



Erosion Control & Stormwater Management Plan

Buchner Park Pool
223 Oakland Avenue
Waukesha, WI 53186

Prepared for:

City of Waukesha
March 2020

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Erosion Control & Stormwater Management Plan

Buchner Park Pool



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Introduction

This Erosion Control and Storm Water Management Plan is prepared in accordance with the requirements of NR 216, NR 151 and City of Waukesha requirements

The City of Waukesha is reconstructing the existing Buchner Park pool and bathhouse building. The pool originally opened in 1968. The project will consist of removing the existing pool and bathhouse building and reconstructing with a modern facility with updated amenities. The project will disturb approximately 2.26 acres of land, requiring an erosion control and stormwater management plan. A bioretention basin is proposed to treat and detain stormwater runoff from the new pool improvements. The best management practices (BMPs) will be maintained by the City of Waukesha following construction activities.

Project Site

Existing Site

The Buchner Park Pool is located on the east side of Waukesha at 223 Oakland Avenue. Buchner Park is a 7.52-acre park that contains the pool complex, tennis courts, a softball diamond, volleyball courts, a playground, a park shelter, and lawn space. Approximately 35% of the entire Buchner Park is impervious surface area. The existing park stormwater management consists of a storm sewer system that conveys existing storm sewer from the south side of Buchner Park to the north side.

See Appendix A for a location map.

Proposed Development

The proposed development consists of the reconstruction of the existing Buchner Park pool and bathhouse. The existing facility is aged and failing. The reconstructed facility will provide an improved facility to the pool's users. Demolition is scheduled for the first week of September 2020, with a Memorial Day 2021 opening. The project area is 2.70 area with approximately 2.26 acres to be altered from construction and final grading.

Drainage patterns will continue to outfall to the existing storm sewer. Portions of the site will be graded to drain to the bioretention basin for treatment and detention. The site plans are shown in Appendix A.

Wetlands

There are no hydric soils or wetland indicators in the project area. No wetland investigation is warranted for the project limits.

Soils

The soil type on the project site, as determined by the USDA's Web Soil Survey:

- HmB – Hochheim loam, 2 to 6 percent slopes (100%)

Soils are considered hydrologic soil group D. Soils maps and information can be found in Appendix B.

Watershed

The Buchner Park Pool project is within the Pewaukee River-Fox River watershed.

Construction Erosion and Sedimentation Controls

Potential Pollutant Sources

Potential storm water contaminants originating from the construction site include sediment, fuel, antifreeze, brake fluid, hydraulic oil, lubricants and cement. Dispersion of these pollutants offsite will be minimized as follows:

Sediment: Best management practices include seeding and mulching of disturbed areas, constructing grassed swales, sediment logs, installing silt fence around disturbed areas (including stockpiles), and constructing a stone tracking pad.

Fuel, antifreeze, brake fluid, hydraulic oil, and lubricants: To minimize mixing of these contaminants with storm water, all equipment and containers shall be inspected prior to entering the site. Leaking equipment or containers shall be repaired, removed from the site, or utilize drip pans to collect leaking contaminants. If a spill of any contaminants should occur, the WDNR Hazardous Waste Substance Spill Hotline shall be called 800.943.0003 and the spill reported.

Cement: To minimize the dispersion of cement into storm water, all equipment and containers shall be inspected prior to entering the site. Equipment cleaning shall be performed to ensure no wash-down water is discharged to waters of the state. Should a spill occur, the WDNR Hazardous Waste Substance Spill Hotline shall be called 800.943.0003 and the spill reported.

Material Handling and Spill Prevention Plan

Hazardous materials should be handled and stored in accordance with the recommendations of the manufacturer and Material Safety Data Sheets (MSDS). Containers or equipment leaking any contaminants shall be repaired, removed from the site, or utilize drip pans for containment purposes. Spills of any contaminants shall be immediately reported to the WDNR Hazardous Waste Substance Spill Hotline at 800.943.0003. The contractor shall maintain an emergency spill kit containing contaminant containment products and absorbent materials (inlet socks, dry absorbent materials, etc.).

Erosion and Sedimentation Control Measures

The contractor will maintain erosion controls to protect the site and prevent sediment pollution of adjacent water courses and properties. Unless otherwise specified, erosion controls will comply with the planning, design, and maintenance provisions of Chapter 3 of the Wisconsin Department of Natural Resources *Technical Standards*. The erosion and sedimentation controls will be as follows:

- Install silt fencing, erosion mat, and inlet protection as required by the construction documents.
- Provide tracking control by constructing temporary stone tracking pads to reduce the amount of sediment transported onto public roads.
- Grade slopes to a slope of 3:1 or flatter to reduce the erosion potential at the site.
- Control dust by applying water or dust control materials to minimize dispersion of dust and dirt during construction operations and to confine dust and dirt within the immediate area of construction.
- Dispose of waste materials in an approved manner.
- Seed and mulch graded areas to stabilize the exposed soil.

