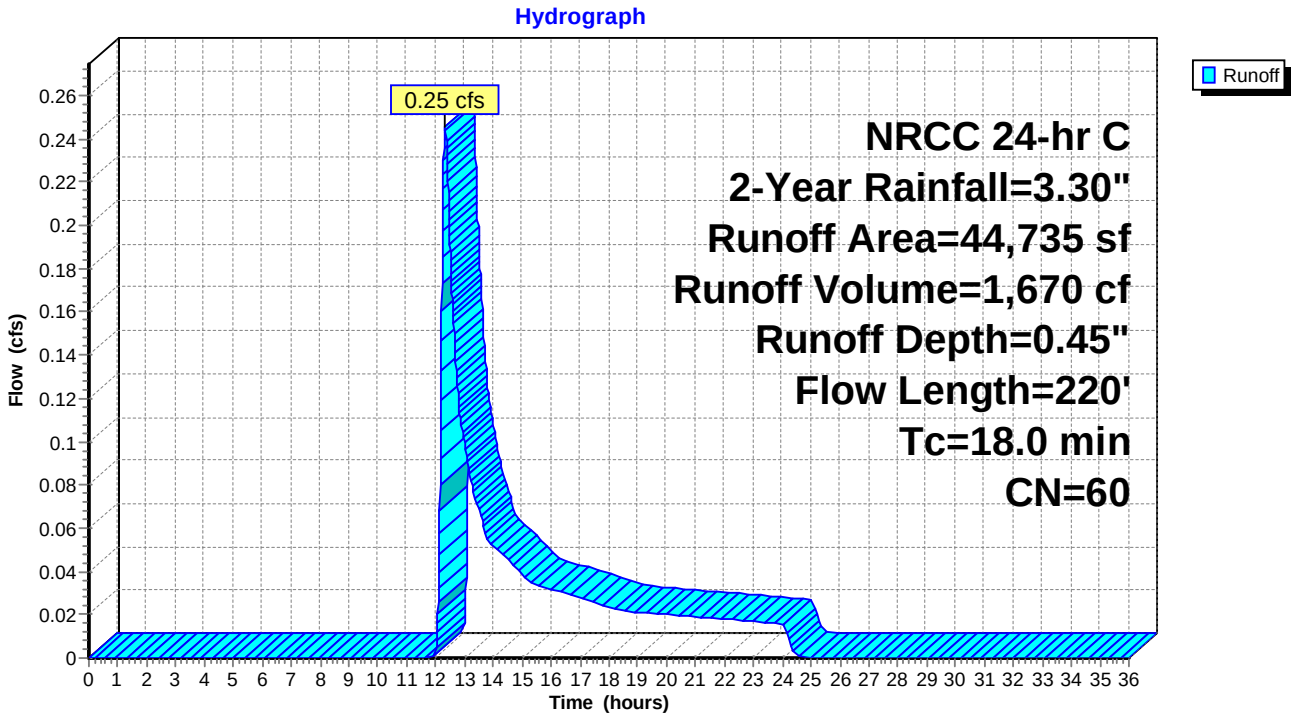
Runoff = 0.25 cfs @ 12.34 hrs, Volume= 1,670 cf, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
44,735	60	Woods, Fair, HSG B
44,735		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0250	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.2	120	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	50	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.0	220	Total			

Subcatchment 1S: Ex. Watershed 1



Summary for Subcatchment 2S: Ex. Watershed 2

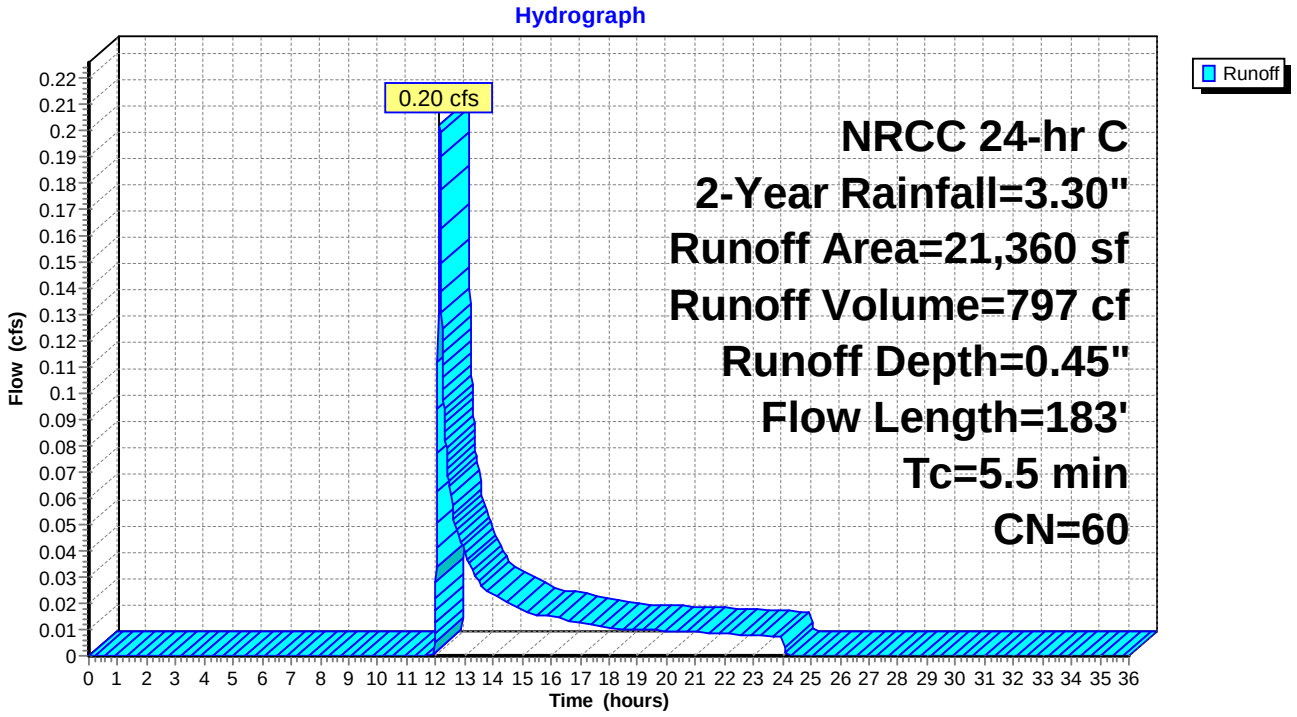
Runoff = 0.20 cfs @ 12.14 hrs, Volume= 797 cf, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
21,360	60	Woods, Fair, HSG B
21,360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.1000	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.2	133	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.5	183	Total			

Subcatchment 2S: Ex. Watershed 2



Summary for Subcatchment 3S: Ex. Watershed 3

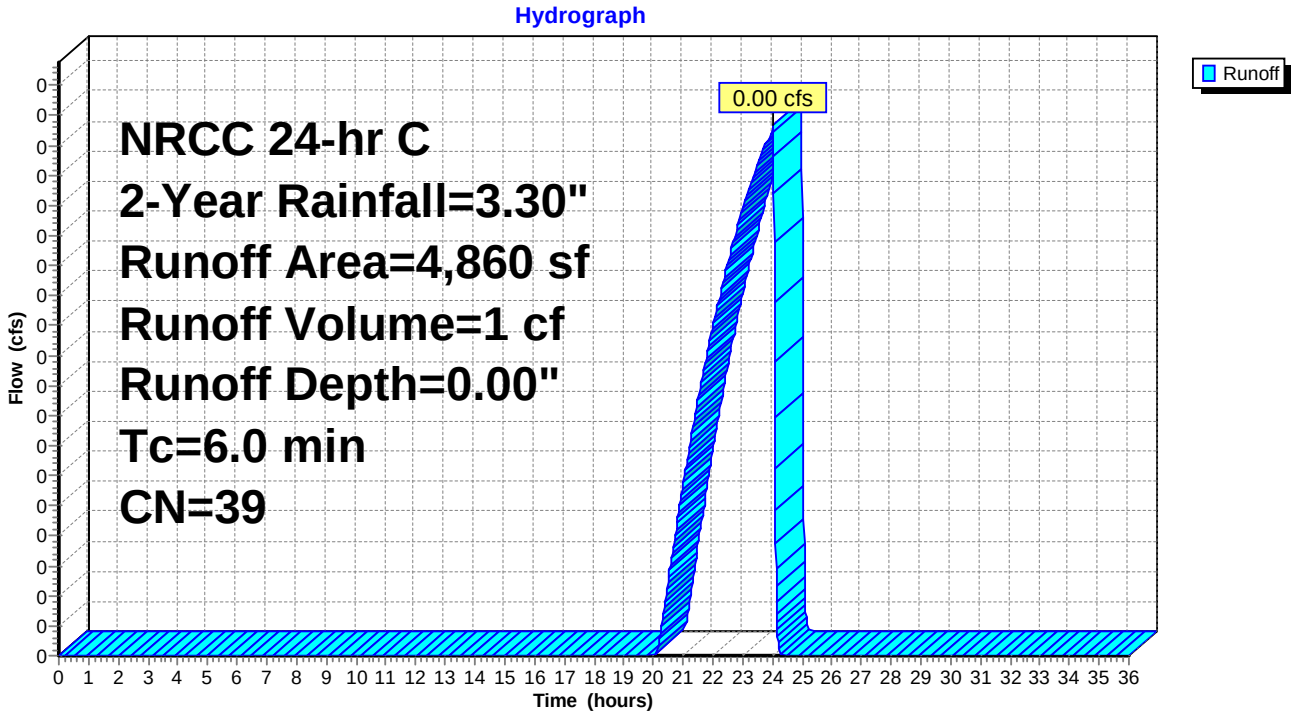
Runoff = 0.00 cfs @ 24.01 hrs, Volume= 1 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
4,860	39	>75% Grass cover, Good, HSG A
4,860		100.00% Pervious Area

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

Subcatchment 3S: Ex. Watershed 3



Summary for Subcatchment 4A: Showcase Property

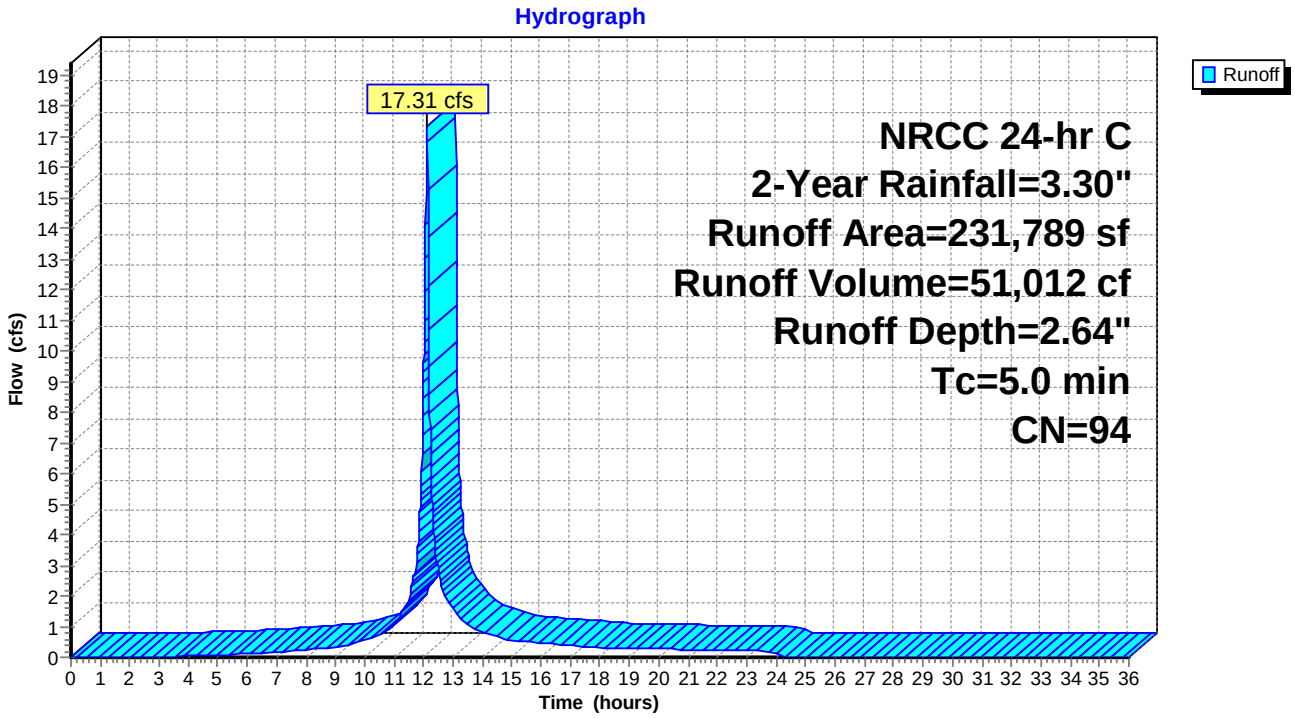
Runoff = 17.31 cfs @ 12.12 hrs, Volume= 51,012 cf, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
27,341	65	Woods/grass comb., Fair, HSG B
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	94	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Subcatchment 4A: Showcase Property



Summary for Subcatchment 4S: To Showcase

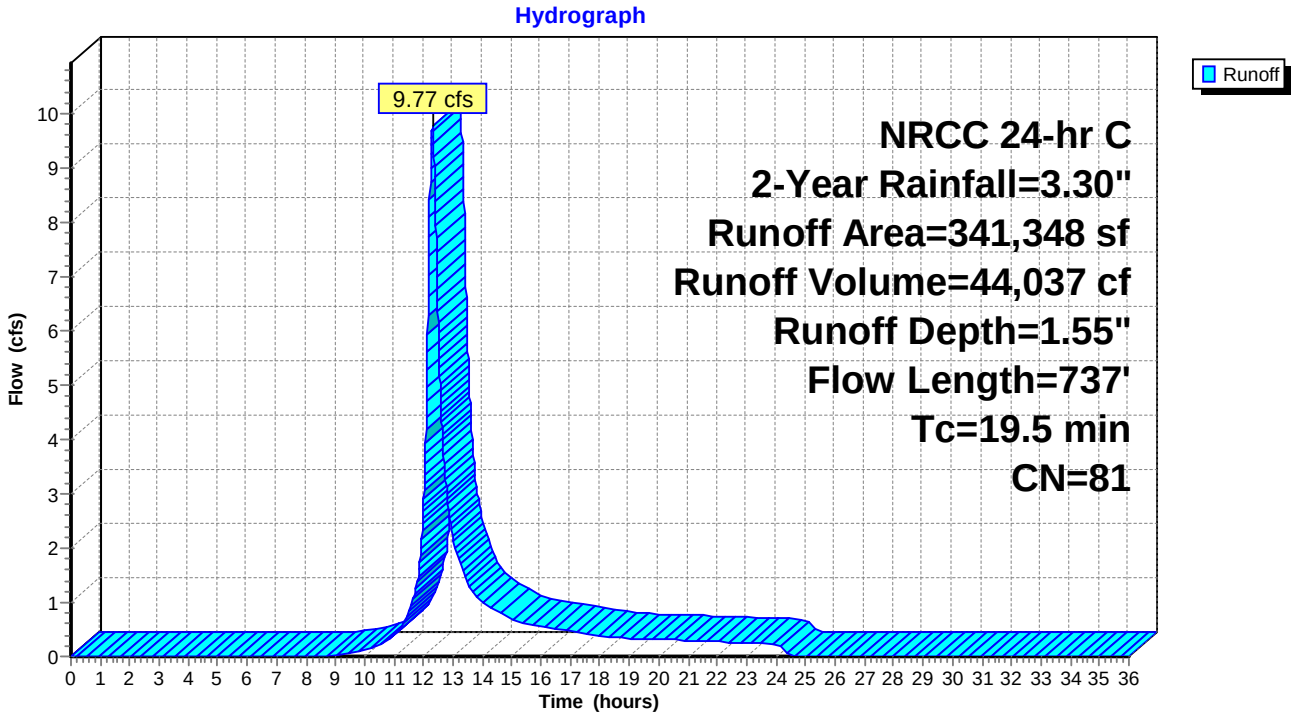
Runoff = 9.77 cfs @ 12.29 hrs, Volume= 44,037 cf, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
91,404	36	Woods, Fair, HSG A
249,944	98	Paved roads w/curbs & sewers, HSG A
341,348	81	Weighted Average
91,404		26.78% Pervious Area
249,944		73.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	50	0.0300	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
3.4	257	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	430	0.0100	9.05	44.44	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
19.5	737	Total			

Subcatchment 4S: To Showcase



Summary for Subcatchment 5S: Ex. Watershed 5

[45] Hint: Runoff=Zero

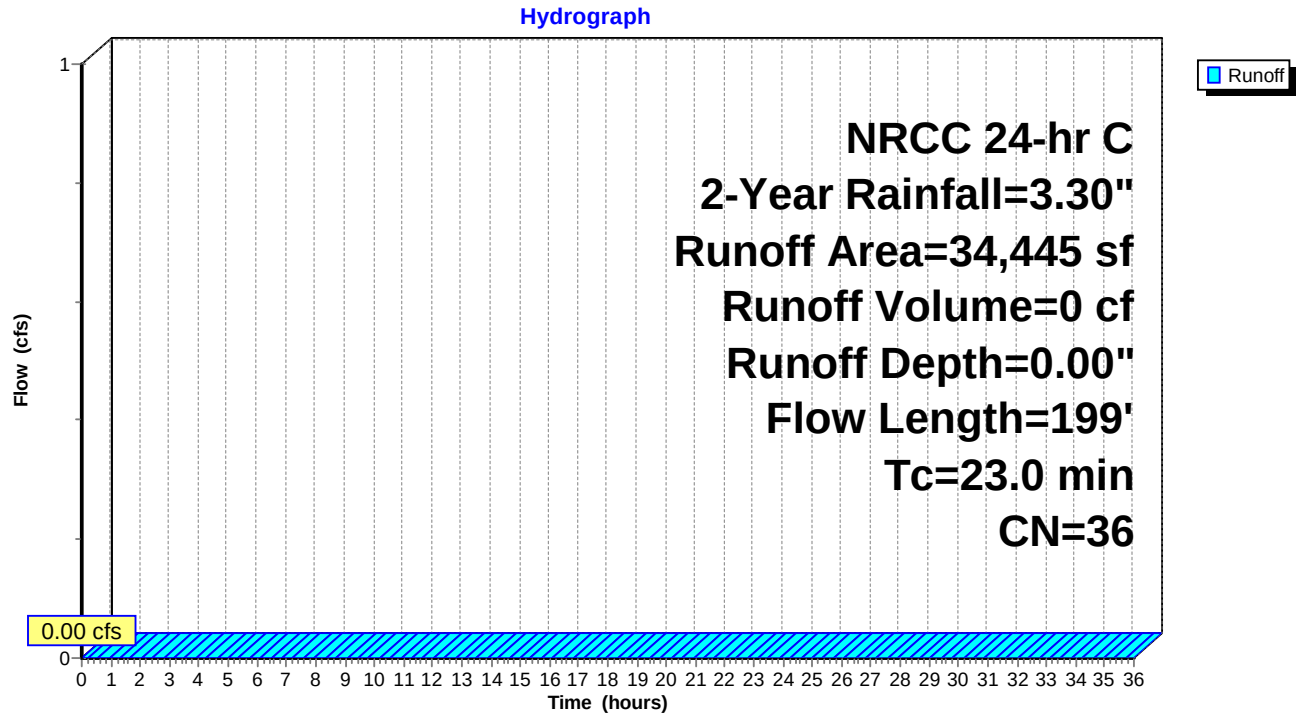
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
34,445	36	Woods, Fair, HSG A
34,445		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0200	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
5.0	149	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	199	Total			

Subcatchment 5S: Ex. Watershed 5



Summary for Subcatchment 6S: Ex. Watershed 6

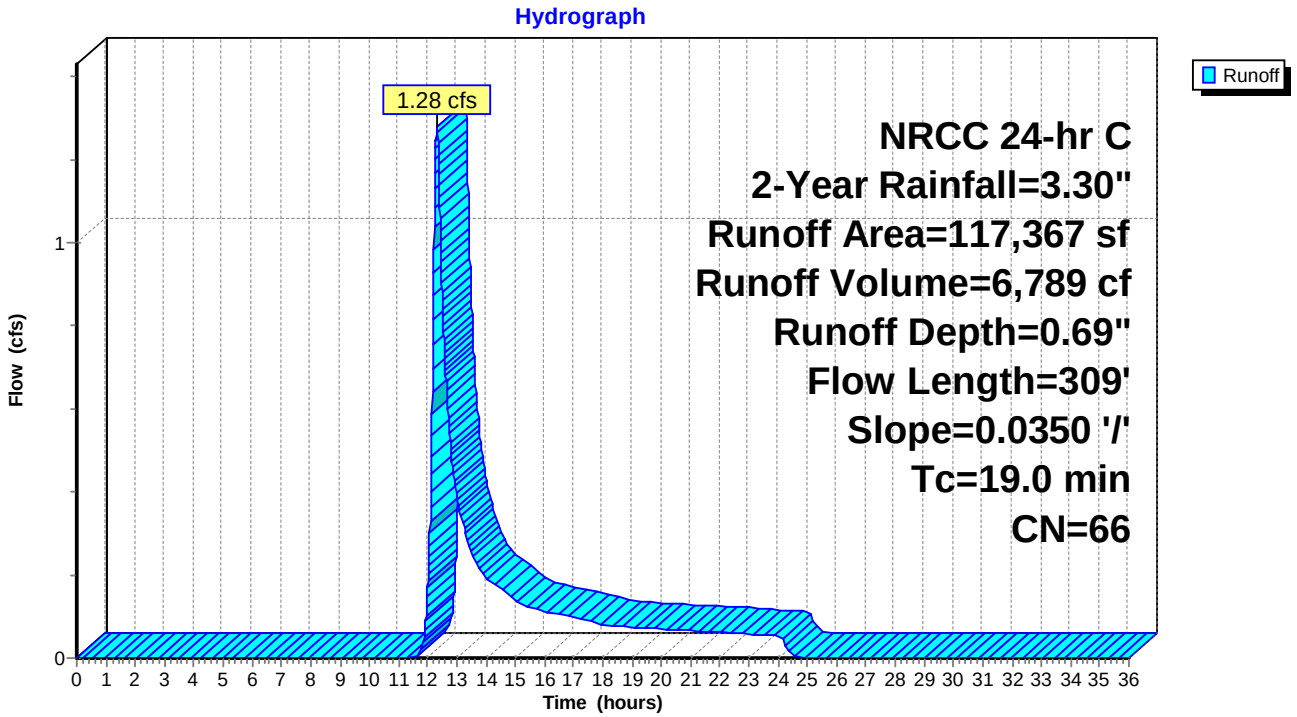
Runoff = 1.28 cfs @ 12.31 hrs, Volume= 6,789 cf, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
117,367	66	Woods, Poor, HSG B
117,367	66	Weighted Average
117,367		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	50	0.0350	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
4.6	259	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	309	Total			

Subcatchment 6S: Ex. Watershed 6



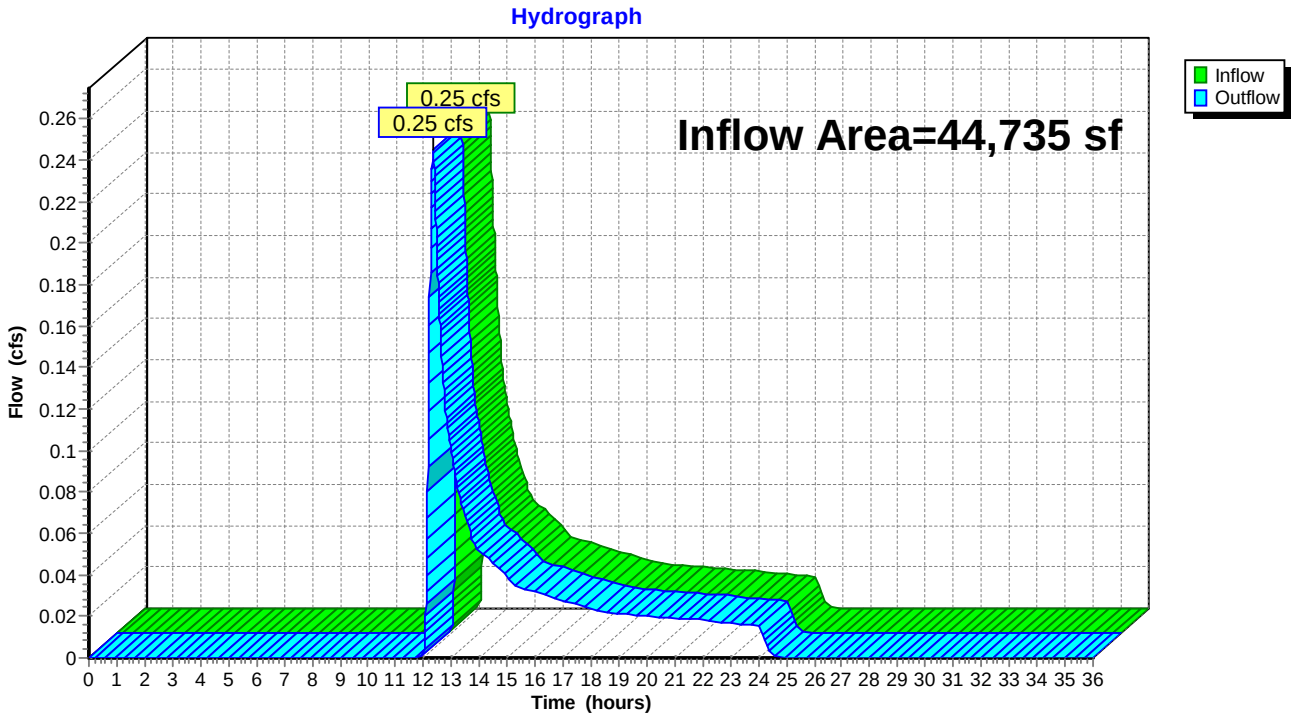
Summary for Reach 1R: Wetland 1

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

Inflow Area = 44,735 sf, 0.00% Impervious, Inflow Depth = 0.45" for 2-Year event
Inflow = 0.25 cfs @ 12.34 hrs, Volume= 1,670 cf
Outflow = 0.25 cfs @ 12.34 hrs, Volume= 1,670 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: Wetland 1



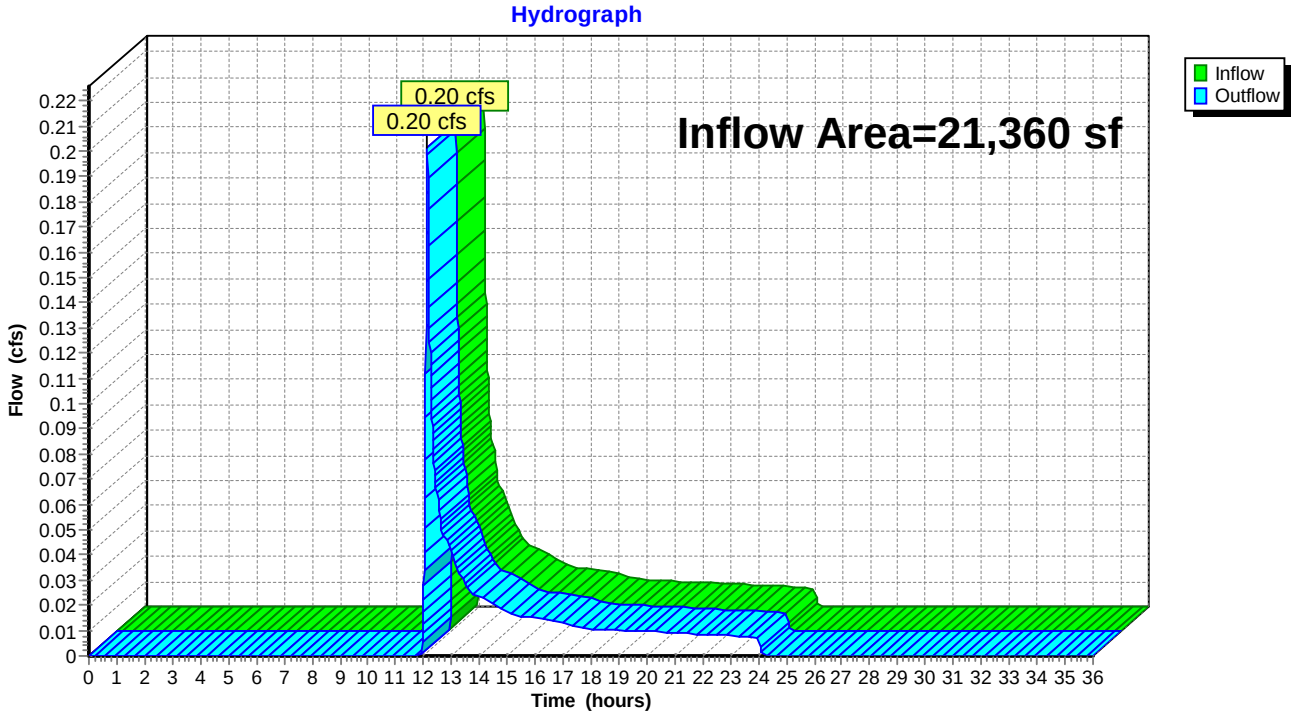
Summary for Reach 2R: Wetland D

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

Inflow Area = 21,360 sf, 0.00% Impervious, Inflow Depth = 0.45" for 2-Year event
Inflow = 0.20 cfs @ 12.14 hrs, Volume= 797 cf
Outflow = 0.20 cfs @ 12.14 hrs, Volume= 797 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 2R: Wetland D



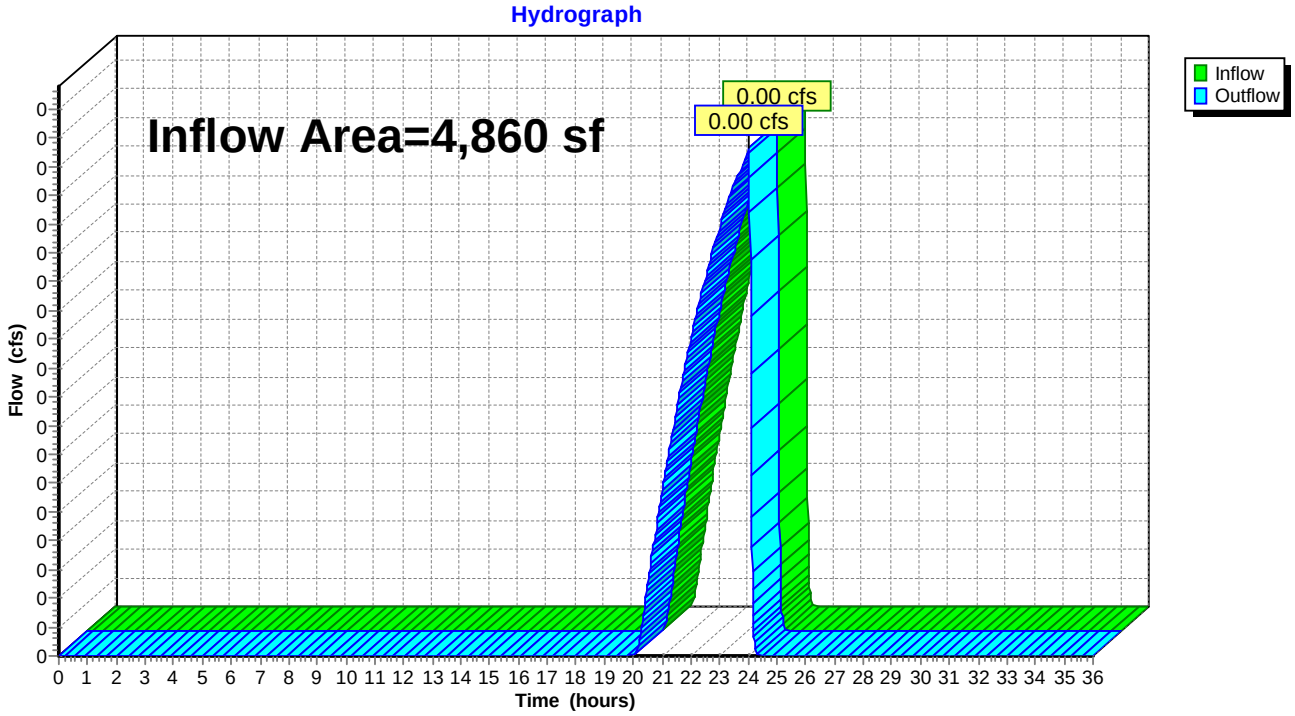
Summary for Reach 3R: Wetland M

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

Inflow Area = 4,860 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.01 hrs, Volume= 1 cf
Outflow = 0.00 cfs @ 24.01 hrs, Volume= 1 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 3R: Wetland M



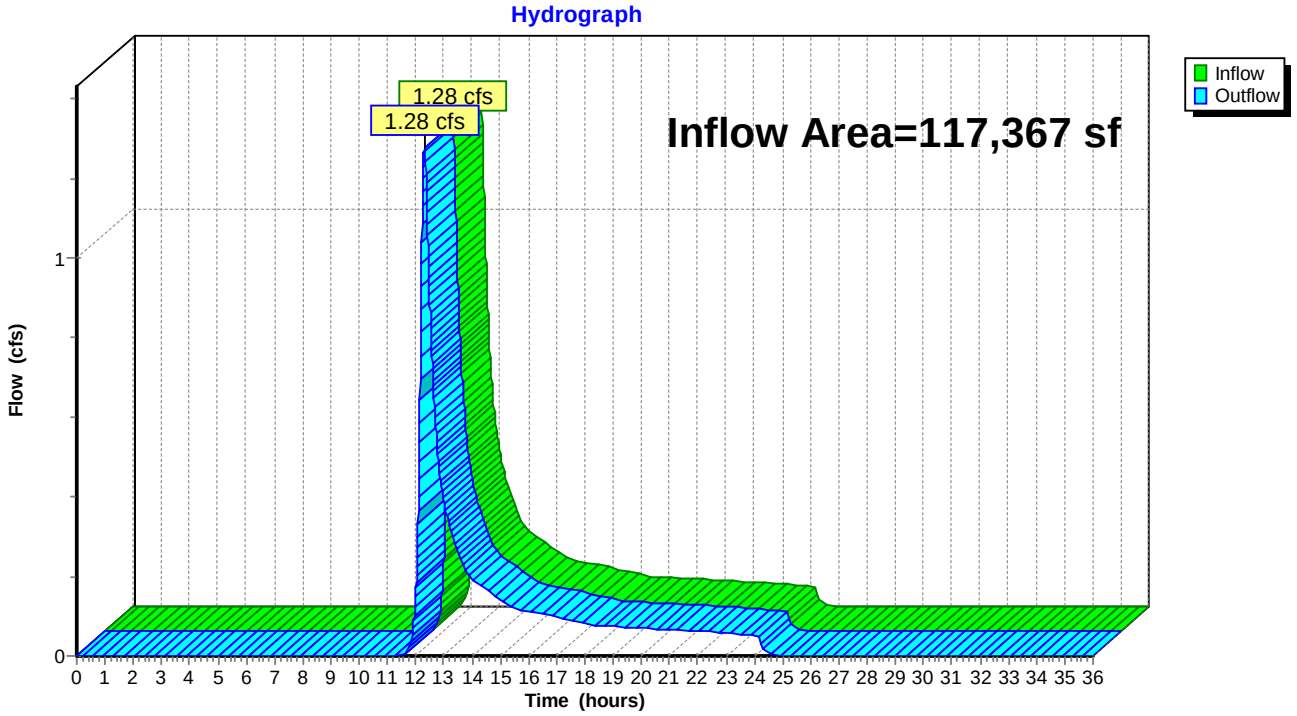
Summary for Reach 4R: Wetland N

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

Inflow Area = 117,367 sf, 0.00% Impervious, Inflow Depth = 0.69" for 2-Year event
Inflow = 1.28 cfs @ 12.31 hrs, Volume= 6,789 cf
Outflow = 1.28 cfs @ 12.31 hrs, Volume= 6,789 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 4R: Wetland N



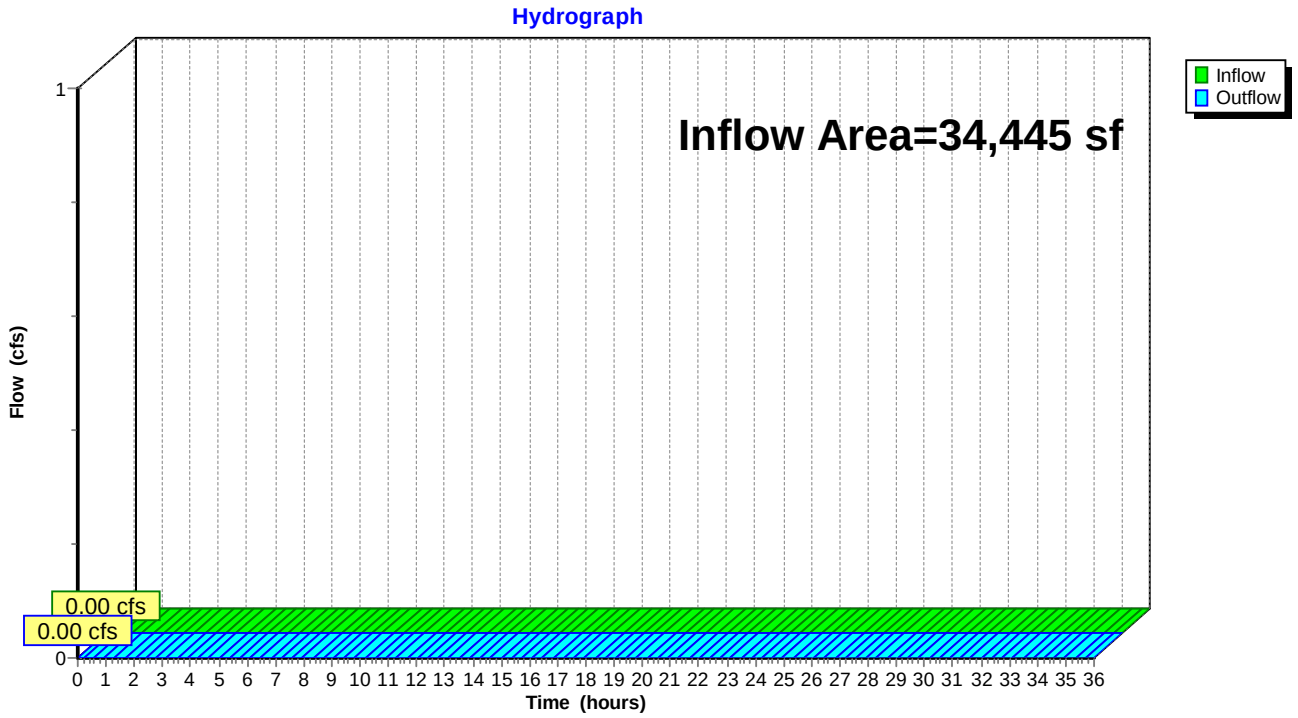
Summary for Reach 5R: Wetland C

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

Inflow Area = 34,445 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 5R: Wetland C



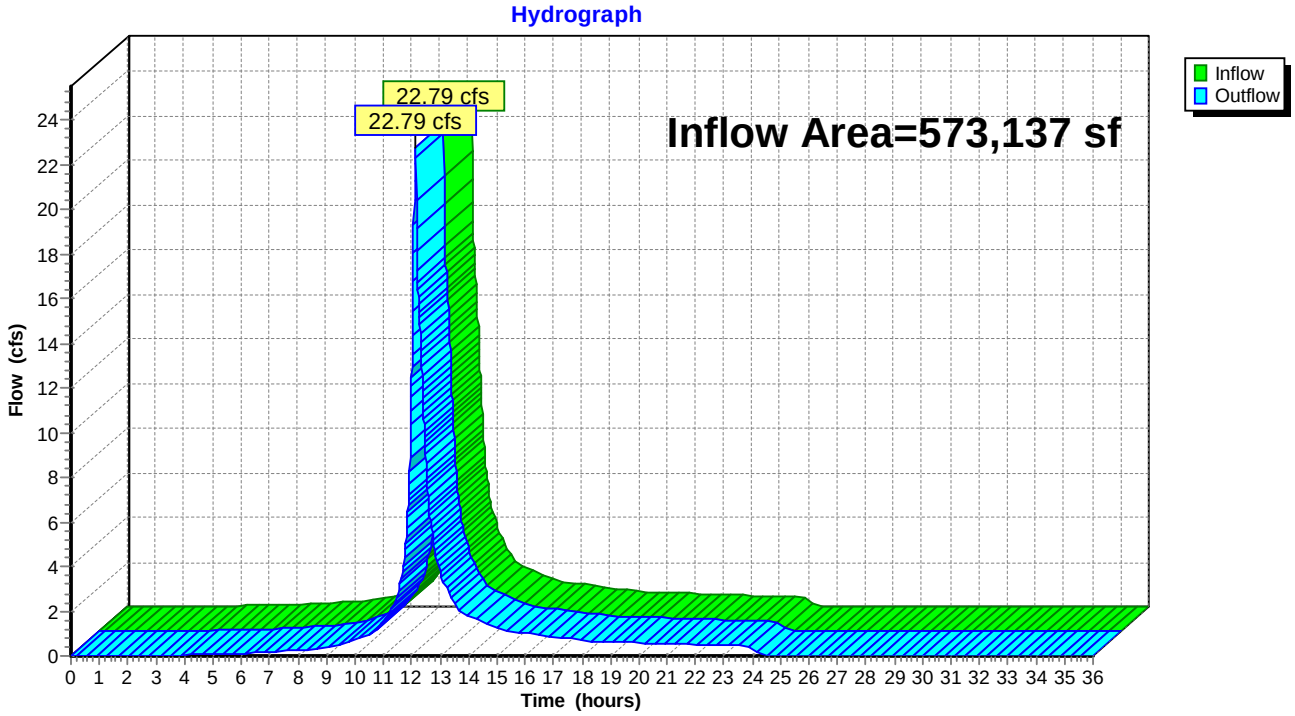
Summary for Reach 6R: Showcase Drainage System

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

Inflow Area = 573,137 sf, 79.28% Impervious, Inflow Depth = 1.99" for 2-Year event
Inflow = 22.79 cfs @ 12.13 hrs, Volume= 95,049 cf
Outflow = 22.79 cfs @ 12.13 hrs, Volume= 95,049 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Showcase Drainage System



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Ex. Watershed 1 Runoff Area=44,735 sf 0.00% Impervious Runoff Depth=1.23"
Flow Length=220' Tc=18.0 min CN=60 Runoff=0.95 cfs 4,591 cf

Subcatchment 2S: Ex. Watershed 2 Runoff Area=21,360 sf 0.00% Impervious Runoff Depth=1.23"
Flow Length=183' Tc=5.5 min CN=60 Runoff=0.74 cfs 2,192 cf

Subcatchment 3S: Ex. Watershed 3 Runoff Area=4,860 sf 0.00% Impervious Runoff Depth=0.18"
Tc=6.0 min CN=39 Runoff=0.00 cfs 71 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=4.19"
Tc=5.0 min CN=94 Runoff=26.65 cfs 80,926 cf

Subcatchment 4S: To Showcase Runoff Area=341,348 sf 73.22% Impervious Runoff Depth=2.88"
Flow Length=737' Tc=19.5 min CN=81 Runoff=18.25 cfs 81,910 cf

Subcatchment 5S: Ex. Watershed 5 Runoff Area=34,445 sf 0.00% Impervious Runoff Depth=0.09"
Flow Length=199' Tc=23.0 min CN=36 Runoff=0.01 cfs 264 cf

Subcatchment 6S: Ex. Watershed 6 Runoff Area=117,367 sf 0.00% Impervious Runoff Depth=1.65"
Flow Length=309' Slope=0.0350 '/' Tc=19.0 min CN=66 Runoff=3.48 cfs 16,103 cf

Reach 1R: Wetland 1 Inflow=0.95 cfs 4,591 cf
Outflow=0.95 cfs 4,591 cf

Reach 2R: Wetland D Inflow=0.74 cfs 2,192 cf
Outflow=0.74 cfs 2,192 cf

Reach 3R: Wetland M Inflow=0.00 cfs 71 cf
Outflow=0.00 cfs 71 cf

Reach 4R: Wetland N Inflow=3.48 cfs 16,103 cf
Outflow=3.48 cfs 16,103 cf

Reach 5R: Wetland C Inflow=0.01 cfs 264 cf
Outflow=0.01 cfs 264 cf

Reach 6R: Showcase Drainage System Inflow=37.43 cfs 162,836 cf
Outflow=37.43 cfs 162,836 cf

Total Runoff Area = 795,904 sf Runoff Volume = 186,058 cf Average Runoff Depth = 2.81"
42.91% Pervious = 341,512 sf 57.09% Impervious = 454,392 sf

Summary for Subcatchment 1S: Ex. Watershed 1

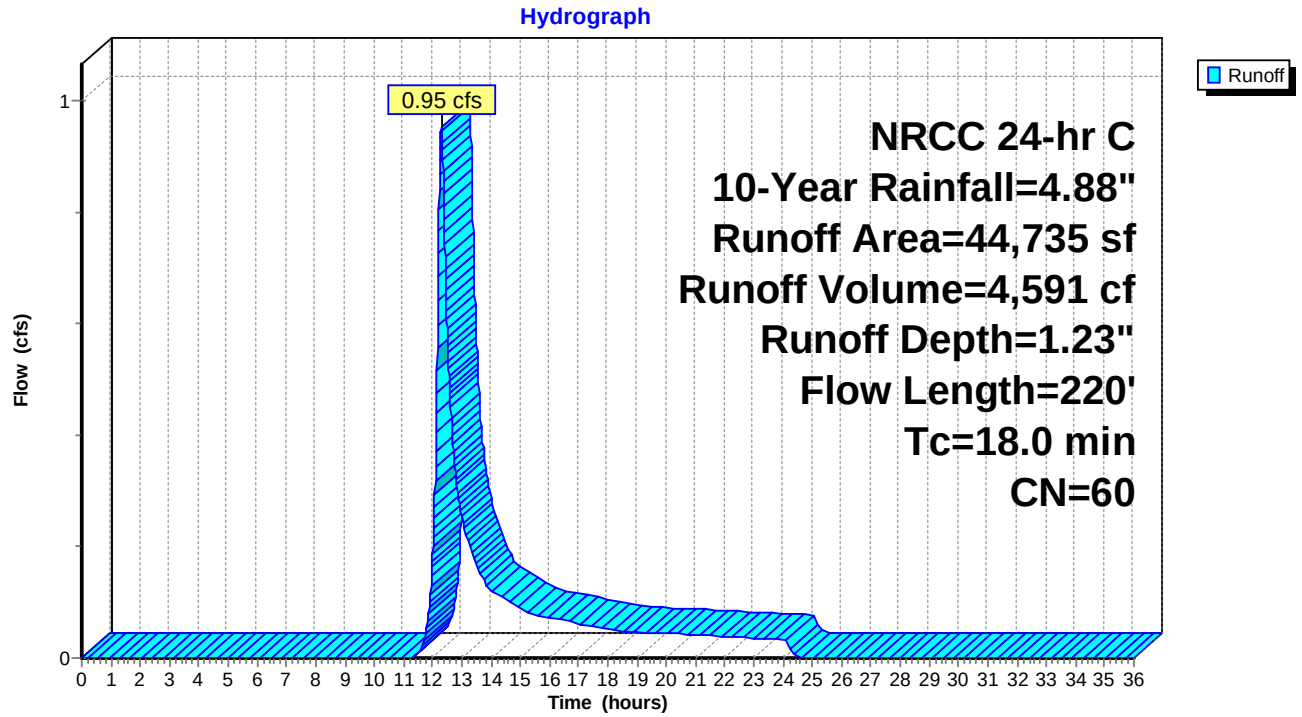
Runoff = 0.95 cfs @ 12.30 hrs, Volume= 4,591 cf, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
44,735	60	Woods, Fair, HSG B
44,735		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0250	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.2	120	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	50	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.0	220	Total			

Subcatchment 1S: Ex. Watershed 1



Summary for Subcatchment 2S: Ex. Watershed 2

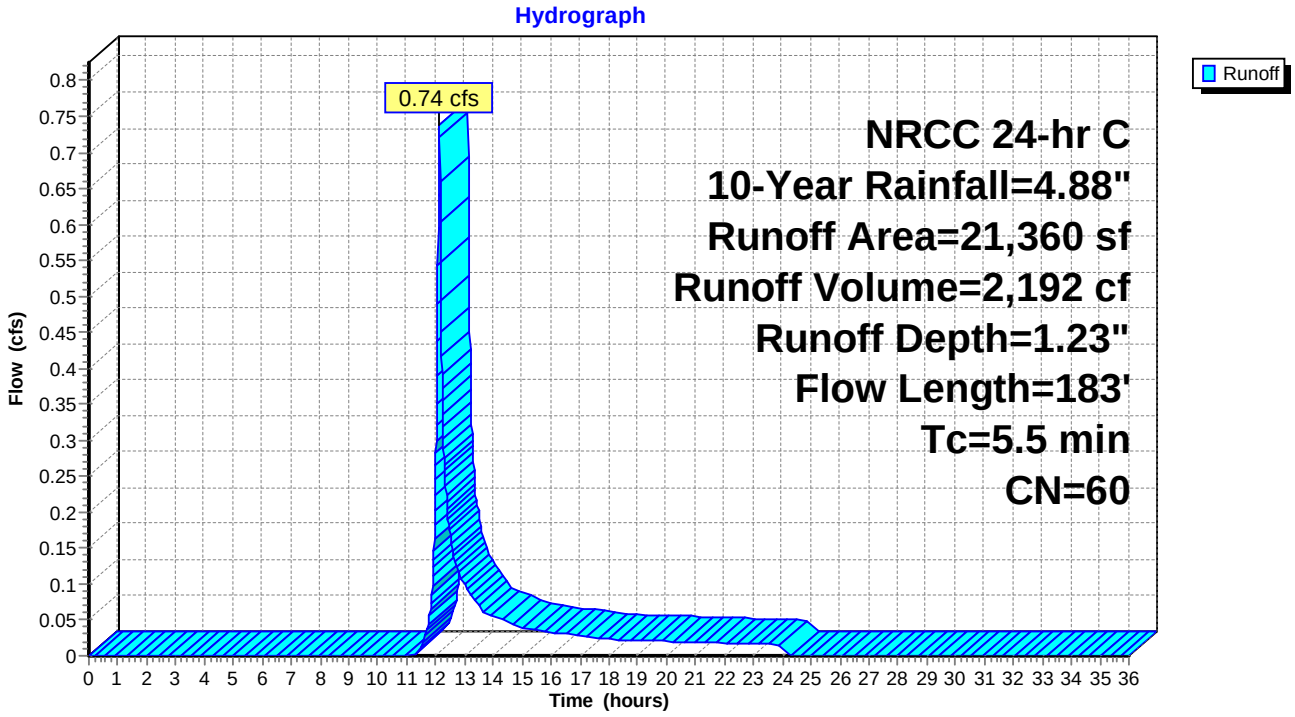
Runoff = 0.74 cfs @ 12.13 hrs, Volume= 2,192 cf, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
21,360	60	Woods, Fair, HSG B
21,360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.1000	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.2	133	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.5	183	Total			

Subcatchment 2S: Ex. Watershed 2



Summary for Subcatchment 3S: Ex. Watershed 3

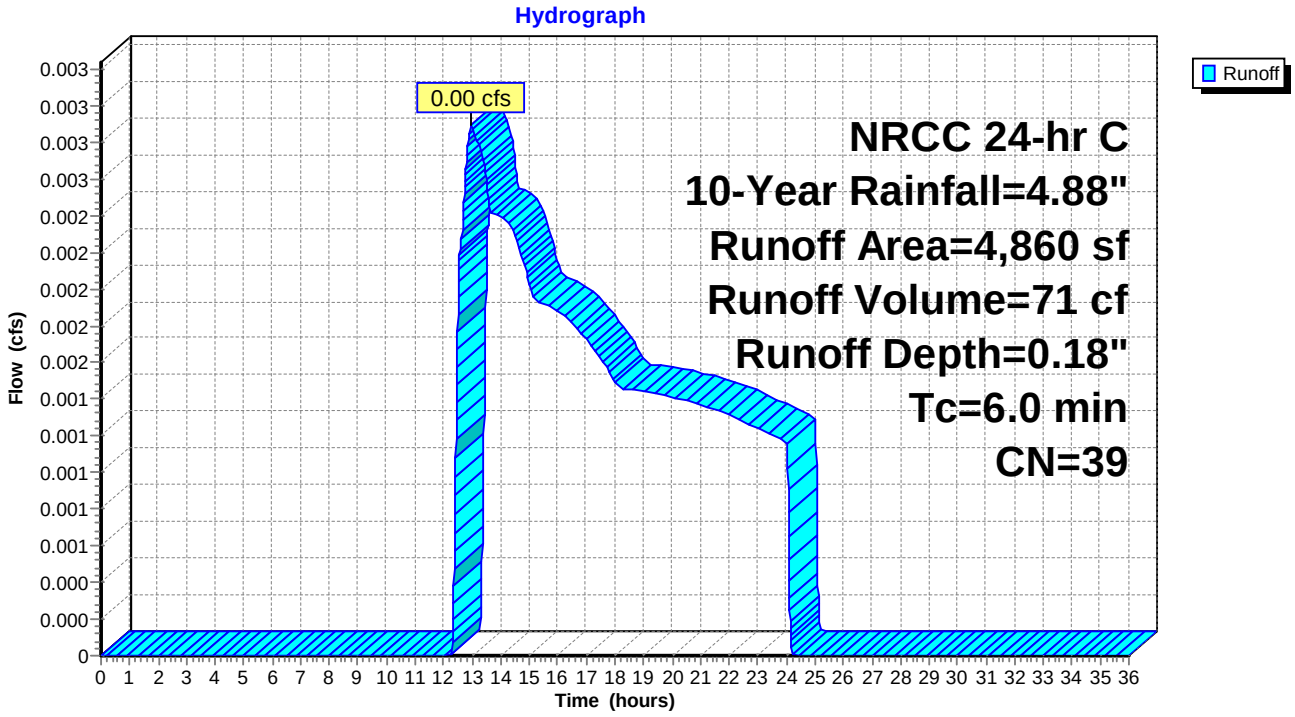
Runoff = 0.00 cfs @ 12.95 hrs, Volume= 71 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
4,860	39	>75% Grass cover, Good, HSG A
4,860		100.00% Pervious Area

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

Subcatchment 3S: Ex. Watershed 3



Summary for Subcatchment 4A: Showcase Property

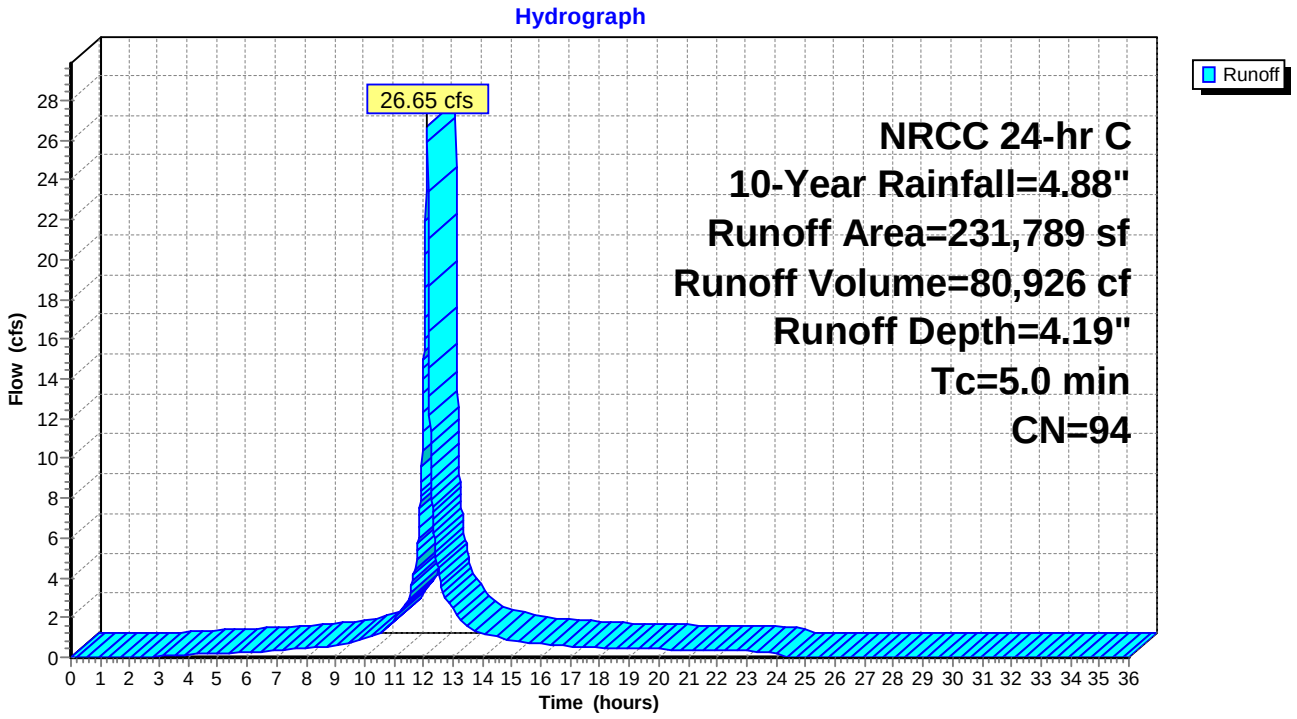
Runoff = 26.65 cfs @ 12.12 hrs, Volume= 80,926 cf, Depth= 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
27,341	65	Woods/grass comb., Fair, HSG B
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	94	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Subcatchment 4A: Showcase Property



Summary for Subcatchment 4S: To Showcase

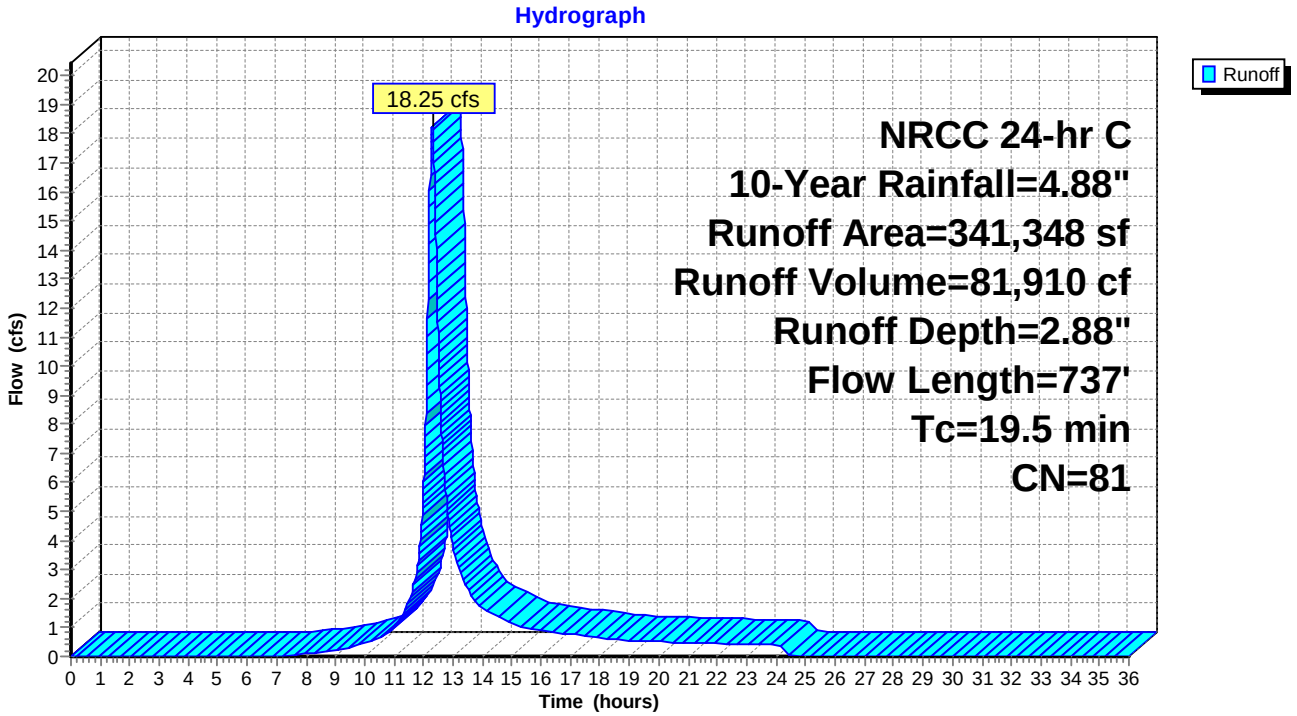
Runoff = 18.25 cfs @ 12.29 hrs, Volume= 81,910 cf, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
91,404	36	Woods, Fair, HSG A
249,944	98	Paved roads w/curbs & sewers, HSG A
341,348	81	Weighted Average
91,404		26.78% Pervious Area
249,944		73.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	50	0.0300	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
3.4	257	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	430	0.0100	9.05	44.44	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
19.5	737	Total			