Dewatering

The need for dewatering is not expected due to the depth of excavation and anticipated depth to ground water.

Construction Sequence

The anticipated construction and erosion control sequence is as follows:

- Plan approvals and preconstruction meeting
- Mobilization and erosion control installation.
- Site preparation, building and pool demolition, clearing and grubbing.
- Utility Installation.
- Pool Deck grading and pool vessel construction.
- Bathhouse construction.
- Demolition of existing hardscaping.
- Hardscaping grading and base course surfacing.
- Concrete flatwork and curb and gutter installation.
- Bioretention system construction.
- Asphalt paving
- Site Landscape restoration/seeding
- Erosion control removal and demobilization

Disturbed areas will be seeded, mulched and maintained until these areas are stabilized. Street sweeping will be completed as needed throughout construction.

Post Construction Storm Water Management

The post construction storm water management for the site involves controlling the runoff from the construction site and providing protection for the existing natural drainage ways. According to NR 151, the site is classified as “Redevelopment”. Total suspended solids reduction has been incorporated into this plan per the NR 151 pollution performance standards.

Lawn care and landscape maintenance will be done by the City of Waukesha after construction is completed and will be done in a manner to allow as much infiltration of storm water and greatest reduction of flow as possible. Grass clippings, leaves, tree branches and other debris will be controlled on a regular basis to prevent materials from being carried by the storm water runoff and entering surface waters.

Total Suspended Solids

Routing of the site’s runoff through grass swales is proposed to meet the total suspended solids post construction requirement outlined in NR 151.122(1) Table 1, which states Redevelopment TSS reduction of 40 percent of load from parking areas and roads. Additionally, the City of Waukesha classifies this site a redevelopment and requires 40 percent reduction in TSS from roads and parking areas.

A bioretention basin is proposed to meet post construction requirements. The performance of the BMPs was estimated using WinSLAMM software. The procedures for modeling on-site and off-site runoff and TSS removal calculations in WinSLAMM described WDNR’s May 2015 memo, “Modeling Post-Construction Storm Water Management Treatment” were followed. Basin mapping for WinSLAMM and WinSLAMM input and output data are included in Appendix C. The following paragraphs describe the WinSLAMM modeling.

A WinSLAMM model was created that includes on-site areas of parking lots and roads. The results from this model are presented in Table 1.

Table 1: TSS Removal Results

	TSS Yield (lbs.)	TSS Reduction
Total Before Drainage System (Parking Lot Only)	93	--
Total After Outfall Controls (Parking Lot Only)	2	98%
Total Before Drainage System (Whole Site)	788	--
Total After Outfall Controls (Whole Site)	696	12%

The overall site with proposed BMPs meets TSS performance standards of NR 151.122 (1) Table 1 and the requirements of the City of Waukesha.

Peak Discharge

Per NR 151.123 peak discharge performance standard is required for the peak runoff of the 1-year, 24-hour event and 2-year, 24-hour event. The City of Waukesha is additionally requiring that the additional runoff does not exceed the downstream pipe size maximum capacity for the 10-year and 100-year events.

A bioretention basin is proposed to meet post construction requirements. HydroCAD software was used to determine peak flows for the 1-year, 2-year, 10-year, and 100-year storm events. A summary of the existing and developed conditions hydrologic modeling for the site are listed below in Table 3. HydroCAD report data can be found in Appendix D.

NRCS NOAA Atlas 14 rainfall depths were used with 24-hr rainfall distribution, the rainfall depths applied are shown in Table 2. The NRCS NOAA Atlas 14 24-hour rainfall depth was modified to conform to the more conservative rainfall depths defined in Chapter 32.11 of the City of Waukesha Stormwater Management and Erosion Control Ordinance.

Table 2: Rainfall Depths

Year Event	Rainfall (in)
1-Year	2.40
2 Year	2.70
10 Year	3.81
100 Year	6.18

Table 3: Peak Flow Analysis

Year Event	Existing Conditions (cfs)	Proposed Conditions (cfs)
1-Year	6.28	6.15
2 Year	7.45	7.13
10 Year	11.84	11.59
100 Year	21.20	21.11

The overall site with proposed BMPs meets peak discharge performance standards of NR 151.123 and the City of Waukesha Chapter 32 Stormwater Management and Erosion Control Ordinance.

Infiltration

Total Project Area = 2.71 Acres

Total Connected Impervious = 1.80 Acres

Percent connected Impervious = 66.5%

Per NR 151.124 (1) (b) site is a moderate impervious (>40% - <80%), which requires either 75% of the pre-developed annual infiltration volume or 2% of the post construction site (2361 SF).

A WinSLAMM model of the existing site was created to determine an existing infiltration volume. To conform with the City of Waukesha Chapter 32.11 Technical Standards, the modeled average annual rainfall utilized was the 1969 Milwaukee area rainfall data from March 28 to December 6, 1969.

The proposed site infiltrates 92% of the infiltration volume of the existing site when comparing the total outfall runoff volume of the existing condition to the proposed site condition.

The overall site with proposed BMPs meets performance standards of NR 151.124 (1) (b) and Chapter 32 of the City of Waukesha Stormwater Management and Erosion Control Ordinance.

Site infiltration calculations are included in Appendix E.

Operation and Maintenance

Short Term Maintenance and Reporting

The Contractor shall conduct the following inspections:

1. Weekly inspections of implemented erosion and sediment controls.
2. Inspections of erosion and sediment controls within 24 hours after a precipitation event that produces 0.5 inches of rain or more during a 24-hour period.

The Contractor shall prepare weekly written reports of all inspections that include:

1. Date, time, and exact place of inspection.
2. Name of individual who performed inspections.
3. And assessment of condition of erosion and sediment controls.
4. A description of any erosion and sediment control implementation and maintenance performed.
5. A description of the present phase of construction at the site.

The Contractor shall complete the following maintenance activities as needed throughout the project:

- Maintain erosion and sediment control BMPs continually.
- Remove sediment from behind the silt fence when deposits reach approximately one-half the volume capacity of the fence.
- Remove any sediment accumulating on adjacent property or potential drainage ways at the end of each day.
- Street sweeping/cleaning as needed throughout the construction project.

Long Term Maintenance Plan

The stormwater management system for this site consists of a bioretention basin and a storm sewer network. This system will pretreat, remove suspended solids, and reduce peak discharge of stormwater runoff.

The bioretention basin is located east of the Buchner Park Pool parking lot. The basin will treat storm runoff. The system will pretreat, remove suspended solids, infiltrate, and reduce peak discharge of stormwater runoff.

The bioretention system consists of plugged plantings, a mulch top surface, a subsurface engineering soil filter layer, a gravel storage layer and an underdrain pipe.

A network of storm sewer connects the pool deck drains, building roof drains, and bioretention basin underdrain to the city storm sewer network running through Buchner Park.

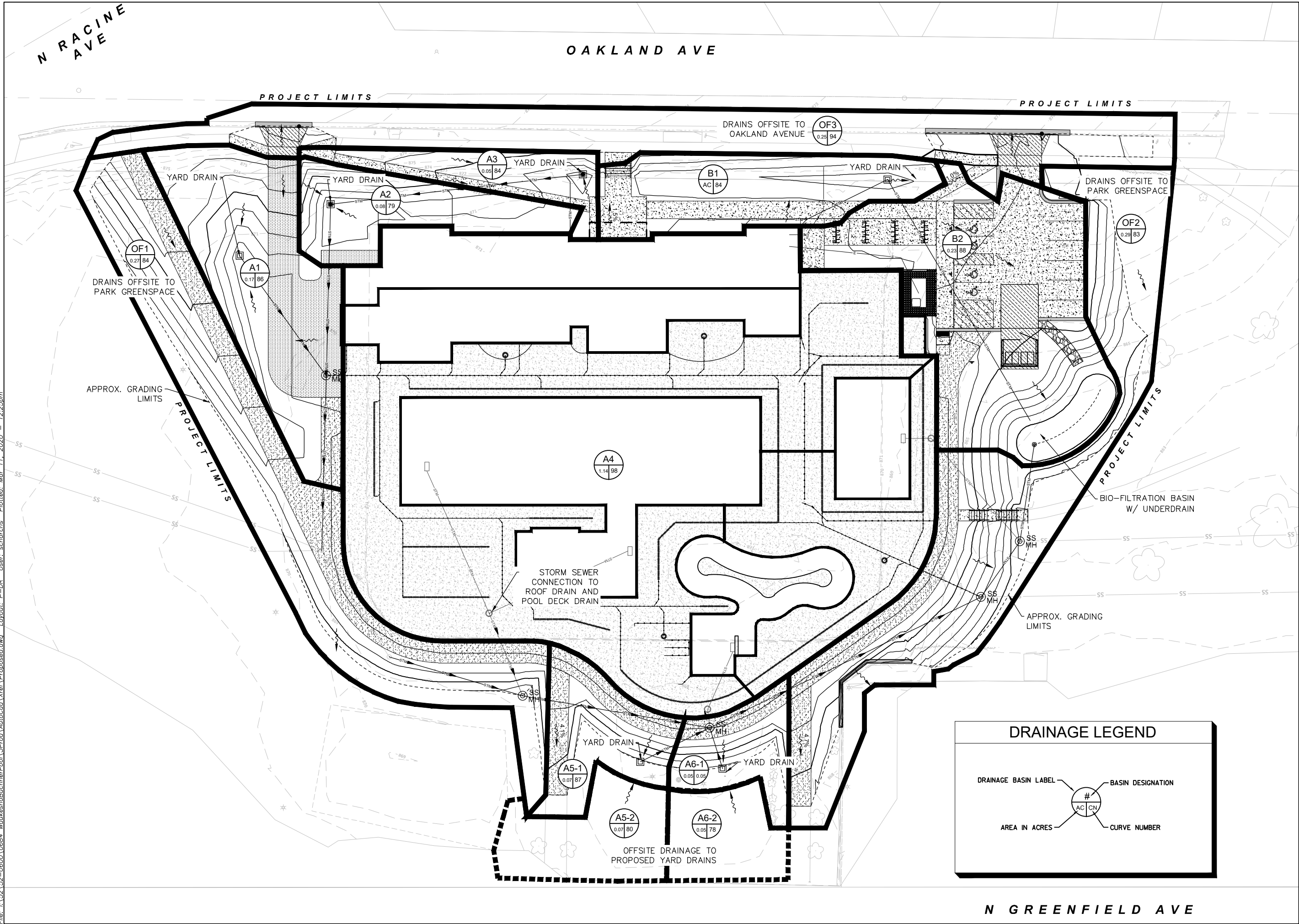
Long term operation and maintenance of the storm sewer and bioretention basin will be the responsibility of the City of Waukesha. Costs for the operation and maintenance of the storm sewer and bioretention basin will be assumed by the City.