Subcatchment 4S: To Showcase



Summary for Subcatchment 5S: Ex. Watershed 5

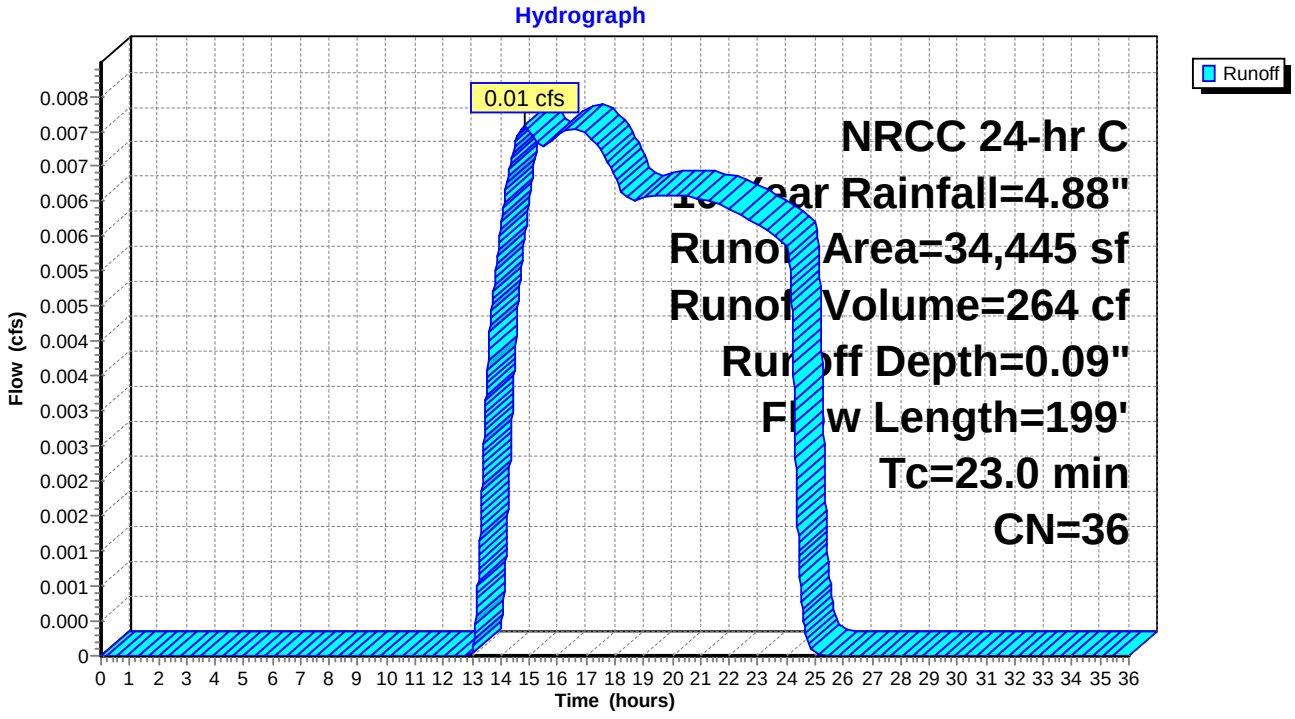
Runoff = 0.01 cfs @ 14.85 hrs, Volume= 264 cf, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
34,445	36	Woods, Fair, HSG A
34,445		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0200	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
5.0	149	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	199	Total			

Subcatchment 5S: Ex. Watershed 5



Summary for Subcatchment 6S: Ex. Watershed 6

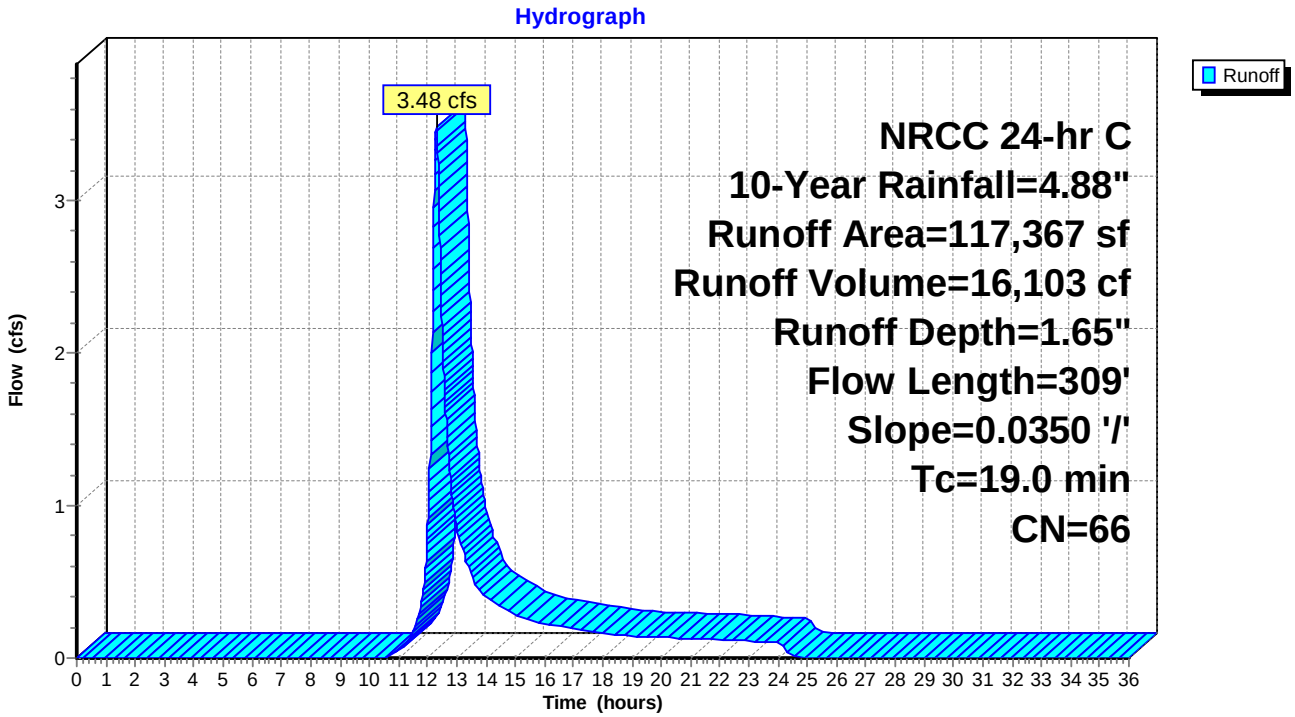
Runoff = 3.48 cfs @ 12.30 hrs, Volume= 16,103 cf, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
117,367	66	Woods, Poor, HSG B
117,367	66	Weighted Average
117,367		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	50	0.0350	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
4.6	259	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	309	Total			

Subcatchment 6S: Ex. Watershed 6



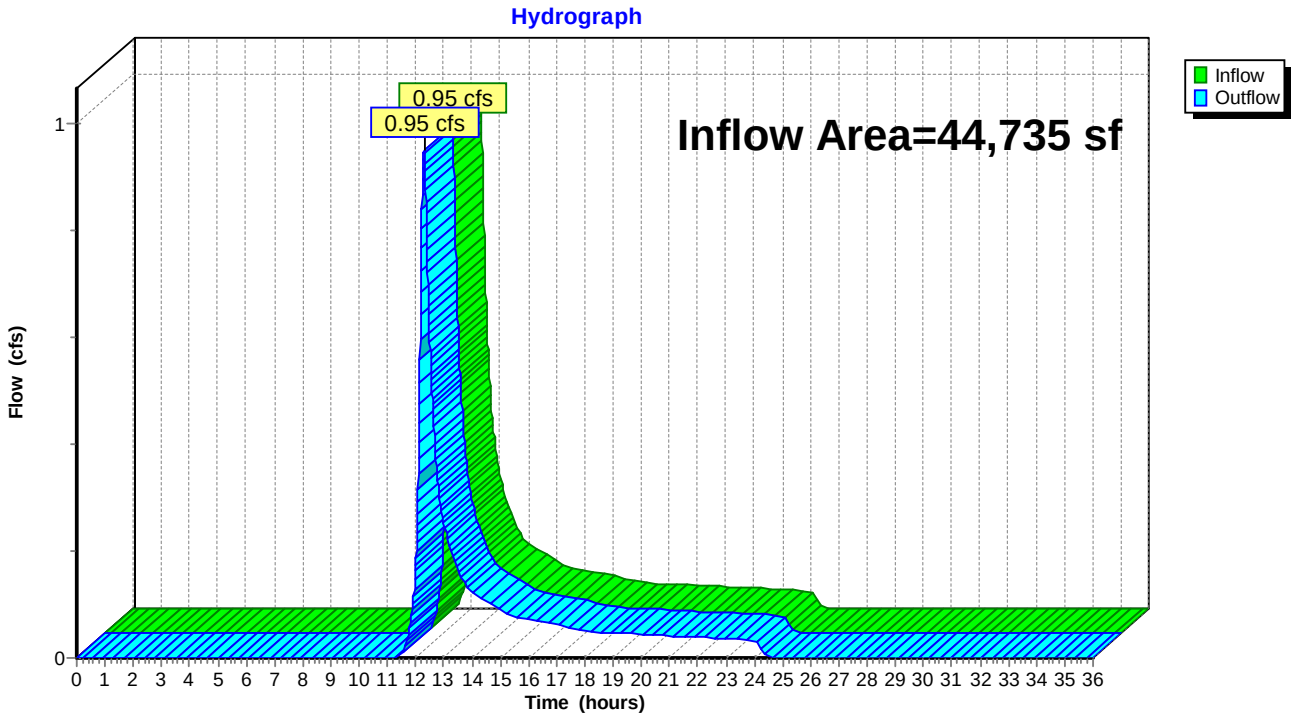
Summary for Reach 1R: Wetland 1

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

Inflow Area = 44,735 sf, 0.00% Impervious, Inflow Depth = 1.23" for 10-Year event
Inflow = 0.95 cfs @ 12.30 hrs, Volume= 4,591 cf
Outflow = 0.95 cfs @ 12.30 hrs, Volume= 4,591 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: Wetland 1



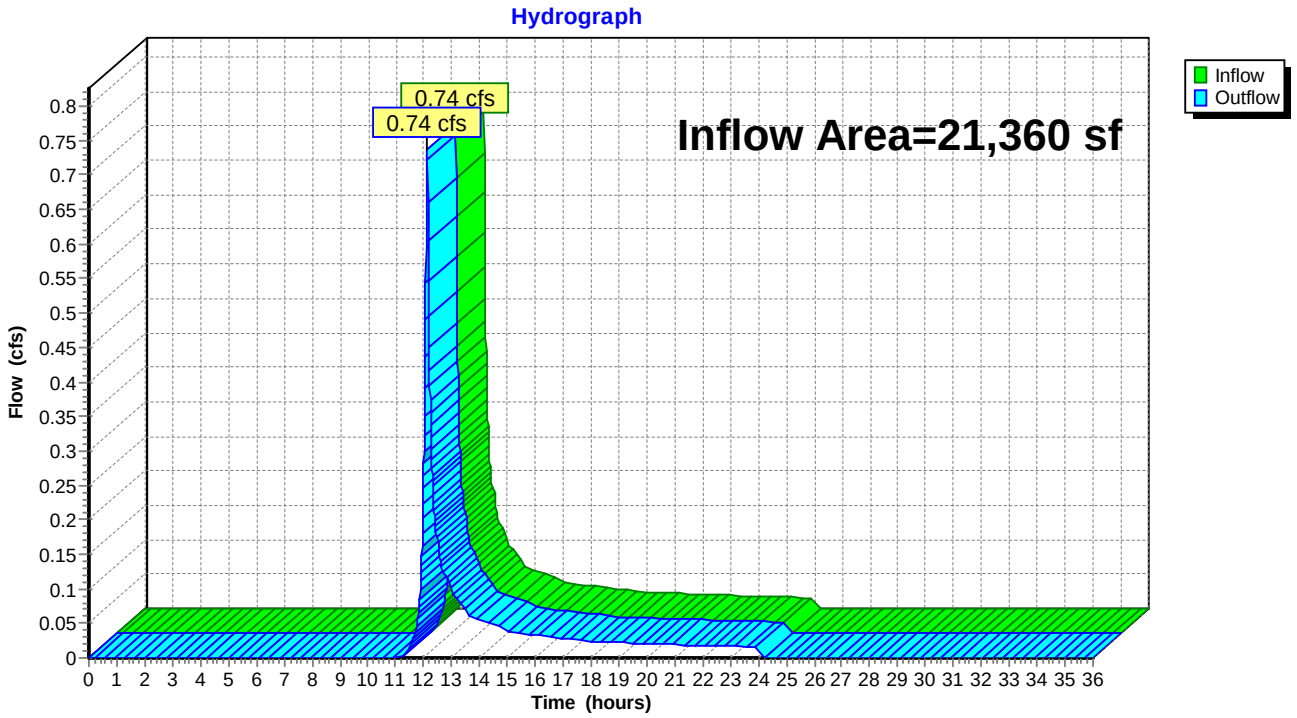
Summary for Reach 2R: Wetland D

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

Inflow Area = 21,360 sf, 0.00% Impervious, Inflow Depth = 1.23" for 10-Year event
Inflow = 0.74 cfs @ 12.13 hrs, Volume= 2,192 cf
Outflow = 0.74 cfs @ 12.13 hrs, Volume= 2,192 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 2R: Wetland D



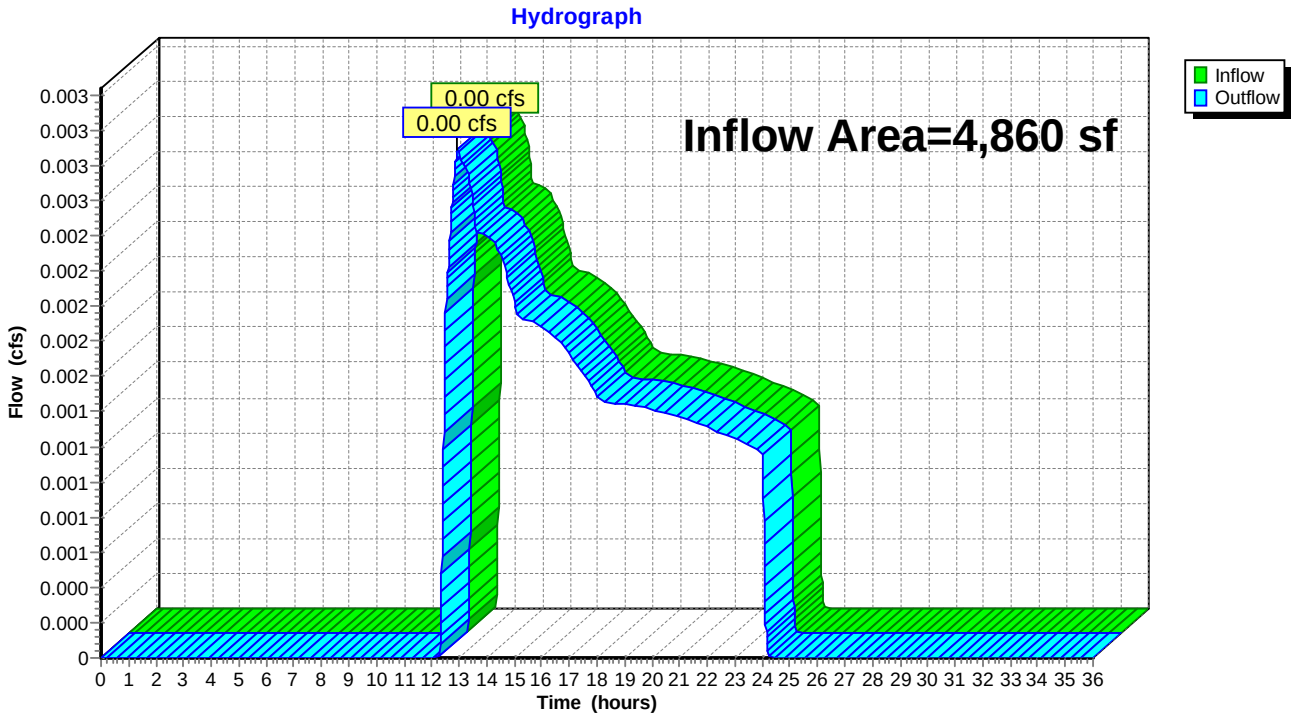
Summary for Reach 3R: Wetland M

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

Inflow Area = 4,860 sf, 0.00% Impervious, Inflow Depth = 0.18" for 10-Year event
Inflow = 0.00 cfs @ 12.95 hrs, Volume= 71 cf
Outflow = 0.00 cfs @ 12.95 hrs, Volume= 71 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 3R: Wetland M



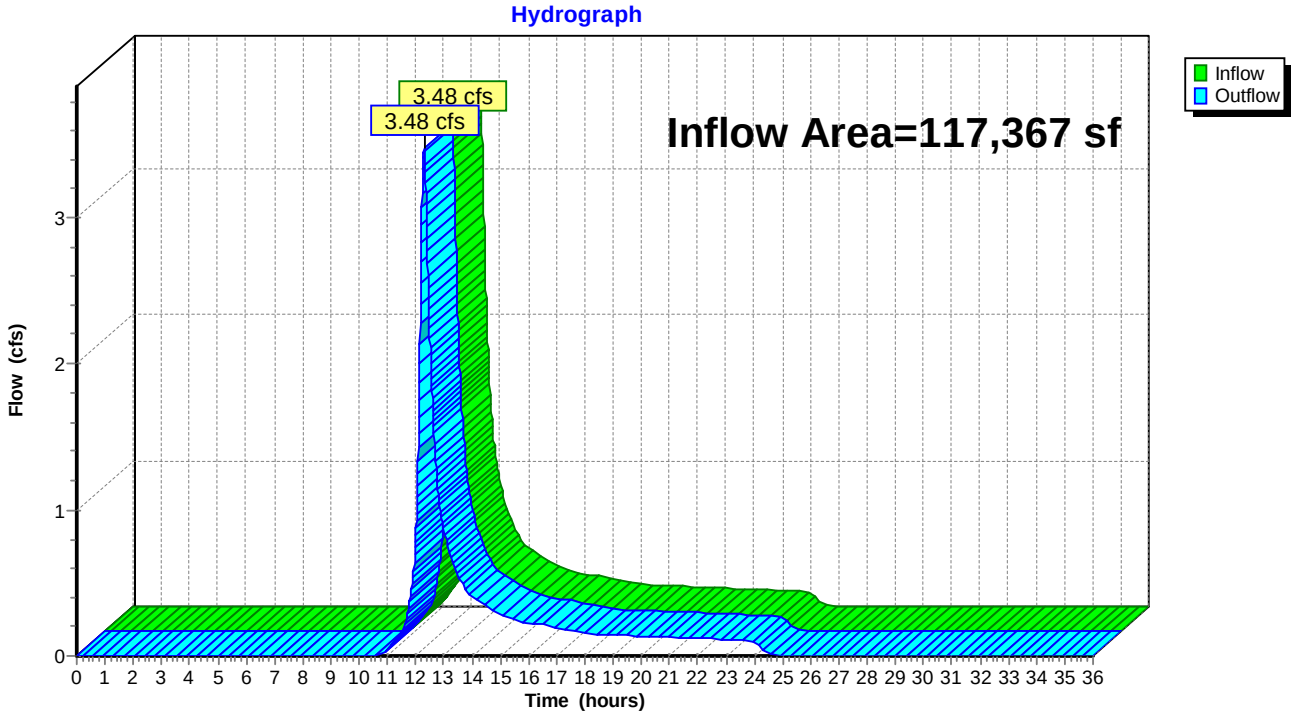
Summary for Reach 4R: Wetland N

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

Inflow Area = 117,367 sf, 0.00% Impervious, Inflow Depth = 1.65" for 10-Year event
Inflow = 3.48 cfs @ 12.30 hrs, Volume= 16,103 cf
Outflow = 3.48 cfs @ 12.30 hrs, Volume= 16,103 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 4R: Wetland N



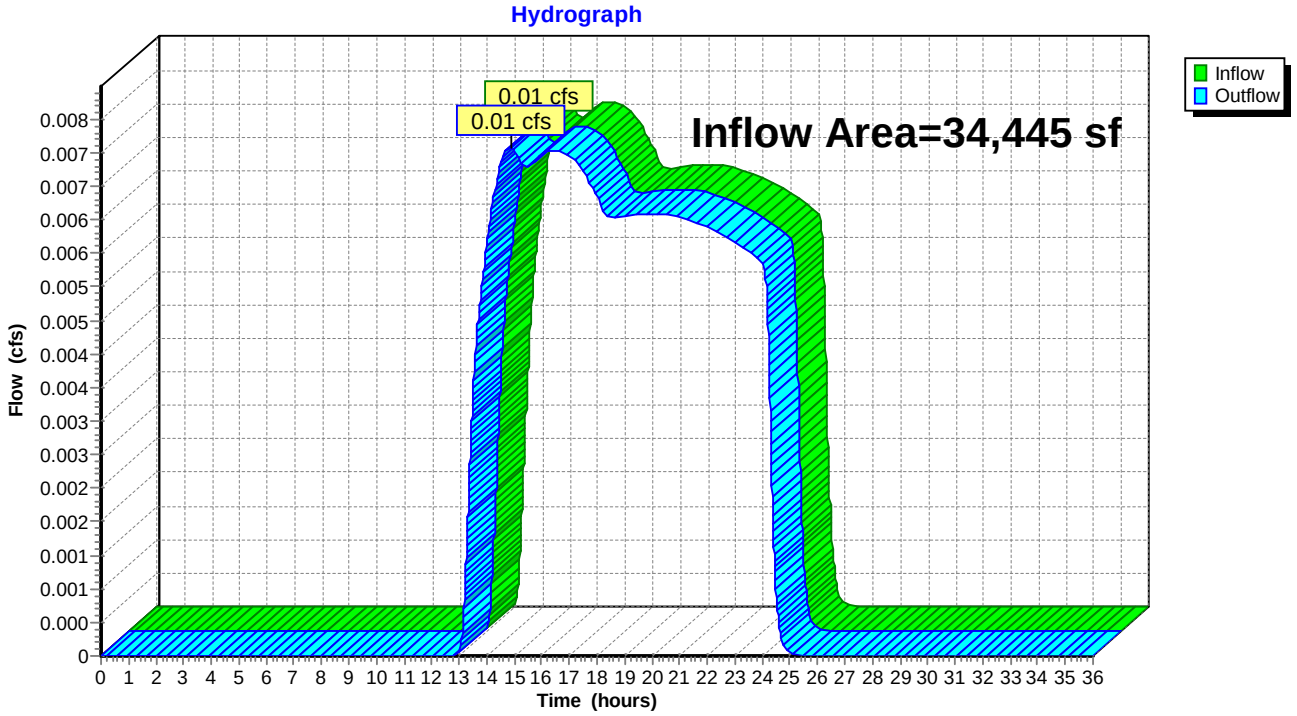
Summary for Reach 5R: Wetland C

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

Inflow Area = 34,445 sf, 0.00% Impervious, Inflow Depth = 0.09" for 10-Year event
Inflow = 0.01 cfs @ 14.85 hrs, Volume= 264 cf
Outflow = 0.01 cfs @ 14.85 hrs, Volume= 264 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 5R: Wetland C



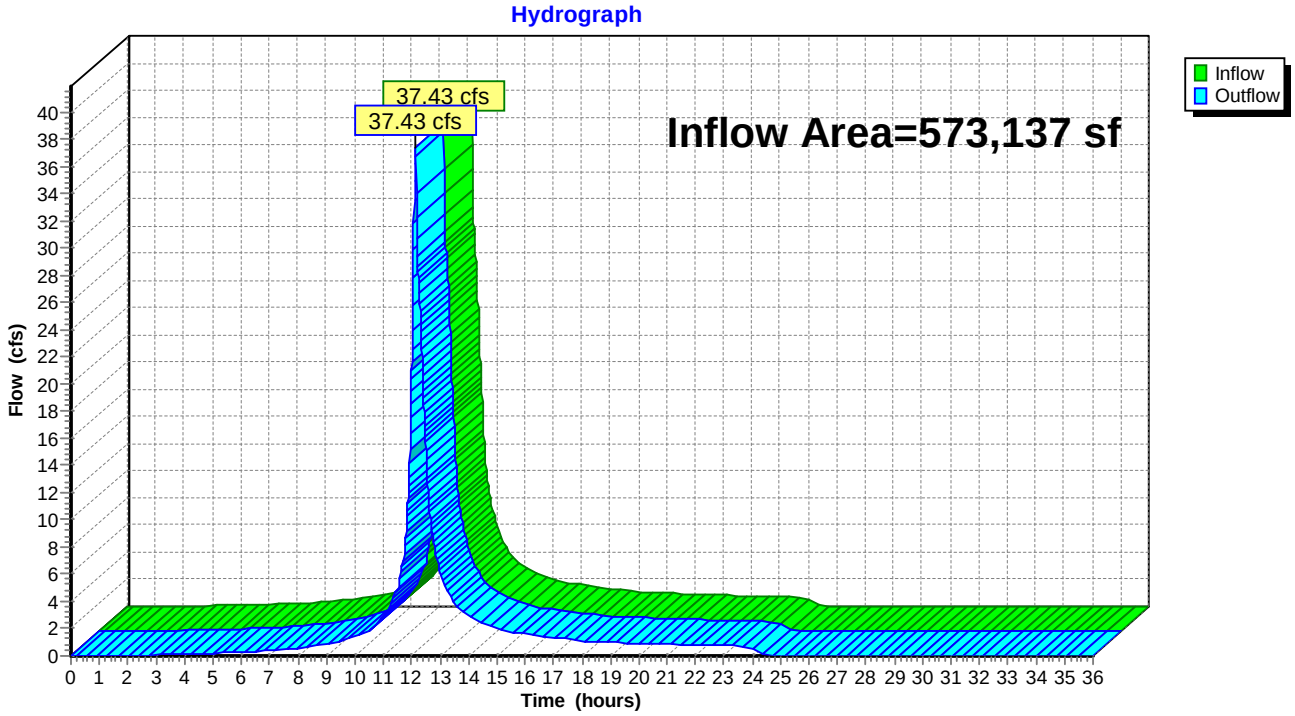
Summary for Reach 6R: Showcase Drainage System

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

Inflow Area = 573,137 sf, 79.28% Impervious, Inflow Depth = 3.41" for 10-Year event
Inflow = 37.43 cfs @ 12.13 hrs, Volume= 162,836 cf
Outflow = 37.43 cfs @ 12.13 hrs, Volume= 162,836 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Showcase Drainage System



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Ex. Watershed 1 Runoff Area=44,735 sf 0.00% Impervious Runoff Depth=1.99"
Flow Length=220' Tc=18.0 min CN=60 Runoff=1.63 cfs 7,408 cf

Subcatchment 2S: Ex. Watershed 2 Runoff Area=21,360 sf 0.00% Impervious Runoff Depth=1.99"
Flow Length=183' Tc=5.5 min CN=60 Runoff=1.24 cfs 3,537 cf

Subcatchment 3S: Ex. Watershed 3 Runoff Area=4,860 sf 0.00% Impervious Runoff Depth=0.47"
Tc=6.0 min CN=39 Runoff=0.02 cfs 192 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=5.40"
Tc=5.0 min CN=94 Runoff=33.78 cfs 104,221 cf

Subcatchment 4S: To Showcase Runoff Area=341,348 sf 73.22% Impervious Runoff Depth=3.97"
Flow Length=737' Tc=19.5 min CN=81 Runoff=25.04 cfs 113,071 cf

Subcatchment 5S: Ex. Watershed 5 Runoff Area=34,445 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=199' Tc=23.0 min CN=36 Runoff=0.05 cfs 914 cf

Subcatchment 6S: Ex. Watershed 6 Runoff Area=117,367 sf 0.00% Impervious Runoff Depth=2.51"
Flow Length=309' Slope=0.0350 '/' Tc=19.0 min CN=66 Runoff=5.46 cfs 24,594 cf

Reach 1R: Wetland 1 Inflow=1.63 cfs 7,408 cf
Outflow=1.63 cfs 7,408 cf

Reach 2R: Wetland D Inflow=1.24 cfs 3,537 cf
Outflow=1.24 cfs 3,537 cf

Reach 3R: Wetland M Inflow=0.02 cfs 192 cf
Outflow=0.02 cfs 192 cf

Reach 4R: Wetland N Inflow=5.46 cfs 24,594 cf
Outflow=5.46 cfs 24,594 cf

Reach 5R: Wetland C Inflow=0.05 cfs 914 cf
Outflow=0.05 cfs 914 cf

Reach 6R: Showcase Drainage System Inflow=48.89 cfs 217,293 cf
Outflow=48.89 cfs 217,293 cf

Total Runoff Area = 795,904 sf Runoff Volume = 253,939 cf Average Runoff Depth = 3.83"
42.91% Pervious = 341,512 sf 57.09% Impervious = 454,392 sf

Summary for Subcatchment 1S: Ex. Watershed 1

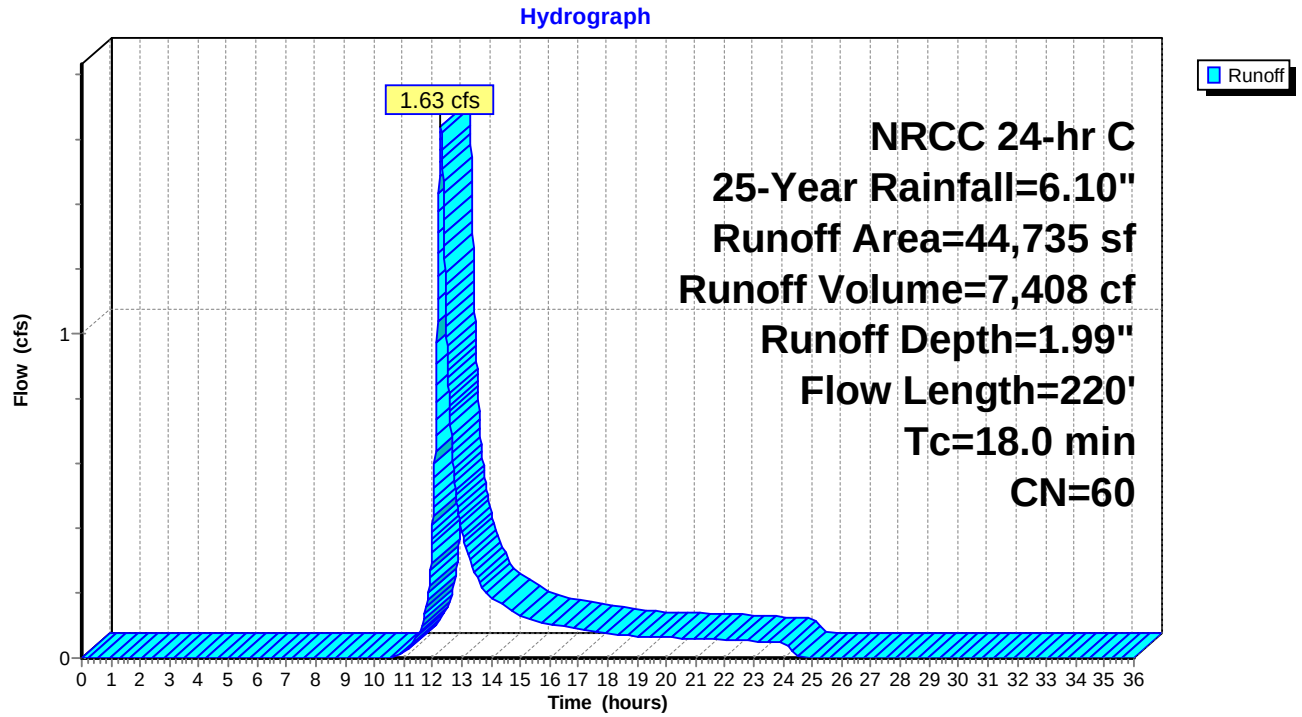
Runoff = 1.63 cfs @ 12.28 hrs, Volume= 7,408 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
44,735	60	Woods, Fair, HSG B
44,735		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0250	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.2	120	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	50	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.0	220	Total			

Subcatchment 1S: Ex. Watershed 1



Summary for Subcatchment 2S: Ex. Watershed 2

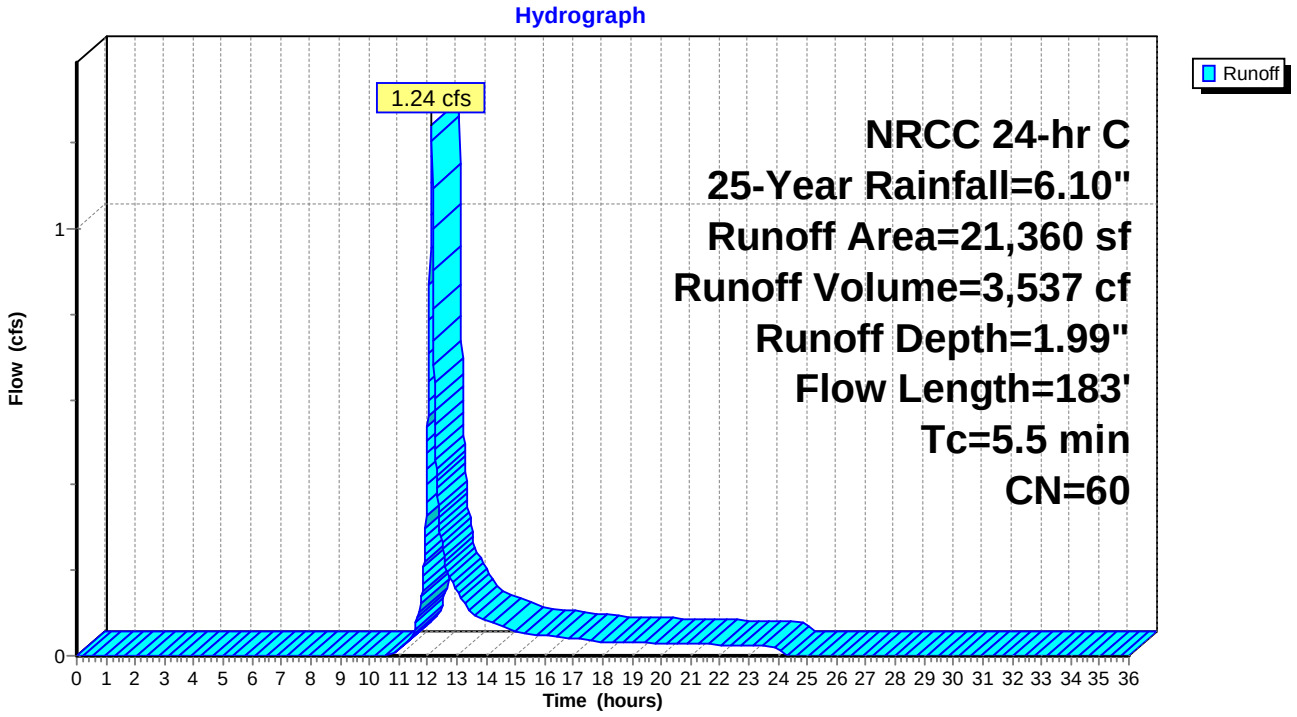
Runoff = 1.24 cfs @ 12.13 hrs, Volume= 3,537 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
21,360	60	Woods, Fair, HSG B
21,360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.1000	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.2	133	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.5	183	Total			

Subcatchment 2S: Ex. Watershed 2



Summary for Subcatchment 3S: Ex. Watershed 3

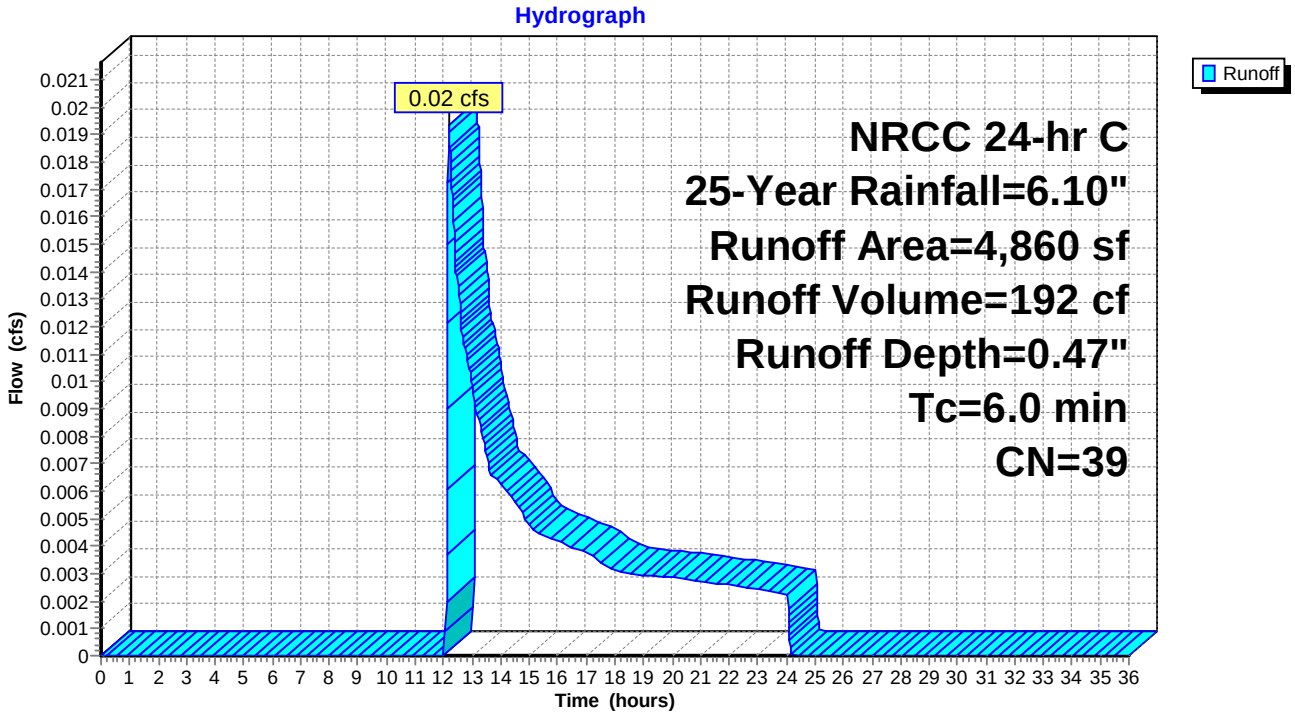
Runoff = 0.02 cfs @ 12.18 hrs, Volume= 192 cf, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
4,860	39	>75% Grass cover, Good, HSG A
4,860		100.00% Pervious Area

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

Subcatchment 3S: Ex. Watershed 3



Summary for Subcatchment 4A: Showcase Property

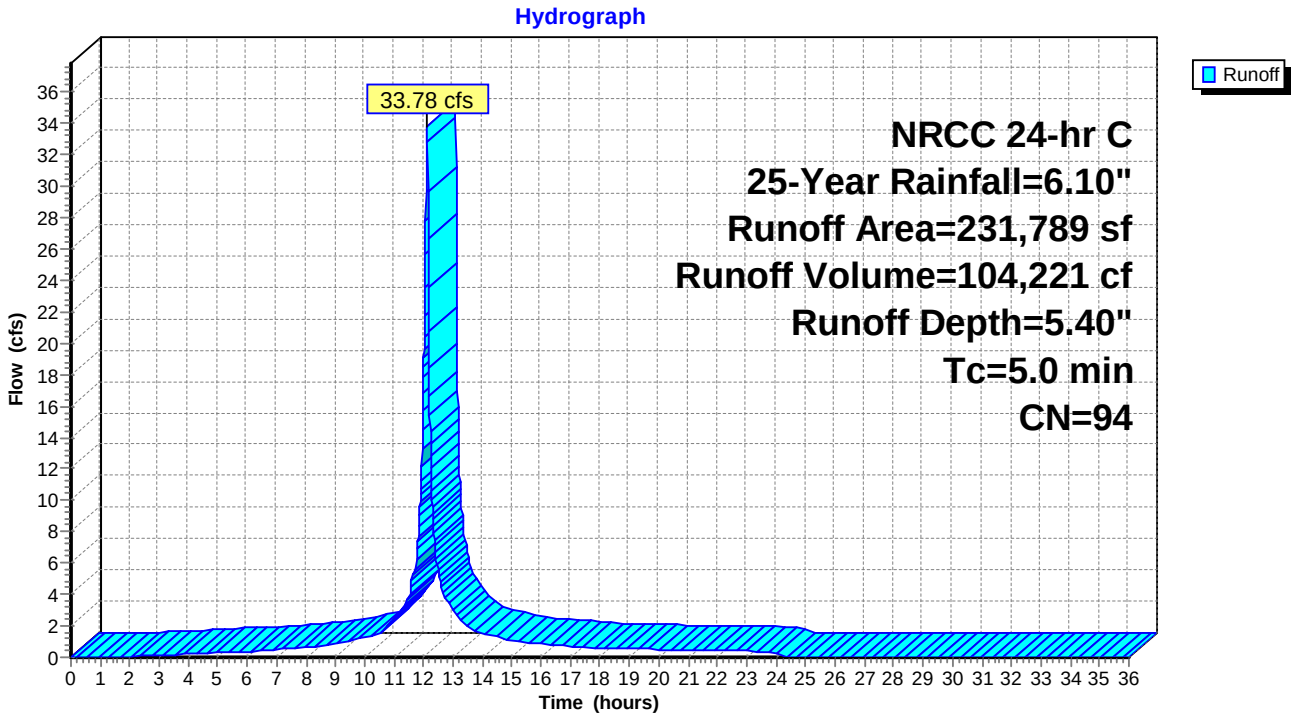
Runoff = 33.78 cfs @ 12.12 hrs, Volume= 104,221 cf, Depth= 5.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
27,341	65	Woods/grass comb., Fair, HSG B
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	94	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Subcatchment 4A: Showcase Property



Summary for Subcatchment 4S: To Showcase

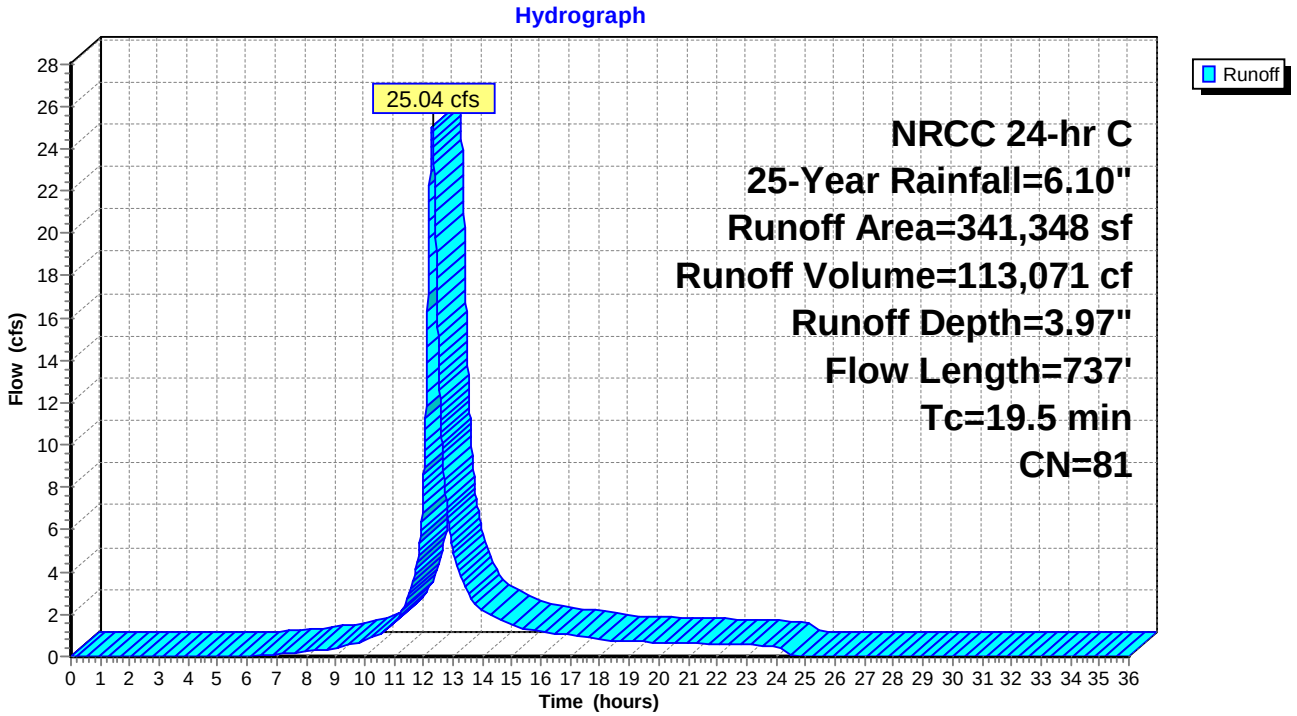
Runoff = 25.04 cfs @ 12.28 hrs, Volume= 113,071 cf, Depth= 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
91,404	36	Woods, Fair, HSG A
249,944	98	Paved roads w/curbs & sewers, HSG A
341,348	81	Weighted Average
91,404		26.78% Pervious Area
249,944		73.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	50	0.0300	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
3.4	257	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	430	0.0100	9.05	44.44	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
19.5	737	Total			

Subcatchment 4S: To Showcase



Summary for Subcatchment 5S: Ex. Watershed 5

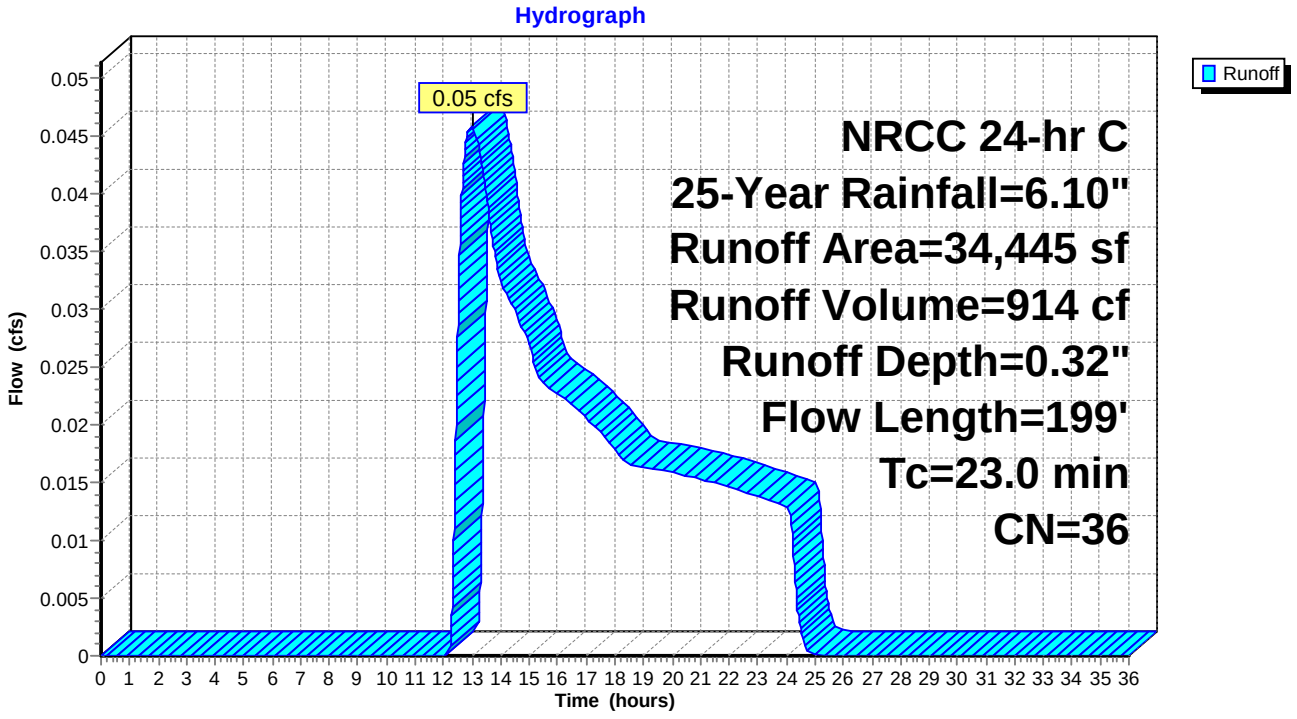
Runoff = 0.05 cfs @ 13.01 hrs, Volume= 914 cf, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
34,445	36	Woods, Fair, HSG A
34,445		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0200	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
5.0	149	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	199	Total			

Subcatchment 5S: Ex. Watershed 5



Summary for Subcatchment 6S: Ex. Watershed 6

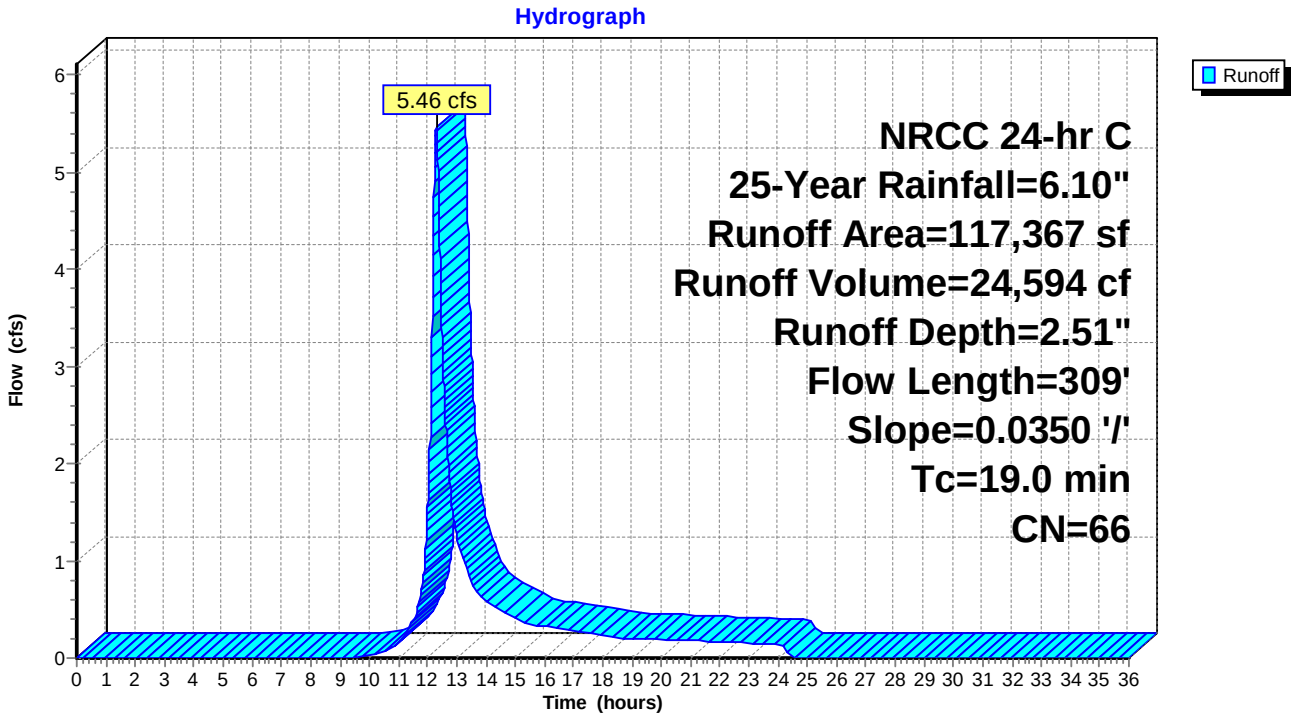
Runoff = 5.46 cfs @ 12.29 hrs, Volume= 24,594 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
117,367	66	Woods, Poor, HSG B
117,367	66	Weighted Average
117,367		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	50	0.0350	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
4.6	259	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	309	Total			

Subcatchment 6S: Ex. Watershed 6



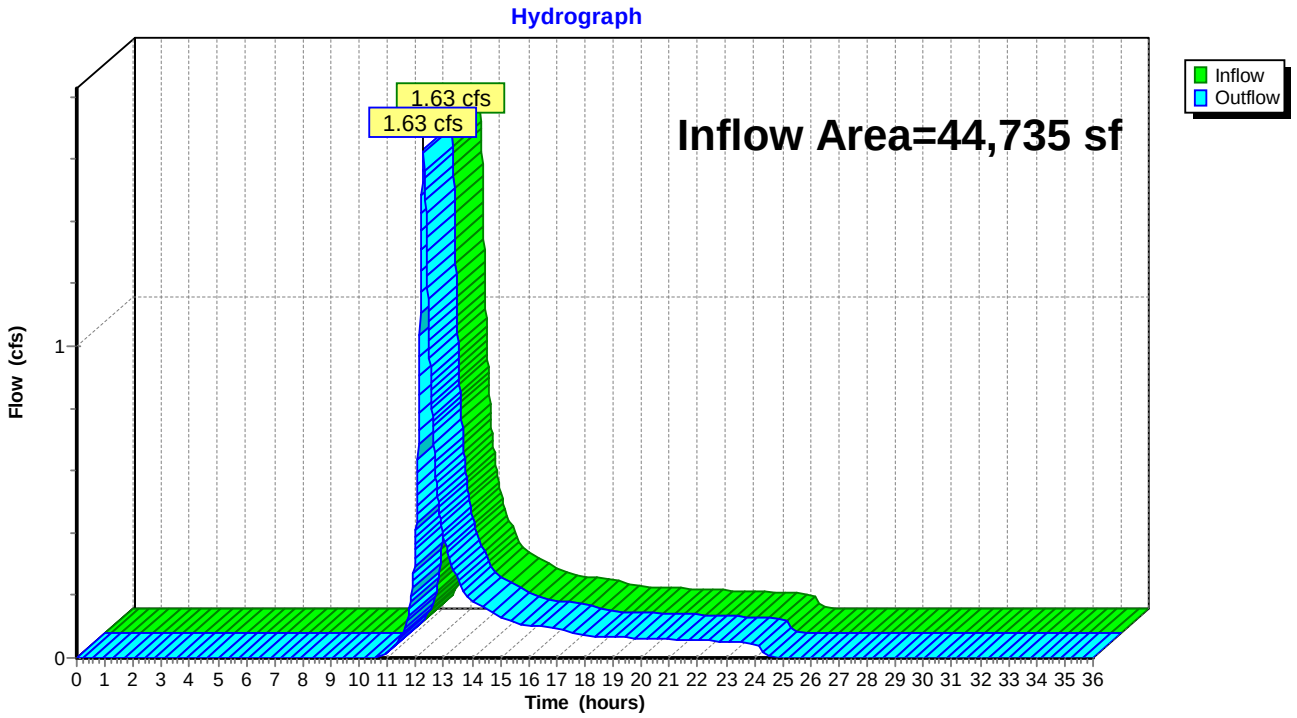
Summary for Reach 1R: Wetland 1

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

Inflow Area = 44,735 sf, 0.00% Impervious, Inflow Depth = 1.99" for 25-Year event
Inflow = 1.63 cfs @ 12.28 hrs, Volume= 7,408 cf
Outflow = 1.63 cfs @ 12.28 hrs, Volume= 7,408 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: Wetland 1



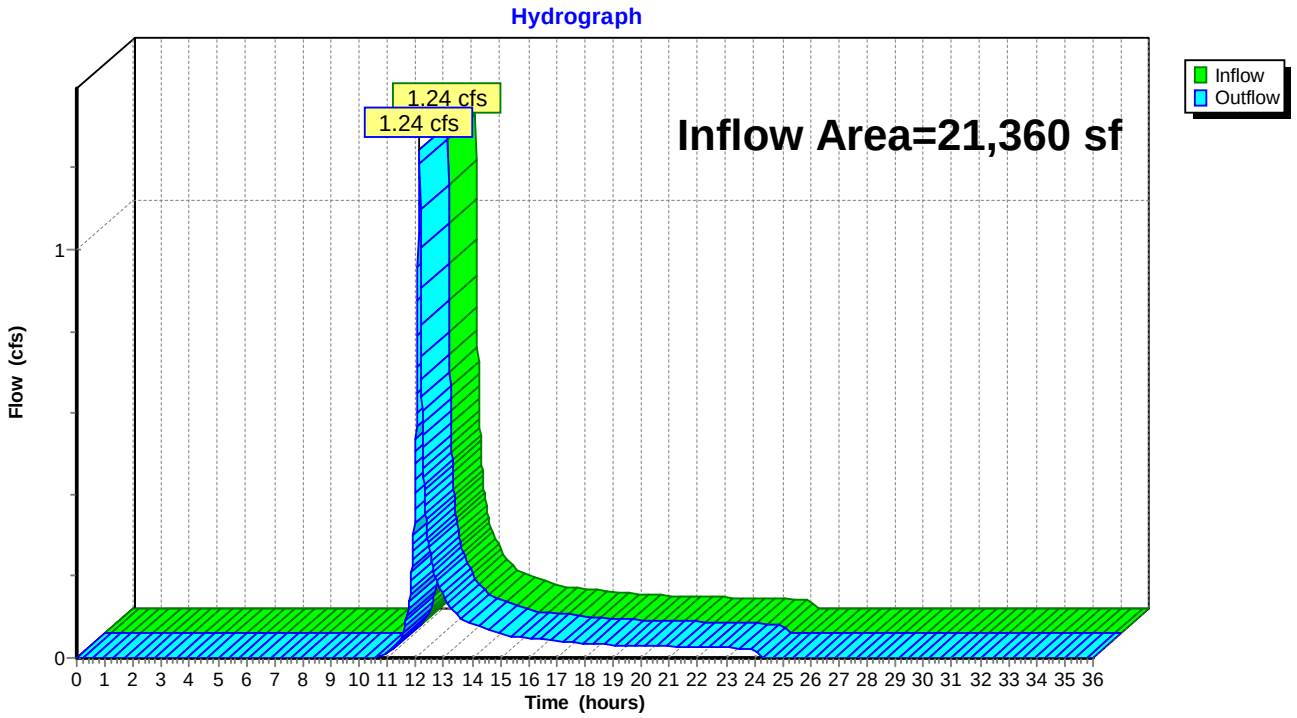
Summary for Reach 2R: Wetland D

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

Inflow Area = 21,360 sf, 0.00% Impervious, Inflow Depth = 1.99" for 25-Year event
Inflow = 1.24 cfs @ 12.13 hrs, Volume= 3,537 cf
Outflow = 1.24 cfs @ 12.13 hrs, Volume= 3,537 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 2R: Wetland D