The bioretention basin and storm sewer will require frequent maintenance. The bioretention basin should be inspected at a minimum annually for clogging. The bioretention basin should exhibit no standing water 72 hours following a significant rainfall event. If the system does not drain properly, then clogging should be addressed including clogging of the engineered soil media or underdrain clogging. Clogging of the engineered soil media may require replacement of the engineered soil, or at least part of the media.

Appendix A

Site Maps

File: I:\52\52-0600\0684 WaukeshaBuchnerPool\3Prod\AutoCad\Xref\Proposed.dwg Layout: P-DR User: scharchs Plotted: Mar 11, 2020 -- 12:25pm



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Revision	Date

Project Name
BUCHNER PARK
POOL

**NOT FOR
CONSTRUCTION**

City of Waukesha
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Waukesha, WI 53186

Drawn By:	JW
Checked By:	BM
File:	P-SG
Issued For:	Review
Issue Date:	03.11.2020
Project No.	52-0684.00

Sheet Title
PROPOSED SITE
DRAINAGE

North
0 20 40
Sheet Number

P-DR

Appendix B
Soils Information



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 **Milwaukee and Waukesha Counties, Wisconsin**



February 24, 2020

Preface

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

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

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

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

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

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

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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

Custom Soil Resource Report

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



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Milwaukee and Waukesha Counties, Wisconsin
Survey Area Data: Version 15, Sep 16, 2019

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

Date(s) aerial images were photographed: Aug 1, 2019—Oct 20, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
HmB	Hochheim loam, 2 to 6 percent slopes	6.6	100.0%
Totals for Area of Interest		6.6	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.

Milwaukee and Waukesha Counties, Wisconsin

HmB—Hochheim loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2t03x
Elevation: 820 to 1,330 feet
Mean annual precipitation: 29 to 31 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 135 to 155 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Hochheim

Setting

Landform: Drumlins
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy till and/or calcareous, dense loamy till

Typical profile

Ap - 0 to 9 inches: loam
Bt - 9 to 17 inches: clay loam
C - 17 to 33 inches: gravelly loam
Cd - 33 to 79 inches: gravelly loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 60 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Forage suitability group: Mod AWC, adequately drained (G095BY005WI)
Hydric soil rating: No

Minor Components

Theresa

Percent of map unit: 7 percent

Landform: Drumlins

Landform position (two-dimensional): Summit, backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Lamartine

Percent of map unit: 3 percent

Landform: Drumlins

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

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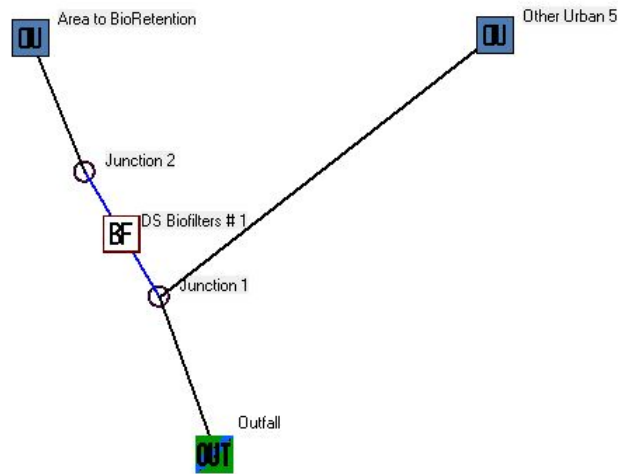
Custom Soil Resource Report

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Appendix C
WinSLAMM Data



Data file name: I:\52\52-0600\0684 WaukeshaBuchnerPool\2SupDoc\Stormwater\Drainage Calculations\WinSlamm\Buchner Park Pool - Proposed.mdb

WinSLAMM Version 10.4.0

Rain file name: C:\WinSLAMM Files\Rain Files\WI_Multi_rain\Milwaukee\WisReg - Milwaukee Annual 1969.ran

Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx

Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx

Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std

Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std

Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std

Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False

Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdX

Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv

Cost Data file name:

Seed for random number generator: -42

Study period starting date: 03/28/69 Study period ending date: 12/06/69

Start of Winter Season: 12/02 End of Winter Season: 03/12

Date: 02-27-2020 Time: 14:14:53

Site information:

Buchner Park Pool Project

LU# 1 - Other Urban: Area to BioRetention Total area (ac): 0.344

13 - Paved Parking 1: 0.078 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

31 - Sidewalks 1: 0.087 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

45 - Large Landscaped Areas 1: 0.179 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Other Urban: Other Urban 5 Total area (ac): 2.361

1 - Roofs 1: 0.235 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

31 - Sidewalks 1: 0.489 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

45 - Large Landscaped Areas 1: 0.729 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

63 - Paved Playground 1: 0.569 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

70 - Water Body Areas: 0.339 ac. Source Area PSD File:

Control Practice 1: Biofilter CP# 1 (DS) - DS Biofilters # 1

1. Top area (square feet) = 1073
2. Bottom area (square feet) = 872
3. Depth (ft): 5.5
4. Biofilter width (ft) - for Cost Purposes Only: 17
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 0.001
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 2
10. Porosity of rock filled volume = 0.33
11. Engineered soil infiltration rate: 13
12. Engineered soil depth (ft) = 2
13. Engineered soil porosity = 0.43
14. Percent solids reduction due to flow through engineered soil = 80
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: Not needed - calculated by program
18. Initial water surface elevation (ft): 0

Soil Data Soil Type Fraction in Eng. Soil

User-Defined Soil Type 1.000
Saturation water content percent (Porosity) = 0
Field capacity (%) = 0
Permanent Wilting Point (%) = 0
Infiltration rate (in/hr) = 13

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 10
2. Weir crest width (ft): 0.1
3. Height of datum to bottom of weir opening: 5.45

Outlet type: Drain Tile/Underdrain

1. Underdrain outlet diameter (ft): 0.33
2. Invert elevation above datum (ft): 1.67
3. Number of underdrain outlets: 1

Appendix C – WinSLAMM Output

File Name:
I:\52\52-0600\0684 WaukeshaBuchnerPool\2SupDoc\Stormwater\Drainage Calculations\WinSlamm\Buchner Park Pool - Proposed.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	153571		0.54	82.17	787.8	
Outfall Total with Controls	141055	8.15 %	0.50	79.06	696.2	11.63 %
Current File Output: Annualized Total After Outfall Controls	211872	Years in Model Run:	0.67		1046	

Print Output
Summary to Text
File

Print Output
Summary to .csv
File

Total Area Modeled (ac)
2.705

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall
Flow Duration
Curve Calculations

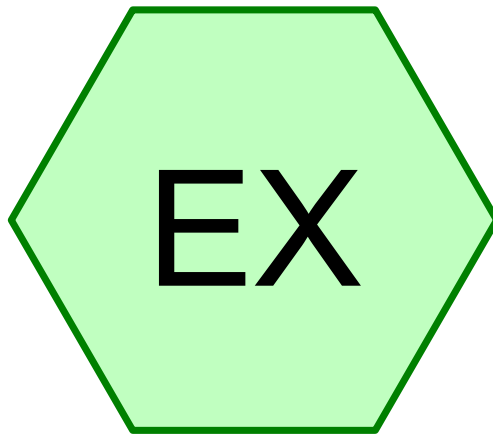
Receiving Water Impacts Due To Stormwater Runoff (CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.54	Poor
With Controls	0.50	Poor

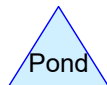
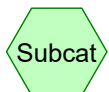
Data File: I:\52\52-0600\0684\water\Drainage Calculations\WinSlamm\Buchner Park Pool - Proposed.mdb
 Run File: WinSlamm - Milwaukee A
 Date: 02/27/20 Time: 2:11:40 PM
 Site Description: Buchner Park Pool

Col #	2	4	5	6	7	8	9	10	11	12	13	14	15	18	19	27	28	29	30	31
Control Practice No.	Control Practice Type	Total Inflow Volume (cfs)	Total Outflow Volume (cfs)	Percent Volume Reduction	Total Influent Load (lbs)	Total Effluent Load (lbs)	Percent Load Reduction	Flow Weighted Influent Conc (mg/L)	Flow Weighted Effluent Conc (mg/L)	Percent Conc. Reduction	Influent Median Part. Size (microns)	Effluent Median Part. Size (microns)	Notes	Maximum Stage (ft)	Hydraulic Volume Out (cfs)	Maximum Surface Ponding Time (hrs)	Maximum Subsurface Ponding Time (hrs)	Volume Initiated (cfs)	Underdrain Discharge Vol (cfs)	Evapo-Transpir Vol (cfs)
1	Bioretter	13615	1097	91.94	93.23	1.651	99.23	109.7	24.11	78.019	7.80	1.67	No Bioretter Overflows	4.03	921	0.2	14.90	12709.54	921	