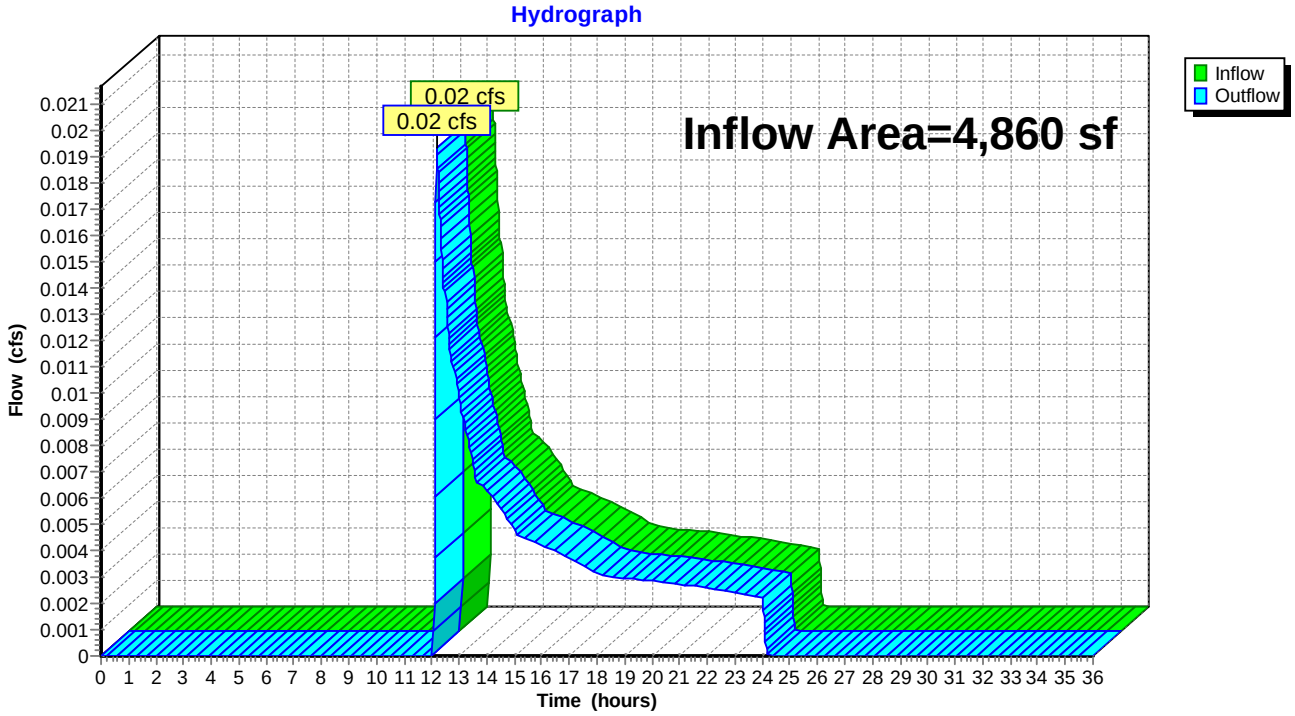
Summary for Reach 3R: Wetland M

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

Inflow Area = 4,860 sf, 0.00% Impervious, Inflow Depth = 0.47" for 25-Year event
Inflow = 0.02 cfs @ 12.18 hrs, Volume= 192 cf
Outflow = 0.02 cfs @ 12.18 hrs, Volume= 192 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 3R: Wetland M



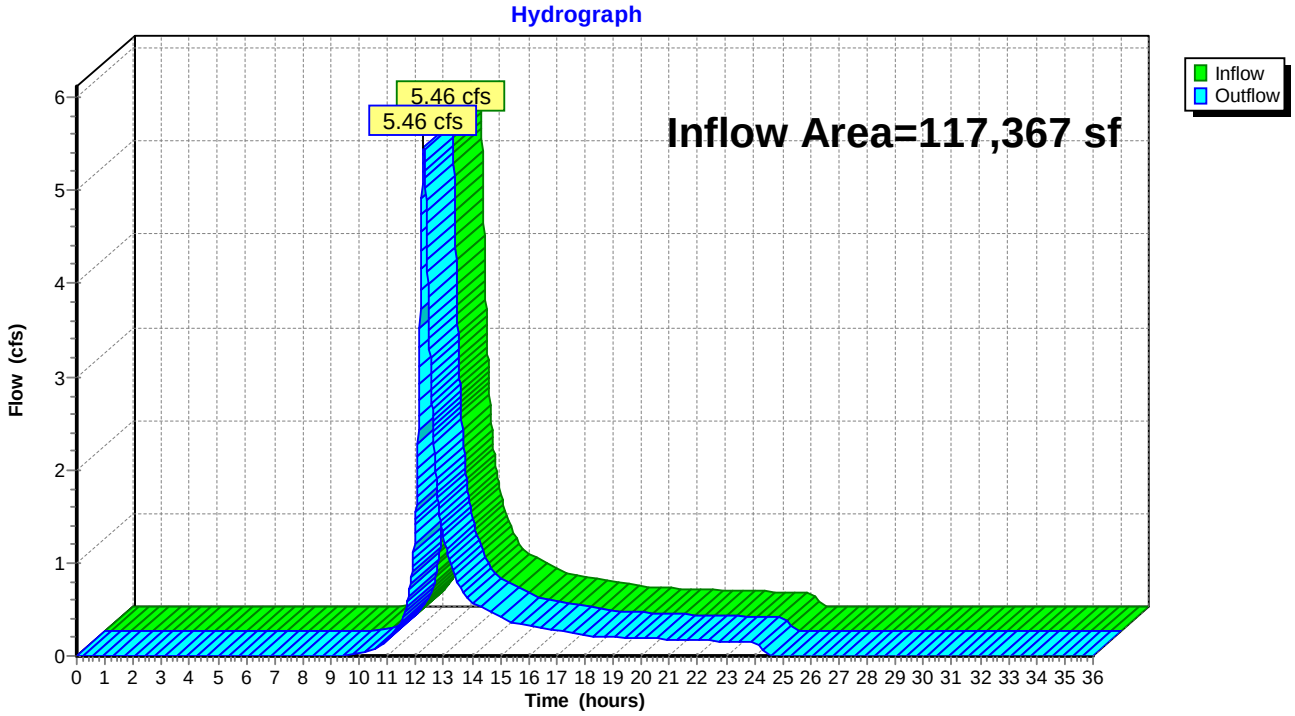
Summary for Reach 4R: Wetland N

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

Inflow Area = 117,367 sf, 0.00% Impervious, Inflow Depth = 2.51" for 25-Year event
Inflow = 5.46 cfs @ 12.29 hrs, Volume= 24,594 cf
Outflow = 5.46 cfs @ 12.29 hrs, Volume= 24,594 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 4R: Wetland N



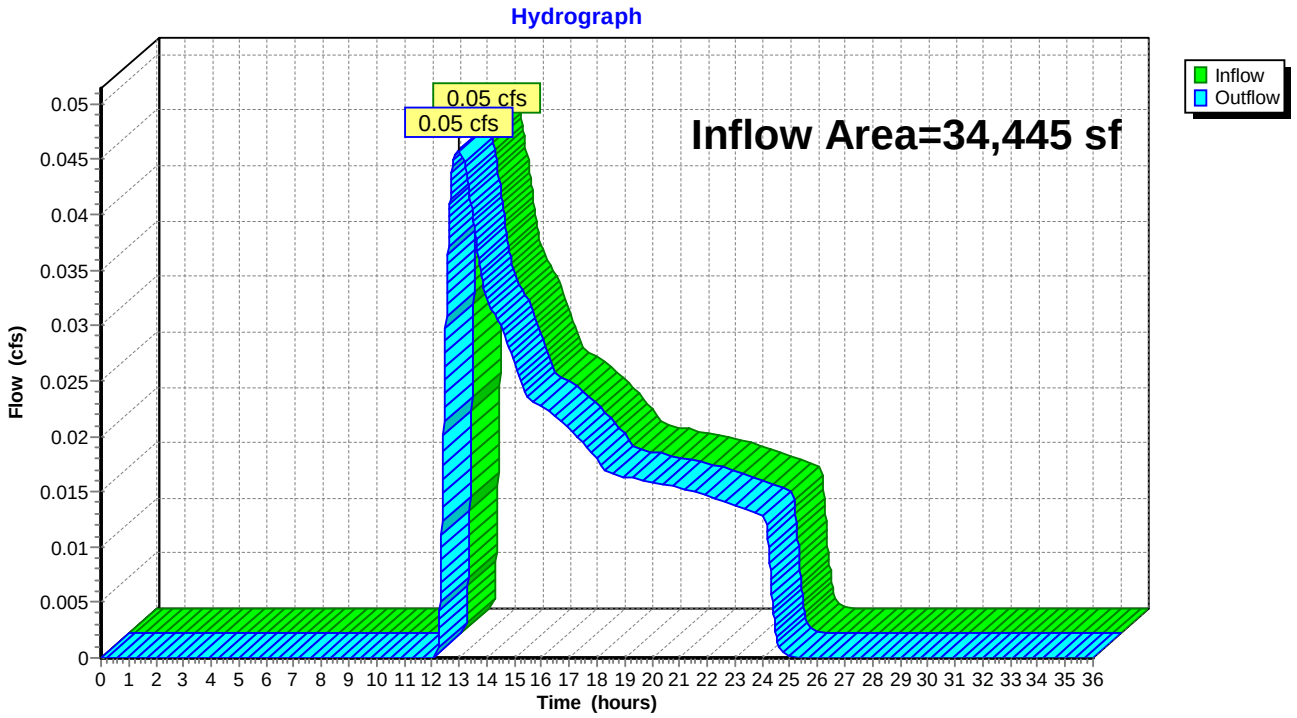
Summary for Reach 5R: Wetland C

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

Inflow Area = 34,445 sf, 0.00% Impervious, Inflow Depth = 0.32" for 25-Year event
Inflow = 0.05 cfs @ 13.01 hrs, Volume= 914 cf
Outflow = 0.05 cfs @ 13.01 hrs, Volume= 914 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 5R: Wetland C



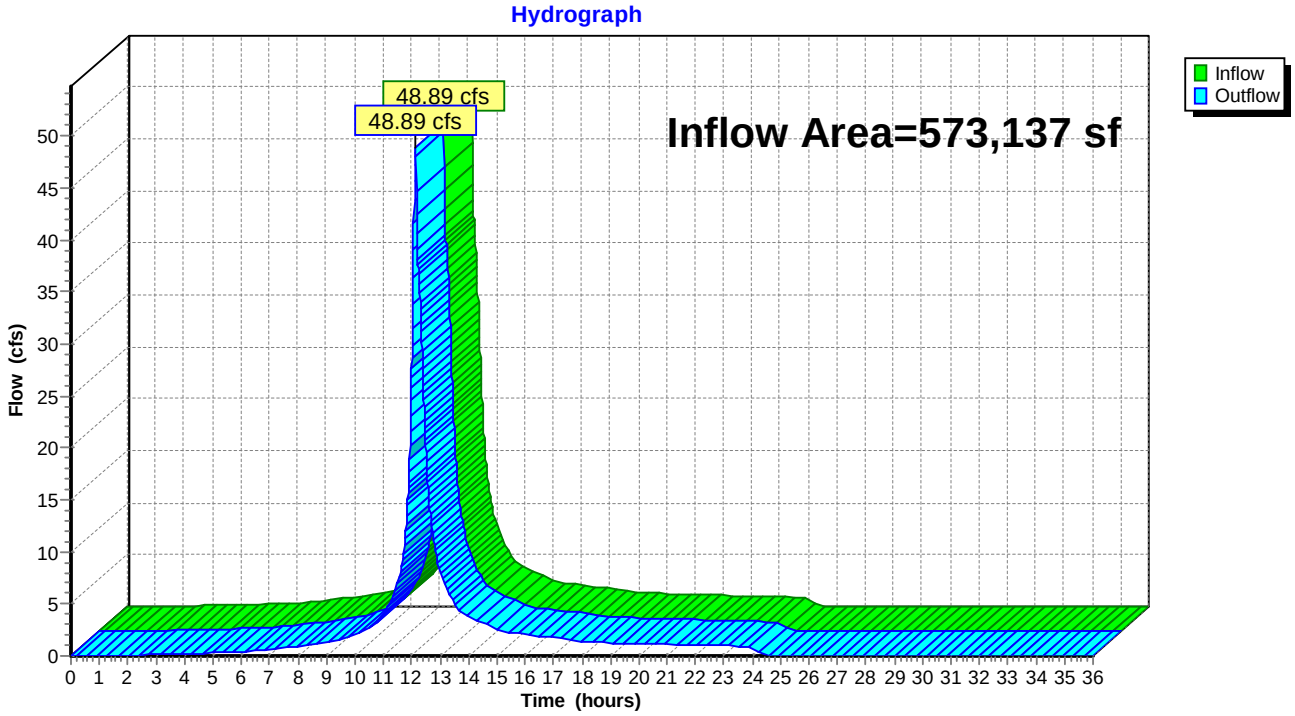
Summary for Reach 6R: Showcase Drainage System

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

Inflow Area = 573,137 sf, 79.28% Impervious, Inflow Depth = 4.55" for 25-Year event
Inflow = 48.89 cfs @ 12.13 hrs, Volume= 217,293 cf
Outflow = 48.89 cfs @ 12.13 hrs, Volume= 217,293 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Showcase Drainage System



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Ex. Watershed 1 Runoff Area=44,735 sf 0.00% Impervious Runoff Depth=3.76"
Flow Length=220' Tc=18.0 min CN=60 Runoff=3.21 cfs 14,013 cf

Subcatchment 2S: Ex. Watershed 2 Runoff Area=21,360 sf 0.00% Impervious Runoff Depth=3.76"
Flow Length=183' Tc=5.5 min CN=60 Runoff=2.40 cfs 6,691 cf

Subcatchment 3S: Ex. Watershed 3 Runoff Area=4,860 sf 0.00% Impervious Runoff Depth=1.40"
Tc=6.0 min CN=39 Runoff=0.16 cfs 567 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=7.84"
Tc=5.0 min CN=94 Runoff=48.05 cfs 151,415 cf

Subcatchment 4S: To Showcase Runoff Area=341,348 sf 73.22% Impervious Runoff Depth=6.27"
Flow Length=737' Tc=19.5 min CN=81 Runoff=38.87 cfs 178,422 cf

Subcatchment 5S: Ex. Watershed 5 Runoff Area=34,445 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=199' Tc=23.0 min CN=36 Runoff=0.39 cfs 3,155 cf

Subcatchment 6S: Ex. Watershed 6 Runoff Area=117,367 sf 0.00% Impervious Runoff Depth=4.47"
Flow Length=309' Slope=0.0350 '/' Tc=19.0 min CN=66 Runoff=9.85 cfs 43,728 cf

Reach 1R: Wetland 1 Inflow=3.21 cfs 14,013 cf
Outflow=3.21 cfs 14,013 cf

Reach 2R: Wetland D Inflow=2.40 cfs 6,691 cf
Outflow=2.40 cfs 6,691 cf

Reach 3R: Wetland M Inflow=0.16 cfs 567 cf
Outflow=0.16 cfs 567 cf

Reach 4R: Wetland N Inflow=9.85 cfs 43,728 cf
Outflow=9.85 cfs 43,728 cf

Reach 5R: Wetland C Inflow=0.39 cfs 3,155 cf
Outflow=0.39 cfs 3,155 cf

Reach 6R: Showcase Drainage System Inflow=72.09 cfs 329,838 cf
Outflow=72.09 cfs 329,838 cf

Total Runoff Area = 795,904 sf Runoff Volume = 397,992 cf Average Runoff Depth = 6.00"
42.91% Pervious = 341,512 sf 57.09% Impervious = 454,392 sf

Summary for Subcatchment 1S: Ex. Watershed 1

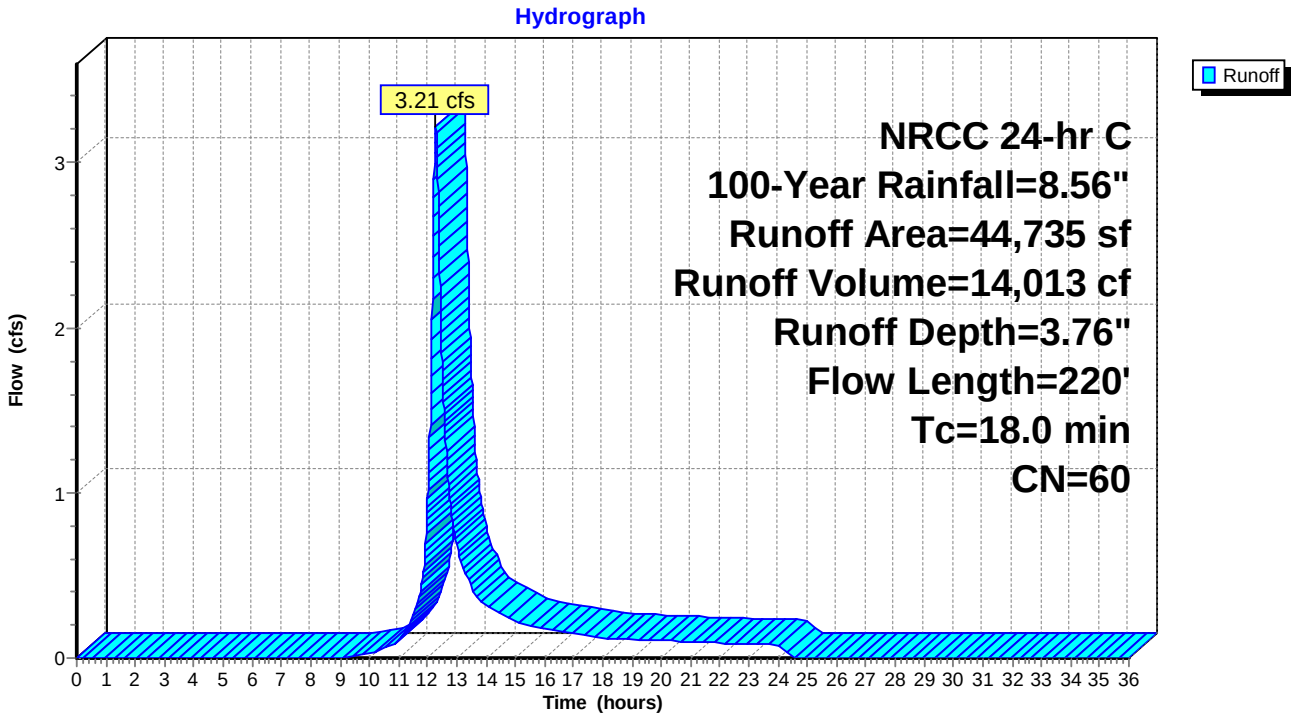
Runoff = 3.21 cfs @ 12.27 hrs, Volume= 14,013 cf, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
44,735	60	Woods, Fair, HSG B
44,735		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0250	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.2	120	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	50	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.0	220	Total			

Subcatchment 1S: Ex. Watershed 1



Summary for Subcatchment 2S: Ex. Watershed 2

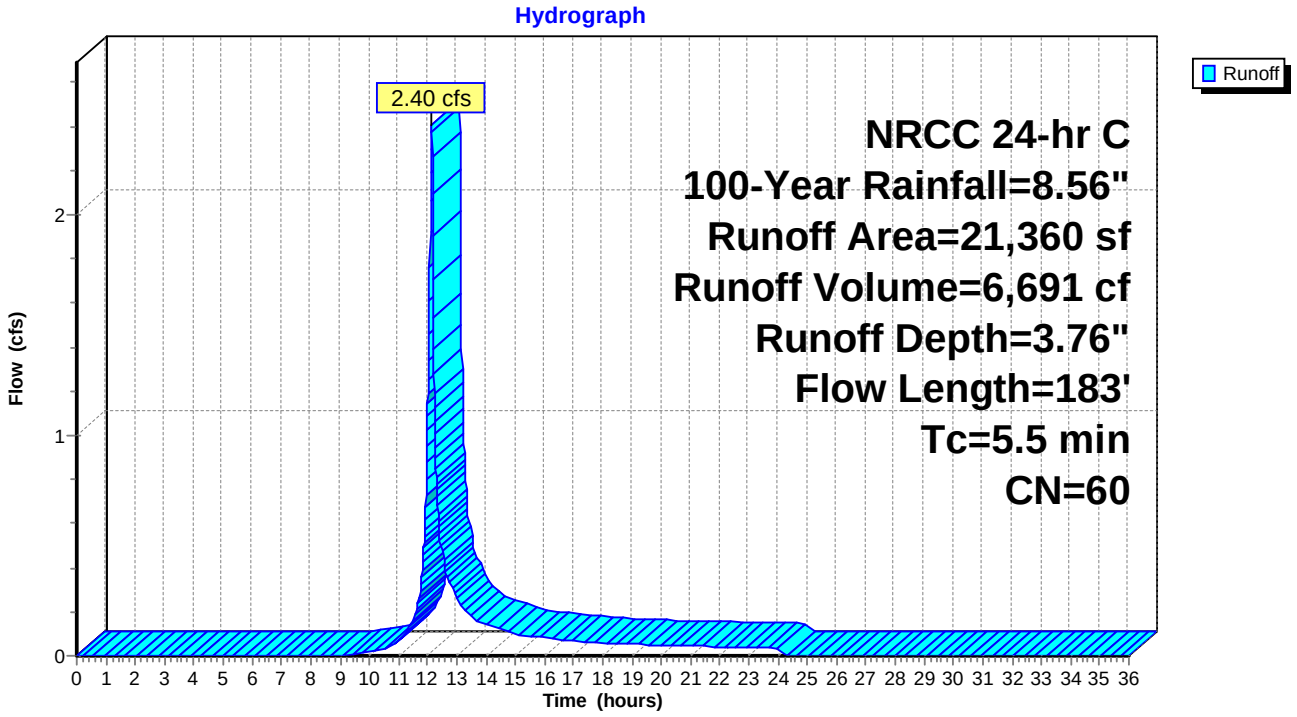
Runoff = 2.40 cfs @ 12.13 hrs, Volume= 6,691 cf, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
21,360	60	Woods, Fair, HSG B
21,360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.1000	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.2	133	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.5	183	Total			

Subcatchment 2S: Ex. Watershed 2



Summary for Subcatchment 3S: Ex. Watershed 3

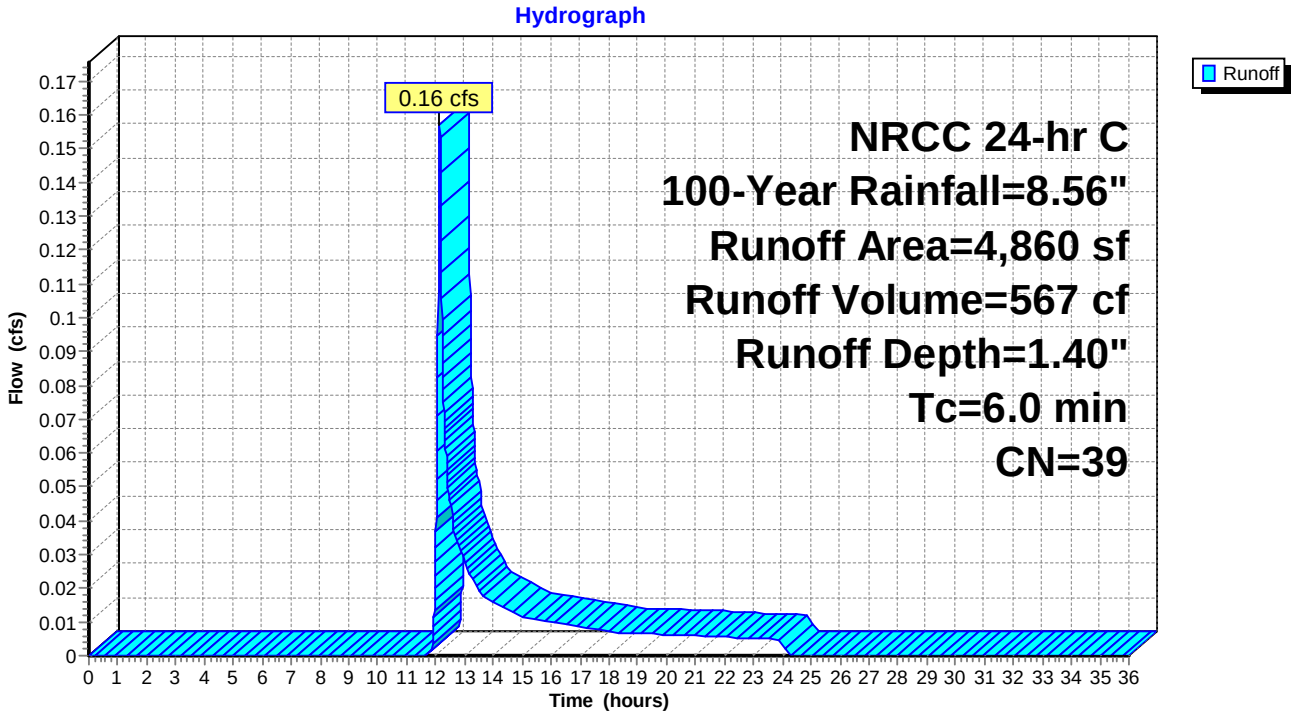
Runoff = 0.16 cfs @ 12.14 hrs, Volume= 567 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
4,860	39	>75% Grass cover, Good, HSG A
4,860		100.00% Pervious Area

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

Subcatchment 3S: Ex. Watershed 3



Summary for Subcatchment 4A: Showcase Property

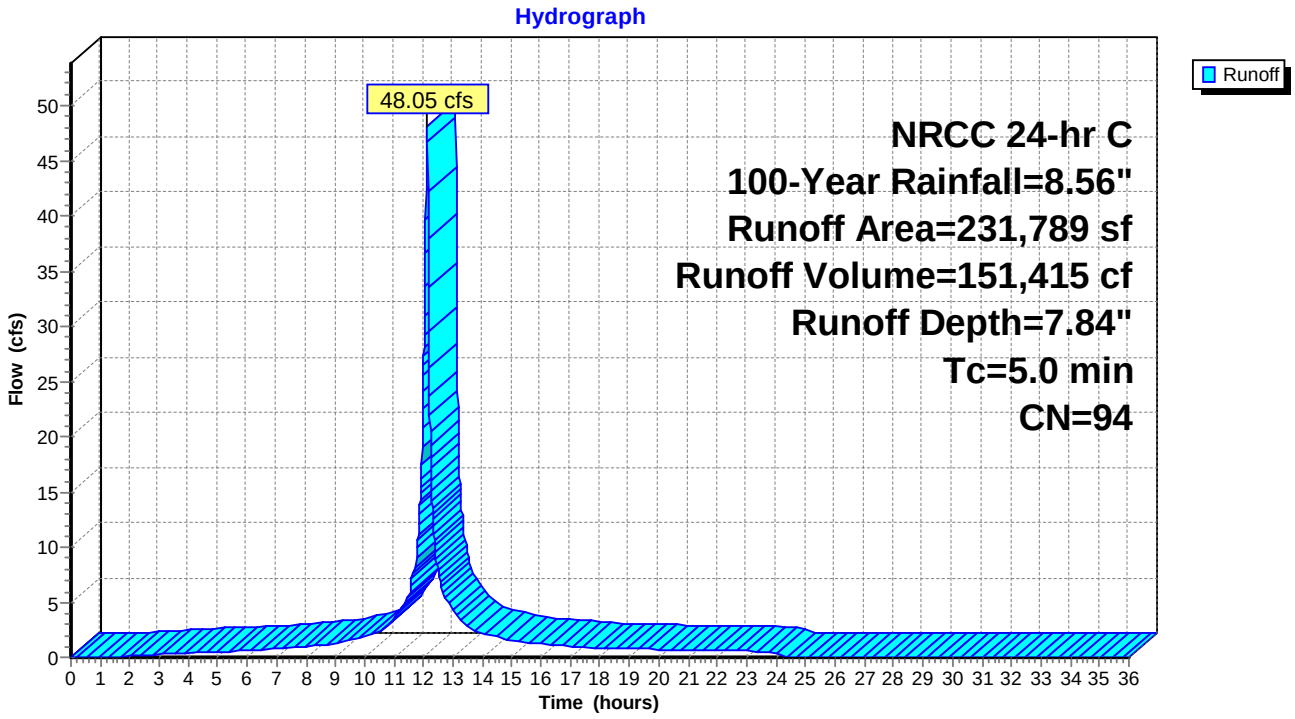
Runoff = 48.05 cfs @ 12.12 hrs, Volume= 151,415 cf, Depth= 7.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
27,341	65	Woods/grass comb., Fair, HSG B
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	94	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Subcatchment 4A: Showcase Property



Summary for Subcatchment 4S: To Showcase

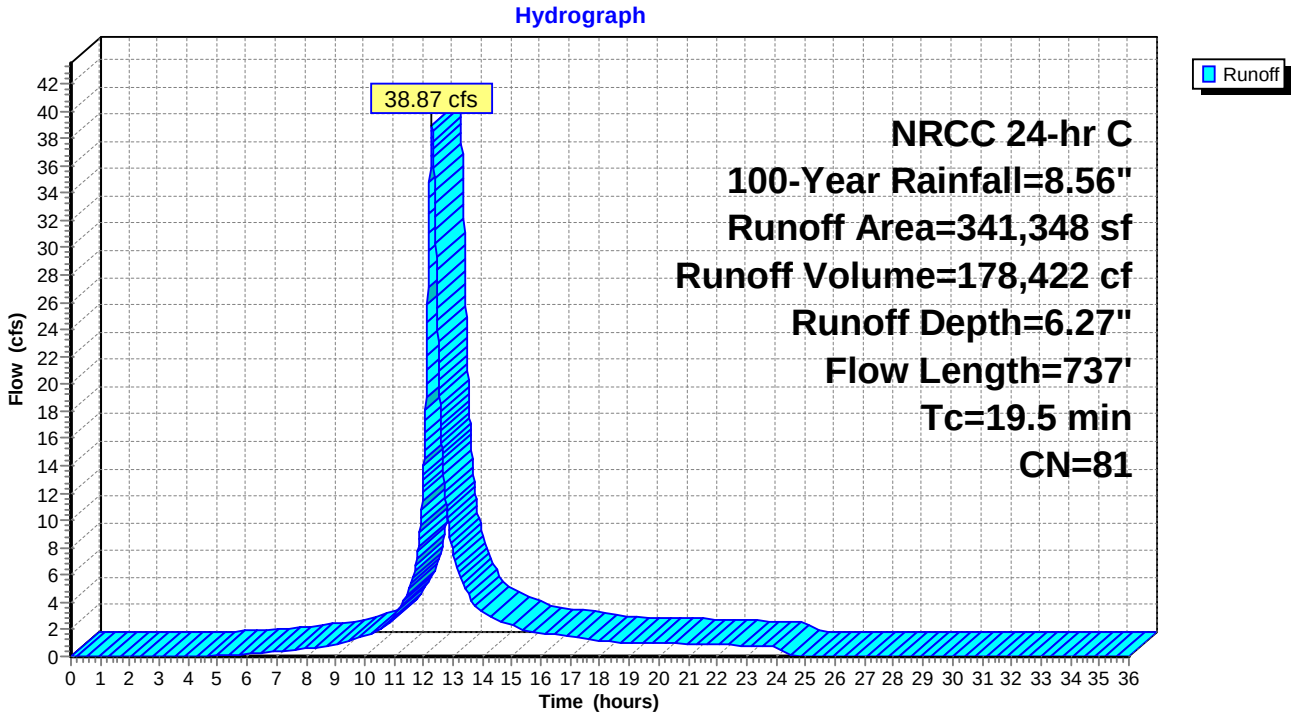
Runoff = 38.87 cfs @ 12.28 hrs, Volume= 178,422 cf, Depth= 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
91,404	36	Woods, Fair, HSG A
249,944	98	Paved roads w/curbs & sewers, HSG A
341,348	81	Weighted Average
91,404		26.78% Pervious Area
249,944		73.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	50	0.0300	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
3.4	257	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	430	0.0100	9.05	44.44	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
19.5	737	Total			

Subcatchment 4S: To Showcase



Summary for Subcatchment 5S: Ex. Watershed 5

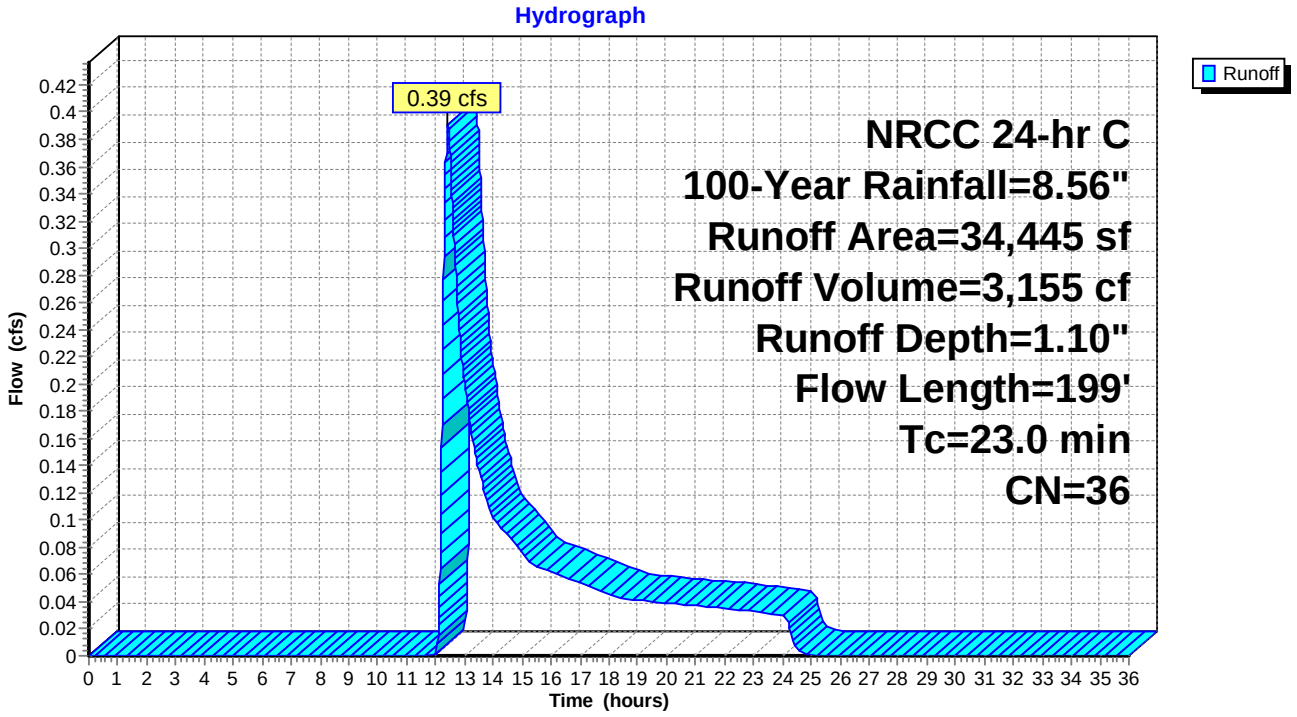
Runoff = 0.39 cfs @ 12.42 hrs, Volume= 3,155 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
34,445	36	Woods, Fair, HSG A
34,445		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0200	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
5.0	149	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	199	Total			

Subcatchment 5S: Ex. Watershed 5



Summary for Subcatchment 6S: Ex. Watershed 6

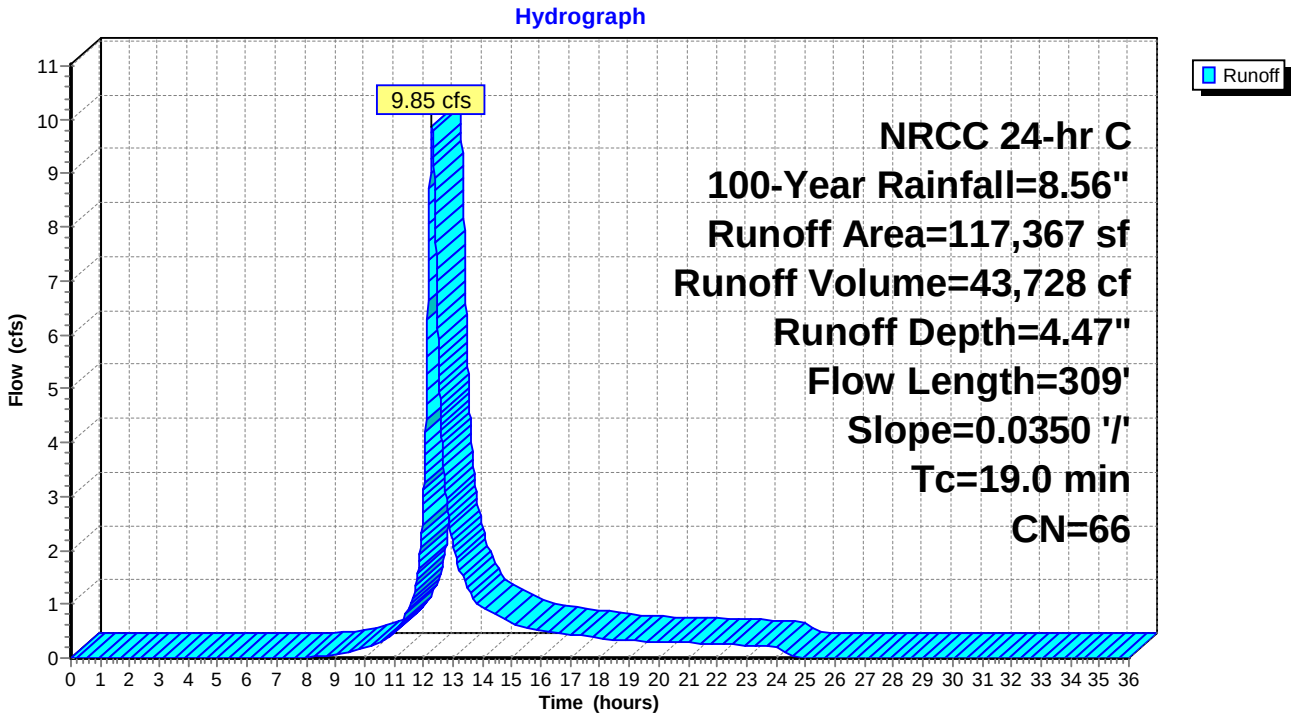
Runoff = 9.85 cfs @ 12.28 hrs, Volume= 43,728 cf, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
117,367	66	Woods, Poor, HSG B
117,367	66	Weighted Average
117,367		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	50	0.0350	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
4.6	259	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	309	Total			

Subcatchment 6S: Ex. Watershed 6



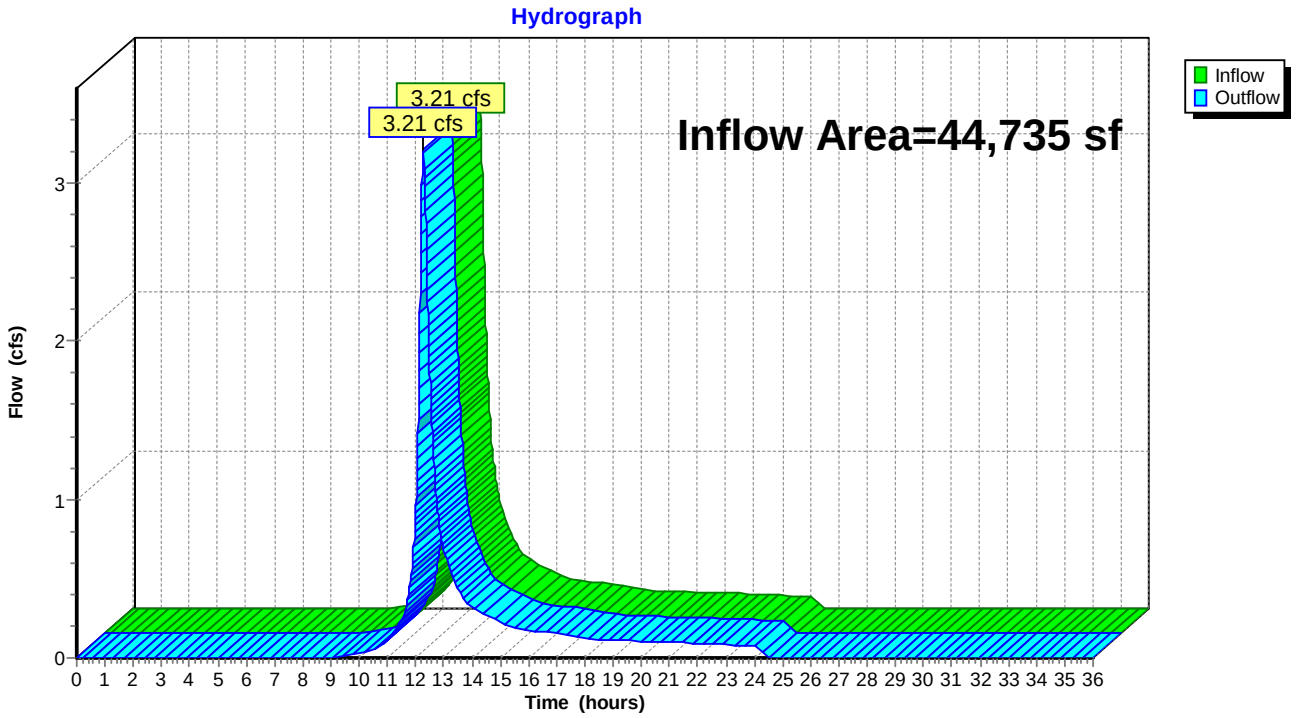
Summary for Reach 1R: Wetland 1

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

Inflow Area = 44,735 sf, 0.00% Impervious, Inflow Depth = 3.76" for 100-Year event
Inflow = 3.21 cfs @ 12.27 hrs, Volume= 14,013 cf
Outflow = 3.21 cfs @ 12.27 hrs, Volume= 14,013 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: Wetland 1



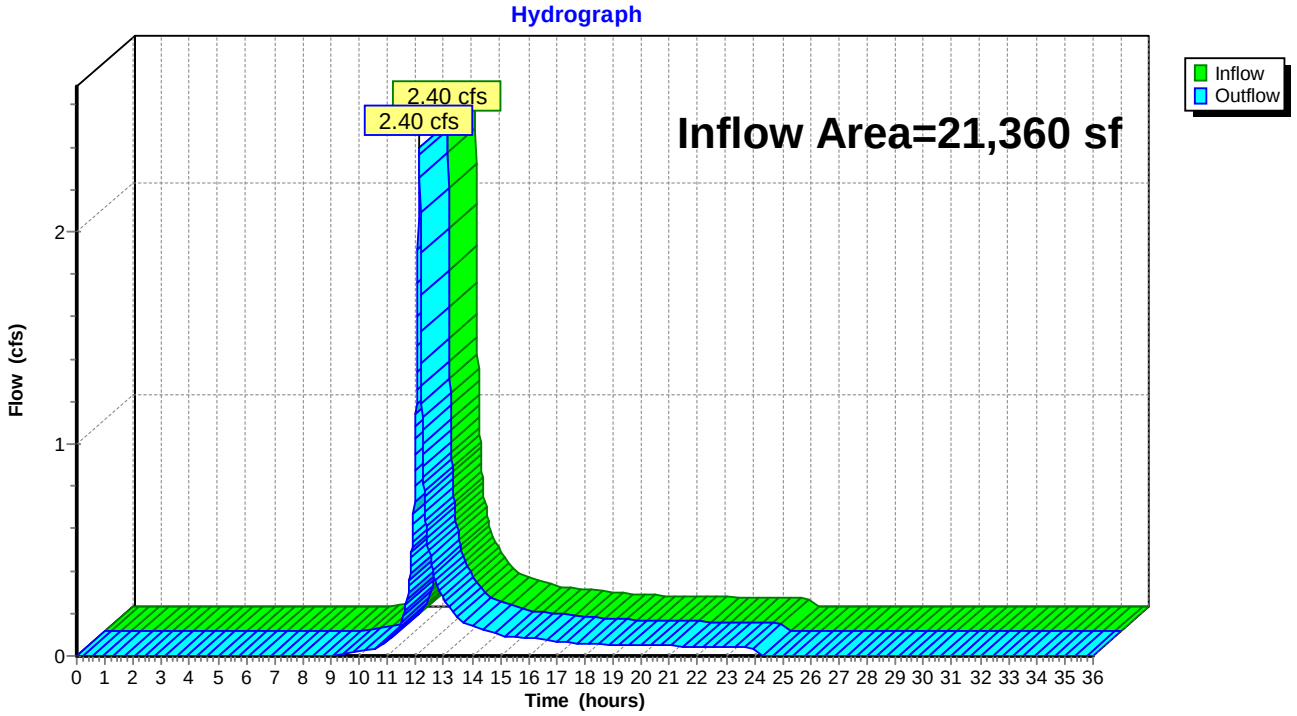
Summary for Reach 2R: Wetland D

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

Inflow Area = 21,360 sf, 0.00% Impervious, Inflow Depth = 3.76" for 100-Year event
Inflow = 2.40 cfs @ 12.13 hrs, Volume= 6,691 cf
Outflow = 2.40 cfs @ 12.13 hrs, Volume= 6,691 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 2R: Wetland D



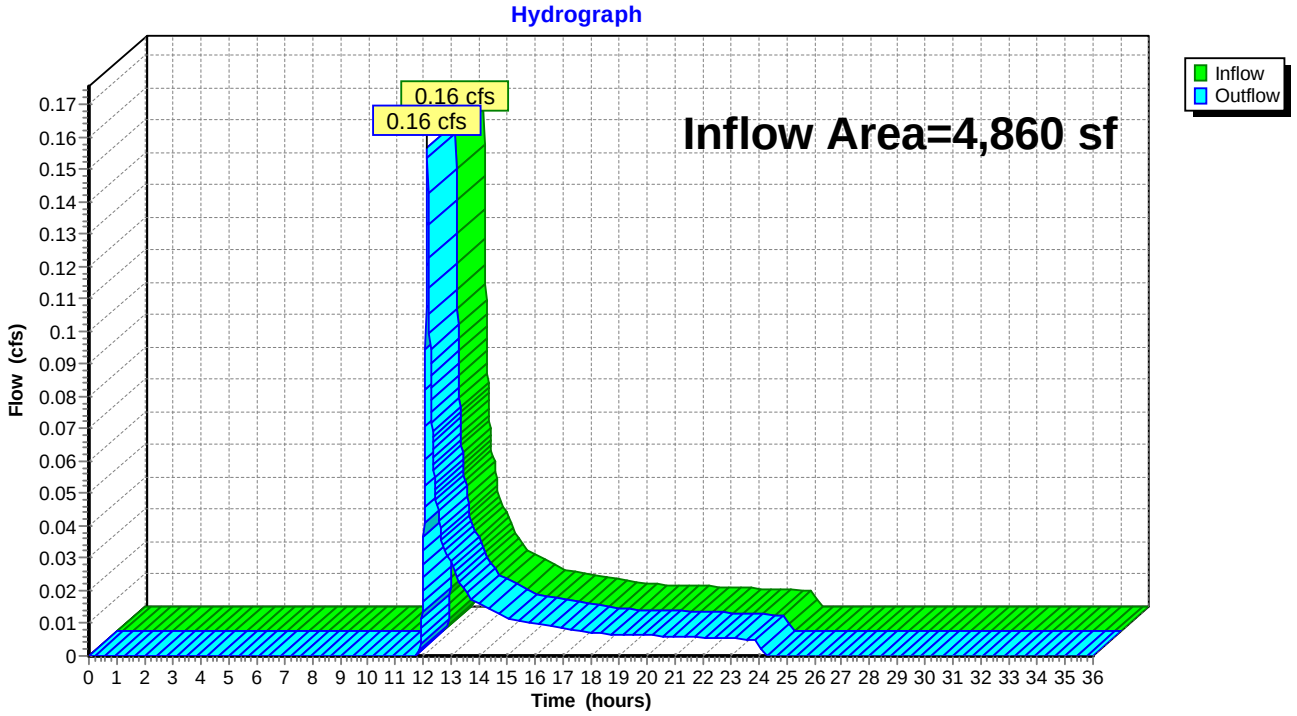
Summary for Reach 3R: Wetland M

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

Inflow Area = 4,860 sf, 0.00% Impervious, Inflow Depth = 1.40" for 100-Year event
Inflow = 0.16 cfs @ 12.14 hrs, Volume= 567 cf
Outflow = 0.16 cfs @ 12.14 hrs, Volume= 567 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 3R: Wetland M



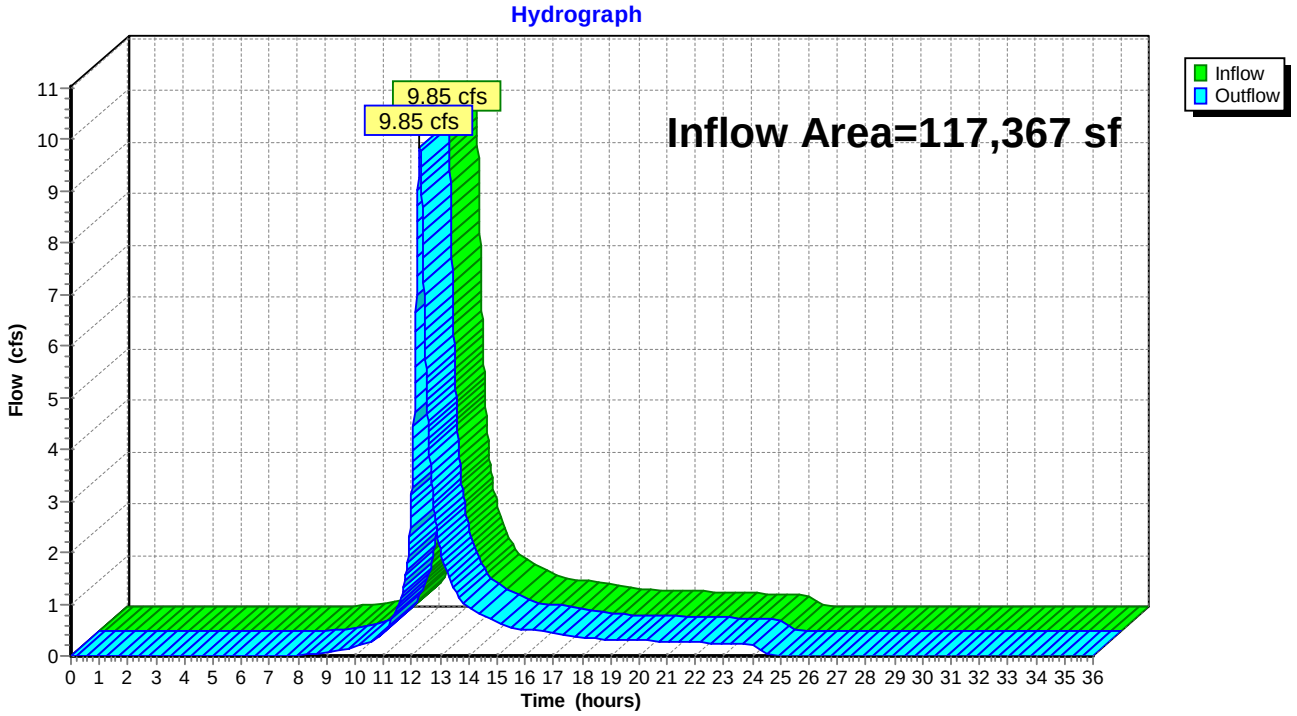
Summary for Reach 4R: Wetland N

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

Inflow Area = 117,367 sf, 0.00% Impervious, Inflow Depth = 4.47" for 100-Year event
Inflow = 9.85 cfs @ 12.28 hrs, Volume= 43,728 cf
Outflow = 9.85 cfs @ 12.28 hrs, Volume= 43,728 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 4R: Wetland N



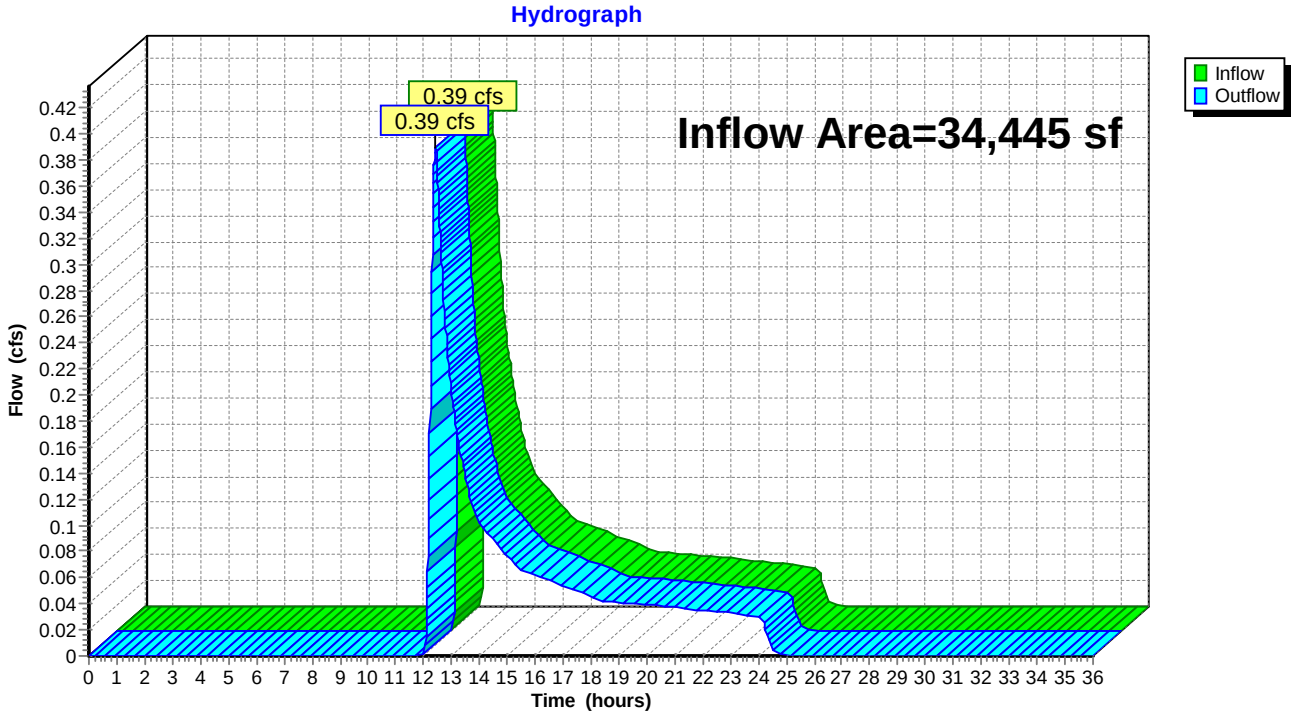
Summary for Reach 5R: Wetland C

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

Inflow Area = 34,445 sf, 0.00% Impervious, Inflow Depth = 1.10" for 100-Year event
Inflow = 0.39 cfs @ 12.42 hrs, Volume= 3,155 cf
Outflow = 0.39 cfs @ 12.42 hrs, Volume= 3,155 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 5R: Wetland C



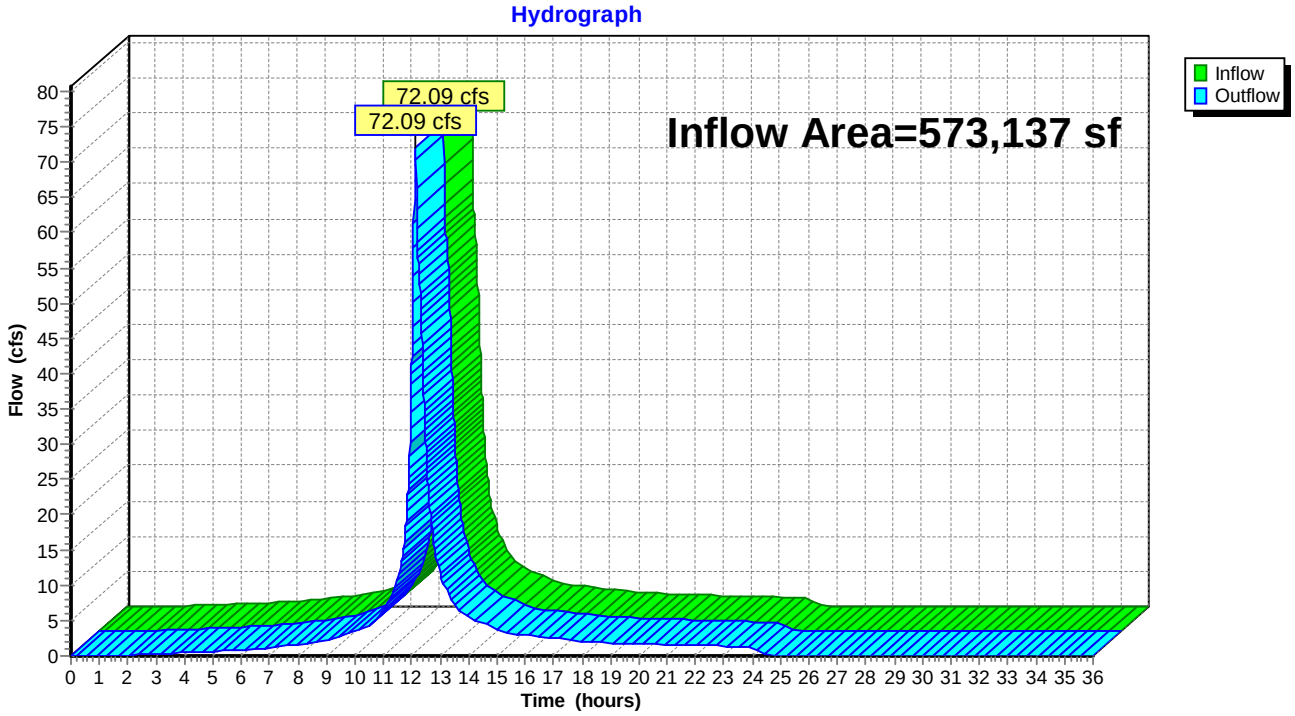
Summary for Reach 6R: Showcase Drainage System

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

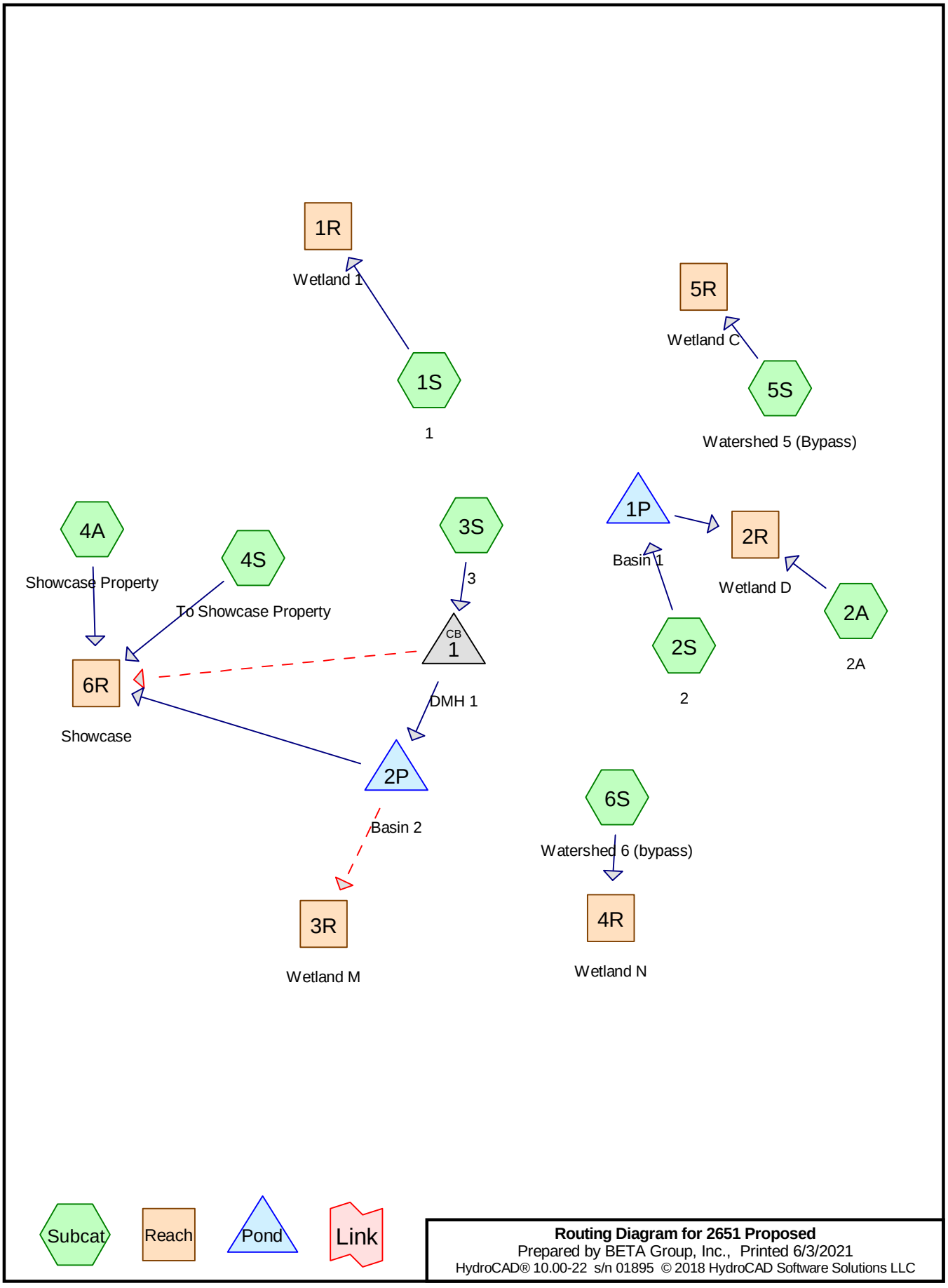
Inflow Area = 573,137 sf, 79.28% Impervious, Inflow Depth = 6.91" for 100-Year event
Inflow = 72.09 cfs @ 12.13 hrs, Volume= 329,838 cf
Outflow = 72.09 cfs @ 12.13 hrs, Volume= 329,838 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Showcase Drainage System