Appendix D
HydroCAD Data



Existing Condition Runoff



Routing Diagram for Buchner Park Pool

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Buchner Park Pool

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Page 2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.208	78	Grassland, HSG D (EX)
0.484	98	Hardscape, HSG D (EX)
0.620	98	Pool Deck, HSG D (EX)
0.133	98	Roofs, HSG D (EX)
0.260	98	Water Surface, HSG D (EX)
2.705	89	TOTAL AREA

Buchner Park Pool

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Page 3

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
2.705	HSG D	EX
0.000	Other	
2.705		TOTAL AREA

Buchner Park Pool

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Page 4

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.208	0.000	1.208	Grassland	EX
0.000	0.000	0.000	0.484	0.000	0.484	Hardscape	EX
0.000	0.000	0.000	0.620	0.000	0.620	Pool Deck	EX
0.000	0.000	0.000	0.133	0.000	0.133	Roofs	EX
0.000	0.000	0.000	0.260	0.000	0.260	Water Surface	EX
0.000	0.000	0.000	2.705	0.000	2.705	TOTAL AREA	

Buchner Park Pool

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MSE-24 hour 1-yr Rainfall=2.40"

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Page 5

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX: Existing Condition

Runoff Area=2.705 ac 55.34% Impervious Runoff Depth>1.31"

Tc=5.0 min CN=89 Runoff=6.28 cfs 0.296 af

Total Runoff Area = 2.705 ac Runoff Volume = 0.296 af Average Runoff Depth = 1.31"
44.66% Pervious = 1.208 ac 55.34% Impervious = 1.497 ac

Buchner Park Pool

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MSE-24 hour 1-yr Rainfall=2.40"

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Summary for Subcatchment EX: Existing Condition Runoff

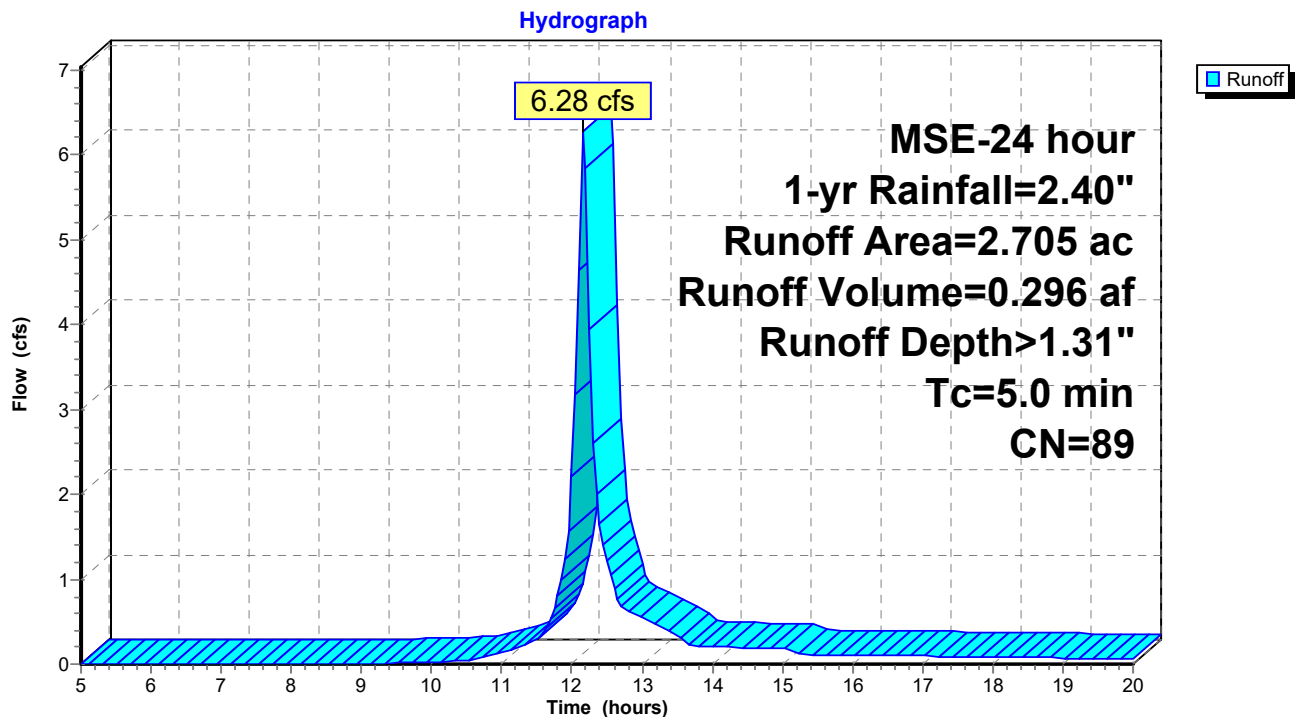
Runoff = 6.28 cfs @ 12.17 hrs, Volume= 0.296 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 1-yr Rainfall=2.40"