Section B-2
HydroCAD Printouts – Proposed Conditions



Routing Diagram for 2651 Proposed
Prepared by BETA Group, Inc., Printed 6/3/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
288,209	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S, 4S, 5S, 6S)
25,367	98	Paved parking, HSG A (4S)
463,660	98	Paved roads w/curbs & sewers, HSG A (1S, 2S, 3S, 4A, 6S)
11,690	65	Playground (2A, 2S)
7,583	98	Unconnected pavement, HSG A (1S)
27,341	65	Woods/grass comb., Fair, HSG B (4A)
823,850	**76**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
784,819	HSG A	1S, 2S, 3S, 4A, 4S, 5S, 6S
27,341	HSG B	4A
0	HSG C	
0	HSG D	
11,690	Other	2A, 2S
823,850		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Nu
288,209	0	0	0	0	288,209	>75% Grass cover, Good	
25,367	0	0	0	0	25,367	Paved parking	
463,660	0	0	0	0	463,660	Paved roads w/curbs & sewers	
0	0	0	0	11,690	11,690	Playground	
7,583	0	0	0	0	7,583	Unconnected pavement	
0	27,341	0	0	0	27,341	Woods/grass comb., Fair	
784,819	**27,341**	**0**	**0**	**11,690**	**823,850**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1 Runoff Area=51,291 sf 24.94% Impervious Runoff Depth=0.13"
Flow Length=508' Tc=10.4 min UI Adjusted CN=49 Runoff=0.03 cfs 546 cf

Subcatchment 2A: 2A Runoff Area=2,863 sf 0.00% Impervious Runoff Depth=0.65"
Tc=5.0 min CN=65 Runoff=0.05 cfs 155 cf

Subcatchment 2S: 2 Runoff Area=170,331 sf 57.03% Impervious Runoff Depth=1.10"
Flow Length=325' Tc=16.6 min CN=74 Runoff=3.82 cfs 15,670 cf

Subcatchment 3S: 3 Runoff Area=238,845 sf 53.87% Impervious Runoff Depth=0.94"
Flow Length=260' Tc=14.1 min CN=71 Runoff=4.74 cfs 18,686 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=2.64"
Tc=5.0 min CN=94 Runoff=17.95 cfs 51,012 cf

Subcatchment 4S: To Showcase Property Runoff Area=65,840 sf 38.53% Impervious Runoff Depth=0.52"
Flow Length=260' Tc=12.4 min CN=62 Runoff=0.61 cfs 2,878 cf

Subcatchment 5S: Watershed 5 (Bypass) Runoff Area=15,741 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=388' Tc=14.4 min CN=39 Runoff=0.00 cfs 2 cf

Subcatchment 6S: Watershed 6 (bypass) Runoff Area=47,150 sf 59.82% Impervious Runoff Depth=1.10"
Flow Length=292' Slope=0.0200 '/' Tc=12.3 min CN=74 Runoff=1.21 cfs 4,338 cf

Reach 1R: Wetland 1 Inflow=0.03 cfs 546 cf
Outflow=0.03 cfs 546 cf

Reach 2R: Wetland D Inflow=0.05 cfs 155 cf
Outflow=0.05 cfs 155 cf

Reach 3R: Wetland M Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 4R: Wetland N Inflow=1.21 cfs 4,338 cf
Outflow=1.21 cfs 4,338 cf

Reach 5R: Wetland C Inflow=0.00 cfs 2 cf
Outflow=0.00 cfs 2 cf

Reach 6R: Showcase Inflow=18.26 cfs 53,979 cf
Outflow=18.26 cfs 53,979 cf

Pond 1: DMH 1 Peak Elev=42.19' Inflow=4.74 cfs 18,686 cf
Primary=4.46 cfs 18,597 cf Secondary=0.29 cfs 89 cf Outflow=4.74 cfs 18,686 cf

Pond 1P: Basin 1 Peak Elev=45.89' Storage=6,060 cf Inflow=3.82 cfs 15,670 cf
Discarded=0.51 cfs 15,673 cf Primary=0.00 cfs 0 cf Outflow=0.51 cfs 15,673 cf

Pond 2P: Basin 2 Peak Elev=41.91' Storage=9,551 cf Inflow=4.46 cfs 18,597 cf
Discarded=0.33 cfs 18,371 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.33 cfs 18,371 cf

Total Runoff Area = 823,850 sf Runoff Volume = 93,286 cf Average Runoff Depth = 1.36"
39.72% Pervious = 327,240 sf 60.28% Impervious = 496,610 sf

Summary for Subcatchment 1S: 1

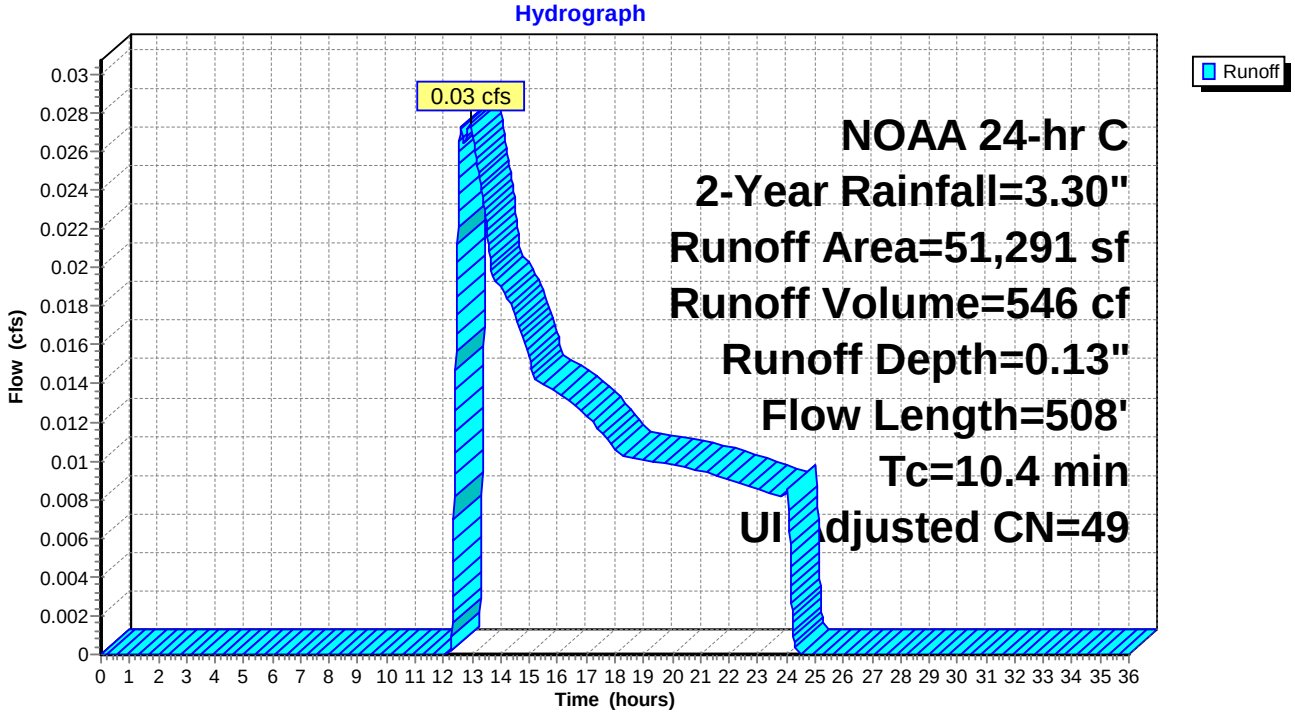
Runoff = 0.03 cfs @ 12.93 hrs, Volume= 546 cf, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Adj	Description
5,209	98		Paved roads w/curbs & sewers, HSG A
38,499	39		>75% Grass cover, Good, HSG A
7,583	98		Unconnected pavement, HSG A
51,291	54	49	Weighted Average, UI Adjusted
38,499			75.06% Pervious Area
12,792			24.94% Impervious Area
7,583			59.28% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.3	325	0.0123	1.66		**Shallow Concentrated Flow, Swale** Grassed Waterway Kv= 15.0 fps
0.9	133	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.4	508	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2A: 2A

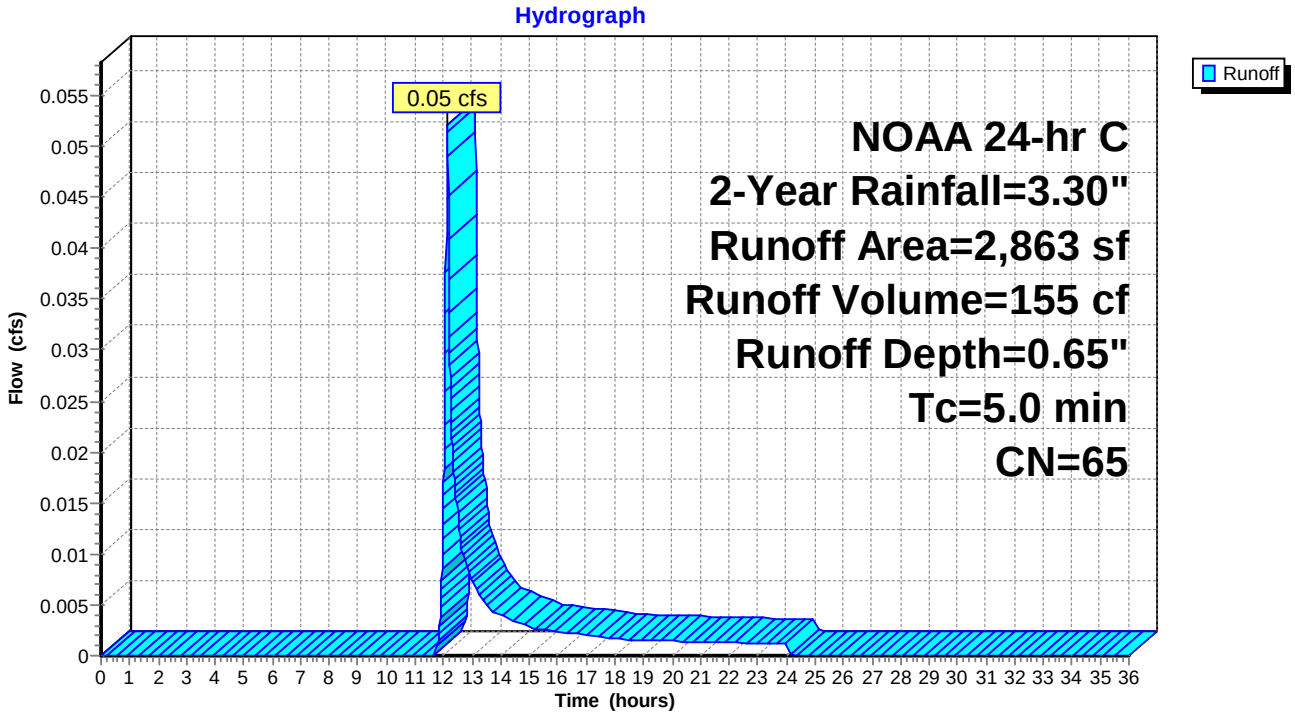
Runoff = 0.05 cfs @ 12.13 hrs, Volume= 155 cf, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

	Area (sf)	CN	Description
*	2,863	65	Playground
	2,863		100.00% Pervious Area

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

Subcatchment 2A: 2A



Summary for Subcatchment 2S: 2

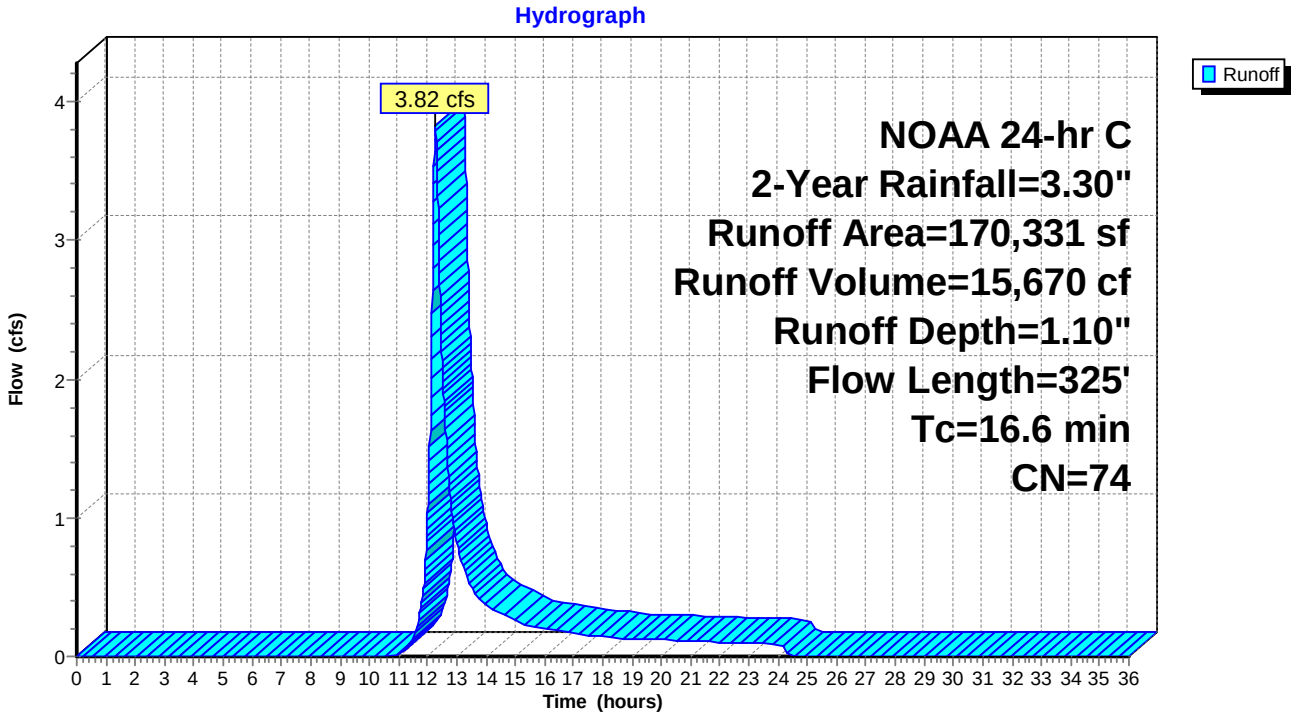
Runoff = 3.82 cfs @ 12.26 hrs, Volume= 15,670 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

	Area (sf)	CN	Description
	97,140	98	Paved roads w/curbs & sewers, HSG A
*	8,827	65	Playground
	64,364	39	>75% Grass cover, Good, HSG A
	170,331	74	Weighted Average
	73,191		42.97% Pervious Area
	97,140		57.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
5.7	250	0.0110	0.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	325	Total			

Subcatchment 2S: 2



Summary for Subcatchment 3S: 3

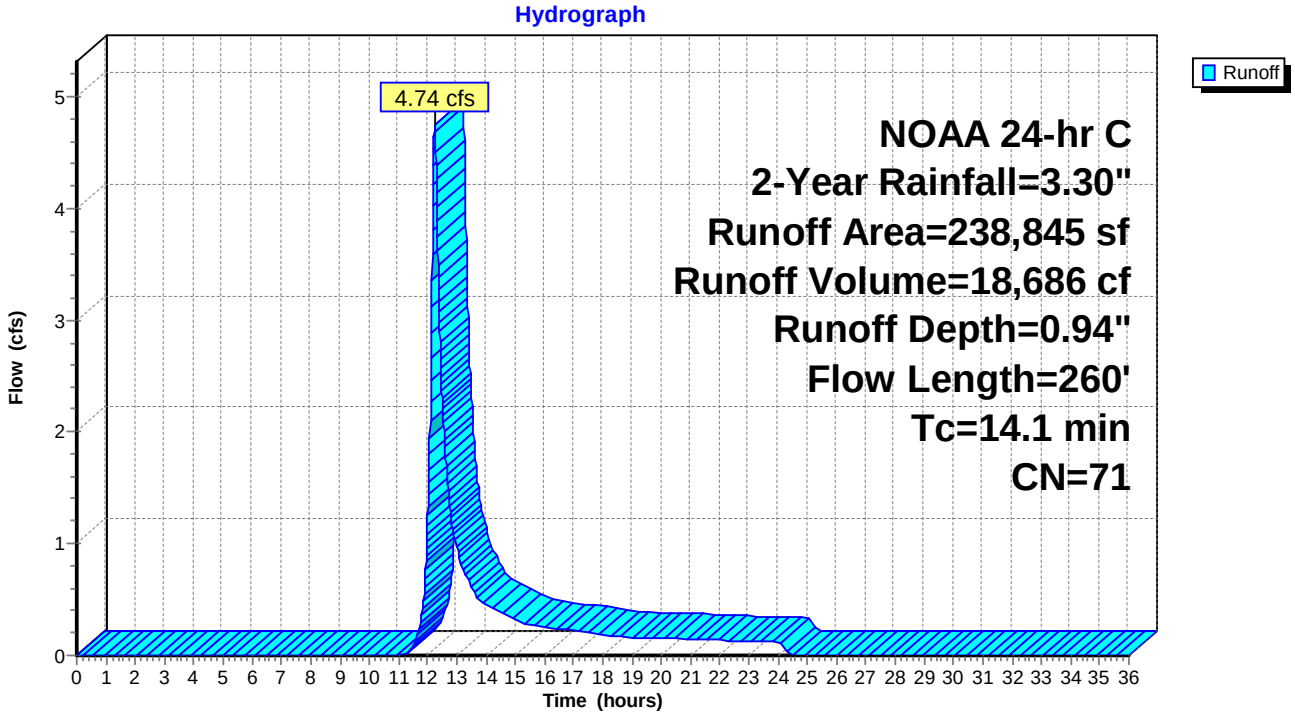
Runoff = 4.74 cfs @ 12.24 hrs, Volume= 18,686 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
128,657	98	Paved roads w/curbs & sewers, HSG A
110,188	39	>75% Grass cover, Good, HSG A
238,845	71	Weighted Average
110,188		46.13% Pervious Area
128,657		53.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.3	210	0.0230	1.06		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.1	260	Total			

Subcatchment 3S: 3



Summary for Subcatchment 4A: Showcase Property

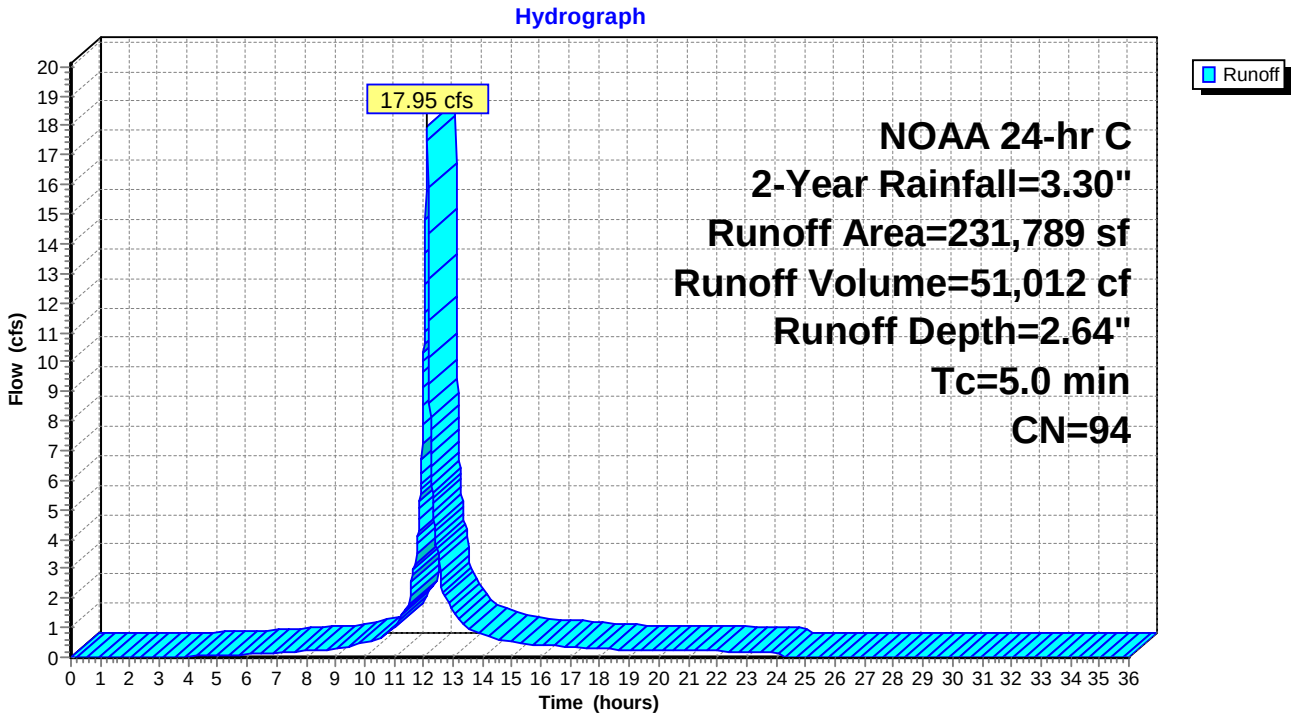
Runoff = 17.95 cfs @ 12.12 hrs, Volume= 51,012 cf, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
27,341	65	Woods/grass comb., Fair, HSG B
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	94	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Subcatchment 4A: Showcase Property



Summary for Subcatchment 4S: To Showcase Property

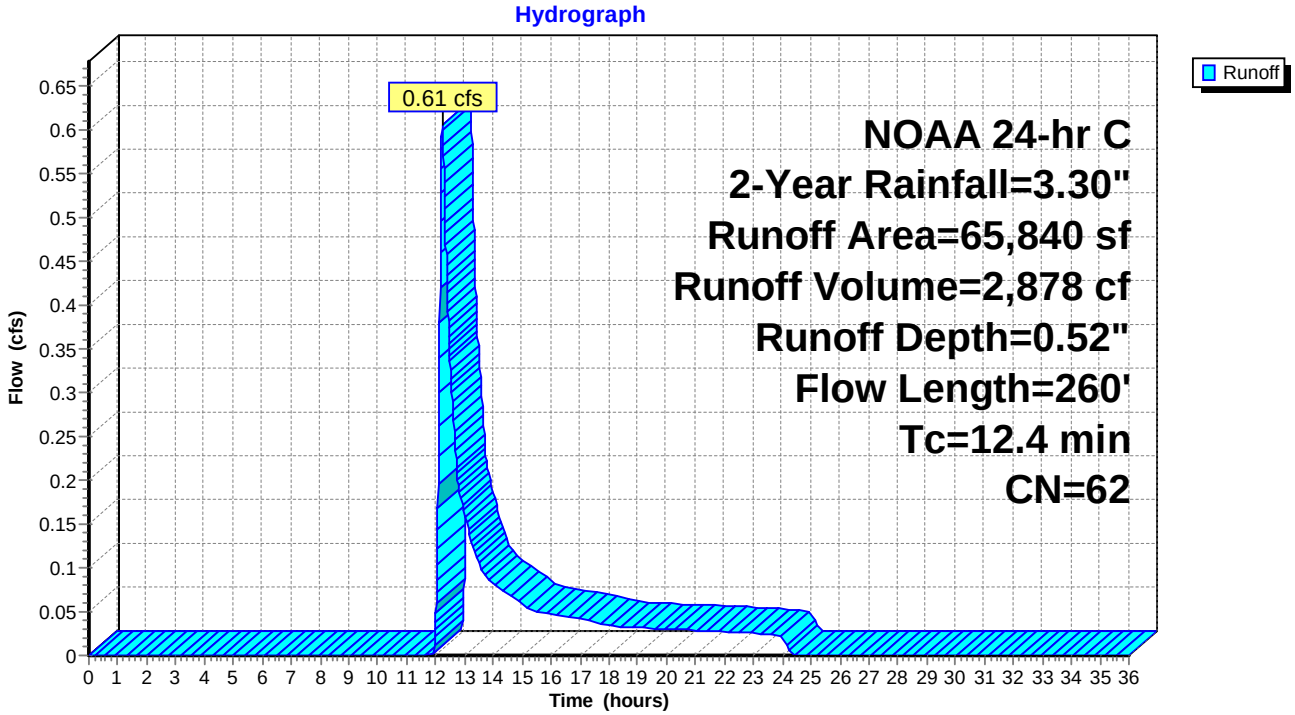
Runoff = 0.61 cfs @ 12.23 hrs, Volume= 2,878 cf, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
40,473	39	>75% Grass cover, Good, HSG A
25,367	98	Paved parking, HSG A
65,840	62	Weighted Average
40,473		61.47% Pervious Area
25,367		38.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.6	210	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.4	260	Total			

Subcatchment 4S: To Showcase Property



Summary for Subcatchment 5S: Watershed 5 (Bypass)

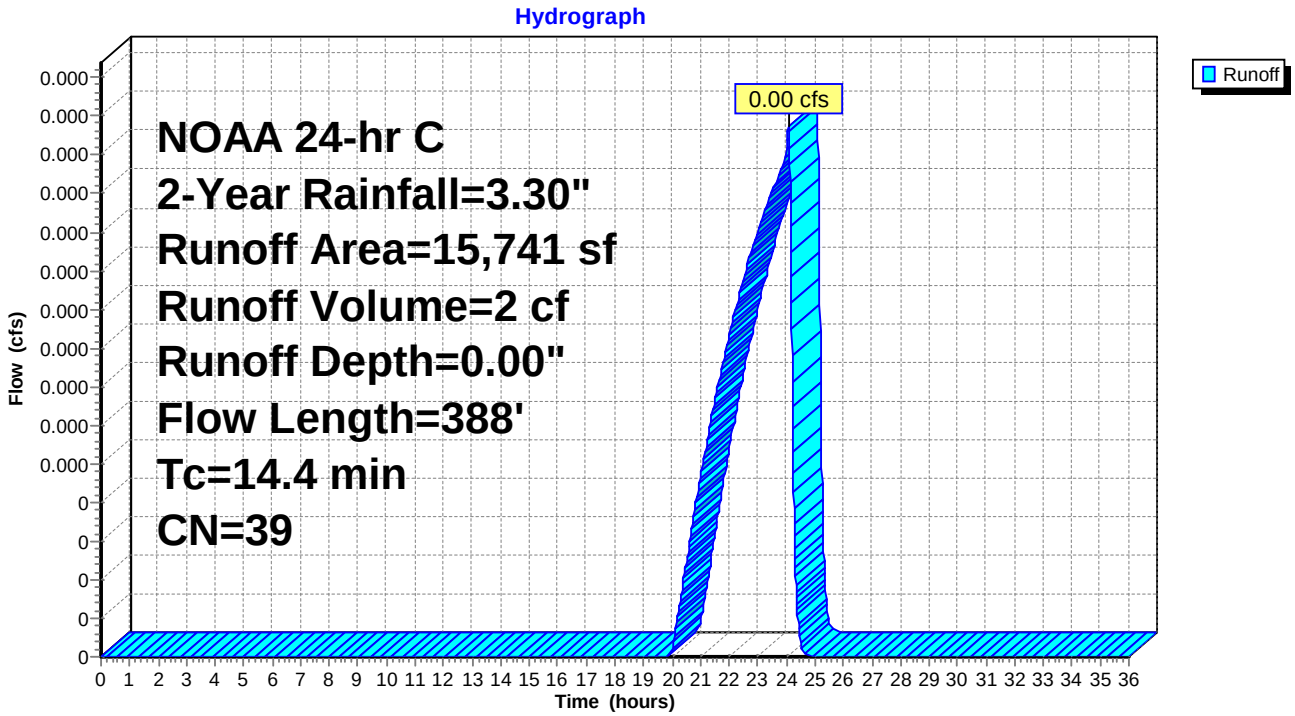
Runoff = 0.00 cfs @ 24.07 hrs, Volume= 2 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
15,741	39	>75% Grass cover, Good, HSG A
15,741	39	Weighted Average
15,741		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	80	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	258	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.4	388	Total			

Subcatchment 5S: Watershed 5 (Bypass)



Summary for Subcatchment 6S: Watershed 6 (bypass)

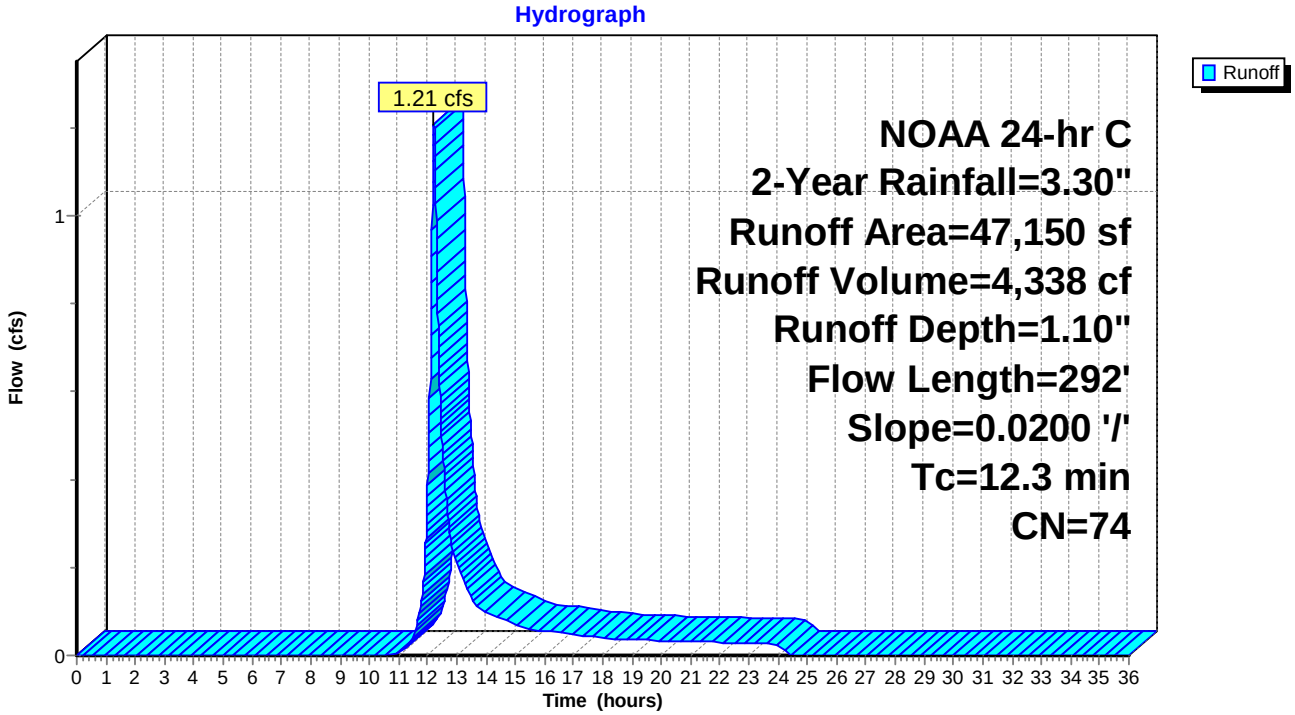
Runoff = 1.21 cfs @ 12.21 hrs, Volume= 4,338 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
28,206	98	Paved roads w/curbs & sewers, HSG A
18,944	39	>75% Grass cover, Good, HSG A
47,150	74	Weighted Average
18,944		40.18% Pervious Area
28,206		59.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
4.1	242	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.3	292	Total			

Subcatchment 6S: Watershed 6 (bypass)



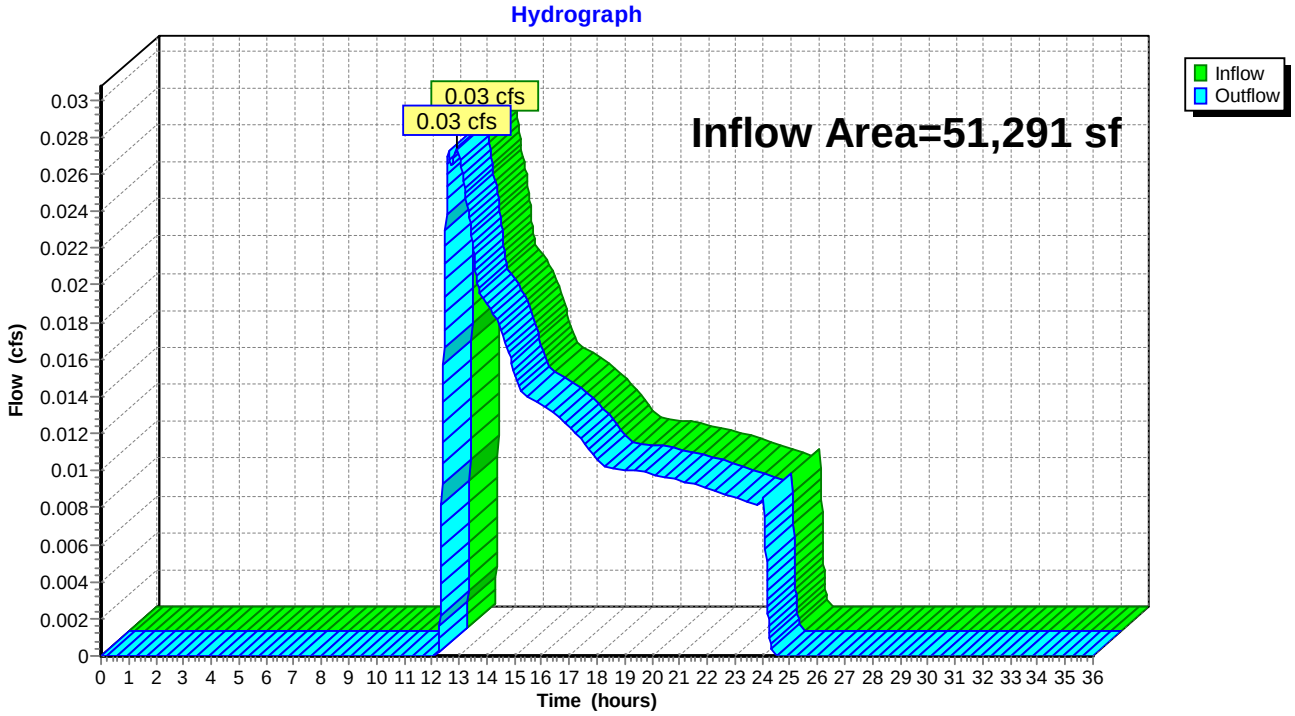
Summary for Reach 1R: Wetland 1

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

Inflow Area = 51,291 sf, 24.94% Impervious, Inflow Depth = 0.13" for 2-Year event
Inflow = 0.03 cfs @ 12.93 hrs, Volume= 546 cf
Outflow = 0.03 cfs @ 12.93 hrs, Volume= 546 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: Wetland 1



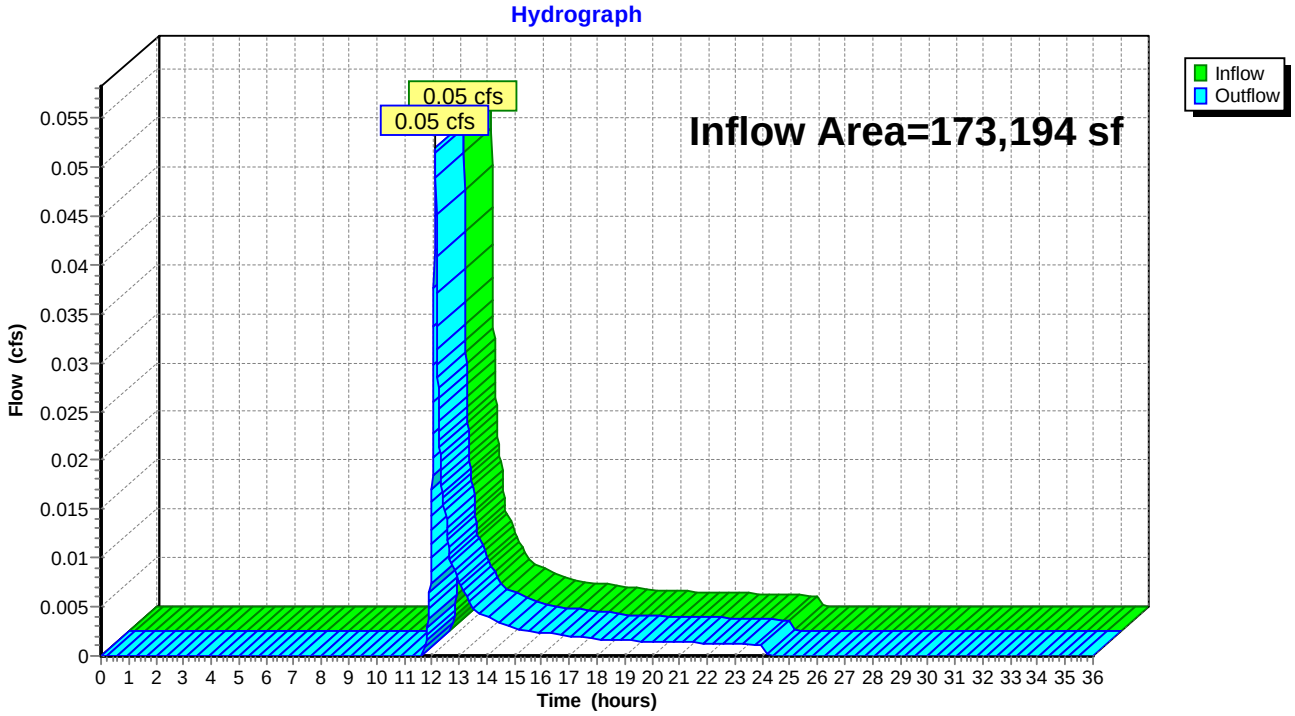
Summary for Reach 2R: Wetland D

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

Inflow Area = 173,194 sf, 56.09% Impervious, Inflow Depth = 0.01" for 2-Year event
Inflow = 0.05 cfs @ 12.13 hrs, Volume= 155 cf
Outflow = 0.05 cfs @ 12.13 hrs, Volume= 155 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 2R: Wetland D



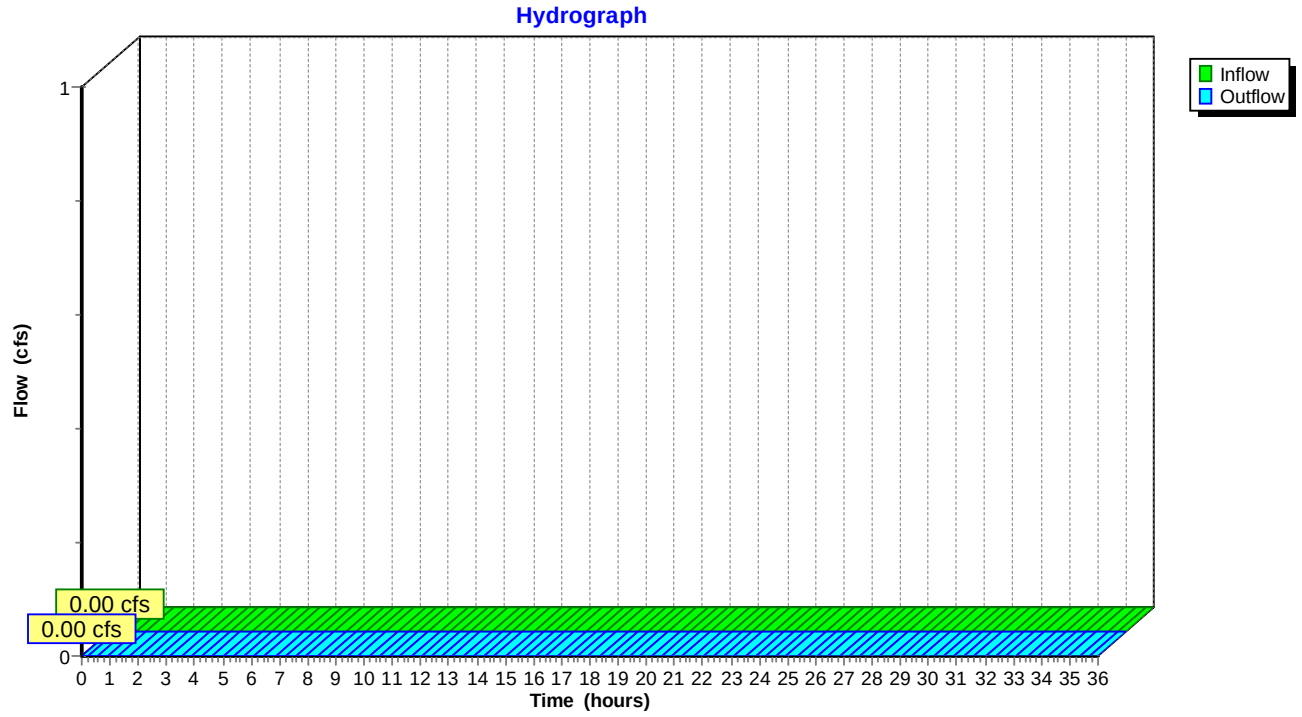
Summary for Reach 3R: Wetland M

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

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 3R: Wetland M



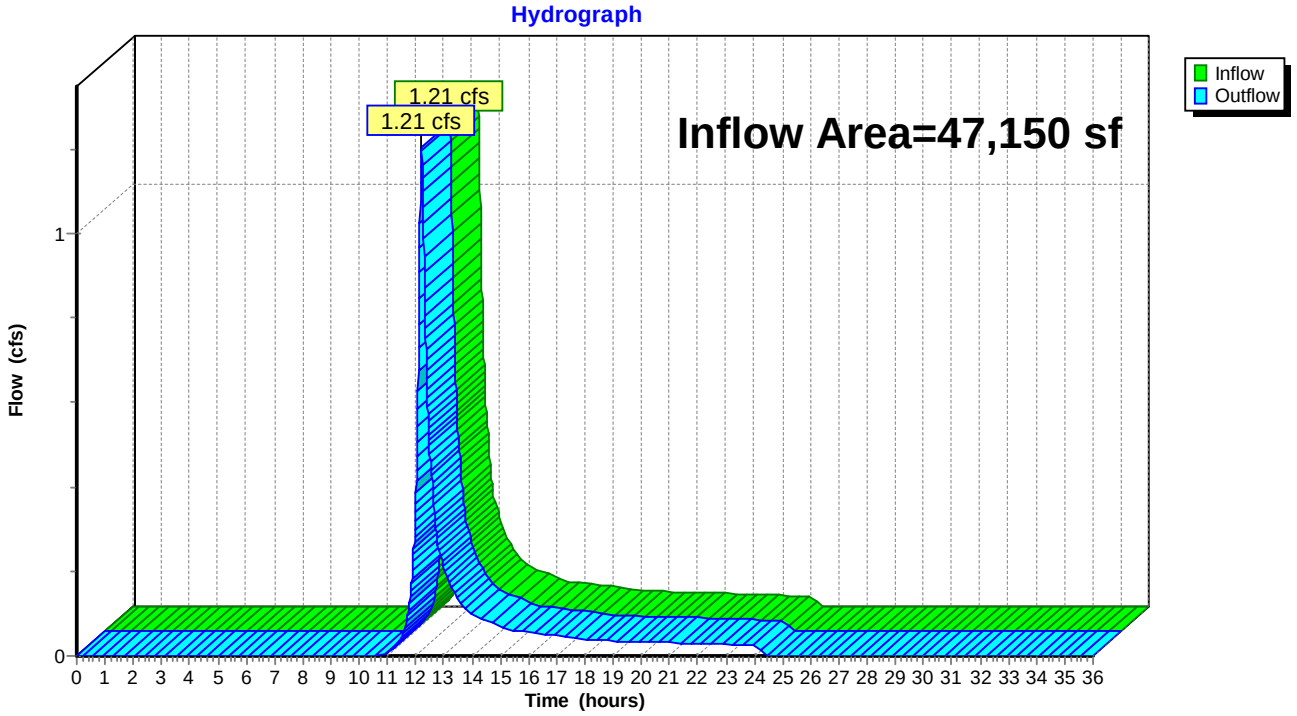
Summary for Reach 4R: Wetland N

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

Inflow Area = 47,150 sf, 59.82% Impervious, Inflow Depth = 1.10" for 2-Year event
Inflow = 1.21 cfs @ 12.21 hrs, Volume= 4,338 cf
Outflow = 1.21 cfs @ 12.21 hrs, Volume= 4,338 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 4R: Wetland N



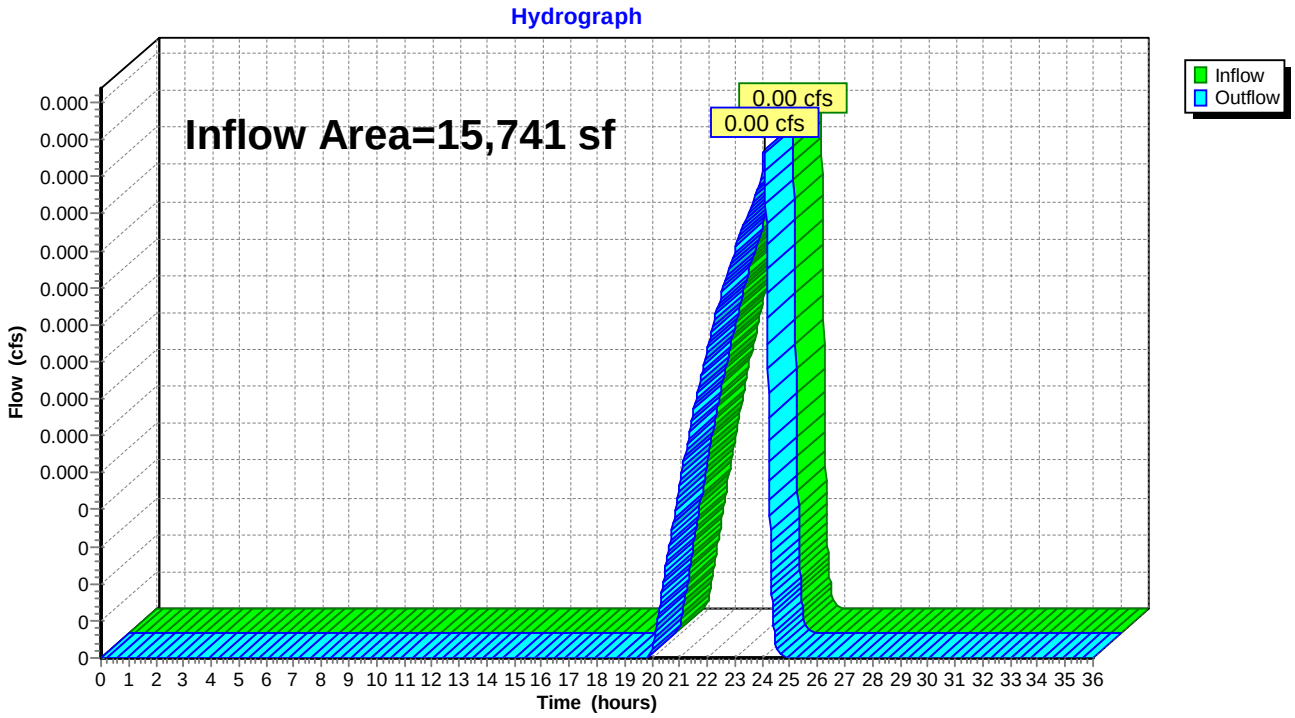
Summary for Reach 5R: Wetland C

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

Inflow Area = 15,741 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.07 hrs, Volume= 2 cf
Outflow = 0.00 cfs @ 24.07 hrs, Volume= 2 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 5R: Wetland C



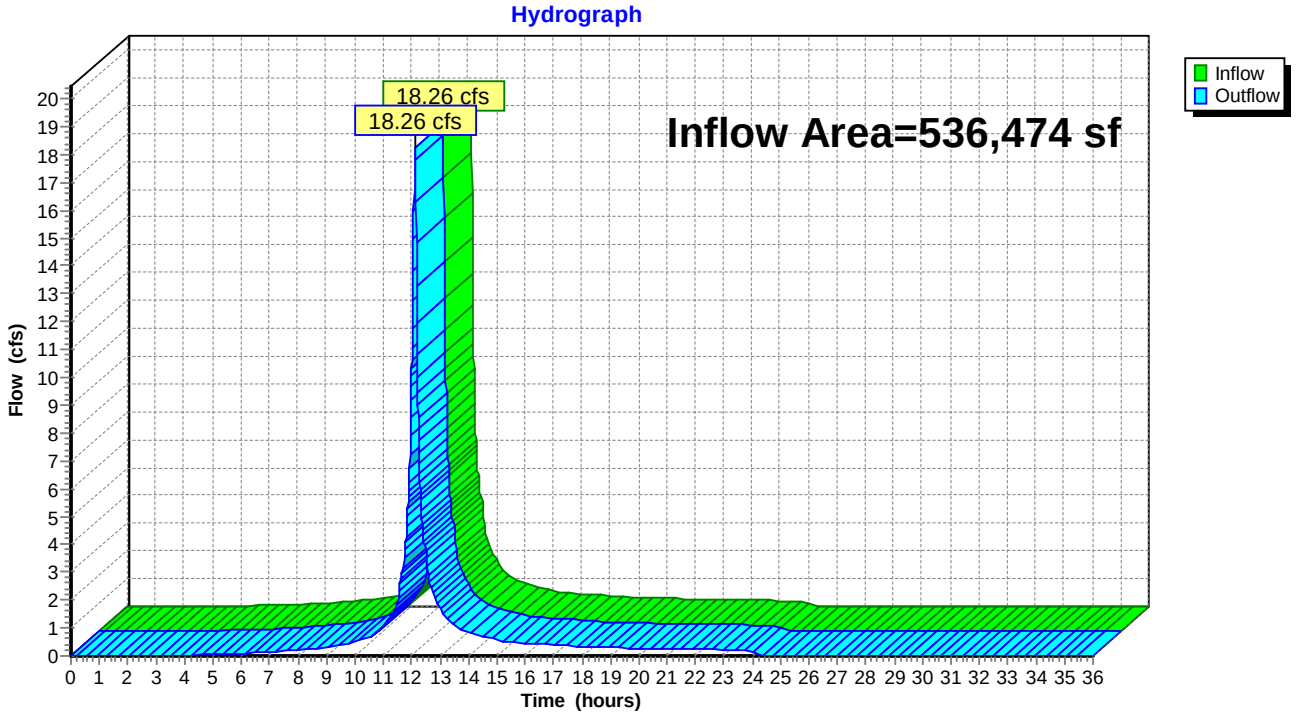
Summary for Reach 6R: Showcase

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

Inflow Area = 536,474 sf, 66.82% Impervious, Inflow Depth = 1.21" for 2-Year event
Inflow = 18.26 cfs @ 12.12 hrs, Volume= 53,979 cf
Outflow = 18.26 cfs @ 12.12 hrs, Volume= 53,979 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Showcase



Summary for Pond 1: DMH 1

Inflow Area = 238,845 sf, 53.87% Impervious, Inflow Depth = 0.94" for 2-Year event
Inflow = 4.74 cfs @ 12.24 hrs, Volume= 18,686 cf
Outflow = 4.74 cfs @ 12.24 hrs, Volume= 18,686 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.46 cfs @ 12.24 hrs, Volume= 18,597 cf
Secondary = 0.29 cfs @ 12.24 hrs, Volume= 89 cf

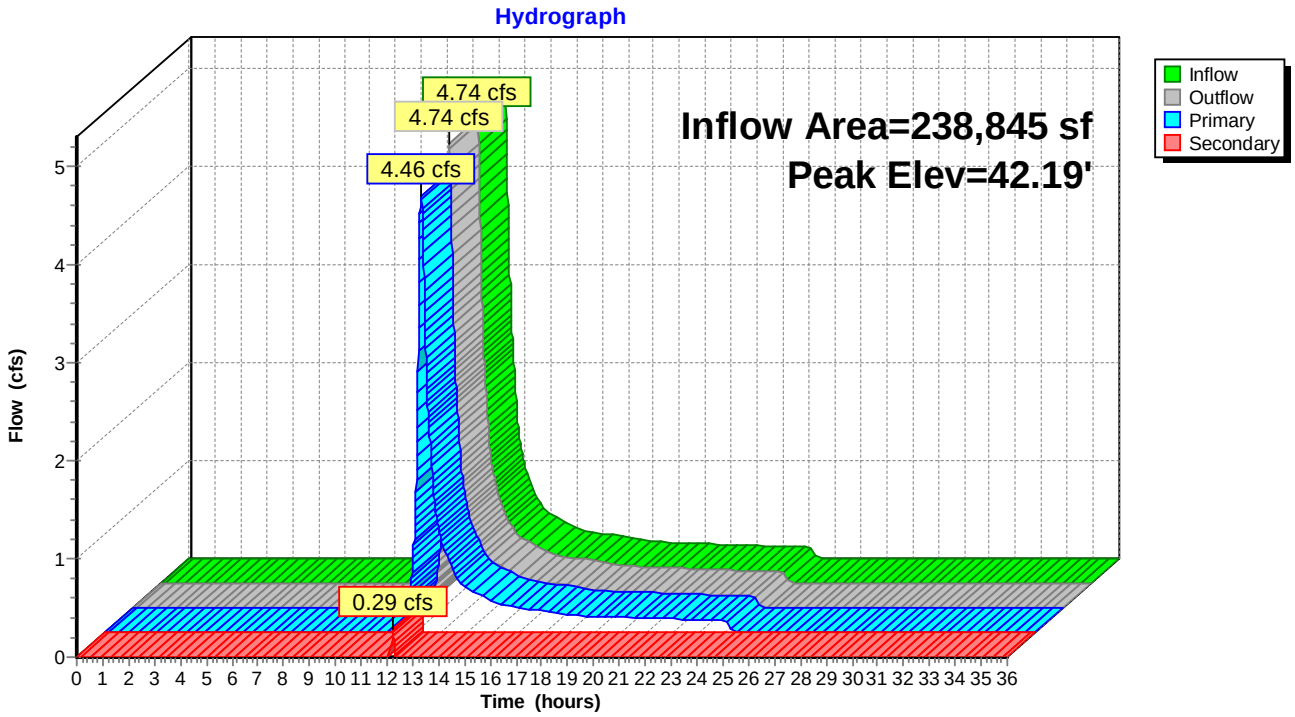
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 42.19' @ 12.24 hrs
Flood Elev= 47.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	40.80'	**15.0" Round 15" RCP** L= 36.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 40.80' / 40.70' S= 0.0028 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.23 sf
#2	Device 3	42.10'	**3.0' long x 3.00' rise Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#3	Secondary	40.70'	**18.0" Round 18" RCP** L= 6.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 40.70' / 40.60' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=4.45 cfs @ 12.24 hrs HW=42.19' TW=40.96' (Dynamic Tailwater)
↑—**1=15" RCP** (Barrel Controls 4.45 cfs @ 4.06 fps)

Secondary OutFlow Max=0.28 cfs @ 12.24 hrs HW=42.19' TW=0.00' (Dynamic Tailwater)
↑—**3=18" RCP** (Passes 0.28 cfs of 6.24 cfs potential flow)
↑—**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.28 cfs @ 1.00 fps)

Pond 1: DMH 1


Hydrograph
Inflow Area=238,845 sf
Peak Elev=42.19'
4.74 cfs
4.74 cfs
4.46 cfs
0.29 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

Summary for Pond 1P: Basin 1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=190)

Inflow Area = 170,331 sf, 57.03% Impervious, Inflow Depth = 1.10" for 2-Year event
Inflow = 3.82 cfs @ 12.26 hrs, Volume= 15,670 cf
Outflow = 0.51 cfs @ 13.50 hrs, Volume= 15,673 cf, Atten= 87%, Lag= 74.4 min
Discarded = 0.51 cfs @ 13.50 hrs, Volume= 15,673 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 45.89' @ 13.50 hrs Surf.Area= 7,629 sf Storage= 6,060 cf
Flood Elev= 49.00' Surf.Area= 14,581 sf Storage= 39,663 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 115.8 min (989.4 - 873.6)

Volume	Invert	Avail.Storage	Storage Description
#1	45.00'	39,663 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

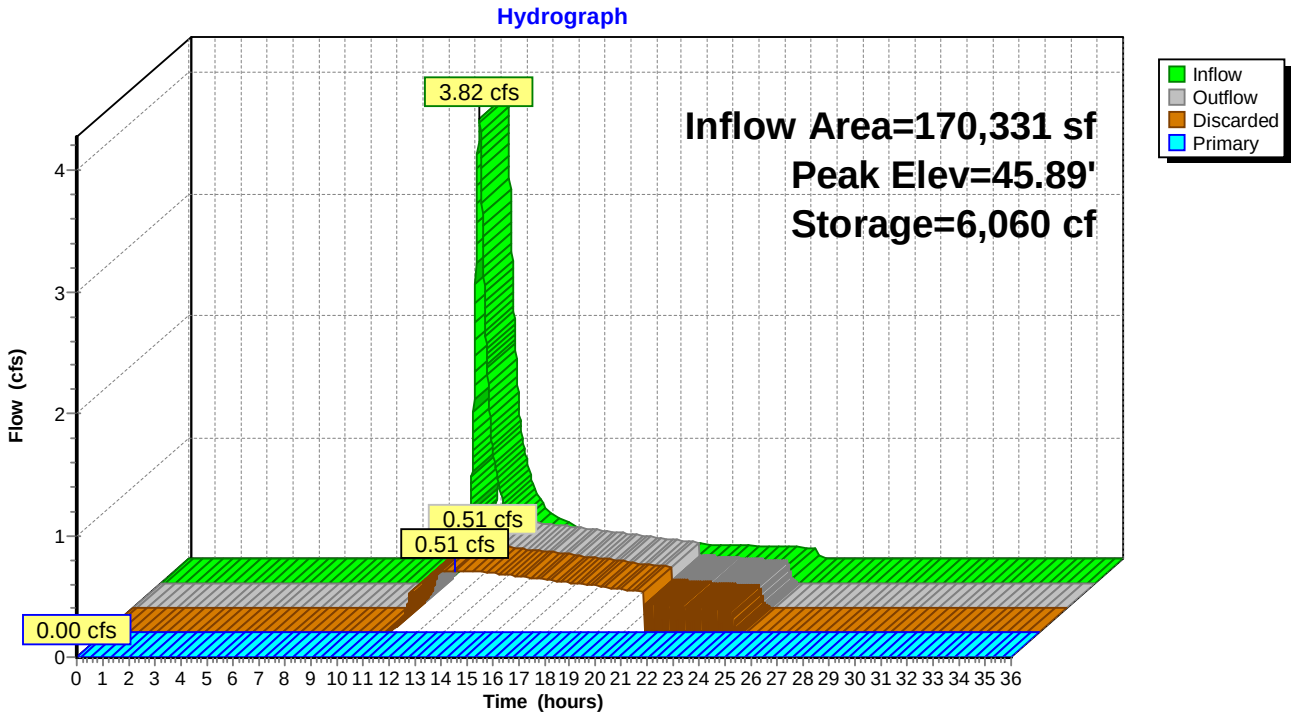
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.00	5,978	0	0
46.00	7,832	6,905	6,905
47.00	9,674	8,753	15,658
48.00	11,877	10,776	26,434
49.00	14,581	13,229	39,663

Device	Routing	Invert	Outlet Devices
#1	Discarded	45.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 41.00'
#2	Primary	48.75'	**13.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.51 cfs @ 13.50 hrs HW=45.89' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.51 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=45.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Basin 1



Summary for Pond 2P: Basin 2

[80] Warning: Exceeded Pond 1 by 0.66' @ 24.80 hrs (0.95 cfs 2,718 cf)

Inflow Area =	238,845 sf,	53.87% Impervious,	Inflow Depth =	0.93"	for 2-Year event
Inflow =	4.46 cfs @	12.24 hrs,	Volume=	18,597 cf	
Outflow =	0.33 cfs @	14.92 hrs,	Volume=	18,371 cf,	Atten= 93%, Lag= 160.9 min
Discarded =	0.33 cfs @	14.92 hrs,	Volume=	18,371 cf	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 41.91' @ 14.92 hrs Surf.Area= 8,998 sf Storage= 9,551 cf
Flood Elev= 43.00' Surf.Area= 14,712 sf Storage= 22,400 cf

Plug-Flow detention time= 393.6 min calculated for 18,366 cf (99% of inflow)
Center-of-Mass det. time= 386.9 min (1,268.9 - 882.0)

Volume	Invert	Avail.Storage	Storage Description
#1	40.00'	22,400 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.00	1,382	0	0
41.00	4,970	3,176	3,176
42.00	9,383	7,177	10,353
43.00	14,712	12,048	22,400

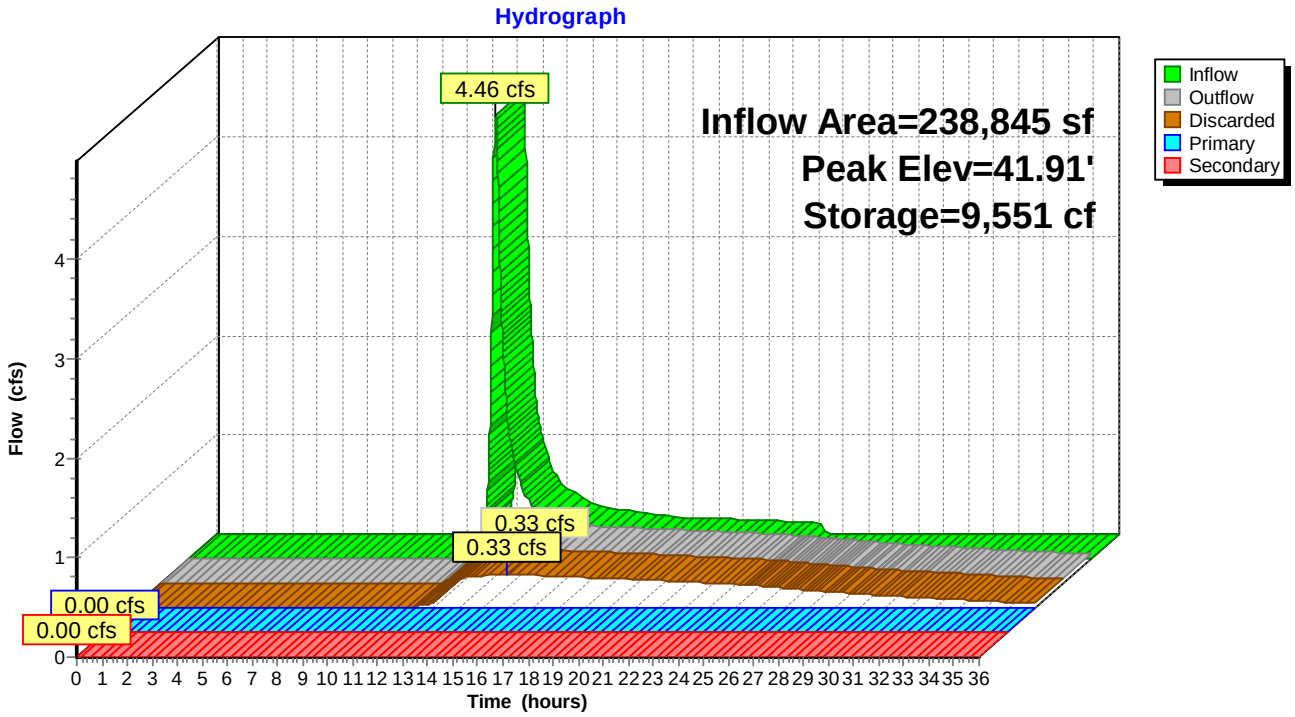
Device	Routing	Invert	Outlet Devices
#1	Primary	37.00'	**12.0" Round 12" RCP** L= 87.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 37.00' / 36.10' S= 0.0103 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	40.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 38.50'
#3	Secondary	42.75'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	42.40'	**32.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.33 cfs @ 14.92 hrs HW=41.91' (Free Discharge)
↑**2=Exfiltration** (Controls 0.33 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.00' TW=0.00' (Dynamic Tailwater)
↑**1=12" RCP** (Passes 0.00 cfs of 5.49 cfs potential flow)
↑**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.00' TW=0.00' (Dynamic Tailwater)
↑**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Basin 2



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1 Runoff Area=51,291 sf 24.94% Impervious Runoff Depth=0.59"
Flow Length=508' Tc=10.4 min UI Adjusted CN=49 Runoff=0.46 cfs 2,534 cf

Subcatchment 2A: 2A Runoff Area=2,863 sf 0.00% Impervious Runoff Depth=1.57"
Tc=5.0 min CN=65 Runoff=0.14 cfs 376 cf

Subcatchment 2S: 2 Runoff Area=170,331 sf 57.03% Impervious Runoff Depth=2.27"
Flow Length=325' Tc=16.6 min CN=74 Runoff=8.15 cfs 32,206 cf

Subcatchment 3S: 3 Runoff Area=238,845 sf 53.87% Impervious Runoff Depth=2.03"
Flow Length=260' Tc=14.1 min CN=71 Runoff=10.86 cfs 40,329 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=4.19"
Tc=5.0 min CN=94 Runoff=27.62 cfs 80,926 cf

Subcatchment 4S: To Showcase Property Runoff Area=65,840 sf 38.53% Impervious Runoff Depth=1.36"
Flow Length=260' Tc=12.4 min CN=62 Runoff=2.00 cfs 7,489 cf

Subcatchment 5S: Watershed 5 (Bypass) Runoff Area=15,741 sf 0.00% Impervious Runoff Depth=0.18"
Flow Length=388' Tc=14.4 min CN=39 Runoff=0.01 cfs 231 cf

Subcatchment 6S: Watershed 6 (bypass) Runoff Area=47,150 sf 59.82% Impervious Runoff Depth=2.27"
Flow Length=292' Slope=0.0200 '/' Tc=12.3 min CN=74 Runoff=2.56 cfs 8,915 cf

Reach 1R: Wetland 1 Inflow=0.46 cfs 2,534 cf
Outflow=0.46 cfs 2,534 cf

Reach 2R: Wetland D Inflow=0.14 cfs 376 cf
Outflow=0.14 cfs 376 cf

Reach 3R: Wetland M Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 4R: Wetland N Inflow=2.56 cfs 8,915 cf
Outflow=2.56 cfs 8,915 cf

Reach 5R: Wetland C Inflow=0.01 cfs 231 cf
Outflow=0.01 cfs 231 cf

Reach 6R: Showcase Inflow=31.34 cfs 102,519 cf
Outflow=31.34 cfs 102,519 cf

Pond 1: DMH 1 Peak Elev=42.71' Inflow=10.86 cfs 40,329 cf
Primary=6.20 cfs 26,225 cf Secondary=4.66 cfs 14,104 cf Outflow=10.86 cfs 40,329 cf

Pond 1P: Basin 1 Peak Elev=46.98' Storage=15,437 cf Inflow=8.15 cfs 32,206 cf
Discarded=0.74 cfs 32,206 cf Primary=0.00 cfs 0 cf Outflow=0.74 cfs 32,206 cf

Pond 2P: Basin 2 Peak Elev=42.36' Storage=14,091 cf Inflow=6.20 cfs 26,225 cf
Discarded=0.43 cfs 25,097 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.43 cfs 25,097 cf

Total Runoff Area = 823,850 sf Runoff Volume = 173,006 cf Average Runoff Depth = 2.52"
39.72% Pervious = 327,240 sf 60.28% Impervious = 496,610 sf

Summary for Subcatchment 1S: 1

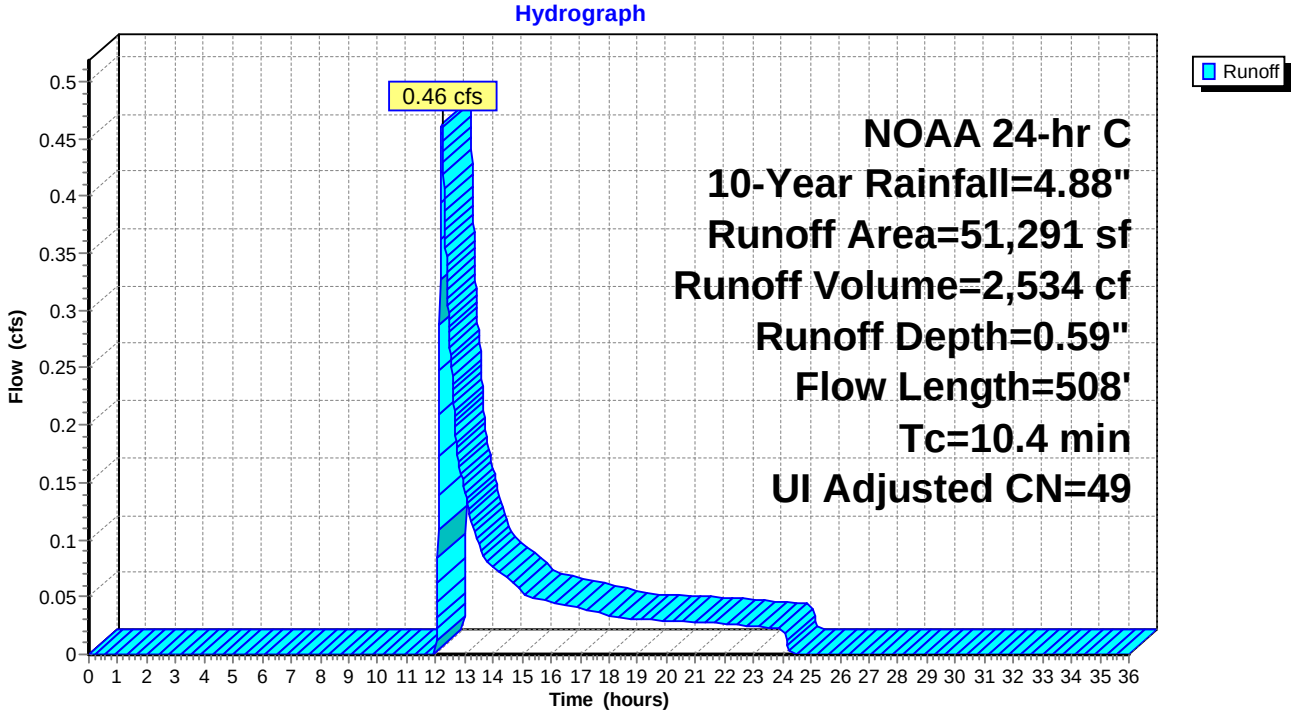
Runoff = 0.46 cfs @ 12.22 hrs, Volume= 2,534 cf, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Adj	Description
5,209	98		Paved roads w/curbs & sewers, HSG A
38,499	39		>75% Grass cover, Good, HSG A
7,583	98		Unconnected pavement, HSG A
51,291	54	49	Weighted Average, UI Adjusted
38,499			75.06% Pervious Area
12,792			24.94% Impervious Area
7,583			59.28% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.3	325	0.0123	1.66		**Shallow Concentrated Flow, Swale** Grassed Waterway Kv= 15.0 fps
0.9	133	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.4	508	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2A: 2A

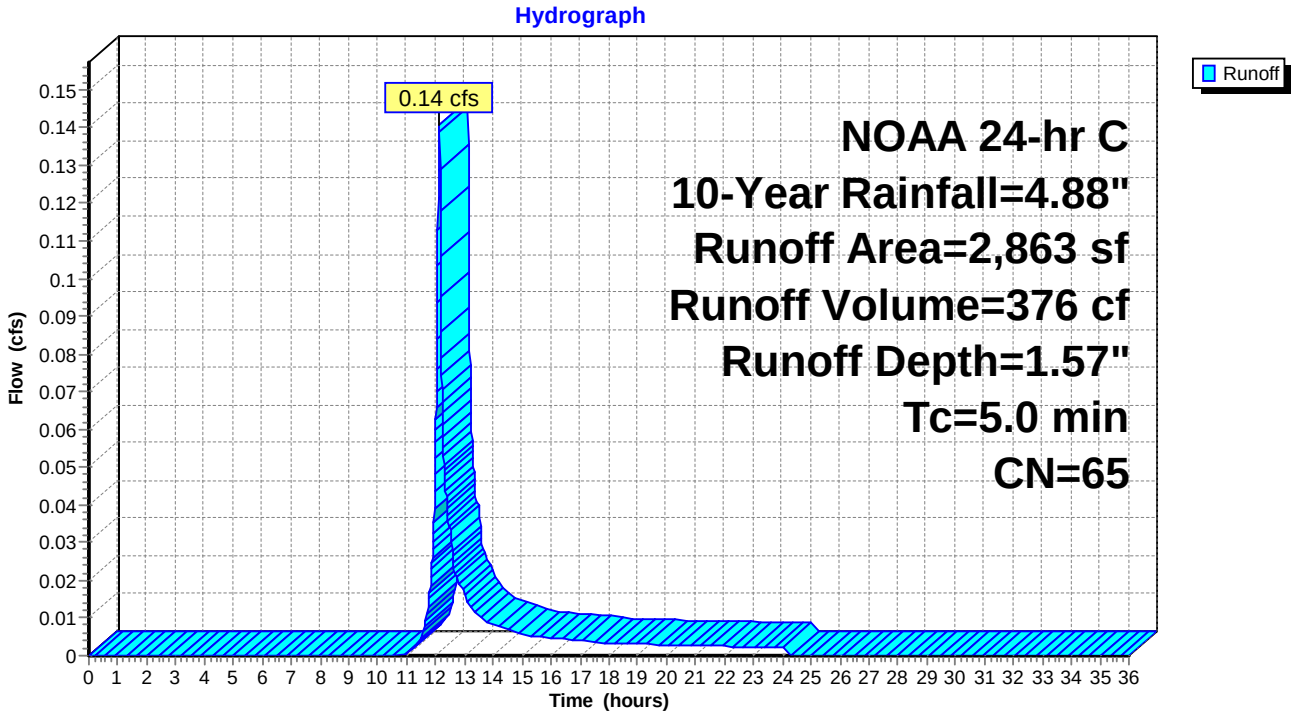
Runoff = 0.14 cfs @ 12.13 hrs, Volume= 376 cf, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

	Area (sf)	CN	Description
*	2,863	65	Playground
	2,863		100.00% Pervious Area

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

Subcatchment 2A: 2A



Summary for Subcatchment 2S: 2

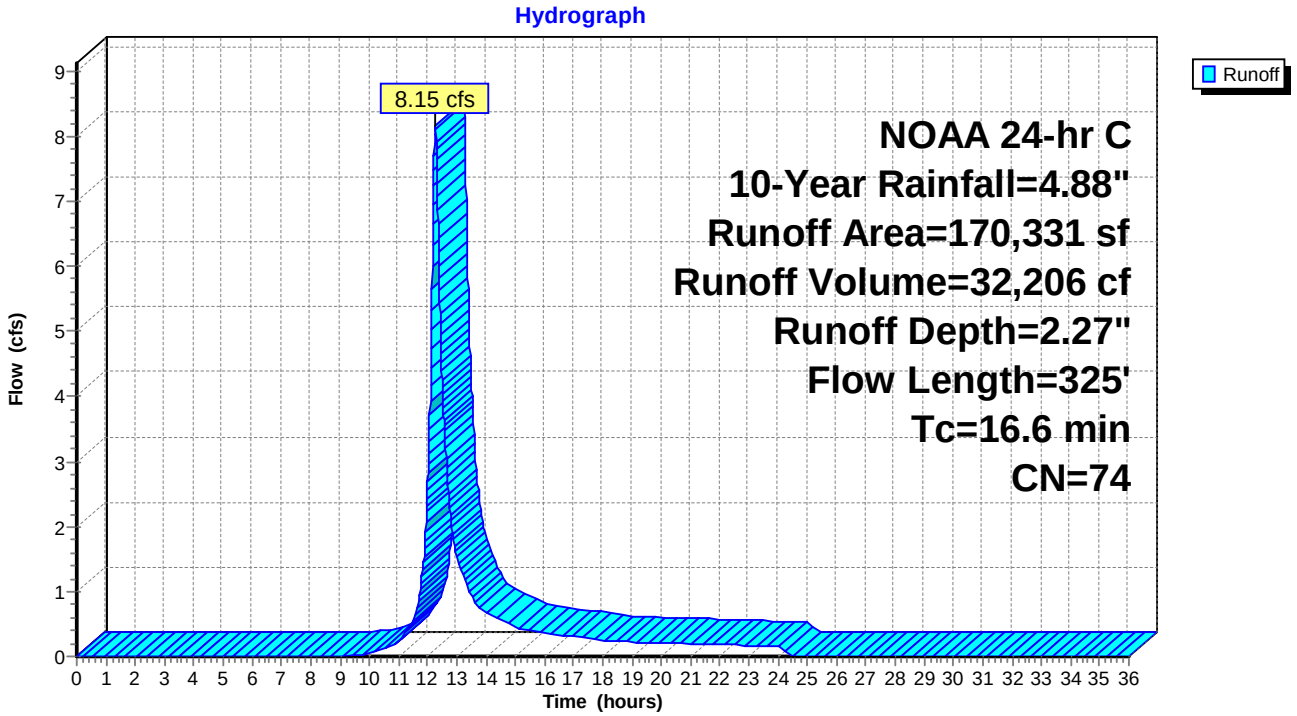
Runoff = 8.15 cfs @ 12.26 hrs, Volume= 32,206 cf, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

	Area (sf)	CN	Description
	97,140	98	Paved roads w/curbs & sewers, HSG A
*	8,827	65	Playground
	64,364	39	>75% Grass cover, Good, HSG A
	170,331	74	Weighted Average
	73,191		42.97% Pervious Area
	97,140		57.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
5.7	250	0.0110	0.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	325	Total			

Subcatchment 2S: 2



Summary for Subcatchment 3S: 3

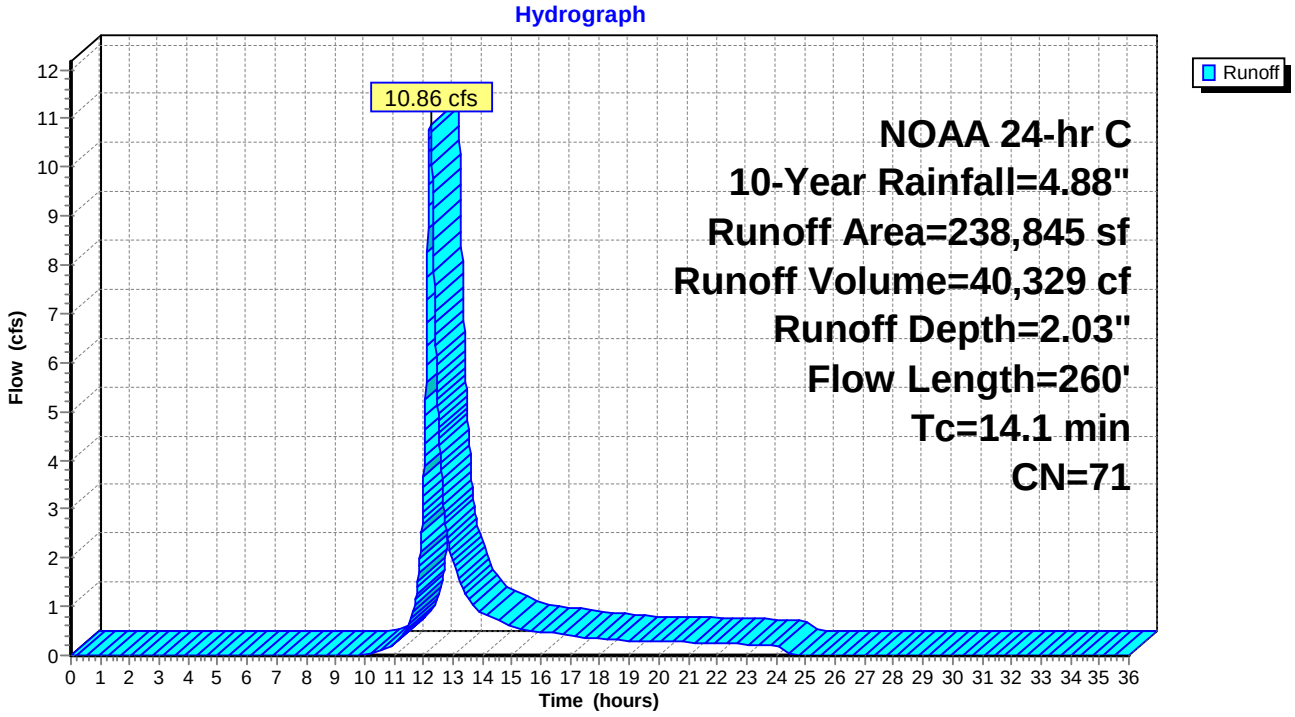
Runoff = 10.86 cfs @ 12.23 hrs, Volume= 40,329 cf, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
128,657	98	Paved roads w/curbs & sewers, HSG A
110,188	39	>75% Grass cover, Good, HSG A
238,845	71	Weighted Average
110,188		46.13% Pervious Area
128,657		53.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.3	210	0.0230	1.06		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.1	260	Total			

Subcatchment 3S: 3



Summary for Subcatchment 4A: Showcase Property

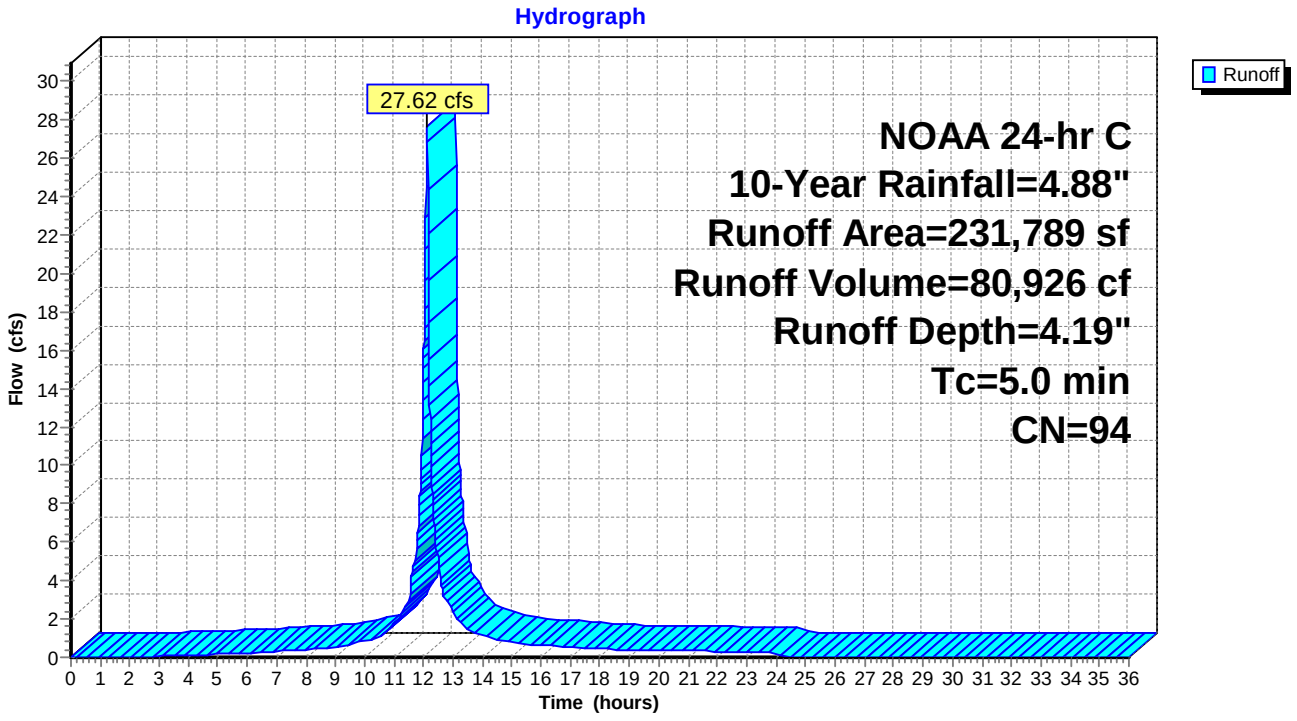
Runoff = 27.62 cfs @ 12.12 hrs, Volume= 80,926 cf, Depth= 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
27,341	65	Woods/grass comb., Fair, HSG B
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	94	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Subcatchment 4A: Showcase Property



Summary for Subcatchment 4S: To Showcase Property

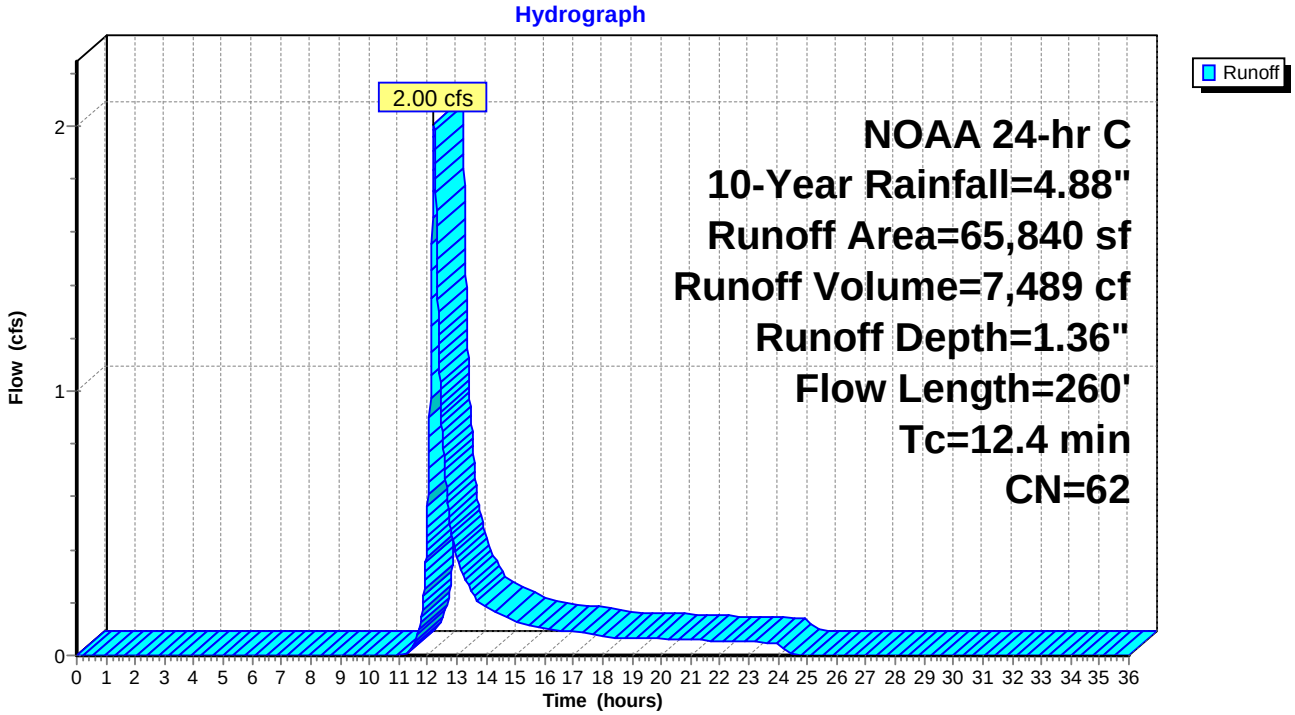
Runoff = 2.00 cfs @ 12.21 hrs, Volume= 7,489 cf, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
40,473	39	>75% Grass cover, Good, HSG A
25,367	98	Paved parking, HSG A
65,840	62	Weighted Average
40,473		61.47% Pervious Area
25,367		38.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.6	210	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.4	260	Total			

Subcatchment 4S: To Showcase Property



Summary for Subcatchment 5S: Watershed 5 (Bypass)

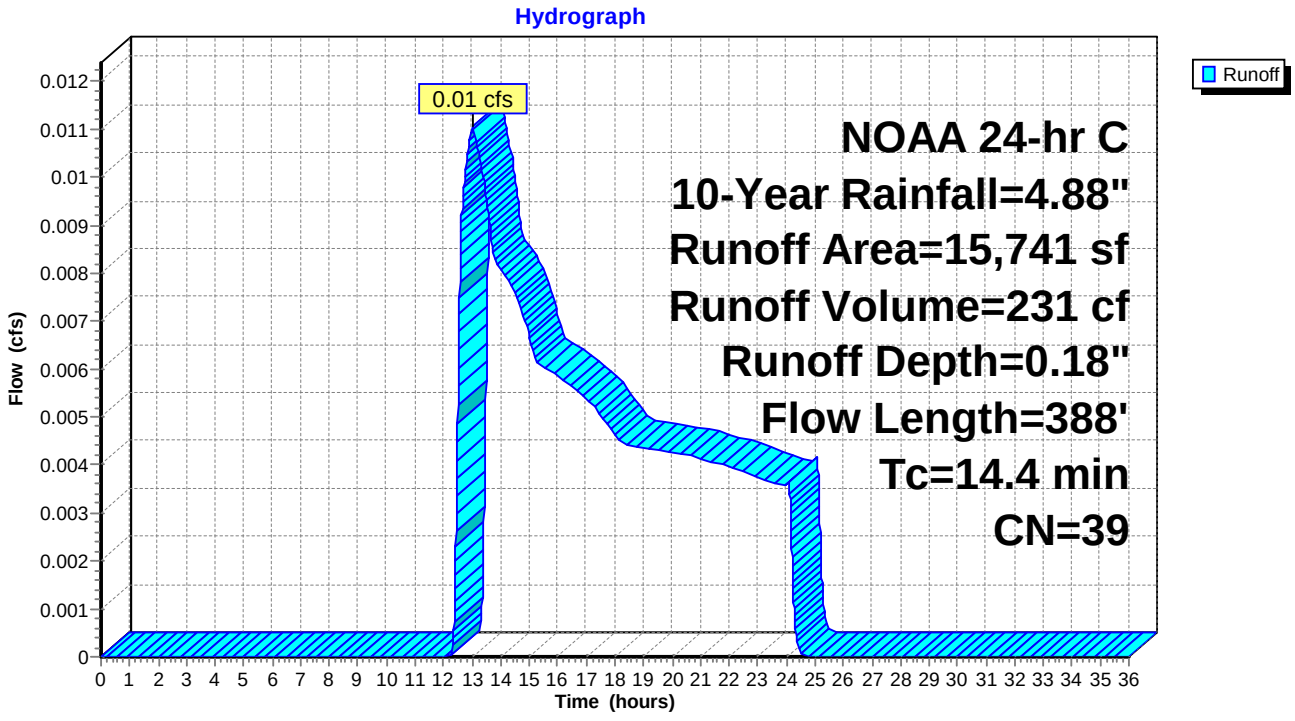
Runoff = 0.01 cfs @ 13.01 hrs, Volume= 231 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
15,741	39	>75% Grass cover, Good, HSG A
15,741	39	Weighted Average
15,741		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	80	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	258	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.4	388	Total			

Subcatchment 5S: Watershed 5 (Bypass)



Summary for Subcatchment 6S: Watershed 6 (bypass)

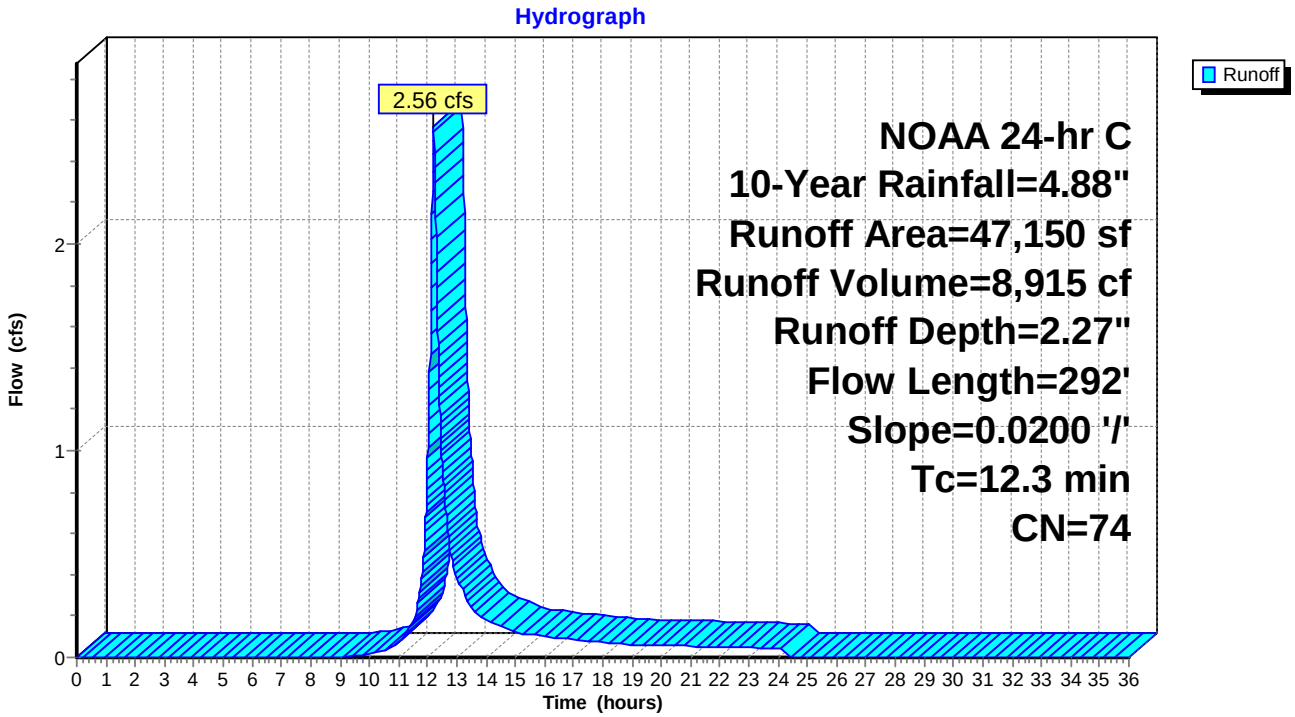
Runoff = 2.56 cfs @ 12.20 hrs, Volume= 8,915 cf, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
28,206	98	Paved roads w/curbs & sewers, HSG A
18,944	39	>75% Grass cover, Good, HSG A
47,150	74	Weighted Average
18,944		40.18% Pervious Area
28,206		59.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
4.1	242	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.3	292	Total			

Subcatchment 6S: Watershed 6 (bypass)



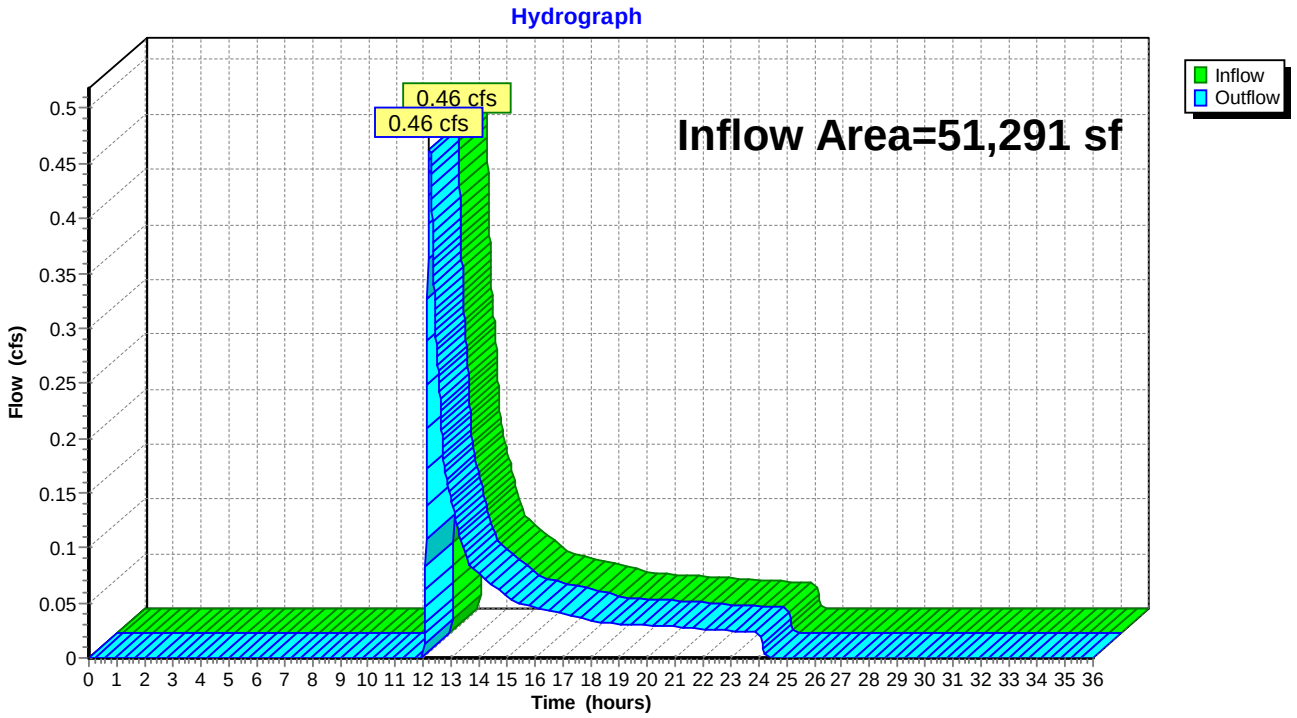
Summary for Reach 1R: Wetland 1

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

Inflow Area = 51,291 sf, 24.94% Impervious, Inflow Depth = 0.59" for 10-Year event
Inflow = 0.46 cfs @ 12.22 hrs, Volume= 2,534 cf
Outflow = 0.46 cfs @ 12.22 hrs, Volume= 2,534 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: Wetland 1



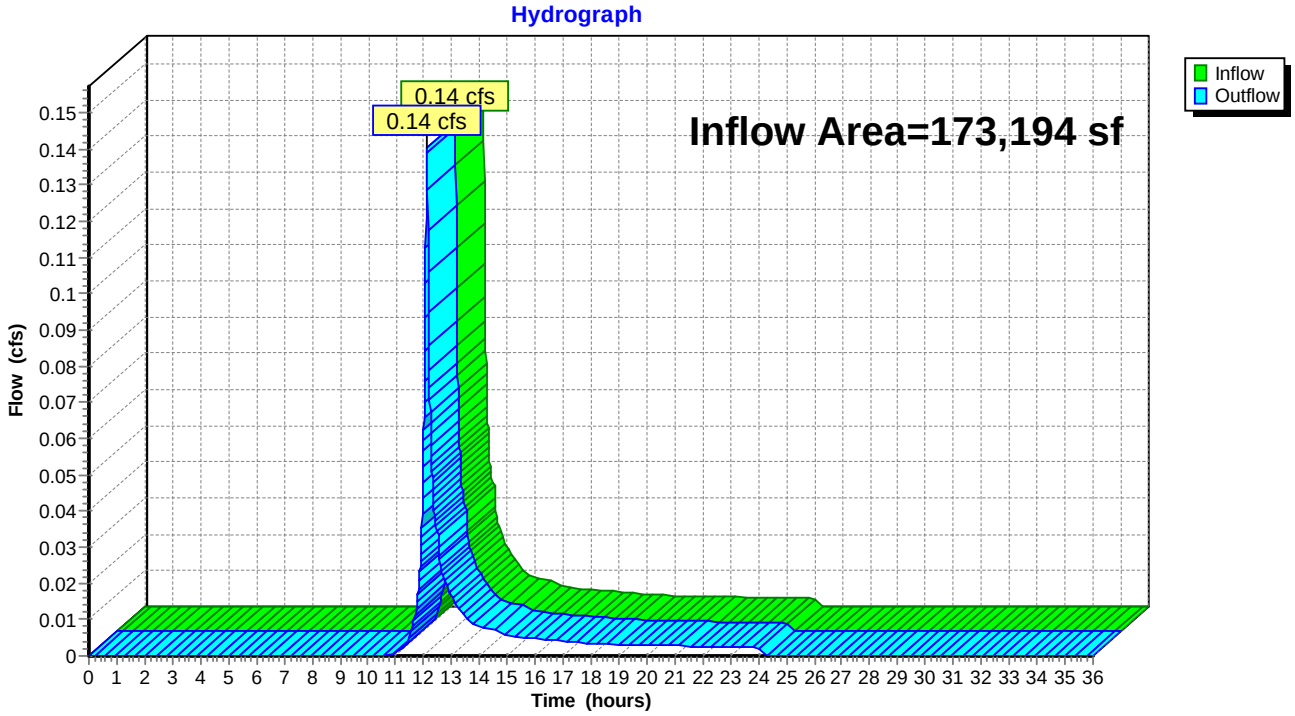
Summary for Reach 2R: Wetland D

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

Inflow Area = 173,194 sf, 56.09% Impervious, Inflow Depth = 0.03" for 10-Year event
Inflow = 0.14 cfs @ 12.13 hrs, Volume= 376 cf
Outflow = 0.14 cfs @ 12.13 hrs, Volume= 376 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 2R: Wetland D



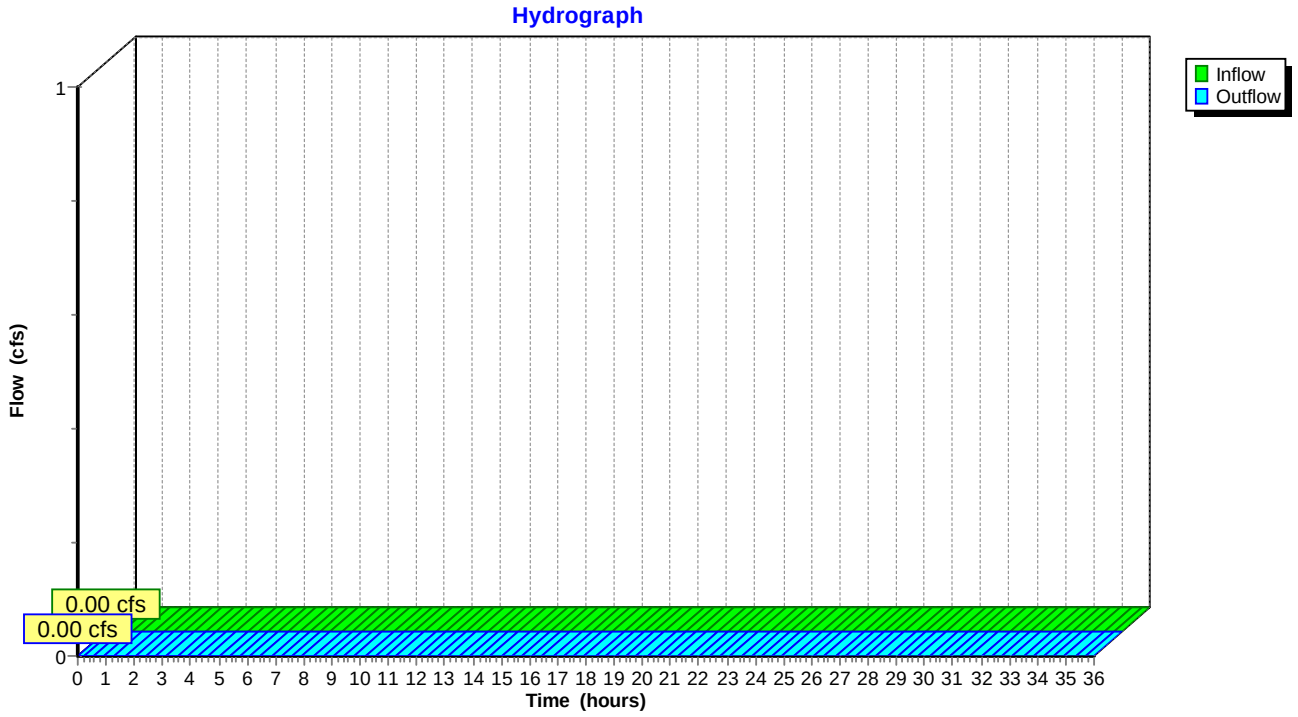
Summary for Reach 3R: Wetland M

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

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 3R: Wetland M



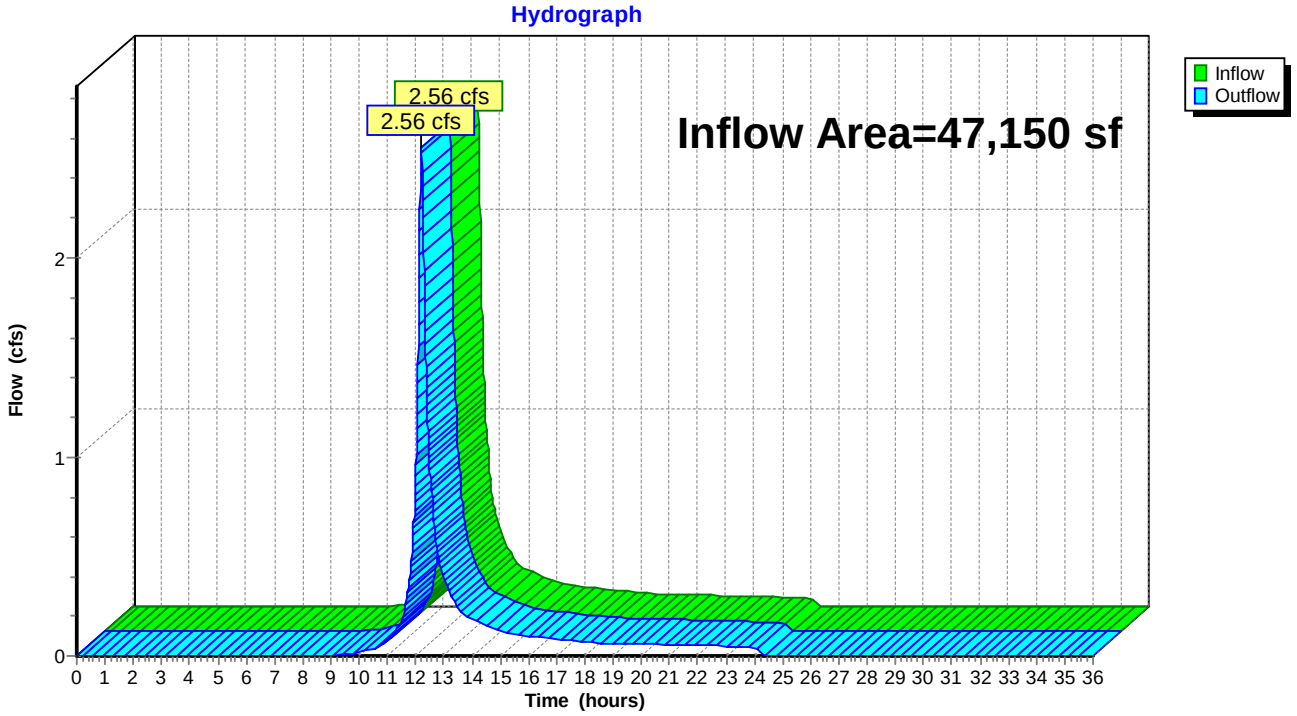
Summary for Reach 4R: Wetland N

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

Inflow Area = 47,150 sf, 59.82% Impervious, Inflow Depth = 2.27" for 10-Year event
Inflow = 2.56 cfs @ 12.20 hrs, Volume= 8,915 cf
Outflow = 2.56 cfs @ 12.20 hrs, Volume= 8,915 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 4R: Wetland N



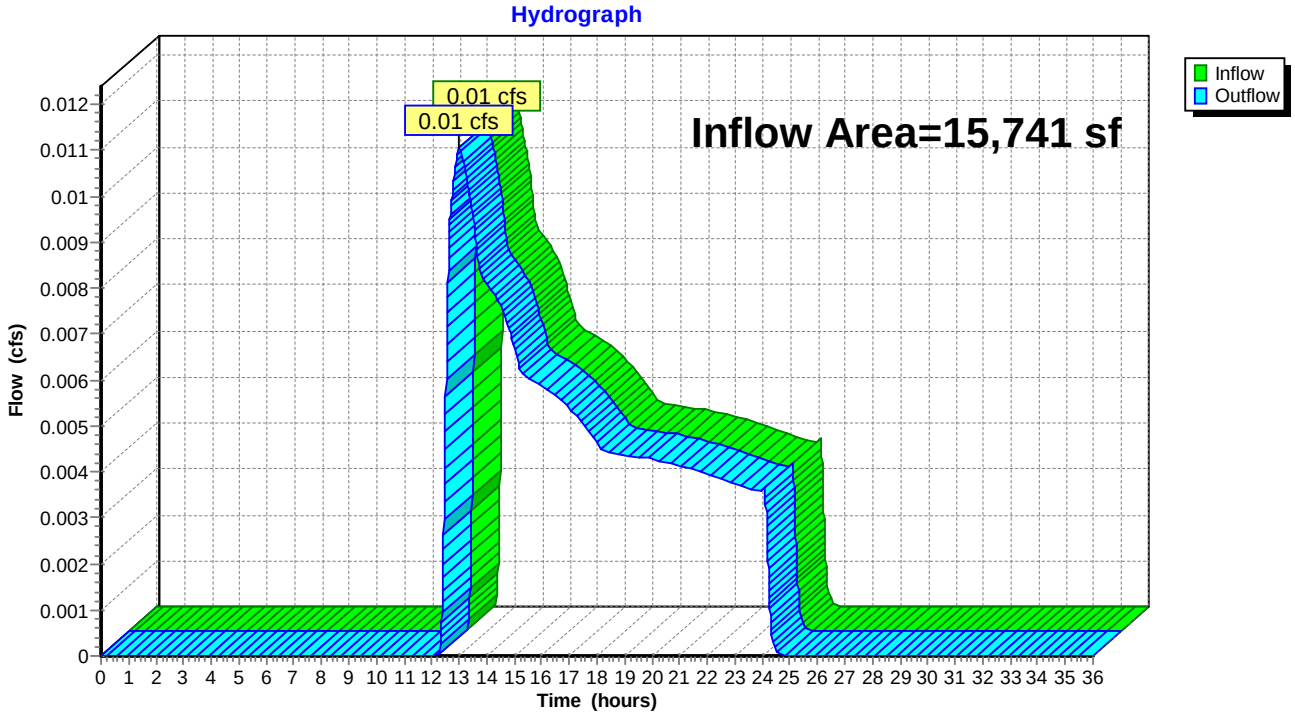
Summary for Reach 5R: Wetland C

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

Inflow Area = 15,741 sf, 0.00% Impervious, Inflow Depth = 0.18" for 10-Year event
Inflow = 0.01 cfs @ 13.01 hrs, Volume= 231 cf
Outflow = 0.01 cfs @ 13.01 hrs, Volume= 231 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 5R: Wetland C



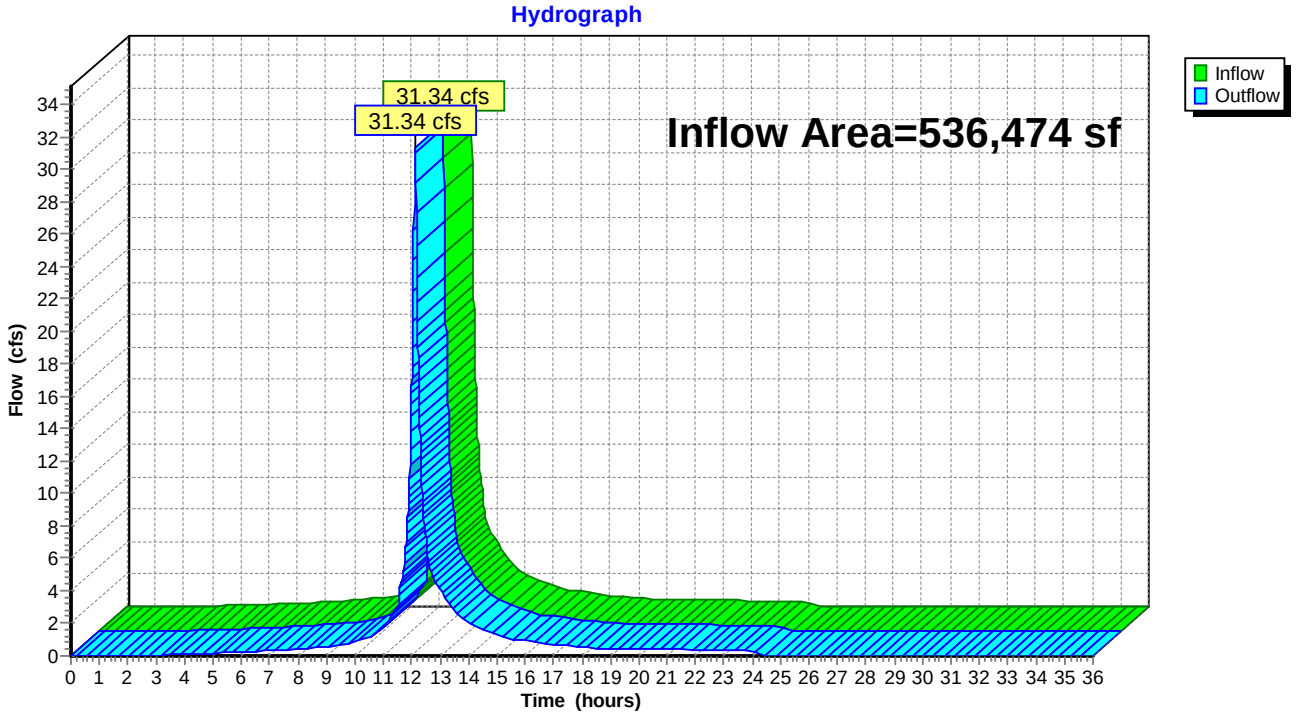
Summary for Reach 6R: Showcase

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

Inflow Area = 536,474 sf, 66.82% Impervious, Inflow Depth = 2.29" for 10-Year event
Inflow = 31.34 cfs @ 12.13 hrs, Volume= 102,519 cf
Outflow = 31.34 cfs @ 12.13 hrs, Volume= 102,519 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Showcase



Summary for Pond 1: DMH 1

Inflow Area = 238,845 sf, 53.87% Impervious, Inflow Depth = 2.03" for 10-Year event
Inflow = 10.86 cfs @ 12.23 hrs, Volume= 40,329 cf
Outflow = 10.86 cfs @ 12.23 hrs, Volume= 40,329 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.20 cfs @ 12.23 hrs, Volume= 26,225 cf
Secondary = 4.66 cfs @ 12.23 hrs, Volume= 14,104 cf

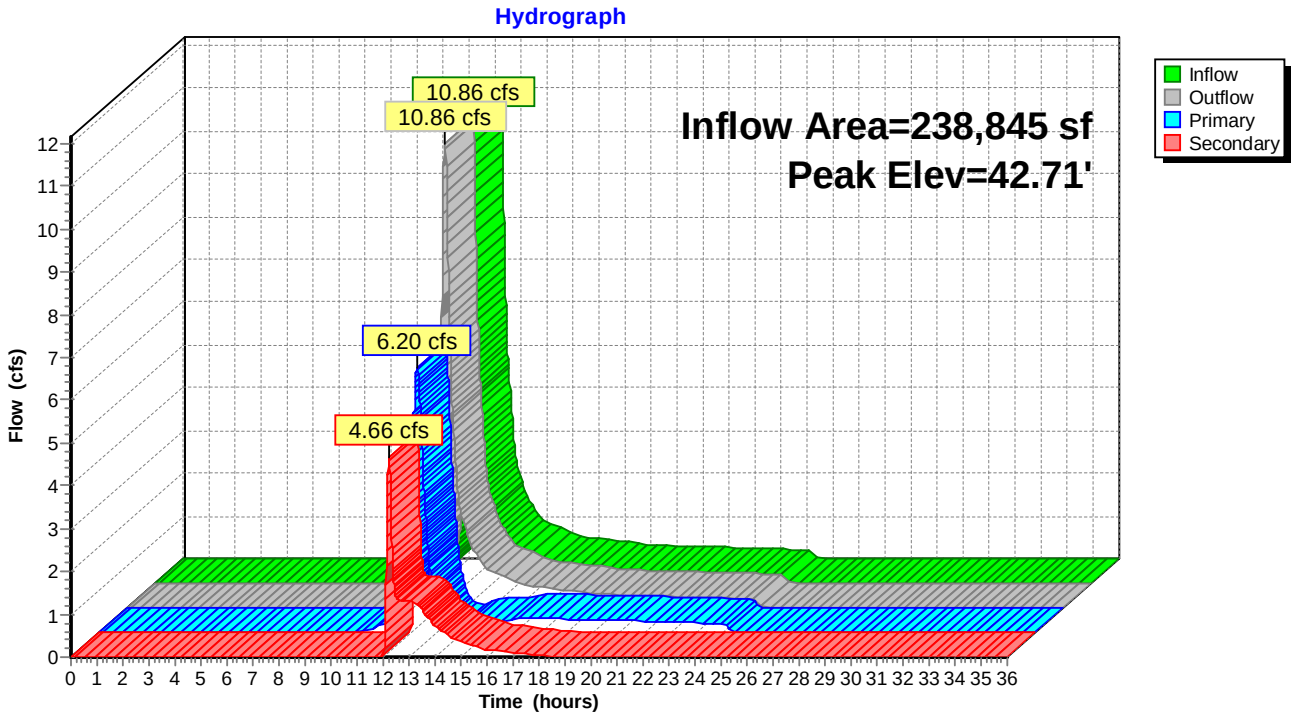
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 42.71' @ 12.23 hrs
Flood Elev= 47.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	40.80'	**15.0" Round 15" RCP** L= 36.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 40.80' / 40.70' S= 0.0028 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.23 sf
#2	Device 3	42.10'	**3.0' long x 3.00' rise Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#3	Secondary	40.70'	**18.0" Round 18" RCP** L= 6.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 40.70' / 40.60' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=6.20 cfs @ 12.23 hrs HW=42.71' TW=41.65' (Dynamic Tailwater)
↑—**1=15" RCP** (Barrel Controls 6.20 cfs @ 5.05 fps)

Secondary OutFlow Max=4.66 cfs @ 12.23 hrs HW=42.71' TW=0.00' (Dynamic Tailwater)
↑—**3=18" RCP** (Passes 4.66 cfs of 8.76 cfs potential flow)
↑—**2=Sharp-Crested Rectangular Weir** (Weir Controls 4.66 cfs @ 2.55 fps)