Area (ac)	CN	Description
0.133	98	Roofs, HSG D
0.260	98	Water Surface, HSG D
* 0.620	98	Pool Deck, HSG D
* 0.484	98	Hardscape, HSG D
* 1.208	78	Grassland, HSG D
2.705	89	Weighted Average
1.208		44.66% Pervious Area
1.497		55.34% Impervious Area

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

Subcatchment EX: Existing Condition Runoff

Buchner Park Pool

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MSE-24 hour 2-yr Rainfall=2.70"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX: Existing Condition

Runoff Area=2.705 ac 55.34% Impervious Runoff Depth>1.57"

Tc=5.0 min CN=89 Runoff=7.45 cfs 0.353 af

Total Runoff Area = 2.705 ac Runoff Volume = 0.353 af Average Runoff Depth = 1.57"
44.66% Pervious = 1.208 ac 55.34% Impervious = 1.497 ac

Buchner Park Pool

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MSE-24 hour 2-yr Rainfall=2.70"

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Summary for Subcatchment EX: Existing Condition Runoff

Runoff = 7.45 cfs @ 12.17 hrs, Volume= 0.353 af, Depth> 1.57"

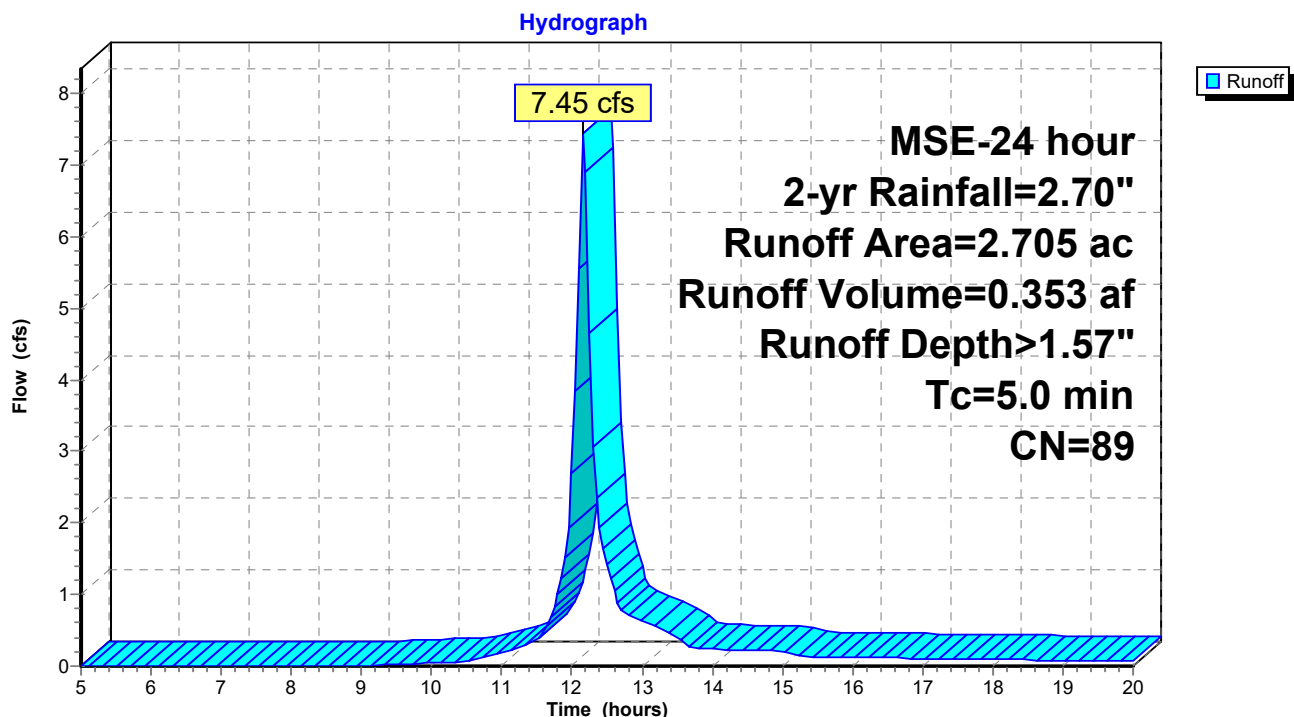
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 2-yr Rainfall=2.70"

Area (ac)	CN	Description
0.133	98	Roofs, HSG D
0.260	98	Water Surface, HSG D
* 0.620	98	Pool Deck, HSG D
* 0.484	98	Hardscape, HSG D
* 1.208	78	Grassland, HSG D
2.705	89	Weighted Average
1.208		44.66% Pervious Area
1.497		55.34% Impervious Area