Pond 1: DMH 1


Hydrograph
Inflow Area=238,845 sf
Peak Elev=42.71'
10.86 cfs
10.86 cfs
6.20 cfs
4.66 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

Summary for Pond 1P: Basin 1

Inflow Area = 170,331 sf, 57.03% Impervious, Inflow Depth = 2.27" for 10-Year event
Inflow = 8.15 cfs @ 12.26 hrs, Volume= 32,206 cf
Outflow = 0.74 cfs @ 13.78 hrs, Volume= 32,206 cf, Atten= 91%, Lag= 91.3 min
Discarded = 0.74 cfs @ 13.78 hrs, Volume= 32,206 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 46.98' @ 13.78 hrs Surf.Area= 9,632 sf Storage= 15,437 cf
Flood Elev= 49.00' Surf.Area= 14,581 sf Storage= 39,663 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 238.5 min (1,090.3 - 851.8)

Volume	Invert	Avail.Storage	Storage Description
#1	45.00'	39,663 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

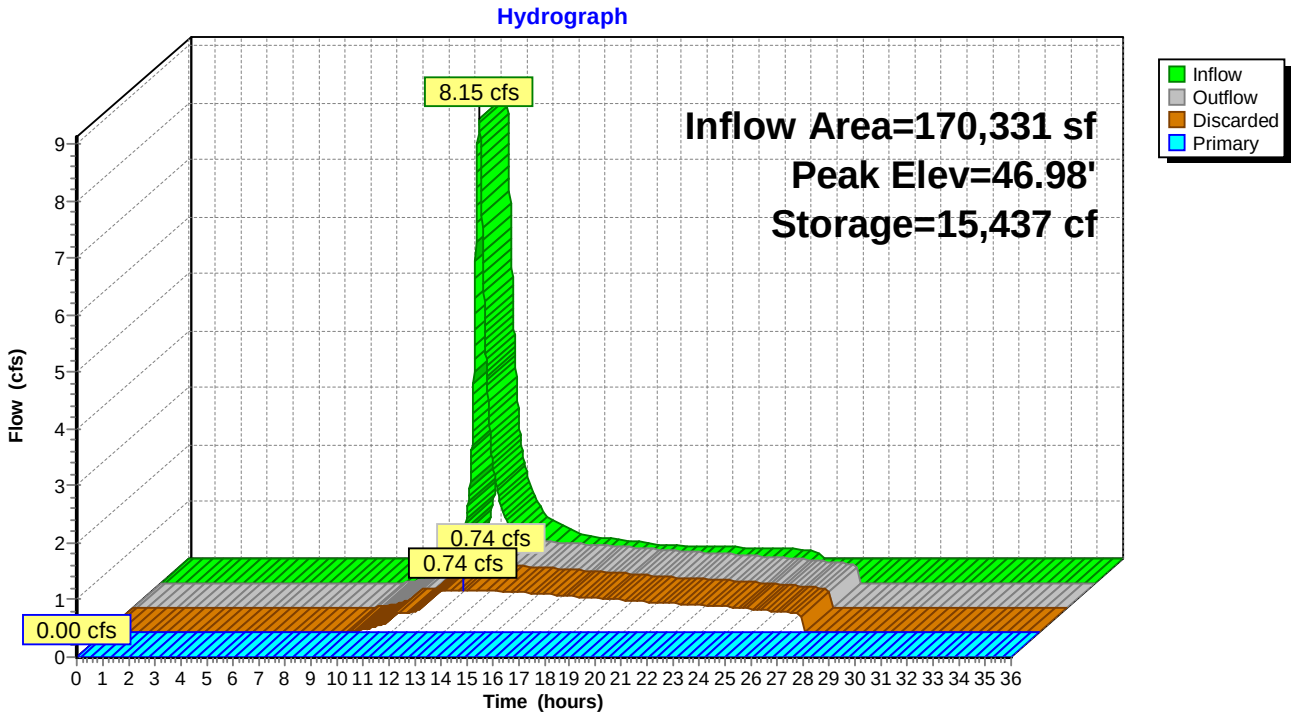
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.00	5,978	0	0
46.00	7,832	6,905	6,905
47.00	9,674	8,753	15,658
48.00	11,877	10,776	26,434
49.00	14,581	13,229	39,663

Device	Routing	Invert	Outlet Devices
#1	Discarded	45.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 41.00'
#2	Primary	48.75'	**13.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.74 cfs @ 13.78 hrs HW=46.98' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.74 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=45.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Basin 1



Summary for Pond 2P: Basin 2

[80] Warning: Exceeded Pond 1 by 1.13' @ 24.80 hrs (2.82 cfs 11,457 cf)

Inflow Area =	238,845 sf,	53.87% Impervious,	Inflow Depth =	1.32"	for 10-Year event
Inflow =	6.20 cfs @	12.23 hrs,	Volume=	26,225 cf	
Outflow =	0.43 cfs @	13.07 hrs,	Volume=	25,097 cf,	Atten= 93%, Lag= 50.5 min
Discarded =	0.43 cfs @	13.07 hrs,	Volume=	25,097 cf	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 42.36' @ 13.07 hrs Surf.Area= 11,309 sf Storage= 14,091 cf
Flood Elev= 43.00' Surf.Area= 14,712 sf Storage= 22,400 cf

Plug-Flow detention time= 425.5 min calculated for 25,090 cf (96% of inflow)
Center-of-Mass det. time= 402.0 min (1,287.9 - 885.9)

Volume	Invert	Avail.Storage	Storage Description
#1	40.00'	22,400 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.00	1,382	0	0
41.00	4,970	3,176	3,176
42.00	9,383	7,177	10,353
43.00	14,712	12,048	22,400

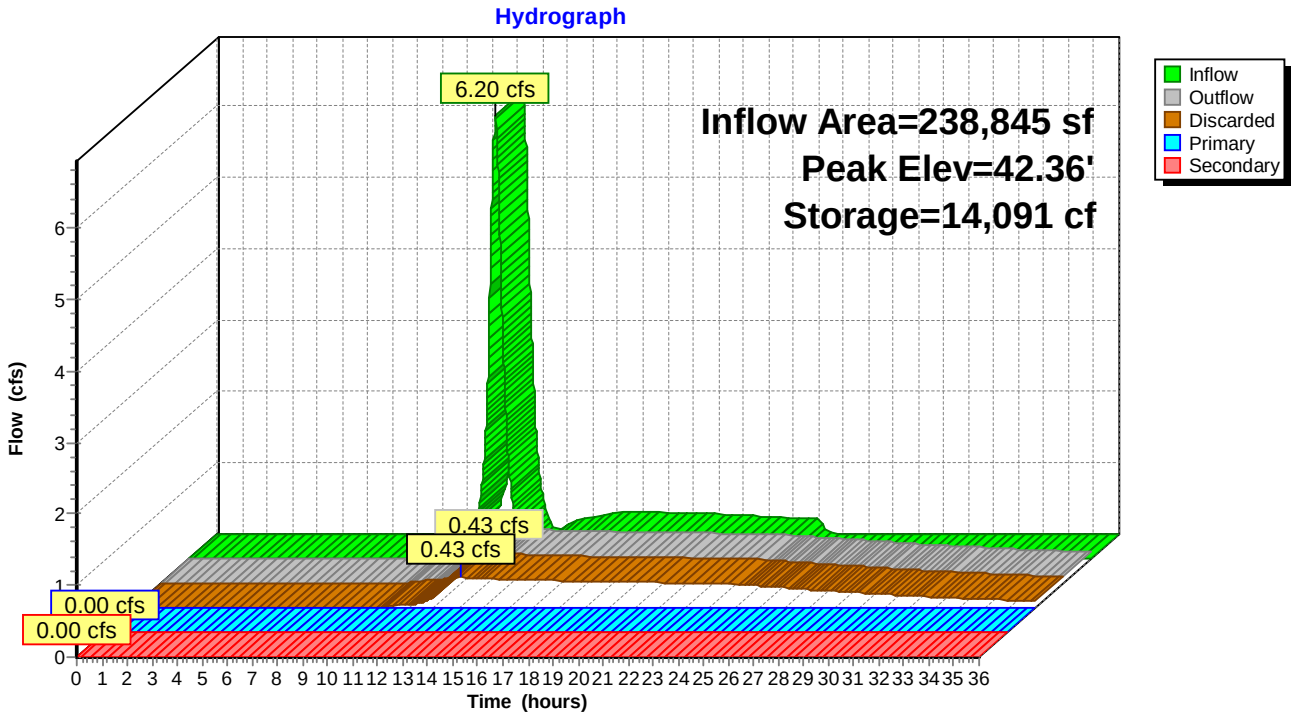
Device	Routing	Invert	Outlet Devices
#1	Primary	37.00'	**12.0" Round 12" RCP** L= 87.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 37.00' / 36.10' S= 0.0103 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	40.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 38.50'
#3	Secondary	42.75'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	42.40'	**32.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.43 cfs @ 13.07 hrs HW=42.36' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.43 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.00' TW=0.00' (Dynamic Tailwater)
↑—**1=12" RCP** (Passes 0.00 cfs of 5.49 cfs potential flow)
↑—**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.00' TW=0.00' (Dynamic Tailwater)
↑—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Basin 2



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1 Runoff Area=51,291 sf 24.94% Impervious Runoff Depth=1.12"
Flow Length=508' Tc=10.4 min UI Adjusted CN=49 Runoff=1.19 cfs 4,784 cf

Subcatchment 2A: 2A Runoff Area=2,863 sf 0.00% Impervious Runoff Depth=2.42"
Tc=5.0 min CN=65 Runoff=0.22 cfs 578 cf

Subcatchment 2S: 2 Runoff Area=170,331 sf 57.03% Impervious Runoff Depth=3.27"
Flow Length=325' Tc=16.6 min CN=74 Runoff=11.79 cfs 46,403 cf

Subcatchment 3S: 3 Runoff Area=238,845 sf 53.87% Impervious Runoff Depth=2.98"
Flow Length=260' Tc=14.1 min CN=71 Runoff=16.13 cfs 59,304 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=5.40"
Tc=5.0 min CN=94 Runoff=35.01 cfs 104,221 cf

Subcatchment 4S: To Showcase Property Runoff Area=65,840 sf 38.53% Impervious Runoff Depth=2.16"
Flow Length=260' Tc=12.4 min CN=62 Runoff=3.31 cfs 11,847 cf

Subcatchment 5S: Watershed 5 (Bypass) Runoff Area=15,741 sf 0.00% Impervious Runoff Depth=0.47"
Flow Length=388' Tc=14.4 min CN=39 Runoff=0.06 cfs 622 cf

Subcatchment 6S: Watershed 6 (bypass) Runoff Area=47,150 sf 59.82% Impervious Runoff Depth=3.27"
Flow Length=292' Slope=0.0200 '/' Tc=12.3 min CN=74 Runoff=3.70 cfs 12,845 cf

Reach 1R: Wetland 1 Inflow=1.19 cfs 4,784 cf
Outflow=1.19 cfs 4,784 cf

Reach 2R: Wetland D Inflow=0.22 cfs 578 cf
Outflow=0.22 cfs 578 cf

Reach 3R: Wetland M Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 4R: Wetland N Inflow=3.70 cfs 12,845 cf
Outflow=3.70 cfs 12,845 cf

Reach 5R: Wetland C Inflow=0.06 cfs 622 cf
Outflow=0.06 cfs 622 cf

Reach 6R: Showcase Inflow=42.61 cfs 146,455 cf
Outflow=42.61 cfs 146,455 cf

Pond 1: DMH 1 Peak Elev=43.05' Inflow=16.13 cfs 59,304 cf
Primary=7.22 cfs 30,956 cf Secondary=9.07 cfs 28,349 cf Outflow=16.13 cfs 59,304 cf

Pond 1P: Basin 1 Peak Elev=47.78' Storage=23,863 cf Inflow=11.79 cfs 46,403 cf
Discarded=0.95 cfs 46,409 cf Primary=0.00 cfs 0 cf Outflow=0.95 cfs 46,409 cf

Pond 2P: Basin 2 Peak Elev=42.52' Storage=15,952 cf Inflow=7.22 cfs 30,956 cf
Discarded=0.47 cfs 27,384 cf Primary=1.14 cfs 2,038 cf Secondary=0.00 cfs 0 cf Outflow=1.61 cfs 29,422 cf

Total Runoff Area = 823,850 sf Runoff Volume = 240,605 cf Average Runoff Depth = 3.50"
39.72% Pervious = 327,240 sf 60.28% Impervious = 496,610 sf

Summary for Subcatchment 1S: 1

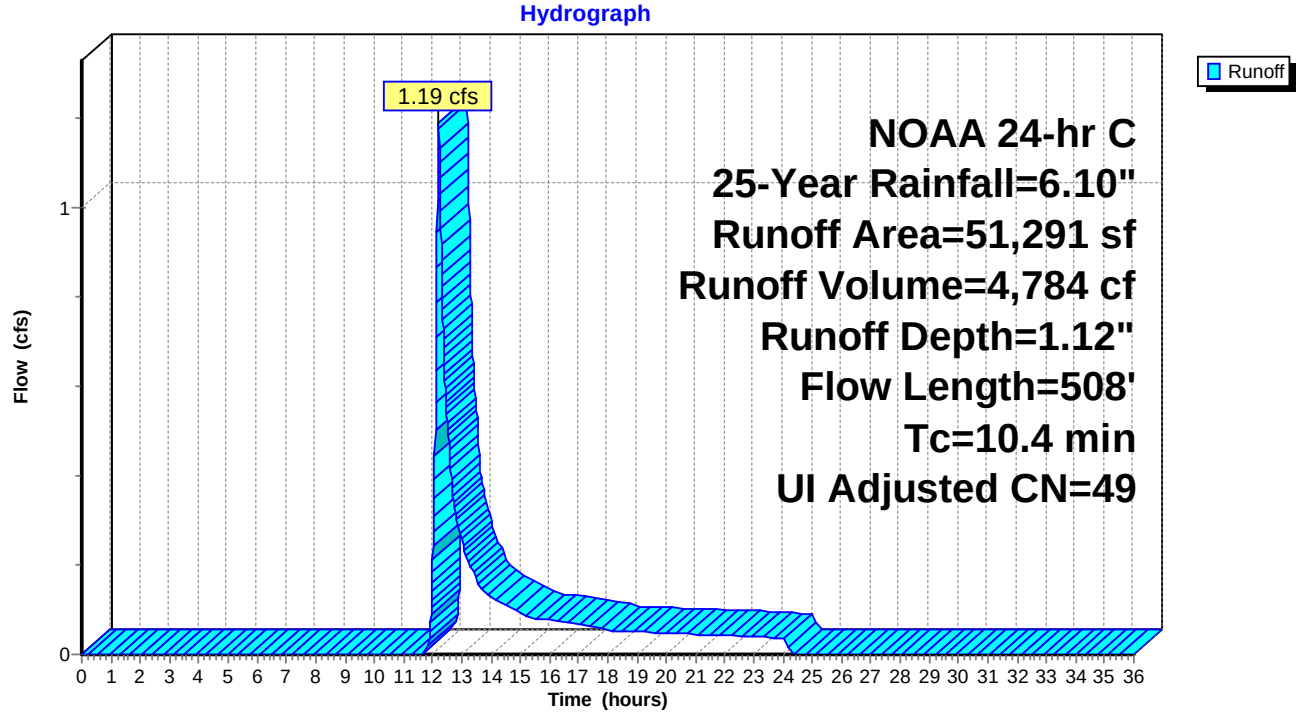
Runoff = 1.19 cfs @ 12.20 hrs, Volume= 4,784 cf, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Adj	Description
5,209	98		Paved roads w/curbs & sewers, HSG A
38,499	39		>75% Grass cover, Good, HSG A
7,583	98		Unconnected pavement, HSG A
51,291	54	49	Weighted Average, UI Adjusted
38,499			75.06% Pervious Area
12,792			24.94% Impervious Area
7,583			59.28% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.3	325	0.0123	1.66		**Shallow Concentrated Flow, Swale** Grassed Waterway Kv= 15.0 fps
0.9	133	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.4	508	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2A: 2A

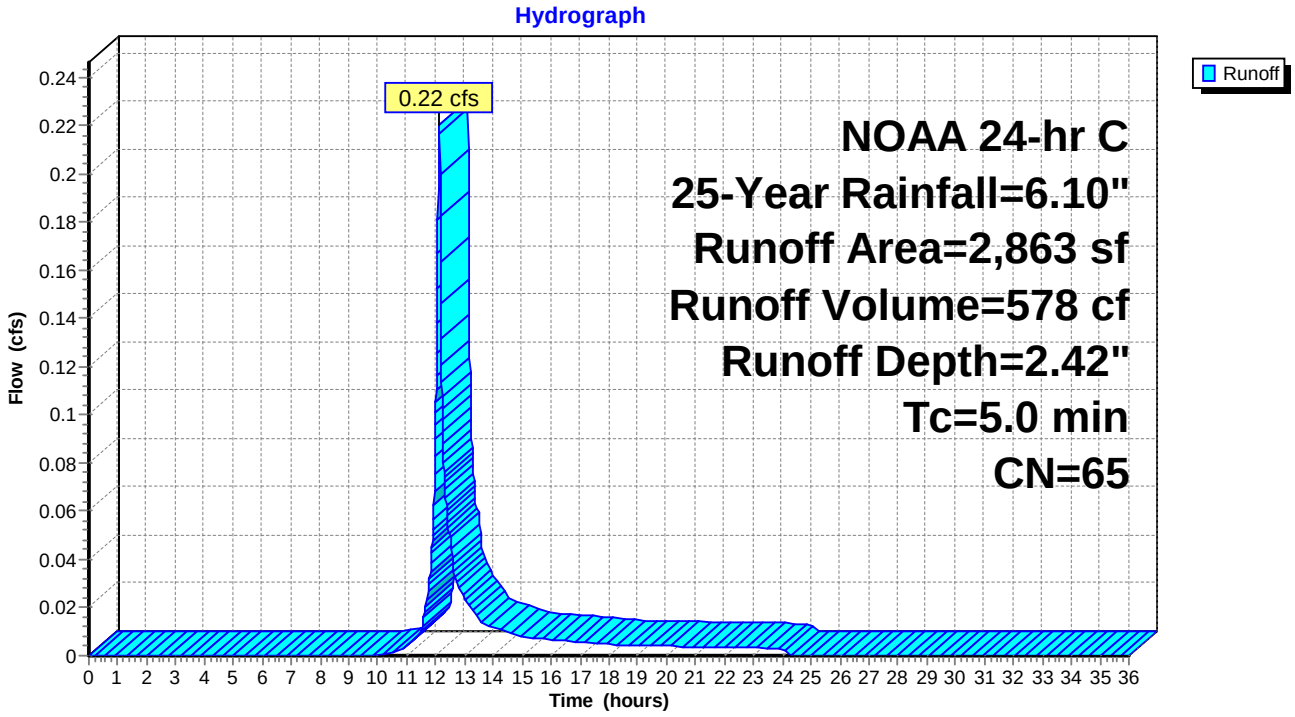
Runoff = 0.22 cfs @ 12.13 hrs, Volume= 578 cf, Depth= 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

	Area (sf)	CN	Description
*	2,863	65	Playground
	2,863		100.00% Pervious Area

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

Subcatchment 2A: 2A



Summary for Subcatchment 2S: 2

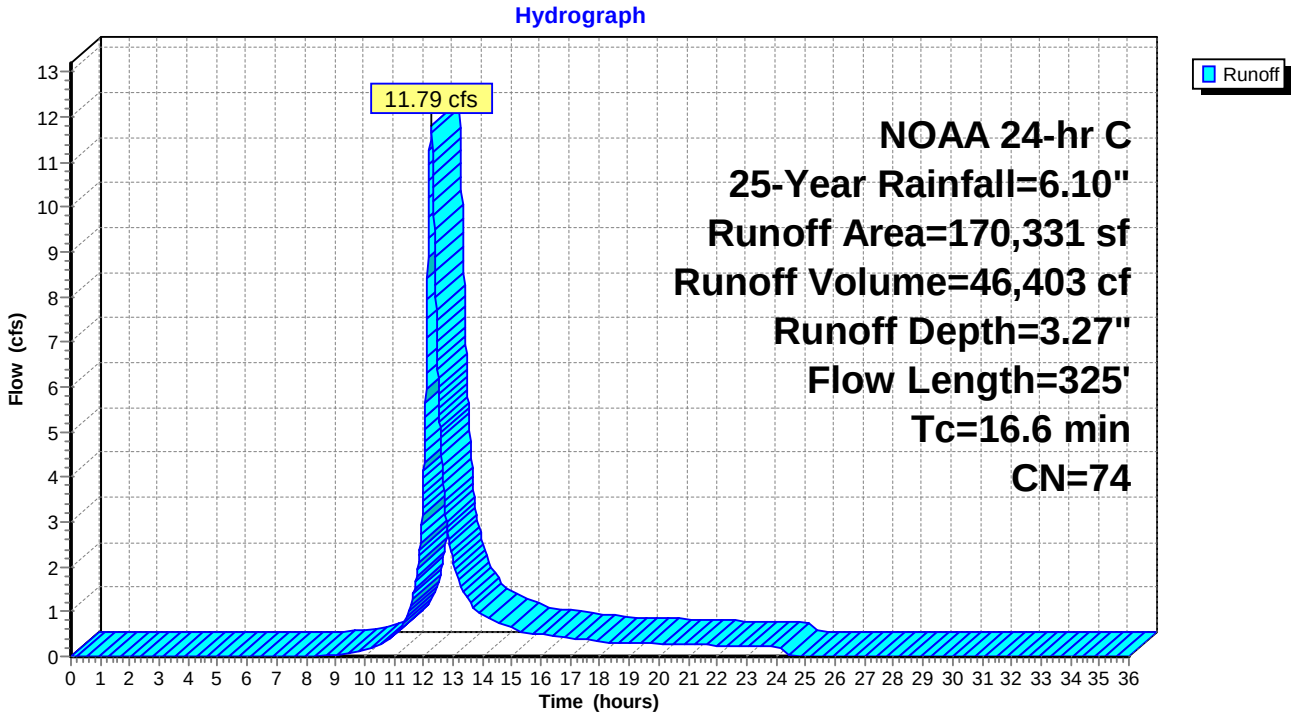
Runoff = 11.79 cfs @ 12.25 hrs, Volume= 46,403 cf, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

	Area (sf)	CN	Description
	97,140	98	Paved roads w/curbs & sewers, HSG A
*	8,827	65	Playground
	64,364	39	>75% Grass cover, Good, HSG A
	170,331	74	Weighted Average
	73,191		42.97% Pervious Area
	97,140		57.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
5.7	250	0.0110	0.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	325	Total			

Subcatchment 2S: 2



Summary for Subcatchment 3S: 3

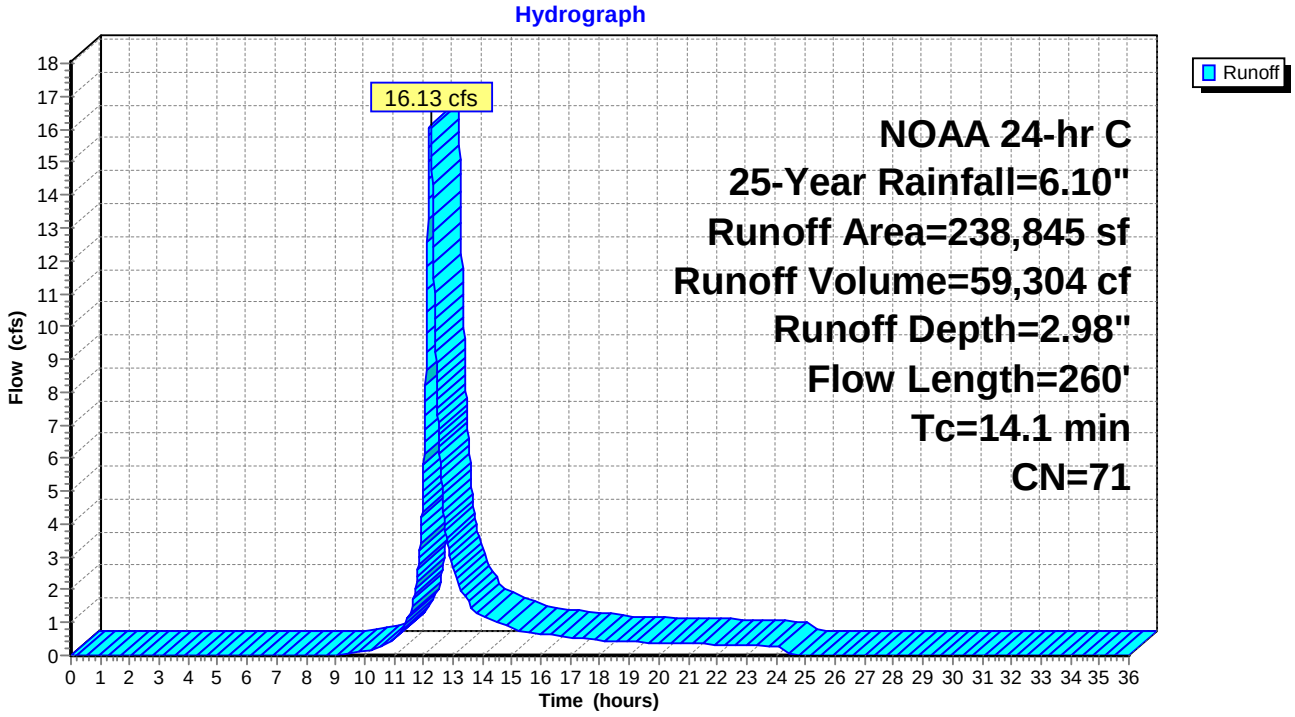
Runoff = 16.13 cfs @ 12.22 hrs, Volume= 59,304 cf, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
128,657	98	Paved roads w/curbs & sewers, HSG A
110,188	39	>75% Grass cover, Good, HSG A
238,845	71	Weighted Average
110,188		46.13% Pervious Area
128,657		53.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.3	210	0.0230	1.06		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.1	260	Total			

Subcatchment 3S: 3



Summary for Subcatchment 4A: Showcase Property

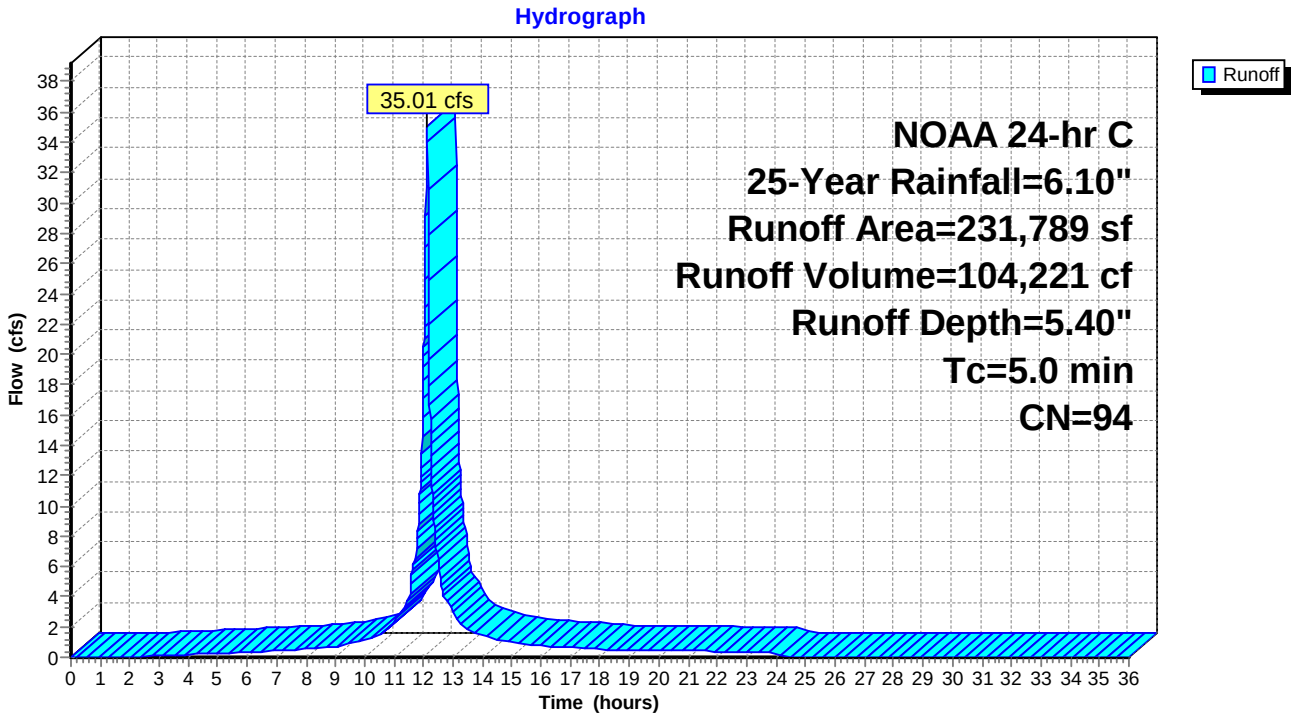
Runoff = 35.01 cfs @ 12.12 hrs, Volume= 104,221 cf, Depth= 5.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
27,341	65	Woods/grass comb., Fair, HSG B
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	94	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Subcatchment 4A: Showcase Property



Summary for Subcatchment 4S: To Showcase Property

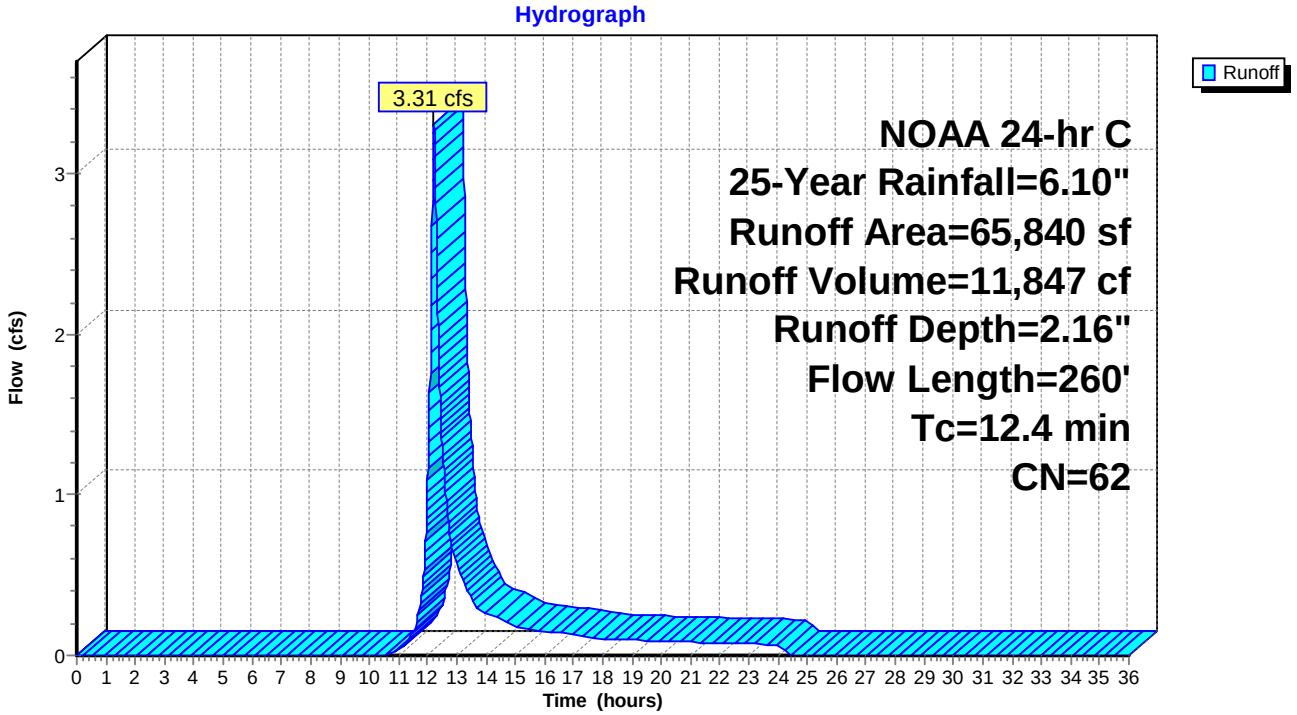
Runoff = 3.31 cfs @ 12.21 hrs, Volume= 11,847 cf, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
40,473	39	>75% Grass cover, Good, HSG A
25,367	98	Paved parking, HSG A
65,840	62	Weighted Average
40,473		61.47% Pervious Area
25,367		38.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.6	210	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.4	260	Total			

Subcatchment 4S: To Showcase Property



Summary for Subcatchment 5S: Watershed 5 (Bypass)

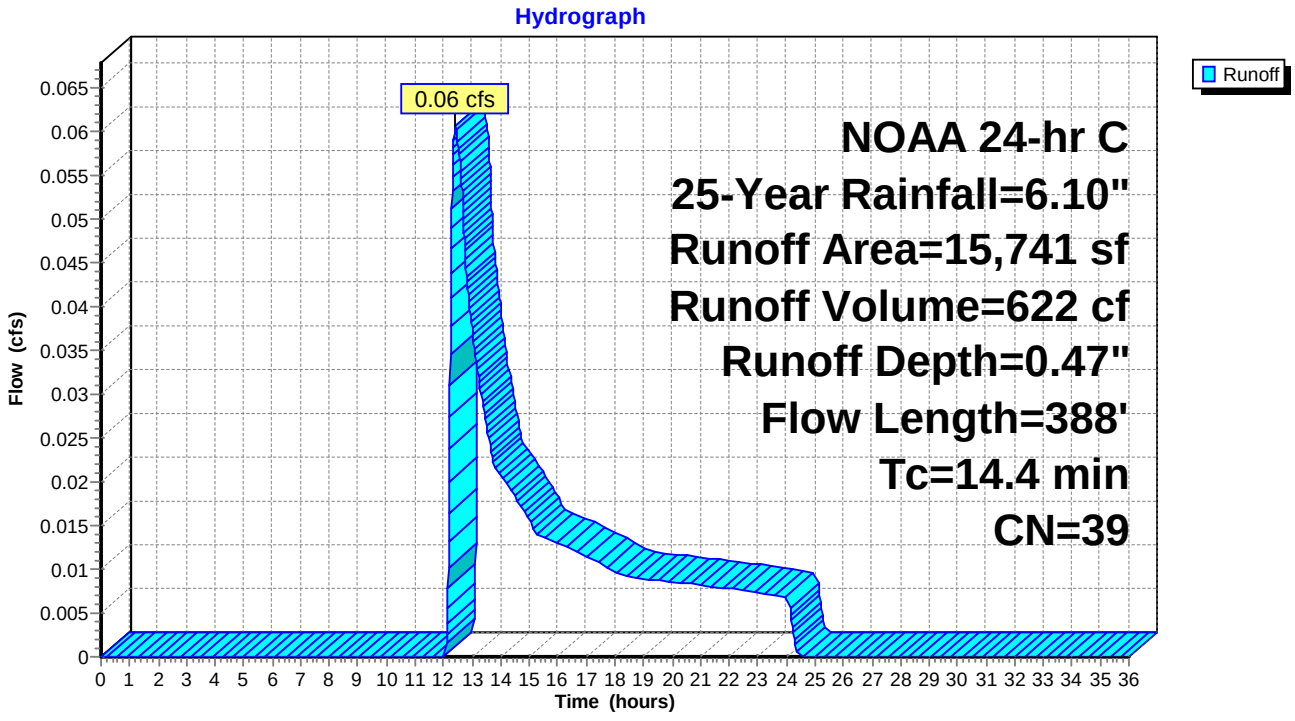
Runoff = 0.06 cfs @ 12.41 hrs, Volume= 622 cf, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
15,741	39	>75% Grass cover, Good, HSG A
15,741	39	Weighted Average
15,741		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	80	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	258	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.4	388	Total			

Subcatchment 5S: Watershed 5 (Bypass)



Summary for Subcatchment 6S: Watershed 6 (bypass)

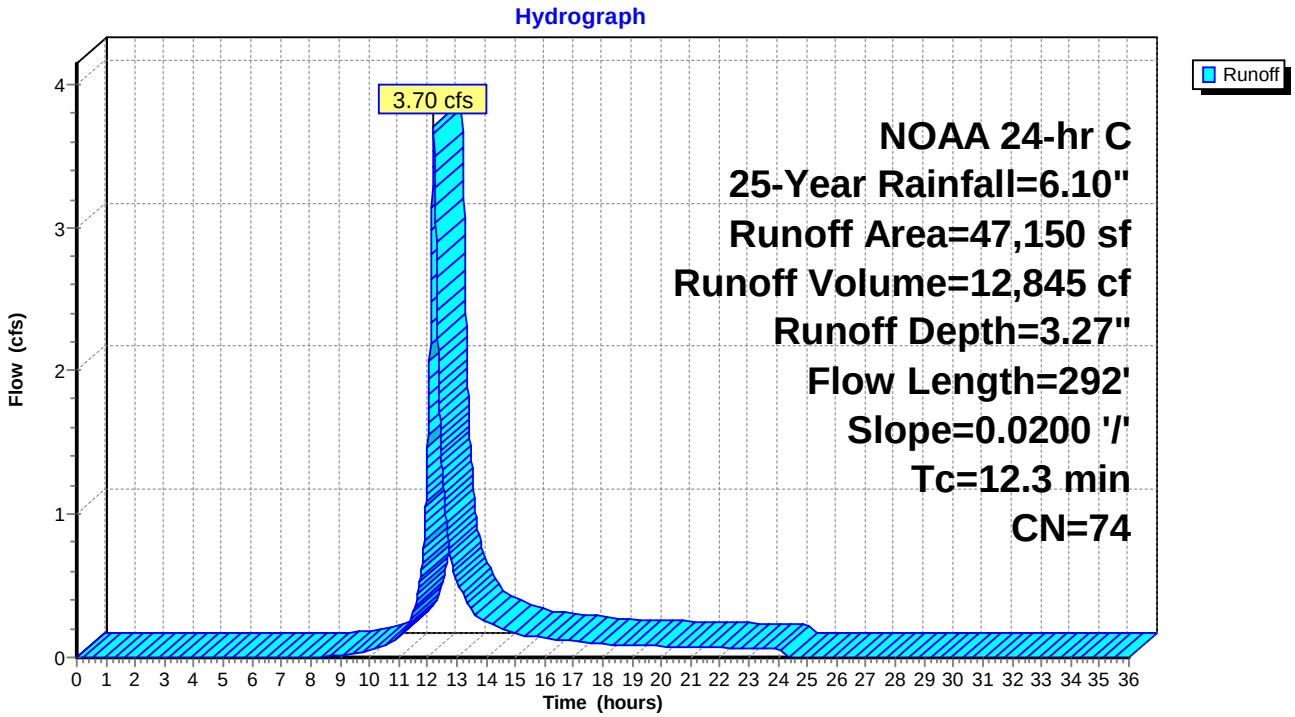
Runoff = 3.70 cfs @ 12.20 hrs, Volume= 12,845 cf, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
28,206	98	Paved roads w/curbs & sewers, HSG A
18,944	39	>75% Grass cover, Good, HSG A
47,150	74	Weighted Average
18,944		40.18% Pervious Area
28,206		59.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
4.1	242	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.3	292	Total			

Subcatchment 6S: Watershed 6 (bypass)



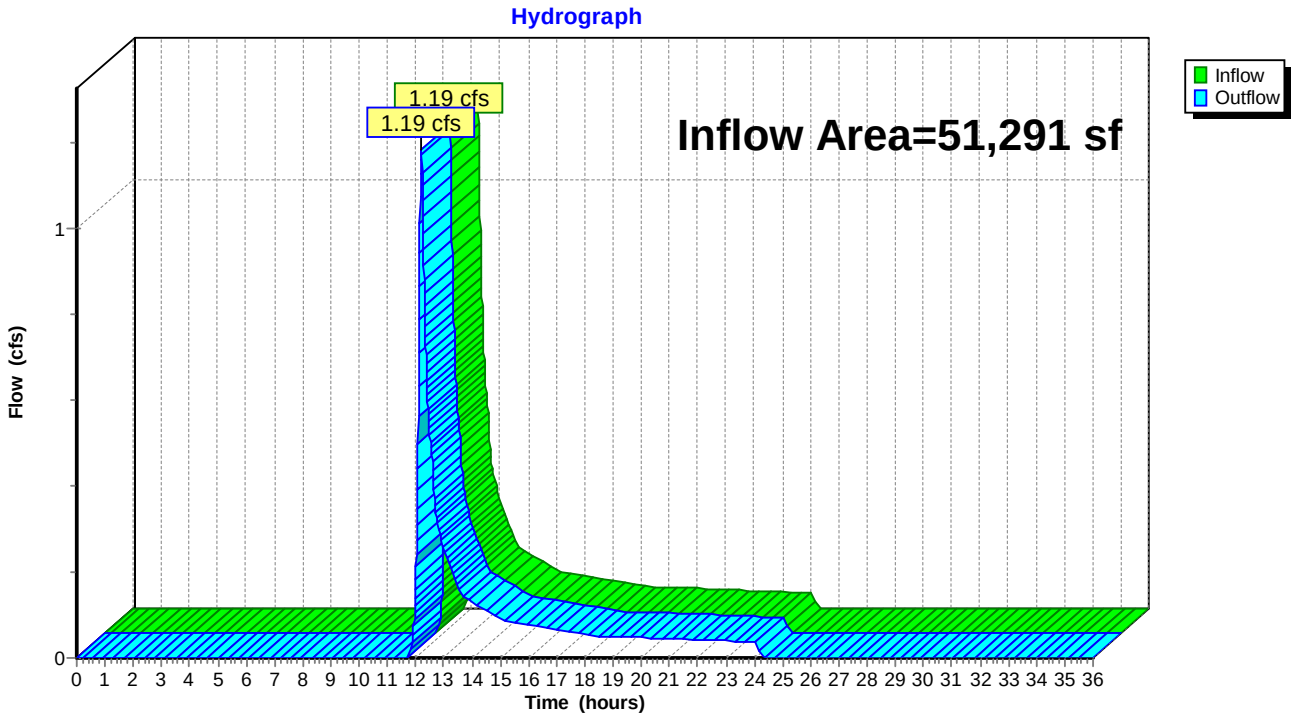
Summary for Reach 1R: Wetland 1

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

Inflow Area = 51,291 sf, 24.94% Impervious, Inflow Depth = 1.12" for 25-Year event
Inflow = 1.19 cfs @ 12.20 hrs, Volume= 4,784 cf
Outflow = 1.19 cfs @ 12.20 hrs, Volume= 4,784 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: Wetland 1



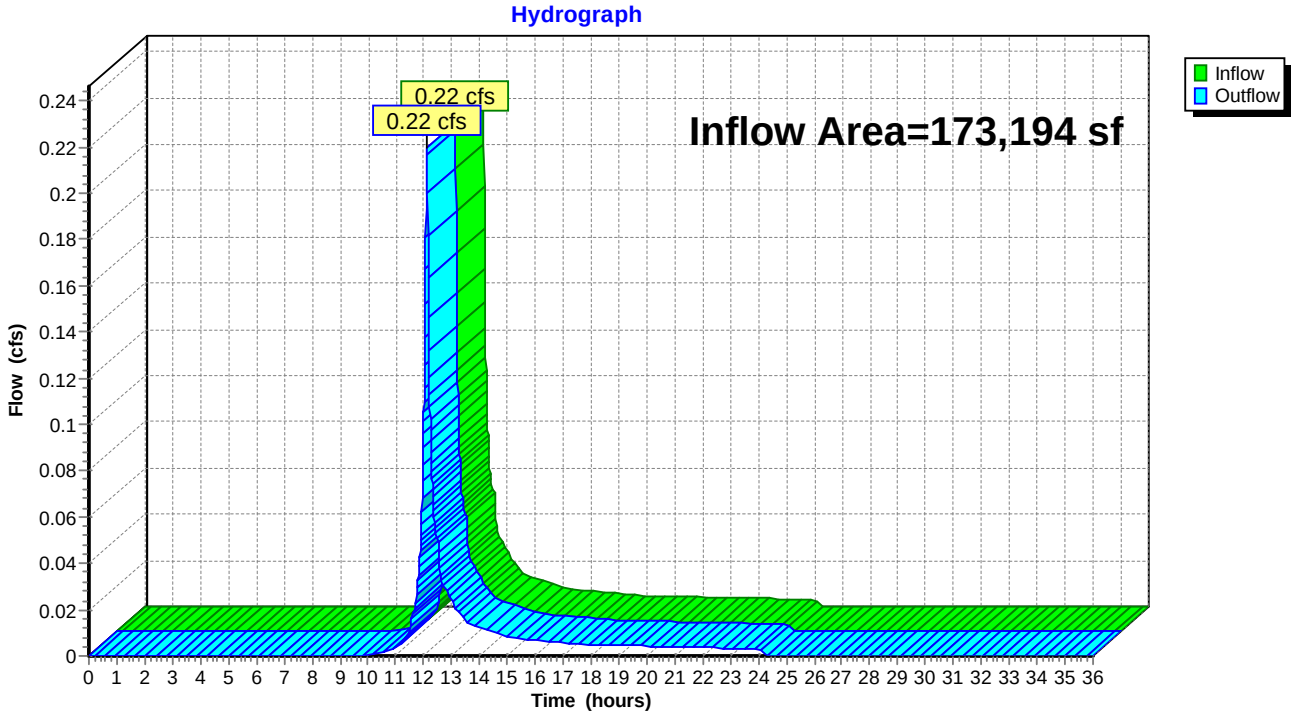
Summary for Reach 2R: Wetland D

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

Inflow Area = 173,194 sf, 56.09% Impervious, Inflow Depth = 0.04" for 25-Year event
Inflow = 0.22 cfs @ 12.13 hrs, Volume= 578 cf
Outflow = 0.22 cfs @ 12.13 hrs, Volume= 578 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 2R: Wetland D



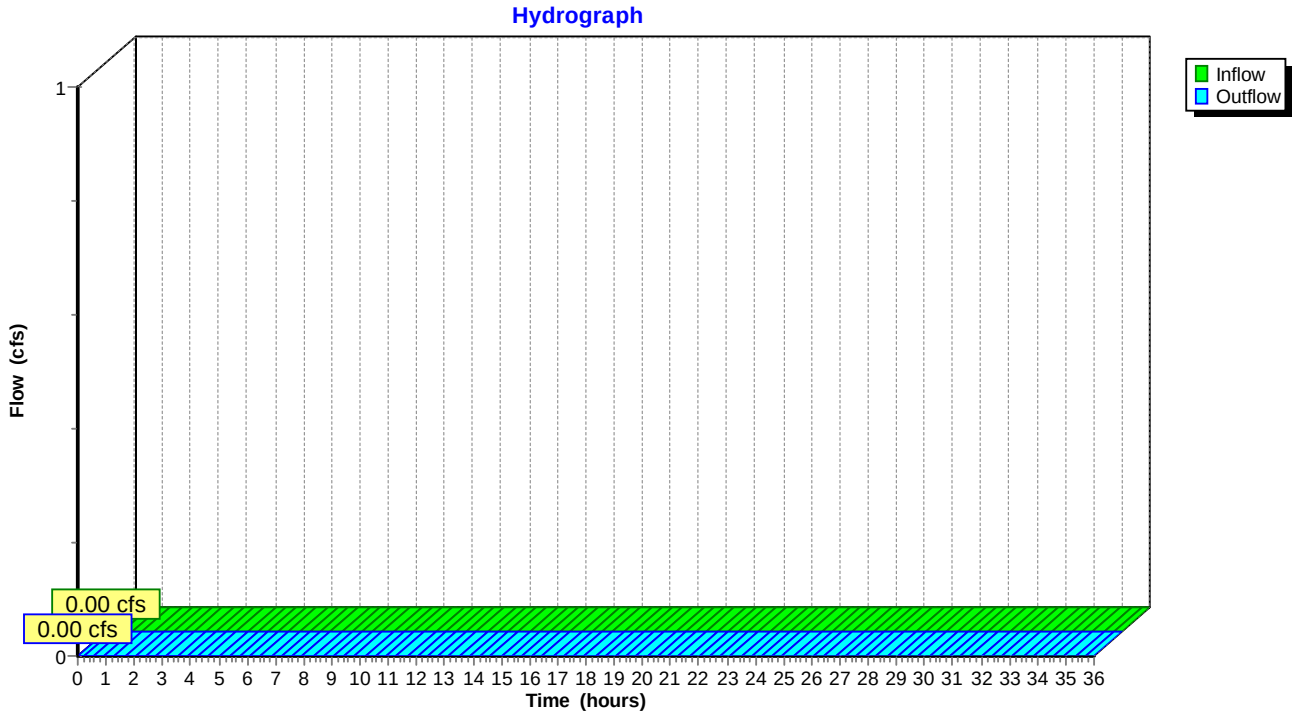
Summary for Reach 3R: Wetland M

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

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 3R: Wetland M



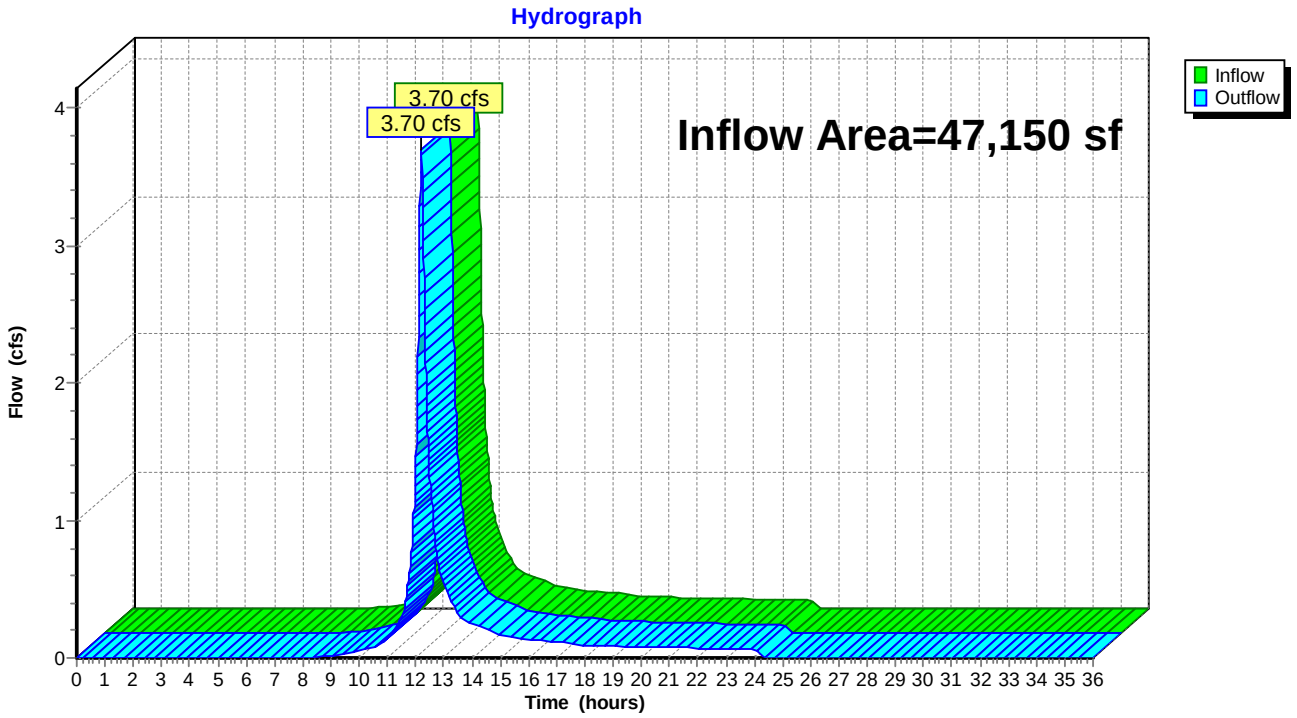
Summary for Reach 4R: Wetland N

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

Inflow Area = 47,150 sf, 59.82% Impervious, Inflow Depth = 3.27" for 25-Year event
Inflow = 3.70 cfs @ 12.20 hrs, Volume= 12,845 cf
Outflow = 3.70 cfs @ 12.20 hrs, Volume= 12,845 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 4R: Wetland N



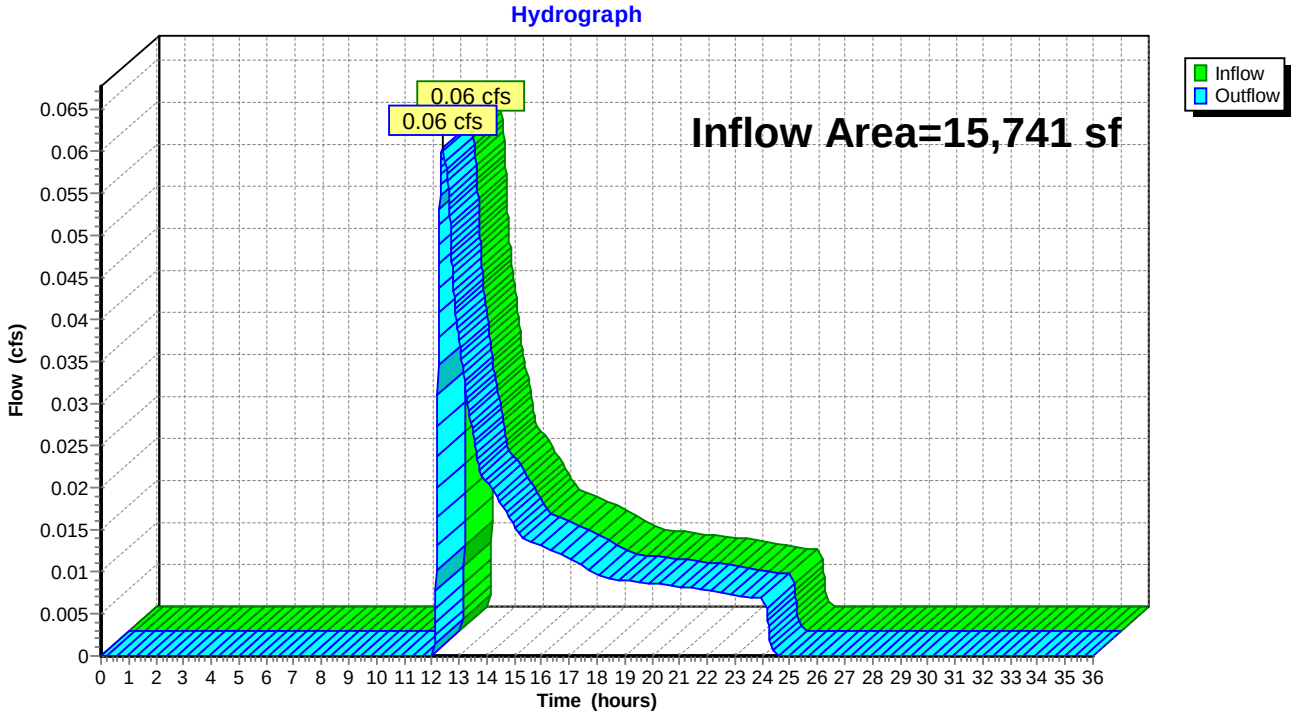
Summary for Reach 5R: Wetland C

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

Inflow Area = 15,741 sf, 0.00% Impervious, Inflow Depth = 0.47" for 25-Year event
Inflow = 0.06 cfs @ 12.41 hrs, Volume= 622 cf
Outflow = 0.06 cfs @ 12.41 hrs, Volume= 622 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 5R: Wetland C



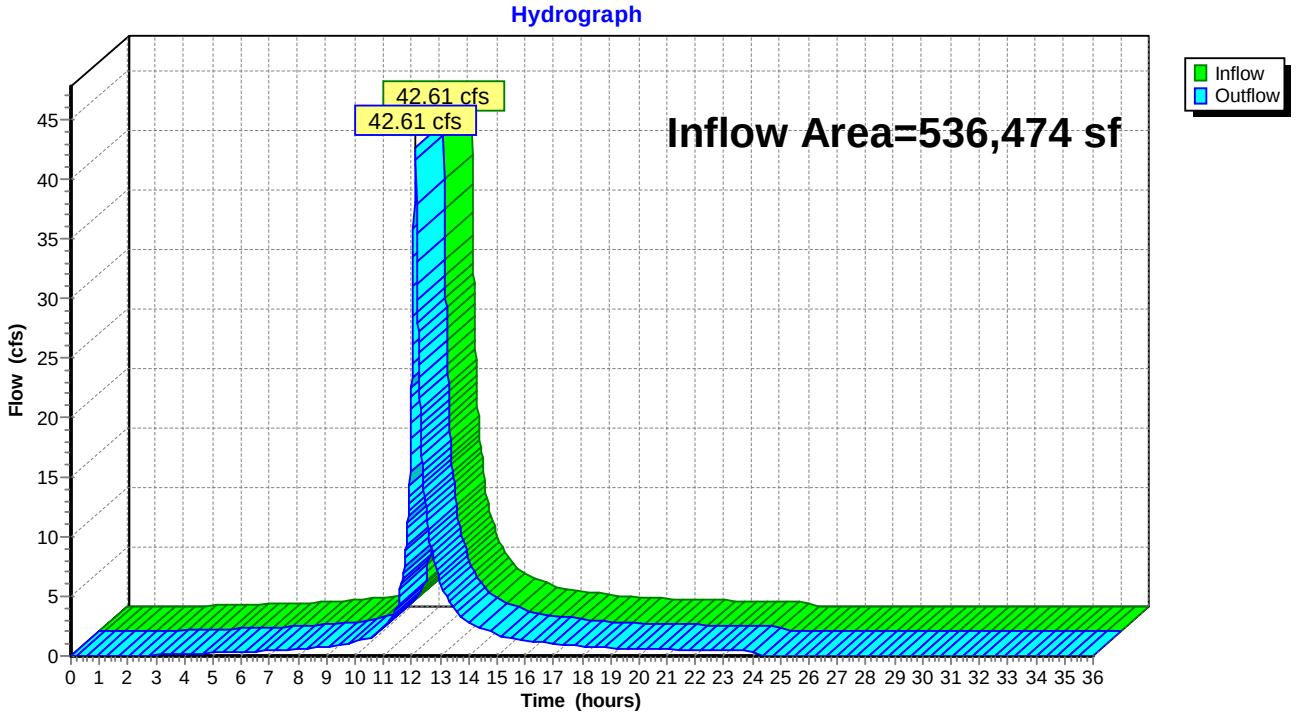
Summary for Reach 6R: Showcase

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

Inflow Area = 536,474 sf, 66.82% Impervious, Inflow Depth = 3.28" for 25-Year event
Inflow = 42.61 cfs @ 12.13 hrs, Volume= 146,455 cf
Outflow = 42.61 cfs @ 12.13 hrs, Volume= 146,455 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Showcase



Summary for Pond 1: DMH 1

Inflow Area = 238,845 sf, 53.87% Impervious, Inflow Depth = 2.98" for 25-Year event
Inflow = 16.13 cfs @ 12.22 hrs, Volume= 59,304 cf
Outflow = 16.13 cfs @ 12.22 hrs, Volume= 59,304 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.22 cfs @ 12.19 hrs, Volume= 30,956 cf
Secondary = 9.07 cfs @ 12.23 hrs, Volume= 28,349 cf

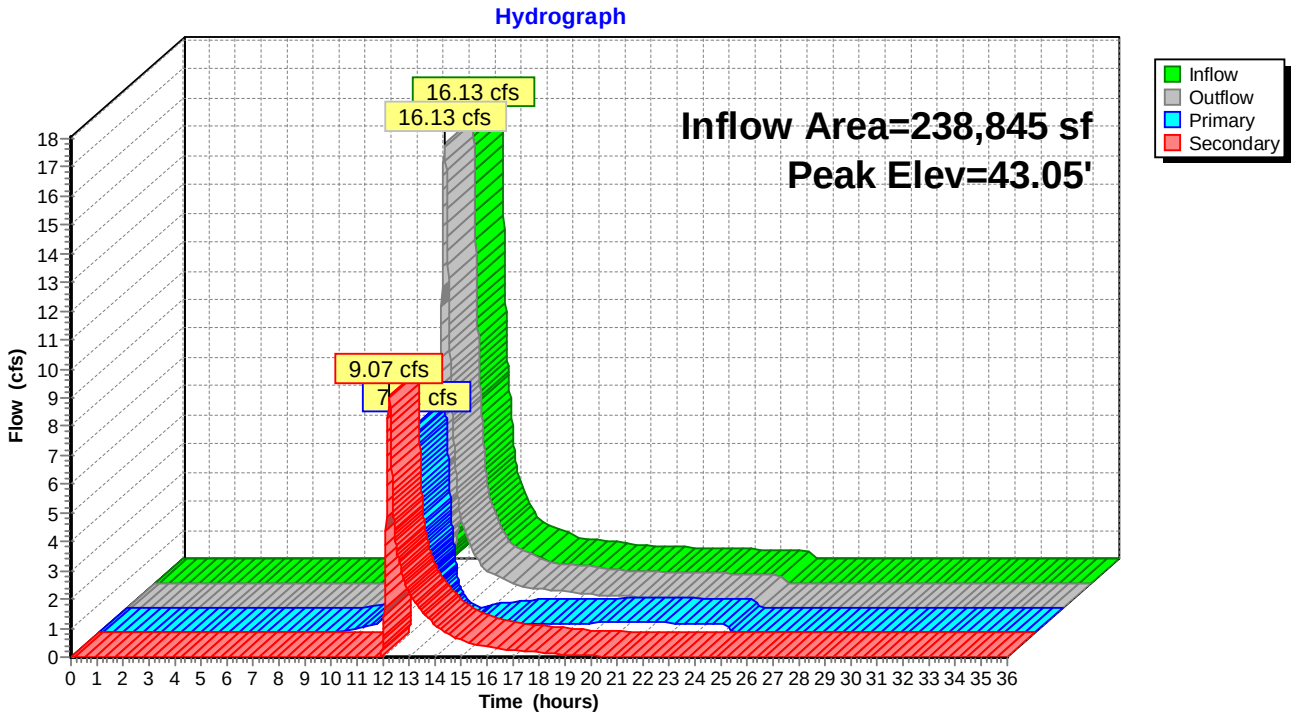
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 43.05' @ 12.23 hrs
Flood Elev= 47.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	40.80'	**15.0" Round 15" RCP** L= 36.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 40.80' / 40.70' S= 0.0028 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.23 sf
#2	Device 3	42.10'	**3.0' long x 3.00' rise Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#3	Secondary	40.70'	**18.0" Round 18" RCP** L= 6.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 40.70' / 40.60' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=7.12 cfs @ 12.19 hrs HW=43.00' TW=42.00' (Dynamic Tailwater)
↑—**1=15" RCP** (Outlet Controls 7.12 cfs @ 5.80 fps)

Secondary OutFlow Max=9.06 cfs @ 12.23 hrs HW=43.05' TW=0.00' (Dynamic Tailwater)
↑—**3=18" RCP** (Passes 9.06 cfs of 10.76 cfs potential flow)
↑—**2=Sharp-Crested Rectangular Weir** (Weir Controls 9.06 cfs @ 3.18 fps)

Pond 1: DMH 1


Hydrograph
16.13 cfs
16.13 cfs
Inflow Area=238,845 sf
Peak Elev=43.05'
9.07 cfs
7 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)

Summary for Pond 1P: Basin 1

Inflow Area = 170,331 sf, 57.03% Impervious, Inflow Depth = 3.27" for 25-Year event
Inflow = 11.79 cfs @ 12.25 hrs, Volume= 46,403 cf
Outflow = 0.95 cfs @ 13.90 hrs, Volume= 46,409 cf, Atten= 92%, Lag= 99.1 min
Discarded = 0.95 cfs @ 13.90 hrs, Volume= 46,409 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 47.78' @ 13.90 hrs Surf.Area= 11,390 sf Storage= 23,863 cf
Flood Elev= 49.00' Surf.Area= 14,581 sf Storage= 39,663 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 302.7 min (1,143.9 - 841.1)

Volume	Invert	Avail.Storage	Storage Description
#1	45.00'	39,663 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

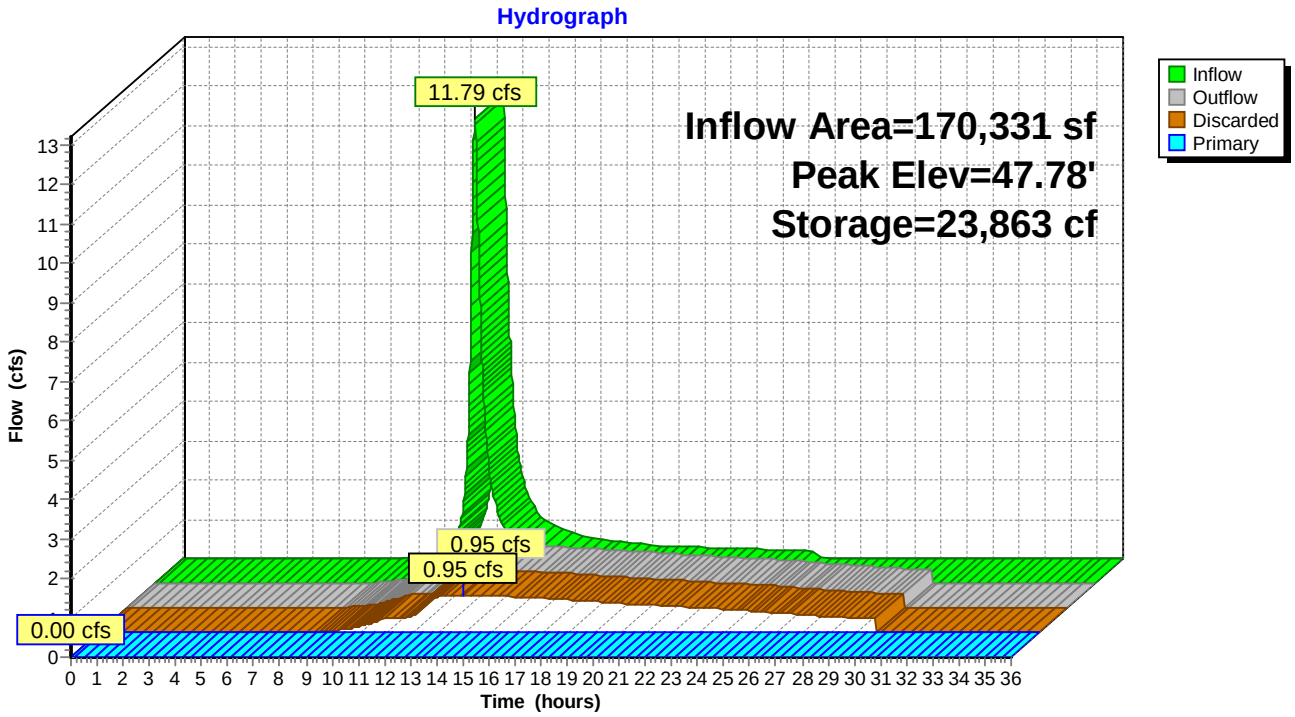
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.00	5,978	0	0
46.00	7,832	6,905	6,905
47.00	9,674	8,753	15,658
48.00	11,877	10,776	26,434
49.00	14,581	13,229	39,663

Device	Routing	Invert	Outlet Devices
#1	Discarded	45.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 41.00'
#2	Primary	48.75'	**13.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.95 cfs @ 13.90 hrs HW=47.78' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.95 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=45.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Basin 1



Summary for Pond 2P: Basin 2

[80] Warning: Exceeded Pond 1 by 1.33' @ 24.42 hrs (3.73 cfs 16,690 cf)

Inflow Area =	238,845 sf,	53.87% Impervious,	Inflow Depth =	1.56"	for 25-Year event
Inflow =	7.22 cfs @	12.19 hrs,	Volume=	30,956 cf	
Outflow =	1.61 cfs @	12.65 hrs,	Volume=	29,422 cf,	Atten= 78%, Lag= 27.5 min
Discarded =	0.47 cfs @	12.65 hrs,	Volume=	27,384 cf	
Primary =	1.14 cfs @	12.65 hrs,	Volume=	2,038 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 42.52' @ 12.65 hrs Surf.Area= 12,154 sf Storage= 15,952 cf
Flood Elev= 43.00' Surf.Area= 14,712 sf Storage= 22,400 cf

Plug-Flow detention time= 399.0 min calculated for 29,422 cf (95% of inflow)
Center-of-Mass det. time= 371.4 min (1,252.3 - 880.9)

Volume	Invert	Avail.Storage	Storage Description
#1	40.00'	22,400 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.00	1,382	0	0
41.00	4,970	3,176	3,176
42.00	9,383	7,177	10,353
43.00	14,712	12,048	22,400

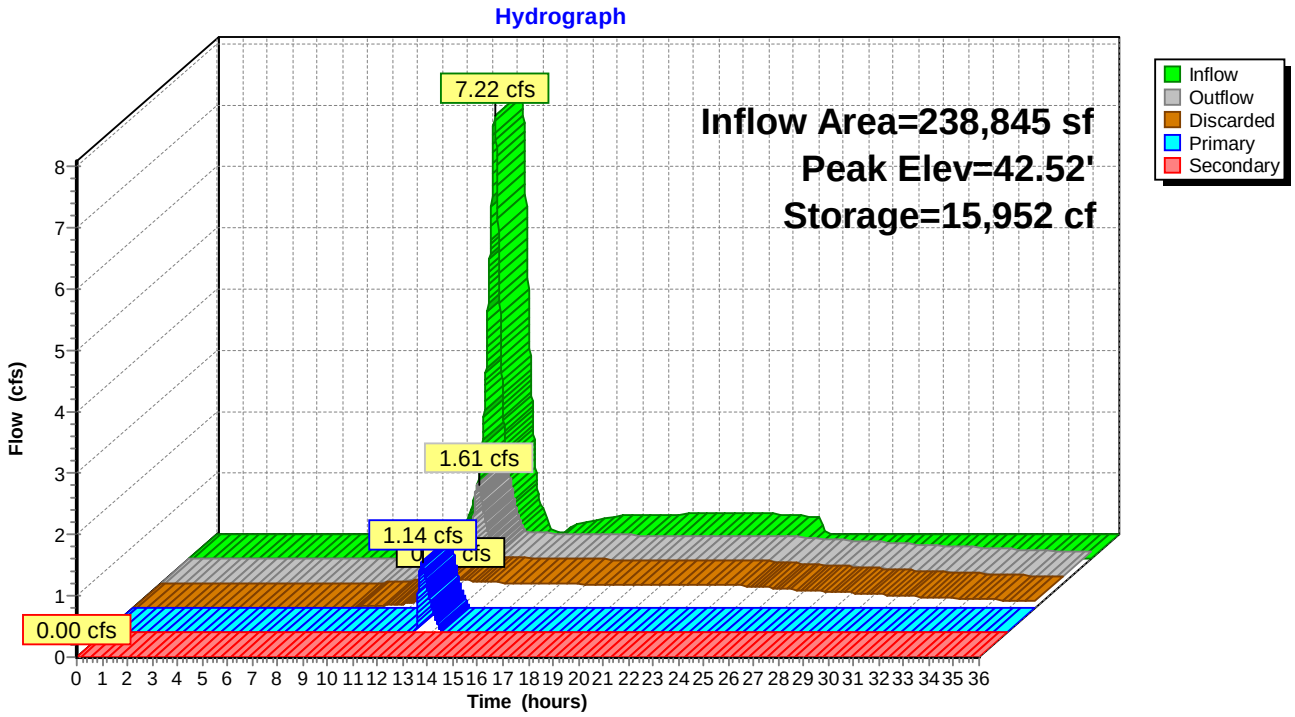
Device	Routing	Invert	Outlet Devices
#1	Primary	37.00'	**12.0" Round 12" RCP** L= 87.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 37.00' / 36.10' S= 0.0103 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	40.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 38.50'
#3	Secondary	42.75'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	42.40'	**32.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.47 cfs @ 12.65 hrs HW=42.52' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.47 cfs)

Primary OutFlow Max=1.14 cfs @ 12.65 hrs HW=42.52' TW=0.00' (Dynamic Tailwater)
↑—**1=12" RCP** (Passes 1.14 cfs of 7.50 cfs potential flow)
↑—**4=Orifice/Grate** (Weir Controls 1.14 cfs @ 1.13 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.00' TW=0.00' (Dynamic Tailwater)
↑—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Basin 2



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1 Runoff Area=51,291 sf 24.94% Impervious Runoff Depth=2.49"
Flow Length=508' Tc=10.4 min UI Adjusted CN=49 Runoff=3.08 cfs 10,623 cf

Subcatchment 2A: 2A Runoff Area=2,863 sf 0.00% Impervious Runoff Depth=4.35"
Tc=5.0 min CN=65 Runoff=0.39 cfs 1,038 cf

Subcatchment 2S: 2 Runoff Area=170,331 sf 57.03% Impervious Runoff Depth=5.43"
Flow Length=325' Tc=16.6 min CN=74 Runoff=19.47 cfs 77,067 cf

Subcatchment 3S: 3 Runoff Area=238,845 sf 53.87% Impervious Runoff Depth=5.07"
Flow Length=260' Tc=14.1 min CN=71 Runoff=27.40 cfs 100,895 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=7.84"
Tc=5.0 min CN=94 Runoff=49.80 cfs 151,415 cf

Subcatchment 4S: To Showcase Property Runoff Area=65,840 sf 38.53% Impervious Runoff Depth=4.00"
Flow Length=260' Tc=12.4 min CN=62 Runoff=6.28 cfs 21,921 cf

Subcatchment 5S: Watershed 5 (Bypass) Runoff Area=15,741 sf 0.00% Impervious Runoff Depth=1.40"
Flow Length=388' Tc=14.4 min CN=39 Runoff=0.37 cfs 1,837 cf

Subcatchment 6S: Watershed 6 (bypass) Runoff Area=47,150 sf 59.82% Impervious Runoff Depth=5.43"
Flow Length=292' Slope=0.0200 '/' Tc=12.3 min CN=74 Runoff=6.09 cfs 21,333 cf

Reach 1R: Wetland 1 Inflow=3.08 cfs 10,623 cf
Outflow=3.08 cfs 10,623 cf

Reach 2R: Wetland D Inflow=2.29 cfs 7,884 cf
Outflow=2.29 cfs 7,884 cf

Reach 3R: Wetland M Inflow=0.15 cfs 46 cf
Outflow=0.15 cfs 46 cf

Reach 4R: Wetland N Inflow=6.09 cfs 21,333 cf
Outflow=6.09 cfs 21,333 cf

Reach 5R: Wetland C Inflow=0.37 cfs 1,837 cf
Outflow=0.37 cfs 1,837 cf

Reach 6R: Showcase Inflow=67.64 cfs 242,457 cf
Outflow=67.64 cfs 242,457 cf

Pond 1: DMH 1 Peak Elev=45.10' Inflow=27.40 cfs 100,895 cf
Primary=11.14 cfs 44,804 cf Secondary=16.27 cfs 56,091 cf Outflow=27.40 cfs 100,895 cf

Pond 1P: Basin 1 Peak Elev=48.89' Storage=38,089 cf Inflow=19.47 cfs 77,067 cf
Discarded=1.28 cfs 70,225 cf Primary=2.25 cfs 6,846 cf Outflow=3.52 cfs 77,071 cf

Pond 2P: Basin 2 Peak Elev=42.78' Storage=19,291 cf Inflow=11.14 cfs 44,804 cf
Discarded=0.53 cfs 29,944 cf Primary=6.41 cfs 13,030 cf Secondary=0.15 cfs 46 cf Outflow=7.10 cfs 43,020 cf

Total Runoff Area = 823,850 sf Runoff Volume = 386,129 cf Average Runoff Depth = 5.62"
39.72% Pervious = 327,240 sf 60.28% Impervious = 496,610 sf

Summary for Subcatchment 1S: 1

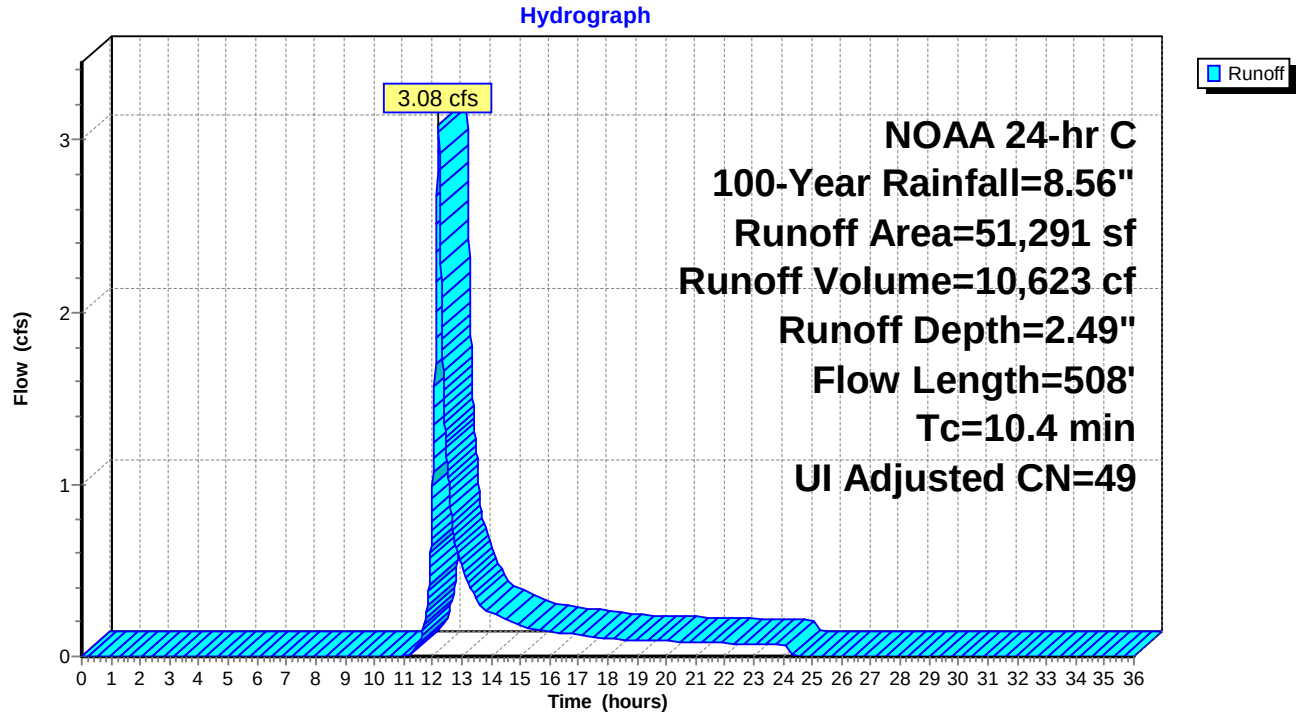
Runoff = 3.08 cfs @ 12.19 hrs, Volume= 10,623 cf, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Adj	Description
5,209	98		Paved roads w/curbs & sewers, HSG A
38,499	39		>75% Grass cover, Good, HSG A
7,583	98		Unconnected pavement, HSG A
51,291	54	49	Weighted Average, UI Adjusted
38,499			75.06% Pervious Area
12,792			24.94% Impervious Area
7,583			59.28% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.3	325	0.0123	1.66		**Shallow Concentrated Flow, Swale** Grassed Waterway Kv= 15.0 fps
0.9	133	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.4	508	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2A: 2A

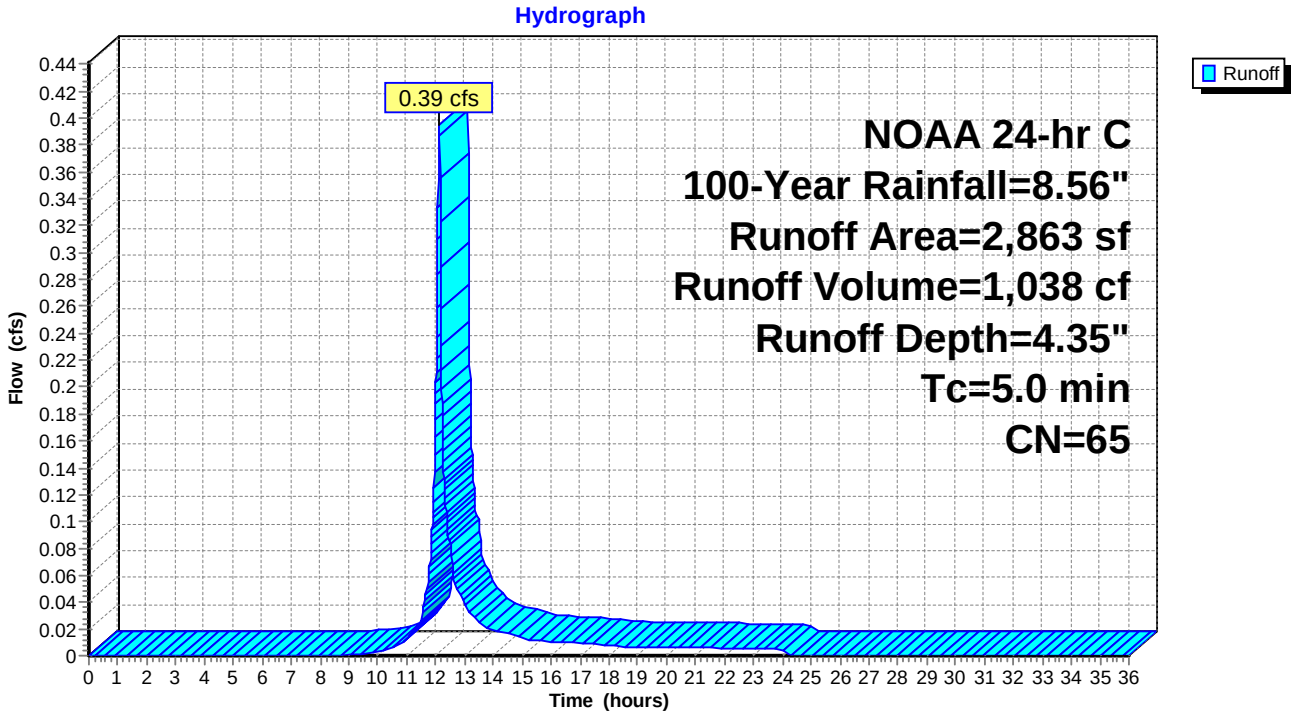
Runoff = 0.39 cfs @ 12.12 hrs, Volume= 1,038 cf, Depth= 4.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

	Area (sf)	CN	Description
*	2,863	65	Playground
	2,863		100.00% Pervious Area

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

Subcatchment 2A: 2A



Summary for Subcatchment 2S: 2

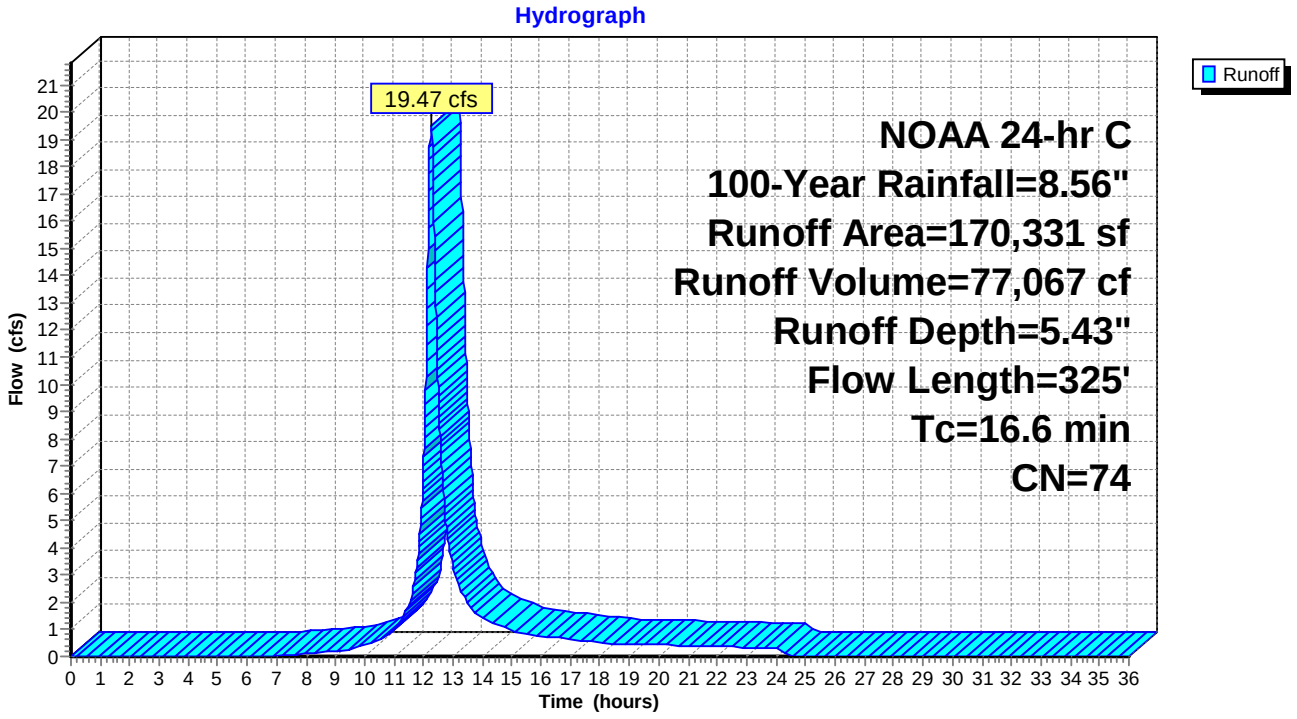
Runoff = 19.47 cfs @ 12.25 hrs, Volume= 77,067 cf, Depth= 5.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

	Area (sf)	CN	Description
	97,140	98	Paved roads w/curbs & sewers, HSG A
*	8,827	65	Playground
	64,364	39	>75% Grass cover, Good, HSG A
	170,331	74	Weighted Average
	73,191		42.97% Pervious Area
	97,140		57.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
5.7	250	0.0110	0.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	325	Total			

Subcatchment 2S: 2



Summary for Subcatchment 3S: 3

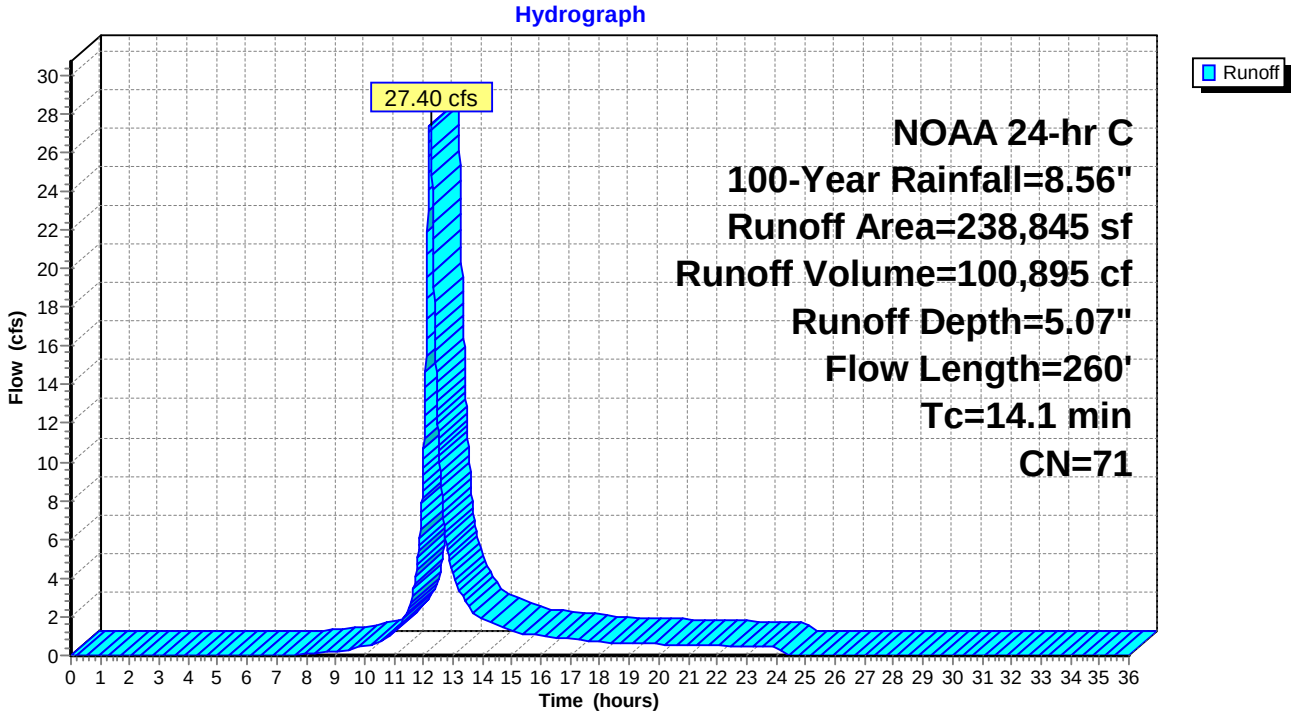
Runoff = 27.40 cfs @ 12.22 hrs, Volume= 100,895 cf, Depth= 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
128,657	98	Paved roads w/curbs & sewers, HSG A
110,188	39	>75% Grass cover, Good, HSG A
238,845	71	Weighted Average
110,188		46.13% Pervious Area
128,657		53.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.3	210	0.0230	1.06		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.1	260	Total			

Subcatchment 3S: 3



Summary for Subcatchment 4A: Showcase Property

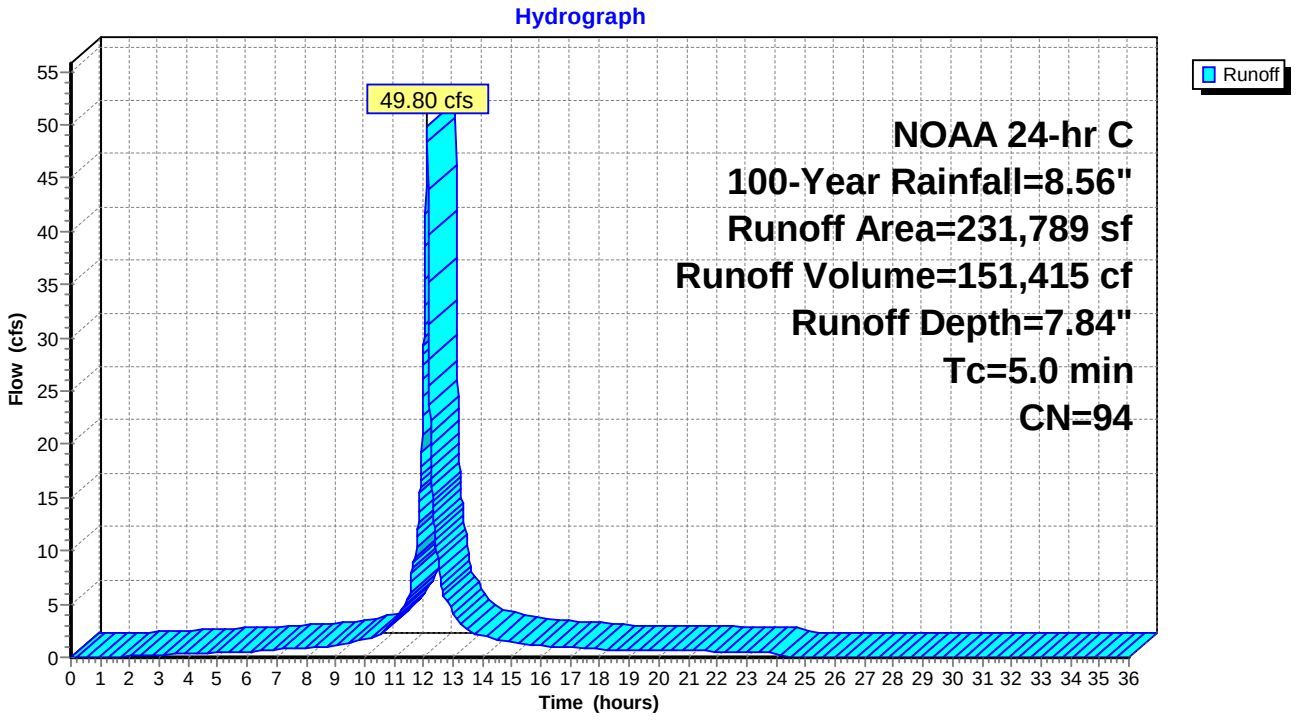
Runoff = 49.80 cfs @ 12.12 hrs, Volume= 151,415 cf, Depth= 7.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
27,341	65	Woods/grass comb., Fair, HSG B
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	94	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Subcatchment 4A: Showcase Property



Summary for Subcatchment 4S: To Showcase Property

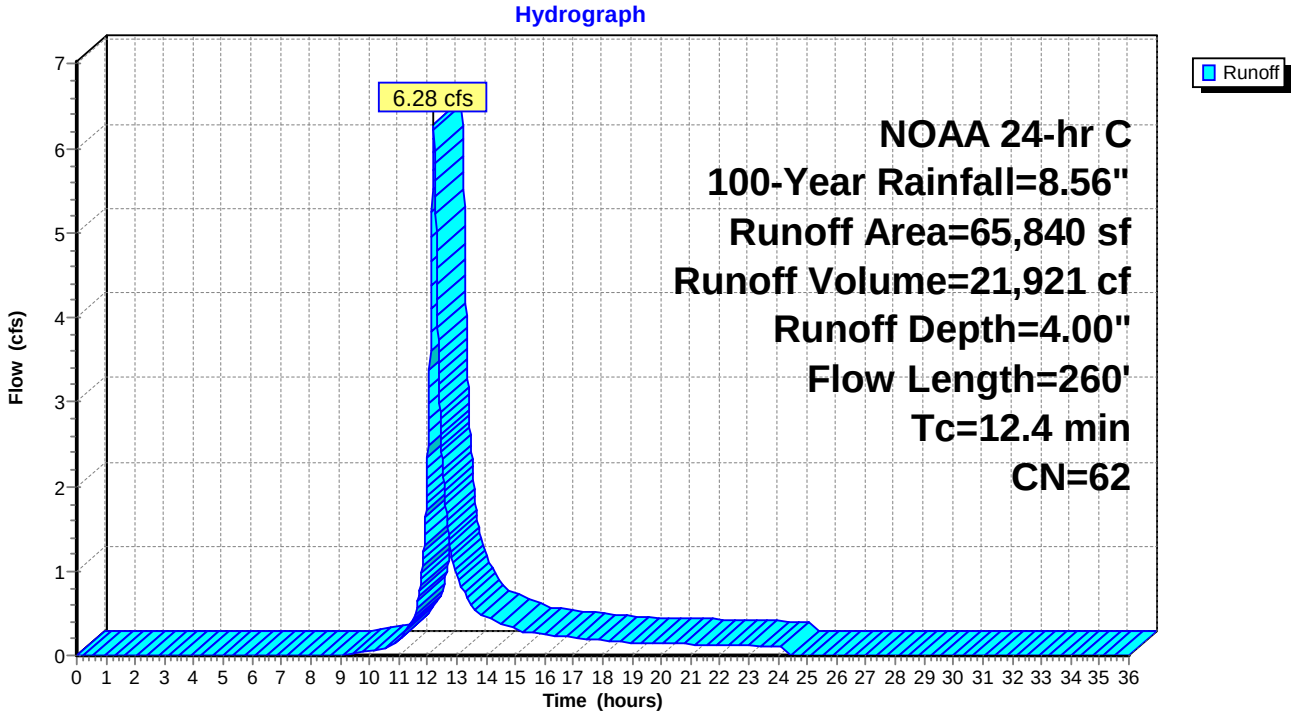
Runoff = 6.28 cfs @ 12.20 hrs, Volume= 21,921 cf, Depth= 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
40,473	39	>75% Grass cover, Good, HSG A
25,367	98	Paved parking, HSG A
65,840	62	Weighted Average
40,473		61.47% Pervious Area
25,367		38.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.6	210	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.4	260	Total			

Subcatchment 4S: To Showcase Property



Summary for Subcatchment 5S: Watershed 5 (Bypass)

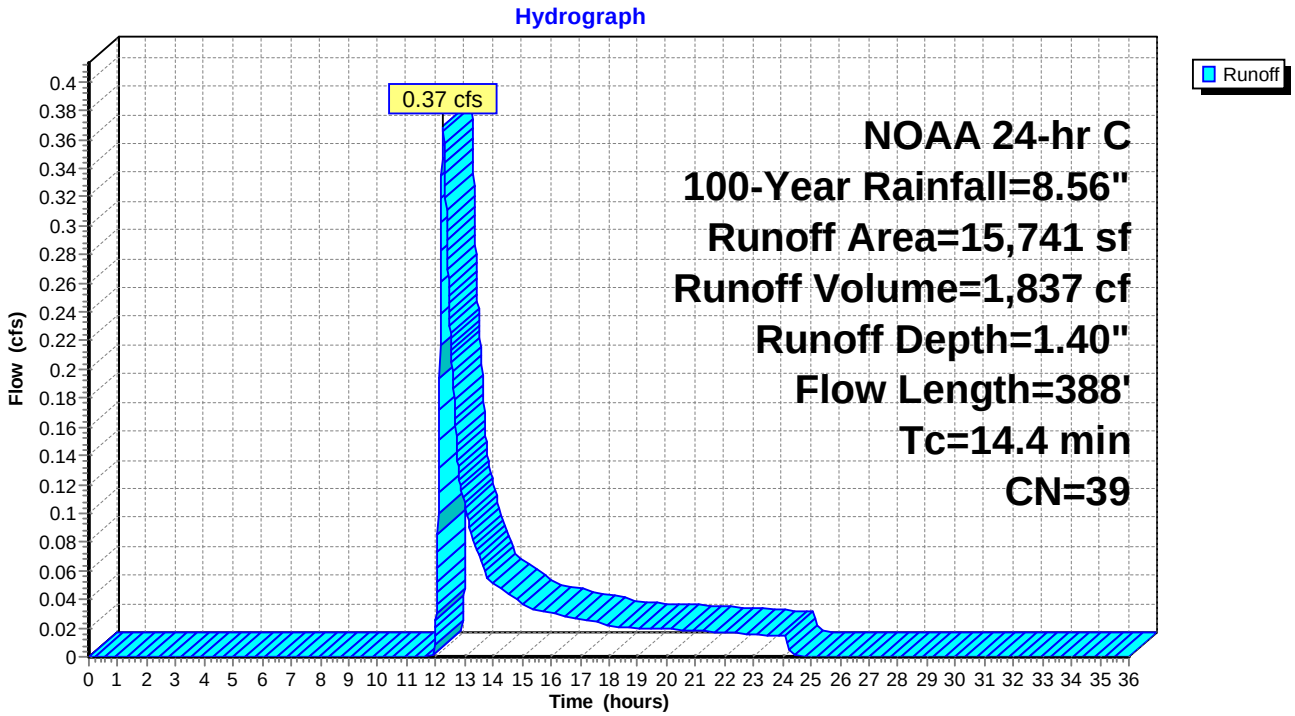
Runoff = 0.37 cfs @ 12.27 hrs, Volume= 1,837 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
15,741	39	>75% Grass cover, Good, HSG A
15,741	39	Weighted Average
15,741		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	80	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	258	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.4	388	Total			

Subcatchment 5S: Watershed 5 (Bypass)



Summary for Subcatchment 6S: Watershed 6 (bypass)

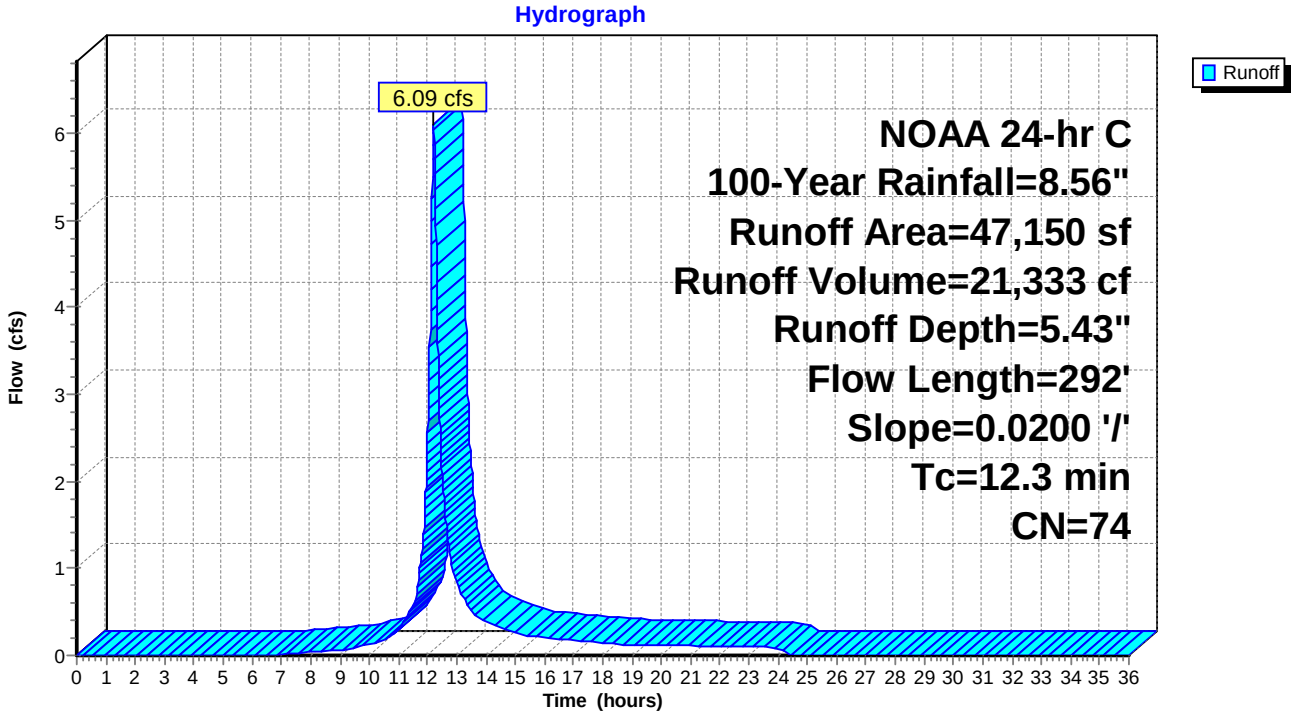
Runoff = 6.09 cfs @ 12.20 hrs, Volume= 21,333 cf, Depth= 5.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
28,206	98	Paved roads w/curbs & sewers, HSG A
18,944	39	>75% Grass cover, Good, HSG A
47,150	74	Weighted Average
18,944		40.18% Pervious Area
28,206		59.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
4.1	242	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.3	292	Total			

Subcatchment 6S: Watershed 6 (bypass)



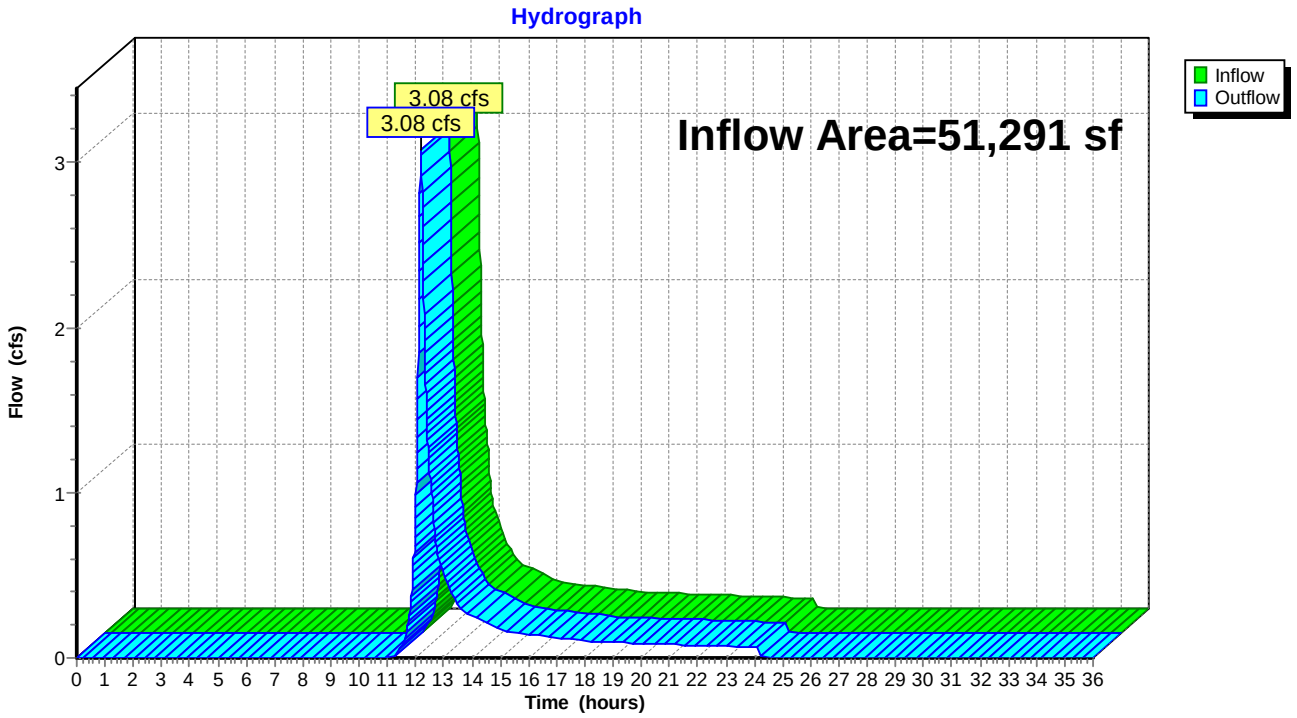
Summary for Reach 1R: Wetland 1

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

Inflow Area = 51,291 sf, 24.94% Impervious, Inflow Depth = 2.49" for 100-Year event
Inflow = 3.08 cfs @ 12.19 hrs, Volume= 10,623 cf
Outflow = 3.08 cfs @ 12.19 hrs, Volume= 10,623 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: Wetland 1



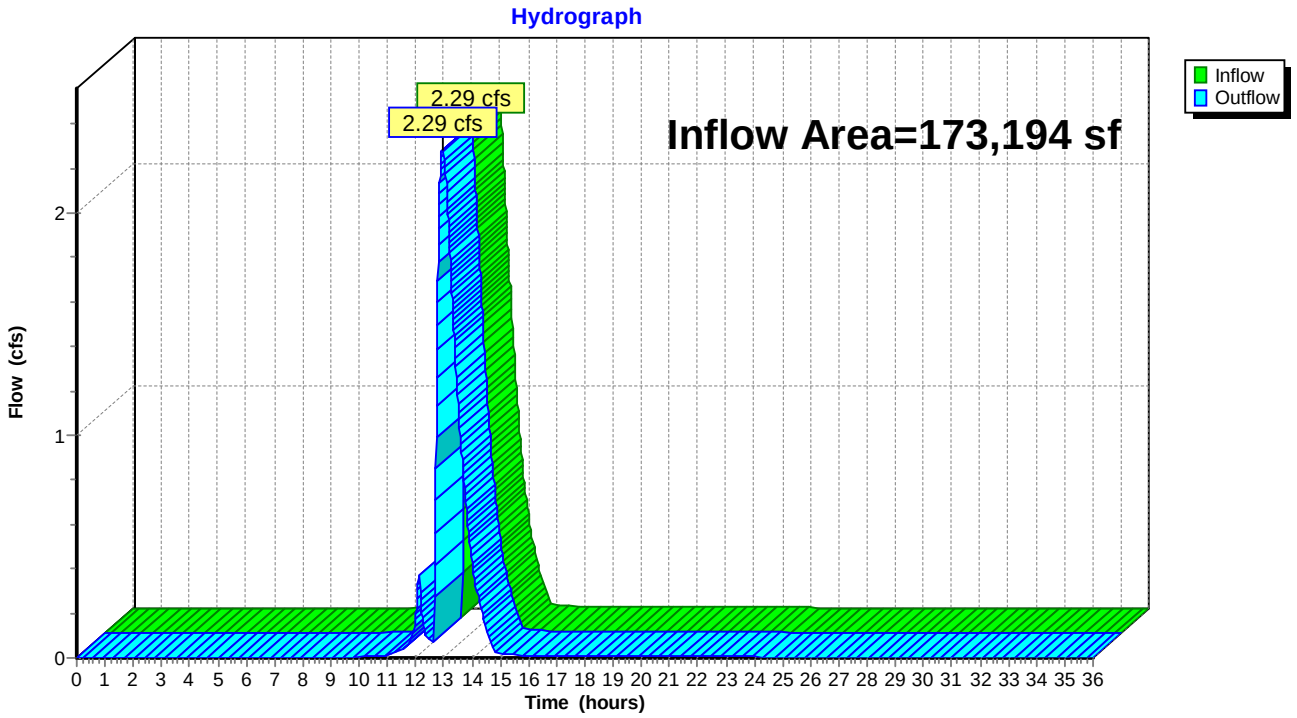
Summary for Reach 2R: Wetland D

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

Inflow Area = 173,194 sf, 56.09% Impervious, Inflow Depth = 0.55" for 100-Year event
Inflow = 2.29 cfs @ 12.95 hrs, Volume= 7,884 cf
Outflow = 2.29 cfs @ 12.95 hrs, Volume= 7,884 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 2R: Wetland D



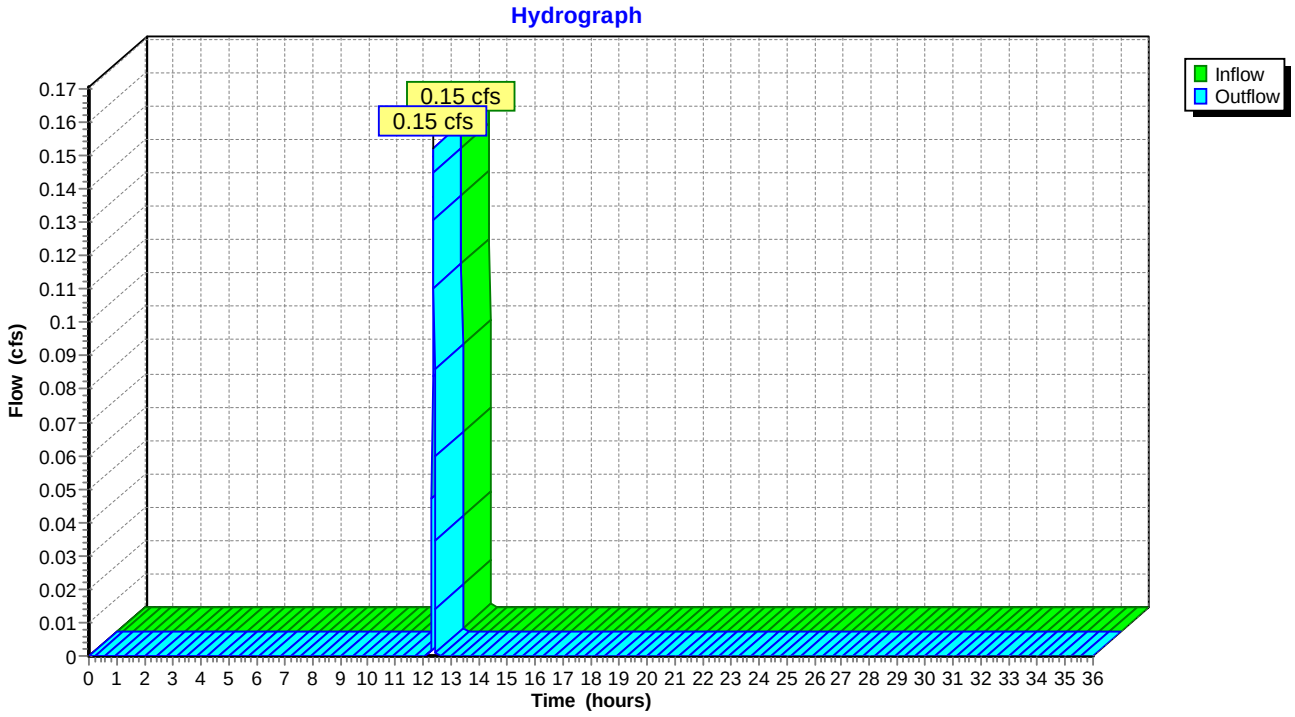
Summary for Reach 3R: Wetland M

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

Inflow	=	0.15 cfs @	12.34 hrs, Volume=	46 cf
Outflow	=	0.15 cfs @	12.34 hrs, Volume=	46 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 3R: Wetland M



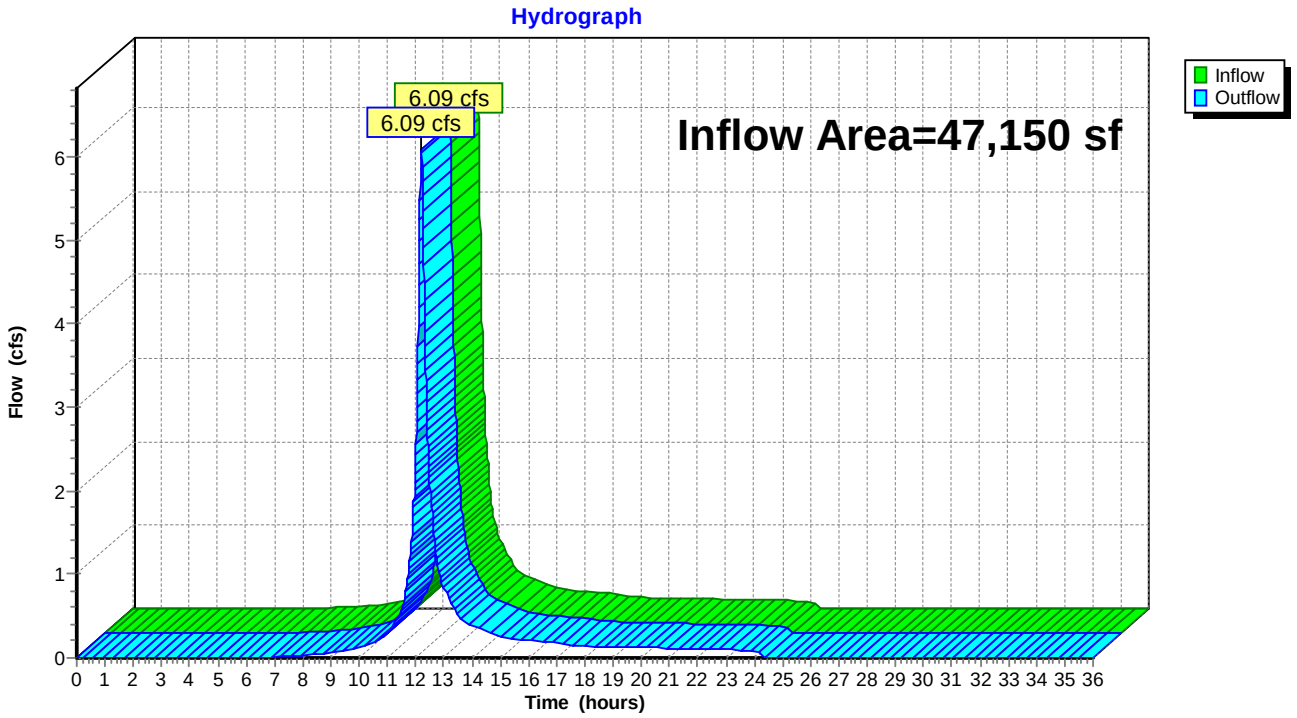
Summary for Reach 4R: Wetland N

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

Inflow Area = 47,150 sf, 59.82% Impervious, Inflow Depth = 5.43" for 100-Year event
Inflow = 6.09 cfs @ 12.20 hrs, Volume= 21,333 cf
Outflow = 6.09 cfs @ 12.20 hrs, Volume= 21,333 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 4R: Wetland N



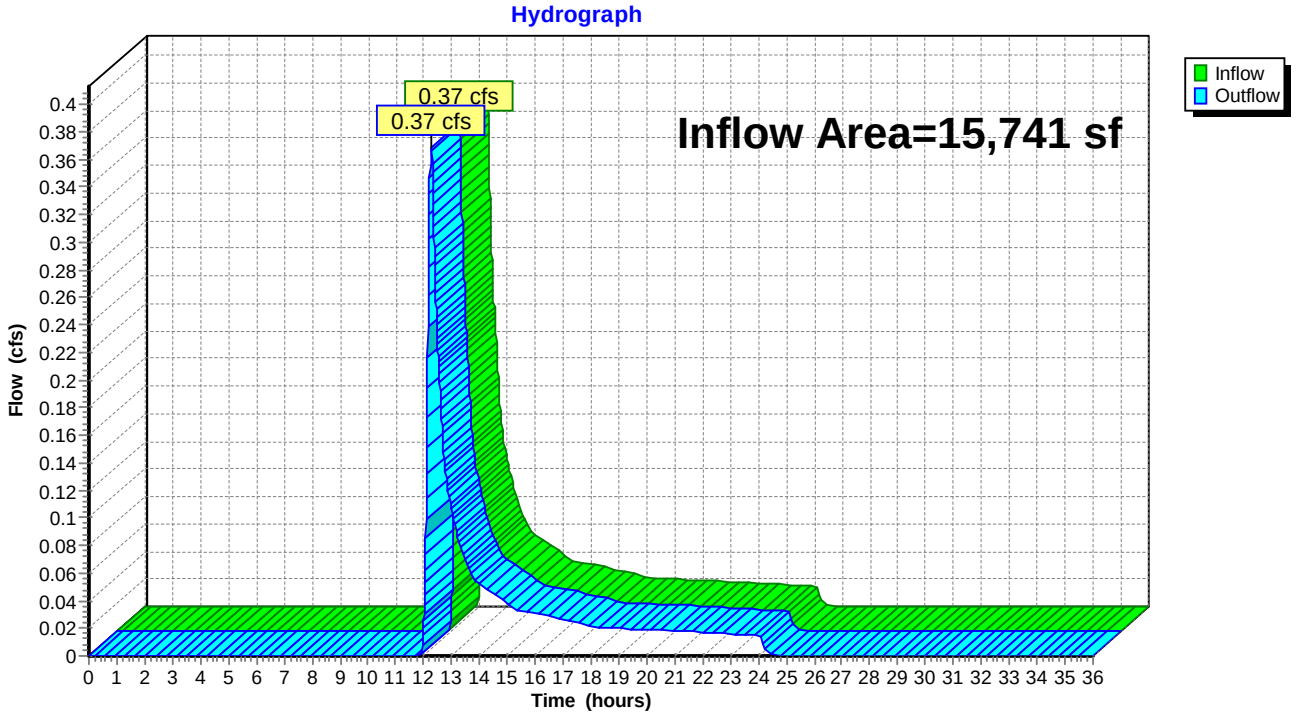
Summary for Reach 5R: Wetland C

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

Inflow Area = 15,741 sf, 0.00% Impervious, Inflow Depth = 1.40" for 100-Year event
Inflow = 0.37 cfs @ 12.27 hrs, Volume= 1,837 cf
Outflow = 0.37 cfs @ 12.27 hrs, Volume= 1,837 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 5R: Wetland C



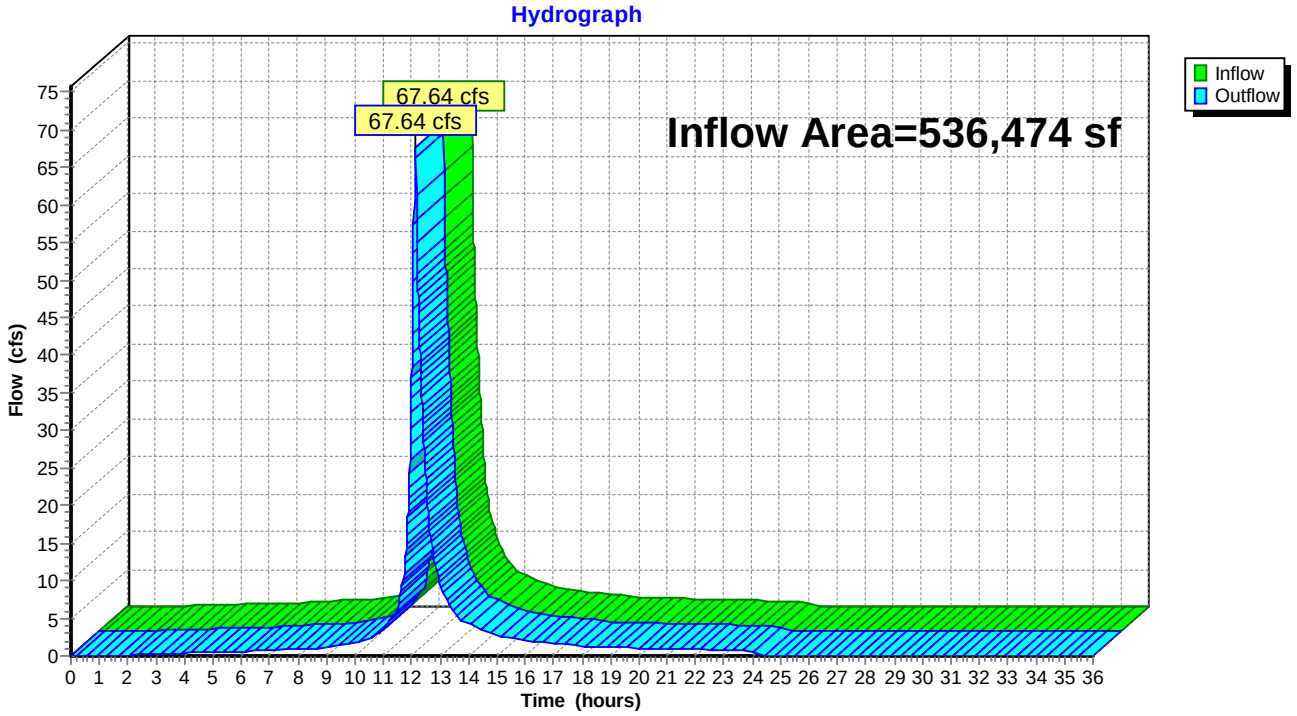
Summary for Reach 6R: Showcase

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

Inflow Area = 536,474 sf, 66.82% Impervious, Inflow Depth = 5.42" for 100-Year event
Inflow = 67.64 cfs @ 12.13 hrs, Volume= 242,457 cf
Outflow = 67.64 cfs @ 12.13 hrs, Volume= 242,457 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Showcase



Summary for Pond 1: DMH 1

[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 238,845 sf, 53.87% Impervious, Inflow Depth = 5.07" for 100-Year event
Inflow = 27.40 cfs @ 12.22 hrs, Volume= 100,895 cf
Outflow = 27.40 cfs @ 12.22 hrs, Volume= 100,895 cf, Atten= 0%, Lag= 0.0 min
Primary = 11.14 cfs @ 12.22 hrs, Volume= 44,804 cf
Secondary = 16.27 cfs @ 12.22 hrs, Volume= 56,091 cf

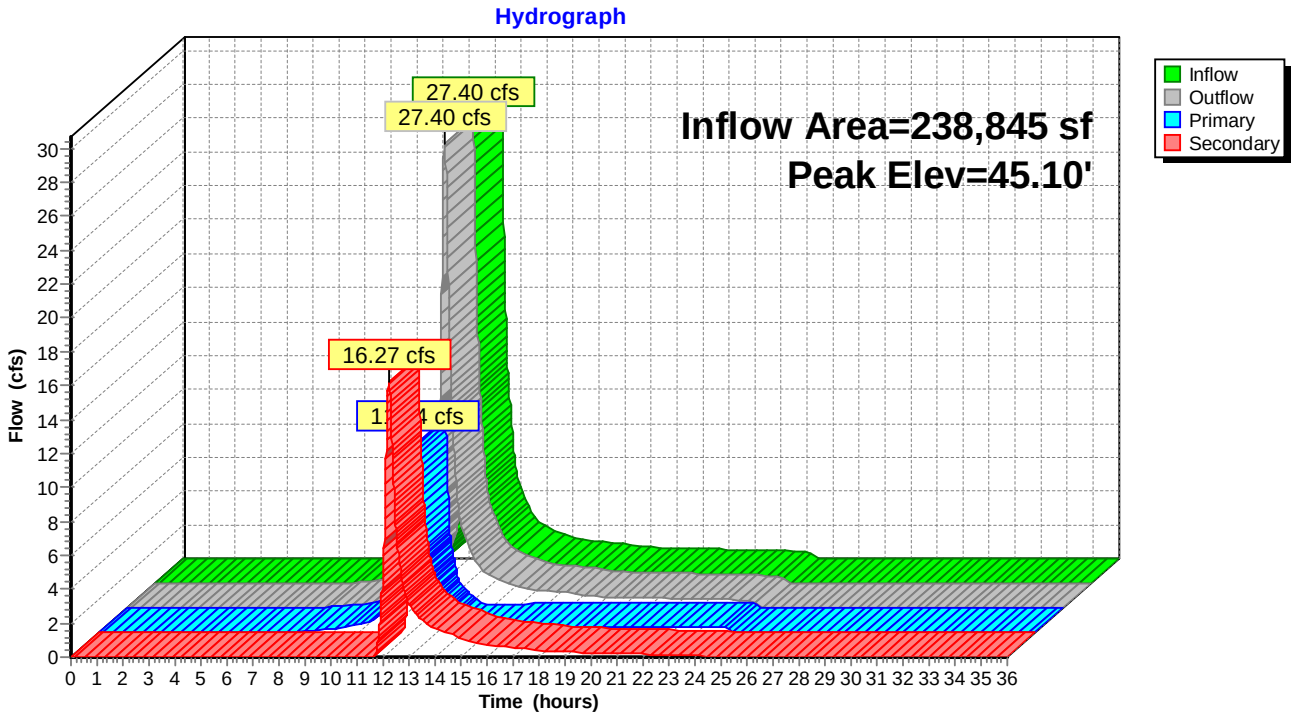
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 45.10' @ 12.22 hrs
Flood Elev= 47.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	40.80'	**15.0" Round 15" RCP** L= 36.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 40.80' / 40.70' S= 0.0028 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.23 sf
#2	Device 3	42.10'	**3.0' long x 3.00' rise Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#3	Secondary	40.70'	**18.0" Round 18" RCP** L= 6.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 40.70' / 40.60' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=11.09 cfs @ 12.22 hrs HW=45.10' TW=42.67' (Dynamic Tailwater)
↑**1=15" RCP** (Outlet Controls 11.09 cfs @ 9.04 fps)

Secondary OutFlow Max=16.26 cfs @ 12.22 hrs HW=45.10' TW=0.00' (Dynamic Tailwater)
↑**3=18" RCP** (Inlet Controls 16.26 cfs @ 9.20 fps)
↑**2=Sharp-Crested Rectangular Weir** (Passes 16.26 cfs of 50.98 cfs potential flow)

Pond 1: DMH 1


Hydrograph
Inflow
Outflow
Primary
Secondary
27.40 cfs
27.40 cfs
Inflow Area=238,845 sf
Peak Elev=45.10'
16.27 cfs
Flow (cfs)
Time (hours)

Summary for Pond 1P: Basin 1

Inflow Area = 170,331 sf, 57.03% Impervious, Inflow Depth = 5.43" for 100-Year event
Inflow = 19.47 cfs @ 12.25 hrs, Volume= 77,067 cf
Outflow = 3.52 cfs @ 12.95 hrs, Volume= 77,071 cf, Atten= 82%, Lag= 42.2 min
Discarded = 1.28 cfs @ 12.95 hrs, Volume= 70,225 cf
Primary = 2.25 cfs @ 12.95 hrs, Volume= 6,846 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 48.89' @ 12.95 hrs Surf.Area= 14,286 sf Storage= 38,089 cf
Flood Elev= 49.00' Surf.Area= 14,581 sf Storage= 39,663 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 336.6 min (1,163.0 - 826.4)

Volume	Invert	Avail.Storage	Storage Description
#1	45.00'	39,663 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

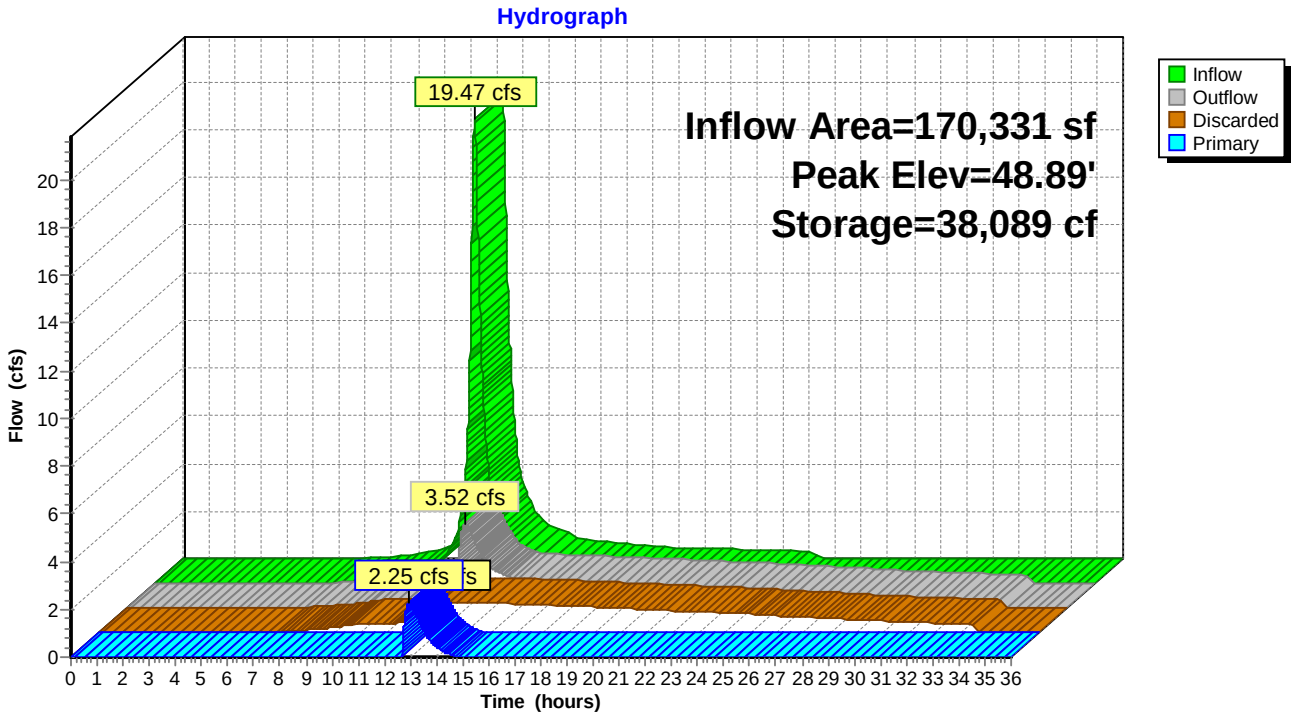
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.00	5,978	0	0
46.00	7,832	6,905	6,905
47.00	9,674	8,753	15,658
48.00	11,877	10,776	26,434
49.00	14,581	13,229	39,663

Device	Routing	Invert	Outlet Devices
#1	Discarded	45.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 41.00'
#2	Primary	48.75'	**13.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=1.28 cfs @ 12.95 hrs HW=48.89' (Free Discharge)
↑—**1=Exfiltration** (Controls 1.28 cfs)

Primary OutFlow Max=2.25 cfs @ 12.95 hrs HW=48.89' TW=0.00' (Dynamic Tailwater)
↑—**2=Sharp-Crested Rectangular Weir** (Weir Controls 2.25 cfs @ 1.23 fps)

Pond 1P: Basin 1



Summary for Pond 2P: Basin 2

[80] Warning: Exceeded Pond 1 by 1.36' @ 24.77 hrs (3.90 cfs 17,452 cf)

Inflow Area =	238,845 sf,	53.87% Impervious,	Inflow Depth =	2.25"	for 100-Year event
Inflow =	11.14 cfs @	12.22 hrs,	Volume=	44,804 cf	
Outflow =	7.10 cfs @	12.34 hrs,	Volume=	43,020 cf,	Atten= 36%, Lag= 7.2 min
Discarded =	0.53 cfs @	12.34 hrs,	Volume=	29,944 cf	
Primary =	6.41 cfs @	12.34 hrs,	Volume=	13,030 cf	
Secondary =	0.15 cfs @	12.34 hrs,	Volume=	46 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 42.78' @ 12.34 hrs Surf.Area= 13,539 sf Storage= 19,291 cf
Flood Elev= 43.00' Surf.Area= 14,712 sf Storage= 22,400 cf

Plug-Flow detention time= 302.5 min calculated for 43,020 cf (96% of inflow)
Center-of-Mass det. time= 278.5 min (1,109.7 - 831.3)

Volume	Invert	Avail.Storage	Storage Description
#1	40.00'	22,400 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.00	1,382	0	0
41.00	4,970	3,176	3,176
42.00	9,383	7,177	10,353
43.00	14,712	12,048	22,400

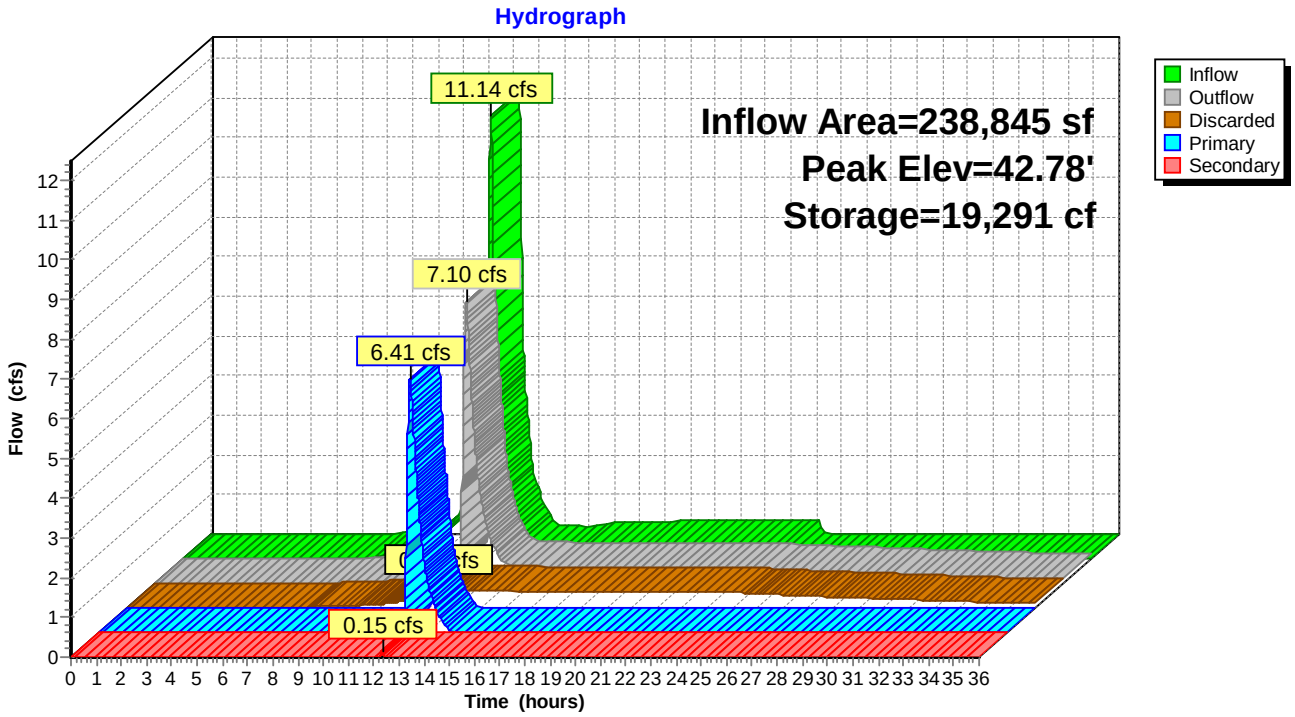
Device	Routing	Invert	Outlet Devices
#1	Primary	37.00'	**12.0" Round 12" RCP** L= 87.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 37.00' / 36.10' S= 0.0103 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	40.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 38.50'
#3	Secondary	42.75'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	42.40'	**32.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.53 cfs @ 12.34 hrs HW=42.78' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.53 cfs)

Primary OutFlow Max=6.41 cfs @ 12.34 hrs HW=42.78' TW=0.00' (Dynamic Tailwater)
↑—**1=12" RCP** (Passes 6.41 cfs of 7.68 cfs potential flow)
↑—**4=Orifice/Grate** (Weir Controls 6.41 cfs @ 2.02 fps)

Secondary OutFlow Max=0.15 cfs @ 12.34 hrs HW=42.78' TW=0.00' (Dynamic Tailwater)
↑—**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.15 cfs @ 0.56 fps)

Pond 2P: Basin 2



Appendix C
Watershed Plans

N.

MASS. STATE PLANE COORDINATE SYSTEM (NAD 83)

60 30 0 60 120 180

SCALE: 1"=60'
SCALE IN FEET

LEGEND:

- TREELINE
- PROPERTY LINE
- 700 — EXISTING CONTOUR
- 700 — PROPOSED CONTOUR
- E — UNDERGROUND ELECTRIC/TELEPHONE/CATV
- FS — FIRE SUPPLY
- W — DOMESTIC WATER
- D — DRAIN
- FM — SANITARY SEWER FORCE MAIN
- S — SANITARY SEWER
- G — GAS
- // — OVERHEAD WIRES
- PEDESTRIAN ROUTES
- EXISTING WATERSHED

NOTES:

1. UNDERGROUND UTILITIES DEPICTED HEREON ARE TO BE CONSIDERED APPROXIMATE. ALL UNDERGROUND UTILITIES ARE NOT SHOWN ON THIS MAP.

WATERSHED 1
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 44,735 SF
Tc = 18.0 MIN.
CN = 60

WATERSHED 4A
IMPERVIOUS AREA = 204,448 SF
PERVIOUS AREA = 27,341 SF
Tc = 5.0 MIN.
CN = 94

EXISTING Tc PATH (TYP.)

WATERSHED 4
IMPERVIOUS AREA = 249,944 SF
PERVIOUS AREA = 91,404 SF
Tc = 19.5 MIN.
CN = 81

WATERSHED 2
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 21,360 SF
Tc = 5.5 MIN.
CN = 60

WATERSHED 5
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 34,445 SF
Tc = 23.0 MIN.
CN = 36

WATERSHED 6
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 117,367 SF
Tc = 19.0 MIN.
CN = 66

WATERSHED 3
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 4,860 SF
Tc = 5.0 MIN.
CN = 39

GREENBRIER

(PRIVATE)

DRIVE

FORSYTHE CIRCLE (PRIVATE)

COLE STREET

PARKING

WETLAND 1

WETLAND C (ISOLATED LAND SUBJECT TO FLOODING) (NHESP CERTIFIED VERNAL POOL NO. 3977)

WETLAND D (ISOLATED VEGETATED WETLAND)

WETLAND N (ISOLATED LAND SUBJECT TO FLOODING)

WETLAND N (POSSIBLE OV)

50' LOCAL BUFFER

EXISTING WATERSHED PLAN
PREPARED FOR
RI SEEKONK HOLDINGS LLC
ASSESSORS PLAT 8 - LOT 3
FALL RIVER AVENUE
SEEKONK, MASSACHUSETTS

CAPUTO AND WICK LTD.
Civil Engineering and Land Surveying
Construction Engineering
Environmental Services
Traffic Engineering
1150 PAWTUCKET AVE.
RUMFORD, R.I. 02916-1897
Tel.: 401-434-8880 WWW.CWLTD.NET

DATE: MAY 19, 2020

SHEET: 3

N:\2600s\2651 Greenbrier Condos II\DrawingFiles\Misc\2651 Watershed Plans.dwg

N.

MASS. STATE PLANE COORDINATE SYSTEM (NAD 83)

60 30 0 60 120 180

SCALE: 1"=60'
SCALE IN FEET

LEGEND:

- TREELINE
- PROPERTY LINE
- 700 — EXISTING CONTOUR
- 700 — PROPOSED CONTOUR
- E — UNDERGROUND ELECTRI/TELEPHONE/CATV
- FS — FIRE SUPPLY
- W — DOMESTIC WATER
- D — DRAIN
- FM — SANITARY SEWER FORCE MAIN
- S — SANITARY SEWER
- G — GAS
- // — OVERHEAD WIRES
- PEDESTRIAN ROUTES
- PROPOSED WATERSHED

NOTES:

1. UNDERGROUND UTILITIES DEPICTED HEREON ARE TO BE CONSIDERED APPROXIMATE. ALL UNDERGROUND UTILITIES ARE NOT SHOWN ON THIS MAP.

WATERSHED 4A
IMPERVIOUS AREA = 204,448 SF
PERVIOUS AREA = 27,341 SF
Tc = 5.0 MIN.
CN = 94

WATERSHED 1
IMPERVIOUS AREA = 12,792 SF
PERVIOUS AREA = 38,499 SF
Tc = 9.5 MIN.
CN = 54

PROPOSED Tc PATH (TYP.)

WATERSHED 4
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 44,630 SF
Tc = 12.4 MIN.
CN = 62

WATERSHED 5
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 15,741 SF
Tc = 14.4 MIN.
CN = 39

WATERSHED 2A
IMPERVIOUS AREA = 0
PERVIOUS AREA = 2,863
Tc = 5.0 MIN.
CN = 65

WATERSHED 3
IMPERVIOUS AREA = 128,657 SF
PERVIOUS AREA = 110,188 SF
Tc = 14.1 MIN.
CN = 71

WATERSHED 2
IMPERVIOUS AREA = 97,140
PERVIOUS AREA = 73,191
Tc = 16.6 MIN.
CN = 73

WATERSHED 6
IMPERVIOUS AREA = 28,206 SF
PERVIOUS AREA = 18,944 SF
Tc = 12.3 MIN.
CN = 74

INFILTRATION BASIN 1

INFILTRATION BASIN 2

PROPOSED APARTMENT BUILDING 1

PROPOSED APARTMENT BUILDING 2

PROPOSED APARTMENT BUILDING 3

PROPOSED APARTMENT BUILDING 4

PROPOSED APARTMENT BUILDING 5

PROPOSED APARTMENT BUILDING 6

PROPOSED APARTMENT BUILDING 7

GREENBRIER

(PRIVATE)

DRIVE

FORSYTHE CIRCLE (PRIVATE)

PARKING

COLE STREET

WETLAND C
(ISOLATED LAND SUBJECT TO FLOODING)
(NHESP CERTIFIED VERNAL POOL NO. 3977)

WETLAND D
(ISOLATED VEGETATED WETLAND)

WETLAND N
(ISOLATED LAND SUBJECT TO FLOODING)

WETLAND N
(POSSIBLE OV)

UTILITY BUILDING

BORDERING VEGETATED WETLAND

ECB

PROPOSED WATERSHED PLAN
PREPARED FOR
RI SEEKONK HOLDINGS LLC
ASSESSORS PLAT 8 - LOT 3
FALL RIVER AVENUE
SEEKONK, MASSACHUSETTS

CAPUTO AND WICK LTD.
Civil Engineering and Land Surveying
Construction Engineering
Environmental Services
Traffic Engineering
1150 PAWTUCKET AVE.
RUMFORD, R.I. 02916-1897
Tel.: 401-434-8880 WWW.CWLTD.NET

DATE
MAY 19, 2020

SHEET
3

N:\2600s\2651 Greenbrier Condos II\DrawingFiles\Misc\2651 Watershed Plans.dwg

Appendix D
TSS Removal

Section D-1
TSS Removal Calculations

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: BMP 1 - Infiltration Basin

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Stormceptor Treatment Chamber	**0.77**	**0.75**	**0.58**	**0.17**
Infiltration Basin	**0.80**	**0.17**	**0.14**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**

Total TSS Removal = **97%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **Greenbrier Condominiums II**

Prepared By: **TD**

Date: **1/20/2021**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: BMP 2 - Infiltration Basin

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**
Infiltration Basin	**0.80**	**0.56**	**0.45**	**0.11**
	0.00	**0.11**	**0.00**	**0.11**
	0.00	**0.11**	**0.00**	**0.11**

Total TSS Removal = **89%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **Greenbrier Condominiums II**

Prepared By: **TD**

Date: **1/20/2021**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Section D-2
Construction Period Pollution Prevention Plan

CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

SITE DESCRIPTION			
Project Name and Location; (Latitude, Longitude, or Address	Greenbrier Residential Condominium Community 800 Fall River Ave, Seekonk	Owner Name and Address:	RI Seekonk Holdings LLC 44 Davis Street Seekonk, MA 02771
Description: (Purpose and Types of Soil Disturbing Activities)	The following information is based on information obtained from the project plans and supporting documents prepared by BETA Group, Inc.		
The project includes the construction of seven apartment buildings for Chapter 40 B affordable housing, containing approximately 240 units, as well as a community center and associated utility buildings. The proposed work will include the creation of an internal roadway network, ADA compliant pedestrian sidewalks, state roadway access, closed drainage systems, municipal water connection, and sanitary sewer connection to the Greenbrier Phase I wastewater treatment facility.			
Runoff Coefficient	Approx. 65 (based on a mix of impervious area and landscaped areas and A hydrologic soil group)		
Site Area:	The project includes approximately 13.40 acres of site disturbance.		

Sequence of Major Activities

The order of activities will be as follows:

1. Install soil erosion controls including compost filter sock.
2. Grade site to accommodate roadway.
3. Install the proposed drainage system in the roadway.
4. Construct the roadway.
5. Grade remaining site and construct buildings
6. Install permanent seeding.
7. Protect disturbed area from erosion with mulch and/or erosion control matting.
8. Remove soil erosion controls after a satisfactory stand of grass has been established.

Type of Receiving Resource Area:	Bordering Vegetated Wetlands Isolated Vegetated Wetlands

CONTROLS

Erosion and Sediment Controls

Stabilization Practices

Temporary Stabilization - Topsoil stock piles and disturbed portions of the site where construction activity temporarily ceases for at least 21 days will be stabilized with temporary seed and mulch no later than 14 days from the last construction activity in that area. The temporary seed shall be Rye (grain) applied at the rate of 50 pounds per 1000 sq. ft. After seeding, each area shall be mulched with straw.

Permanent Stabilization - Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed mix no later than 14 days after the last construction activity. The permanent seed mix shall be as specified in the construction documents, and shall be properly maintained by the contractor until the grass has established an adequate level of growth.

CONTROLS (Continued)

Structural Practices

Compost filter sock – Erosion of or sedimentation from disturbed areas will be prevented by compost filter sock during construction. The compost filter sock will be removed and properly disposed of upon completion of the project.

Storm Water Management

Disturbed areas with slopes of 2h:1v or steeper will have erosion control matting and riprap while disturbed areas with slopes of 3h:1v or gentler will have permanent seeding and/or plantings.

OTHER CONTROLS

Waste Disposal:

Waste Materials

All waste materials will be collected and stored in a securely lidded metal dumpster. The dumpster will meet all local Town and any State solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied as needed, and the trash will be hauled off site. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer and, the individual, who manages the day-to-day site operations, will be responsible for seeing that these procedures are followed.

Hazardous Waste

All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and the individual, who manages day-to-day site operations, will be responsible for seeing that these practices are followed.

Sanitary Waste

All sanitary waste will be collected from the portable units a minimum of once a week by a licensed sanitary waste management contractor, as required by local regulation.

Offsite Vehicle Tracking:

The paved streets adjacent to the site will be swept as needed to remove any excess mud, dirt or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

Construction Equipment Emissions:

Emissions for construction equipment will be reduced through properly maintaining construction equipment. In addition, reducing engine idling time will reduce emissions from construction equipment.

TIMING OF CONTROLS/MEASURES

As indicated in the Plans, compost filter sock will be installed prior to clearing or grading of any other portions of the site. Areas where construction activity temporarily ceases for more than 21 days will be stabilized with temporary seed and mulch within 14 days of the last disturbance. Once construction activity ceases permanently the area will be stabilized with permanent seed and mulch.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS

The construction period pollution prevention and erosion and sedimentation control plan reflects the requirements established by the Massachusetts Stormwater Handbook for all construction activities.

MAINTENANCE/INSPECTION PROCEDURES

Erosion and Sediment Control Inspection and Maintenance Practices

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls.

- All control measures will be inspected at least once every seven calendar days and within 24 hours after any storm event of 0.25 inches or greater in a 24 hour period, or upon the request of the owner or engineer.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report.
- If ponding becomes excessive, and sediment reaches to the midpoint of the control measures, additional control measures should be added in the areas without disturbance of soil or collected sediment.
- Any sediment deposits remaining in place after the control measures have been removed should be dressed to conform to the existing grade, prepared, and seeded.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth.
- A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached.
- The site superintendent will select one individual who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance report.
- Personnel selected for inspection and maintenance responsibilities will receive training from site superintendent. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.

MAINTENANCE /INSPECTION PROCEDURES (Continued)

Non Storm-Water Discharges

It is expected that the following non-storm water discharges may occur from the site during the construction period:

- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).

INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances, but not limited to those listed below, will potentially be present onsite during construction:

- Paints (enamel and latex)
- Fertilizers
- Petroleum Based Products
- Cleaning Solvents
- Asphalt
- Detergents
- Wood
- Tar
- Concrete

SPILL PREVENTION

Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff.

Good Housekeeping

The following good housekeeping practices will be followed onsite during the construction project

- An effort will be made to store on-site only enough products and materials required to do the job.
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product will be used up before disposing of the container.
- Manufacturers' recommendations for proper use and disposal will be followed.
- The site superintendent will inspect daily to ensure proper use and disposal of materials onsite.

Hazardous Products:

These practices are used to reduce the risks associated with hazardous materials.

- Products will be kept in original containers unless they are not re-sealable.
- Original labels and material safety data will be retained; they contain important product information.
- If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

SPILL PREVENTION (Continued)

Product Specific Practices

The following product specific practices will be followed onsite:

Petroleum Products

All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.

Fertilizers:

Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints:

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to manufacturers' instructions or State and local regulations.

Concrete Trucks:

Concrete trucks will be allowed to wash out or discharge surplus concrete or drum wash water to a dedicated area on site.

Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in a storage area onsite. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size.
- The spill prevention plan will be adjusted to include measures to prevent this type of spilt from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.
- The site superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. The individual will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the office trailer onsite.

GREENBRIER RESIDENTIAL CONDOMINIUM COMMUNITY – PHASE 1
CONSTRUCTION PERIOD POLLUTION PREVENTION AND
EROSION AND SEDIMENTATION CONTROL PLAN
INSPECTION AND MAINTENANCE REPORT FORM

TO BE COMPLETED EVERY 7 DAYS AND WITHIN 24 HOURS OF
A RAINFALL EVENT OF 0.25 INCHES OR MORE

INSPECTOR:_____ DATE:_____

INSPECTOR'S QUALIFICATIONS:

_____

_____

_____

_____

DAYS SINCE LAST RAINFALL:_____ AMOUNT OF LAST RAINFALL:_____ INCHES

STABILIZATION MEASURES

AREA	DATE SINCE LAST DISTURBANCE	DATE OF NEXT DISTURBANCE	STABILIZED? (YES/NO)	STABILIZED WITH	CONDITION

STABILIZATION REQUIRED:

_____

_____

_____

_____

TO BE PERFORMED BY:_____ ON OR BEFORE _____

GREENBRIER RESIDENTIAL CONDOMINIUM COMMUNITY – PHASE 1
CONSTRUCTION PERIOD POLLUTION PREVENTION AND
EROSION AND SEDIMENTATION CONTROL PLAN
INSPECTION AND MAINTENANCE REPORT FORM

STRUCTURAL CONTROLS
(Compost filter sock)

DATE:_____

DRAINAGE AREA PERIMETER	HAS SILT REACHED 1/2 OF FILTER SOCK HEIGHT?	IS THE FILTER SOCK PROPERLY SECURED?	IS THERE EVIDENCE OF WASHOUT OR OVERTOPPING?

MAINTENANCE REQUIRED FOR COMPOST FILTER SOCK:

_____

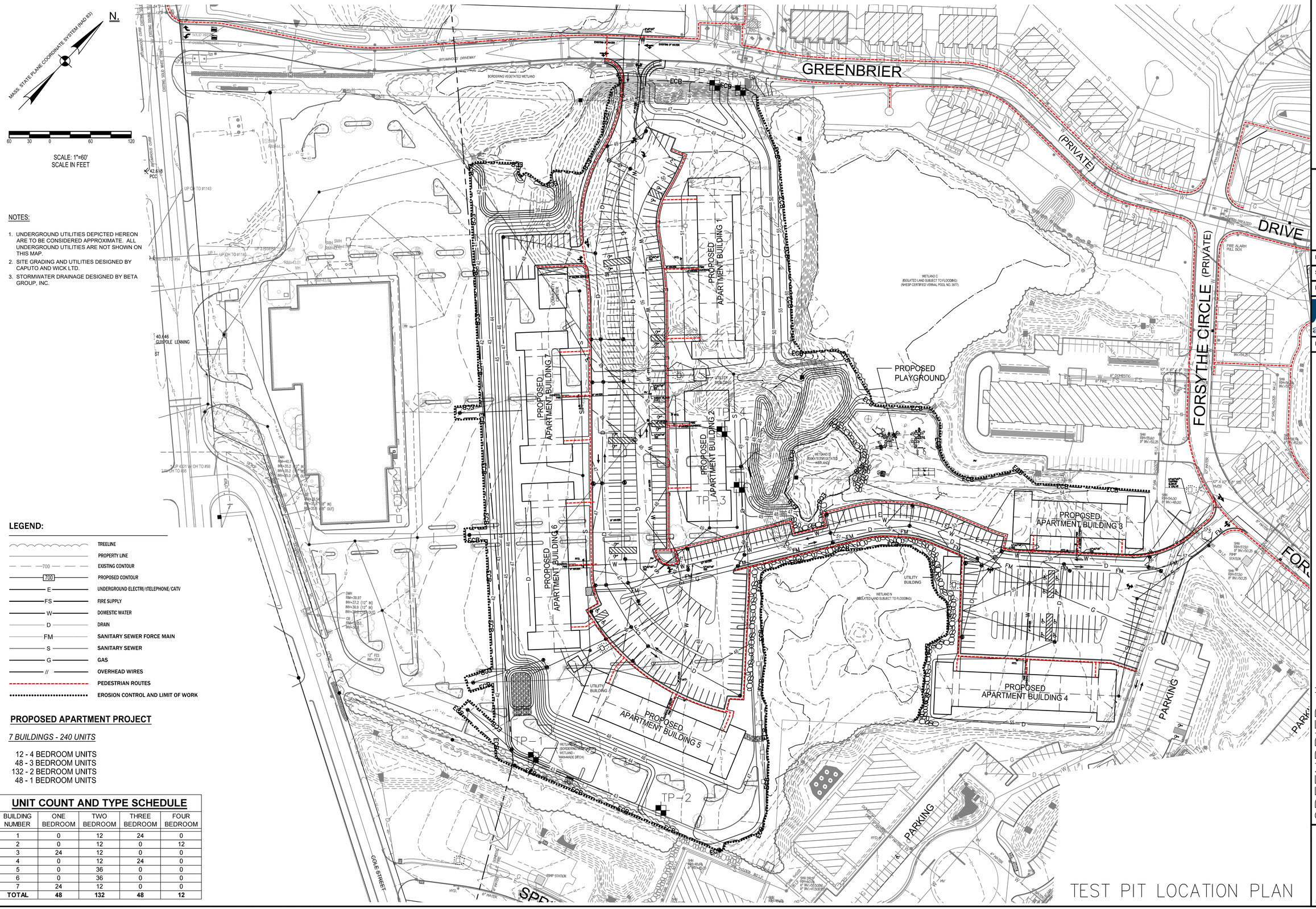
_____

_____

_____

TO BE PERFORMED BY:_____ ON OR BEFORE:_____

Appendix E
Test Pit Logs



NOTES:

1. UNDERGROUND UTILITIES DEPICTED HEREON ARE TO BE CONSIDERED APPROXIMATE. ALL UNDERGROUND UTILITIES ARE NOT SHOWN ON THIS MAP.
2. SITE GRADING AND UTILITIES DESIGNED BY CAPUTO AND WICK LTD.
3. STORMWATER DRAINAGE DESIGNED BY BETA GROUP, INC.

LEGEND:

- TREELINE
- PROPERTY LINE
- 700 EXISTING CONTOUR
- 700 PROPOSED CONTOUR
- E UNDERGROUND ELECTRI/TELEPHONE/CATV
- FS FIRE SUPPLY
- W DOMESTIC WATER
- D DRAIN
- FM SANITARY SEWER FORCE MAIN
- S SANITARY SEWER
- G GAS
- // OVERHEAD WIRES
- PEDESTRIAN ROUTES
- EROSION CONTROL AND LIMIT OF WORK

PROPOSED APARTMENT PROJECT

7 BUILDINGS - 240 UNITS

12 - 4 BEDROOM UNITS
48 - 3 BEDROOM UNITS
132 - 2 BEDROOM UNITS
48 - 1 BEDROOM UNITS

UNIT COUNT AND TYPE SCHEDULE

BUILDING NUMBER	ONE BEDROOM	TWO BEDROOM	THREE BEDROOM	FOUR BEDROOM
1	0	12	24	0
2	0	12	0	12
3	24	12	0	0
4	0	12	24	0
5	0	36	0	0
6	0	36	0	0
7	24	12	0	0
TOTAL	**48**	**132**	**48**	**12**

TEST PIT LOCATION PLAN

Caputo & Wick LTD
1150 Pawtucket Avenue
Rumford, RI 02916-1897
434-8880 Office
434-1615 Fax
(401) (401)
www.cwltd.net
CIVIL ENGINEERING • SURVEYING
TRANSPORTATION • ENVIRONMENTAL

DATE: 11/06/2020
SCALE: 1" = 60'-0"
DRAWN BY: DB

AJA architects

PROJECT # 11/06/2020

GREENBRIER II
RI SEEKONK HOLDINGS LLC

AJA ARCHITECTS
16 MASON AVE SUITE 5 NORTH ATTLEBORO, MA 02760

AJA GROUP, INC.
(781) 935-2500

C-101

SHEET 3.1 OF 21

NOVEMBER 6, 2020

N:\2600s\2651 Greenbrier Condos II\Engineering\Drainage\5 - Test Pits\2018070 MA Seekonk FRA Greenbrier II -Prelim Site Plan Set - Copy.dwg

Test Hole ID:	**TP-1**	(See map for location)	**Percolation Test:**		
Weather	**35 degrees with snow flurries**		Depth of Perc		
Date:	**January 20, 2021**		Start Pre-Soak		
Soil Evaluator	**Alan Gunnison- BETA Group, Inc.**		End Pre-Soak		
	Massachusetts License No. 13996		Time @ 12-in.		
Project:	**Greenbrier**		Time @ 9-in.		
Project / Number	**2651**		Time @ 6-in.		
			Time 9 - 6in.		
Top Hole El. = 42.5	**(Based on assumed datum per Plan)**		Rate (min./inch)		

Groundwater Data	Standing Water Depth, in.	Not Obs	Sc
Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]	or, Depth Weeping from Pit Face	Not Obs	Sc
Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
	Reading Date		-
	Index Well Max Level		Owmax
	Index Well Level		Owc
	Max Range for well		Owr
	Rage in levels for Similar Topography (5% exceedence, Figure 11)		Sr
	Predicted Adjusted Depth (Frimpter), ft	#VALUE!	Sh

Test Hole Log

Depth (inches)	Soil Horizon (Layer)	Soil Matrix Color - Moist (Munsell)	Soil Texture (USDA) (USDA)	Coarse Fragments % by Volume		Structure	Consistence	Redoximorphic Features (mottles)			Other
				Gravel	Cobbles & Stones			Depth	Color	Percent	
0-3	Pavement	--	--	--	--	--	--		--		--
3-40	Fill	--	--	--	--	--	--		--		--
40-90	C1	10YR 3/1	Sandy Loam	5%	2%	MA	FI		Not observed		trace organics
90-120	C2	10YR 5/1	Silty Clay Loam	--	--	MA	FI		Not observed		--

Geologic Setting and Topography

Landform	Landscape Position	Parent Material
Drumlin	Summit (SU)	Dense Compact Glacial Till
Till Ridge	Shoulder (SH)	Loose Ablation Till
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area
Moraine (End / Recessional)	**Footslope (FS)**	Lacustrine
Kettle	Toeslope (TS)	Ice-Contact Outwash
Kame	Channel (CH)	**Proglacial Outwash**
Esker		Alluvium
Outwash Plain		Organic Deposits
Lacustrine Plain		Eolian Deposits
Floodplain		Marine Silts & Clays
Swamp		Human-Made/Transported Materials (Fill)
Other		Other

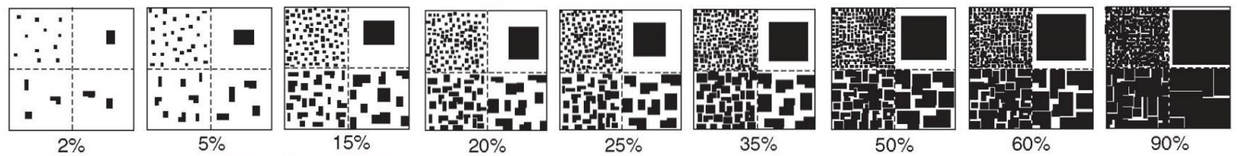
Textural and Structure

Texture (USDA)	Coarse Fragments		Structure	Consistence	Redox %
Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%
Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%
Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%
Loamy Sand			Platy (PL)	Firm (FI)	
Sandy Loam			Structureless	Very Firm (VFI)	
Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)	
Loam			Massive (MA)		
Silt Loam					
Sandy Clay Loam					
Silty Clay					
Clay					

Photo(s)

No Photo

Comments: Broke drain pipe which flooded the hole. Standing water could not be observed



Test Hole ID:	**TP-2**	(See map for location)	**Percolation Test:**			Groundwater Data	Standing Water Depth, in.	64"	Sc
Weather	**35 degrees with snow flurries**		Depth of Perc			**Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]**	or, Depth Weeping from Pit Face	76"	Sc
Date:	**January 20, 2021**		Start Pre-Soak			Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
Soil Evaluator	**Alan Gunnison- BETA Group, Inc.**		End Pre-Soak				Reading Date		-
	Massachusetts License No. 13996		Time @ 12-in.				Index Well Max Level		Owmax
Project:	**Greenbrier**		Time @ 9-in.				Index Well Level		Owc
Project / Number	**2651**		Time @ 6-in.				Max Range for well		Owr
			Time 9 - 6in.				Rage in levels for Similar Topography (5% exceedence, Figure 11)		Sr
Top Hole El. = 45.4	**(Based on datum per Plan)**		Rate (min./inch)				Predicted Adjusted Depth (Frimpter), ft	#VALUE!	Sh

Test Hole Log

Depth (inches)	**Soil Horizon (Layer)**	**Soil Matrix Color - Moist (Munsell)**	**Soil Texture (USDA)** (USDA)	**Coarse Fragments % by Volume**		**Structure**	**Consistence**	**Redoximorphic Features (mottles)**			**Other**
				Gravel	**Cobbles & Stones**			Depth	Color	Percent	
0-3	Pavement	--	--	--	--	--	--		--		--
3-30	Fill/HTM	--	--	--	--	--	--		--		--
30-90	C1	10YR 5/4	Loamy Sand	--	--	MA	Firm	45"	5YR 5/8	5%	--
90-120	C2	10YR 5/1	Silty Clay Loam	--	--	MA	Firm		--		--

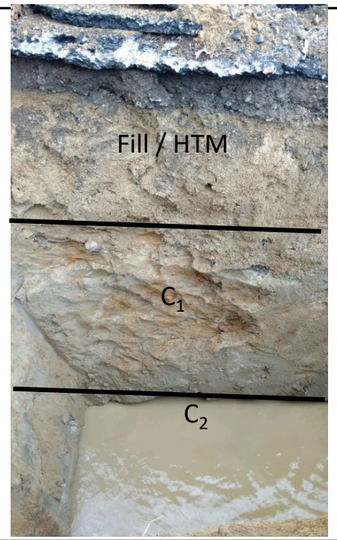
Geologic Setting and Topography

Landform	**Landscape Position**	**Parent Material**
Drumlin	Summit (SU)	Dense Compact Glacial Till
Till Ridge	Shoulder (SH)	Loose Ablation Till
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area
Moraine (End / Recessional)	**Footslope (FS)**	Lacustrine
Kettle	Toeslope (TS)	Ice-Contact Outwash
Kame	Channel (CH)	**Proglacial Outwash**
Esker		Alluvium
Outwash Plain		Organic Deposits
Lacustrine Plain		Eolian Deposits
Floodplain		Marine Silts & Clays
Swamp		Human-Made/Transported Materials (Fill)
Other		Other

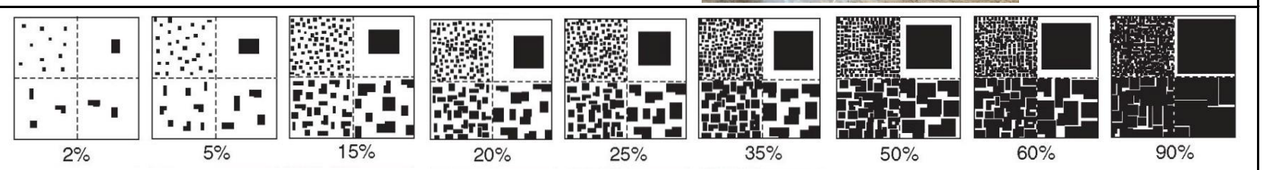
Textural and Structure

Texture (USDA)	**Coarse Fragments**		**Structure**	**Consistence**	**Redox %**
Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%
Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%
Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%
Loamy Sand			Platy (PL)	Firm (FI)	
Sandy Loam			Structureless	Very Firm (VFI)	
Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)	
Loam			Massive (MA)		
Silt Loam					
Sandy Clay Loam					
Silty Clay					
Clay					

Photo(s)



Comments: Standing water measured after hole open for one hour



Test Hole ID:	TP-3	(See map for location)
Weather	35 degrees with snow flurries	
Date:	January 20, 2021	
Soil Evaluator	Alan Gunnison- BETA Group, Inc.	
	Massachusetts License No. 13996	
Project:	Greenbrier	
Project / Number	2651	
Top Hole El. = 48.0	(Based on datum per Plan)	

Percolation Test:		
Depth of Perc		
Start Pre-Soak		
End Pre-Soak		
Time @ 12-in.		
Time @ 9-in.		
Time @ 6-in.		
Time 9 - 6in.		
Rate (min./inch)		

Groundwater Data	Standing Water Depth, in.	84"	Sc
Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]	or, Depth Weeping from Pit Face	Not Obs	Sc
Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
	Reading Date		-
	Index Well Max Level		Owmax
	Index Well Level		Owc
	Max Range for well		Owr
	Rage in levels for Similar Topography (5% exceedence, Figure 11)		Sr
	Predicted Adjusted Depth (Frimpter), ft	#VALUE!	Sh

Test Hole Log

Depth (inches)	Soil Horizon (Layer)	Soil Matrix Color - Moist (Munsell)	Soil Texture (USDA) (USDA)	Coarse Fragments % by Volume		Structure	Consistence	Redoximorphic Features (mottles)			Other
				Gravel	Cobbles & Stones			Depth	Color	Percent	
0-3	Pavement	--	--	--	--	--	--		--		--
3-20	Fill	--	--	--	--	--	--		--		--
20-36	C1	2.5Y 6/6	F-C Sand	--	--	SG	VFR		--		--
36-120	C2	2.5Y 5/3	F-C Sand	25%	2%	SG	L		--		--

Geologic Setting and Topography

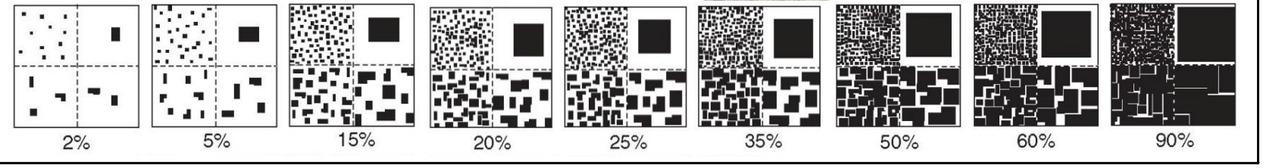
Landform	Landscape Position	Parent Material
Drumlin	Summit (SU)	Dense Compact Glacial Till
Till Ridge	Shoulder (SH)	Loose Ablation Till
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area
Moraine (End / Recessional)	Footslope (FS)	Lacustrine
Kettle	Toeslope (TS)	Ice-Contact Outwash
Kame	Channel (CH)	Proglacial Outwash
Esker		Alluvium
Outwash Plain		Organic Deposits
Lacustrine Plain		Eolian Deposits
Floodplain		Marine Silts & Clays
Swamp		Human-Made/Transported Materials (Fill)
Other		Other

Textural and Structure

Texture (USDA)	Coarse Fragments		Structure	Consistence	Redox %
Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%
Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%
Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%
Loamy Sand			Platy (PL)	Firm (FI)	
Sandy Loam			Structureless	Very Firm (VFI)	
Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)	
Loam			Massive (MA)		
Silt Loam					
Sandy Clay Loam					
Silty Clay					
Clay					

Photo(s)

Comments: Standing water measured after hole open for one hour



Test Hole ID:	TP-4 (See map for location)	Percolation Test:			Groundwater Data	Standing Water Depth, in.	88"	Sc
Weather	35 degrees with snow flurries	Depth of Perc			Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]	or, Depth Weeping from Pit Face	55"	Sc
Date:	January 20, 2021	Start Pre-Soak			Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
Soil Evaluator	Alan Gunnison- BETA Group, Inc.	End Pre-Soak				Reading Date		-
	Massachusetts License No. 13996	Time @ 12-in.				Index Well Max Level		Owmax
Project:	Greenbrier	Time @ 9-in.				Index Well Level		Owc
Project / Number	2651	Time @ 6-in.				Max Range for well		Owr
		Time 9 - 6in.				Rage in levels for Similar Topography (5% exceedence, Figure 11)		Sr
Top Hole El. = 48.0	(Based on datum per Plan)	Rate (min./inch)				Predicted Adjusted Depth (Frimpter), ft	#VALUE!	Sh

Test Hole Log

Depth (inches)	Soil Horizon (Layer)	Soil Matrix Color - Moist (Munsell)	Soil Texture (USDA)	Coarse Fragments % by Volume		Structure	Consistence	Redoximorphic Features (mottles)			Other
			(USDA)	Gravel	Cobbles & Stones			Depth	Color	Percent	
0-3	Pavement	--	--	--	--	--	--		--		--
3-60	Fill	--	--	--	--	--	--		--		--
60-94	1C1	10YR 5/2	Loamy Sand	2%	--	MA	FI		--		--
94-120	2C1	Gley 2 4/5PB	Silty Clay Loam	15%	2%	MA	FI		--		--

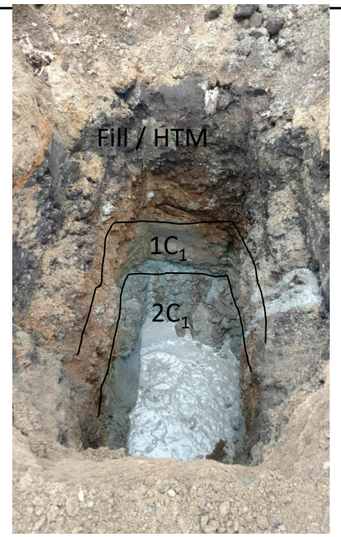
Geologic Setting and Topography

Landform	Landscape Position	Parent Material
Drumlin	Summit (SU)	Dense Compact Glacial Till
Till Ridge	Shoulder (SH)	Loose Ablation Till
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area
Moraine (End / Recessional)	Footslope (FS)	Lacustrine
Kettle	Toeslope (TS)	Ice-Contact Outwash
Kame	Channel (CH)	Proglacial Outwash
Esker		Alluvium
Outwash Plain		Organic Deposits
Lacustrine Plain		Eolian Deposits
Floodplain		Marine Silts & Clays
Swamp		Human-Made/Transported Materials (Fill)
Other		Other

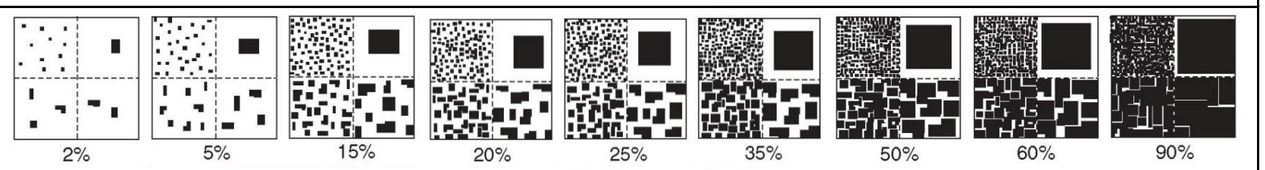
Textural and Structure

Texture (USDA)	Coarse Fragments		Structure	Consistence	Redox %
Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%
Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%
Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%
Loamy Sand			Platy (PL)	Firm (FI)	
Sandy Loam			Structureless	Very Firm (VFI)	
Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)	
Loam			Massive (MA)		
Silt Loam					
Sandy Clay Loam					
Silty Clay					
Clay					

Photo(s)



Comments: Standing water measured after hole open for one hour



Test Hole ID:	TP-5	(See map for location)	Percolation Test:			Groundwater Data	Standing Water Depth, in.	16"	Sc
Weather	30 degrees cloudy		Depth of Perc			Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]	or, Depth Weeping from Pit Face	16"	Sc
Date:	February 10, 2021		Start Pre-Soak			Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
Soil Evaluator	Alan Gunnison- BETA Group, Inc.		End Pre-Soak				Reading Date		-
	Massachusetts License No. 13996		Time @ 12-in.				Index Well Max Level		Owmax
Project:	Greenbrier		Time @ 9-in.				Index Well Level		Owc
Project / Number	2651		Time @ 6-in.				Max Range for well		Owr
			Time 9 - 6in.				Range in levels for Similar Topography (5% exceedance, Figure 11)		Sr
Top Hole El. = 46.1	(Based on datum per Plan)		Rate (min./inch)				Predicted Adjusted Depth (Frimpter), ft		Sh

Test Hole Log

Depth (inches)	Soil Horizon (Layer)	Soil Matrix Color - Moist (Munsell)	Soil Texture (USDA) (USDA)	Coarse Fragments % by Volume		Structure	Consistence	Redoximorphic Features (mottles)			Other
				Gravel	Cobbles & Stones			Depth	Color	Percent	
0-6	Loam/Grass	--	--	--	--	--	--		--		--
6-72	C1	10YR 5/2	F-C Sand	--	--	SG	Loose		--		--
											--
											--

Geologic Setting and Topography

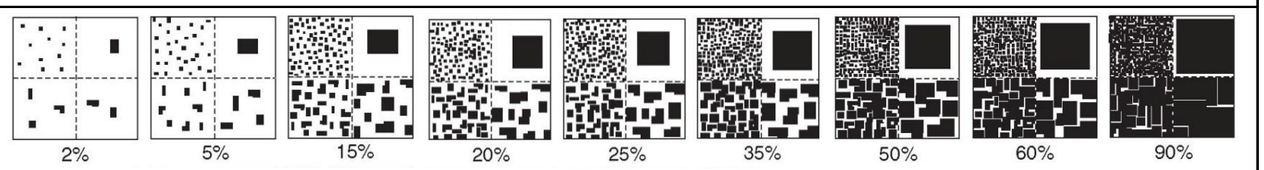
Landform	Landscape Position	Parent Material
Drumlin	Summit (SU)	Dense Compact Glacial Till
Till Ridge	Shoulder (SH)	Loose Ablation Till
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area
Moraine (End / Recessional)	Footslope (FS)	Lacustrine
Kettle	Toeslope (TS)	Ice-Contact Outwash
Kame	Channel (CH)	Proglacial Outwash
Esker		Alluvium
Outwash Plain		Organic Deposits
Lacustrine Plain		Eolian Deposits
Floodplain		Marine Silts & Clays
Swamp		Human-Made/Transported Materials (Fill)
Other		Other

Textural and Structure

Texture (USDA)	Coarse Fragments		Structure	Consistence	Redox %
Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%
Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%
Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%
Loamy Sand			Platy (PL)	Firm (FI)	
Sandy Loam			Structureless	Very Firm (VFI)	
Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)	
Loam			Massive (MA)		
Silt Loam					
Sandy Clay Loam					
Silty Clay					
Clay					

Photo(s)

Comments: Due to high groundwater and sandy soil excavation to 10-feet was not feasible.
The test pit continued to cave in when attempting to reach a depth of 10-feet



Test Hole ID:	**TP-6**	(See map for location)	**Percolation Test:**			Groundwater Data	Standing Water Depth, in.	25	Sc
Weather	**30 degrees cloudy**		Depth of Perc			**Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]**	or, Depth Weeping from Pit Face	25	Sc
Date:	**February 10, 2021**		Start Pre-Soak			Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
Soil Evaluator	**Alan Gunnison- BETA Group, Inc.**		End Pre-Soak				Reading Date		-
	Massachusetts License No. 13996		Time @ 12-in.				Index Well Max Level		Owmax
Project:	**Greenbrier**		Time @ 9-in.				Index Well Level		Owc
Project / Number	**2651**		Time @ 6-in.				Max Range for well		Owr
			Time 9 - 6in.				Rage in levels for Similar Topography (5% exceedance, Figure 11)		Sr
Top Hole El. = 46.2	**(Based on datum per Plan)**		Rate (min./inch)				Predicted Adjusted Depth (Frimpter), ft	#DIV/0!	Sh

Test Hole Log

Depth (inches)	**Soil Horizon (Layer)**	**Soil Matrix Color - Moist (Munsell)**	**Soil Texture (USDA)** (USDA)	**Coarse Fragments % by Volume**		**Structure**	**Consistence**	**Redoximorphic Features (mottles)**			**Other**
				Gravel	**Cobbles & Stones**			Depth	Color	Percent	
0-6	Loam/Grass	--	--	--	--	--	--		--		--
6-60	C1	10YR 5/2	F-C Sand	--	--	SG	Loose		--		--
											--
											--

Geologic Setting and Topography			**Textural and Structure**						**Photo(s)**
Landform	**Landscape Position**	**Parent Material**	**Texture (USDA)**	**Coarse Fragments**		**Structure**	**Consistence**	**Redox %**	
Drumlin	Summit (SU)	Dense Compact Glacial Till	Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%	
Till Ridge	Shoulder (SH)	Loose Ablation Till	Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%	
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area	Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%	
Moraine (End / Recessional)	Footslope (FS)	Lacustrine	Loamy Sand			Platy (PL)	Firm (FI)		
Kettle	Toeslope (TS)	Ice-Contact Outwash	Sandy Loam			Structureless	Very Firm (VFI)		
Kame	Channel (CH)	Proglacial Outwash	Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)		
Esker		Alluvium	Loam			Massive (MA)			
Outwash Plain		Organic Deposits	Silt Loam						
Lacustrine Plain		Eolian Deposits	Sandy Clay Loam						
Floodplain		Marine Silts & Clays	Silty Clay						
Swamp		Human-Made/Transported Materials (Fill)	Clay						
Other		Other							

Comments: Due to high groundwater and sandy soil excavation to 10-feet was not feasible.
The test pit continued to cave in when attempting to reach a depth of 10-feet