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

Subcatchment EX: Existing Condition Runoff



Buchner Park Pool

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MSE-24 hour 10-yr Rainfall=3.81"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX: Existing Condition

Runoff Area=2.705 ac 55.34% Impervious Runoff Depth>2.55"

Tc=5.0 min CN=89 Runoff=11.84 cfs 0.575 af

Total Runoff Area = 2.705 ac Runoff Volume = 0.575 af Average Runoff Depth = 2.55"
44.66% Pervious = 1.208 ac 55.34% Impervious = 1.497 ac

Buchner Park Pool

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MSE-24 hour 10-yr Rainfall=3.81"

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Summary for Subcatchment EX: Existing Condition Runoff

Runoff = 11.84 cfs @ 12.16 hrs, Volume= 0.575 af, Depth> 2.55"

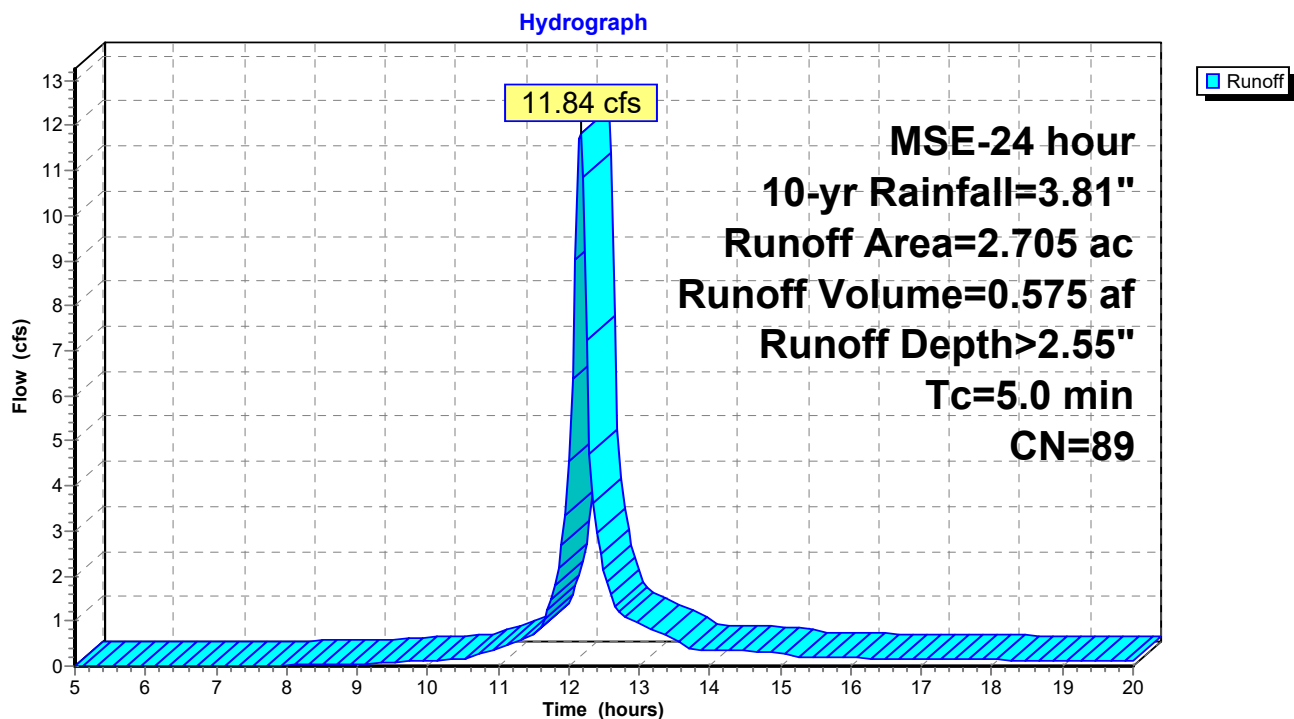
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

Area (ac)	CN	Description
0.133	98	Roofs, HSG D
0.260	98	Water Surface, HSG D
* 0.620	98	Pool Deck, HSG D
* 0.484	98	Hardscape, HSG D
* 1.208	78	Grassland, HSG D
2.705	89	Weighted Average
1.208		44.66% Pervious Area
1.497		55.34% Impervious Area

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

Subcatchment EX: Existing Condition Runoff



Buchner Park Pool

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MSE-24 hour 100-yr Rainfall=6.18"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX: Existing Condition

Runoff Area=2.705 ac 55.34% Impervious Runoff Depth>4.75"

Tc=5.0 min CN=89 Runoff=21.20 cfs 1.070 af

Total Runoff Area = 2.705 ac Runoff Volume = 1.070 af Average Runoff Depth = 4.75"
44.66% Pervious = 1.208 ac 55.34% Impervious = 1.497 ac

Buchner Park Pool

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MSE-24 hour 100-yr Rainfall=6.18"

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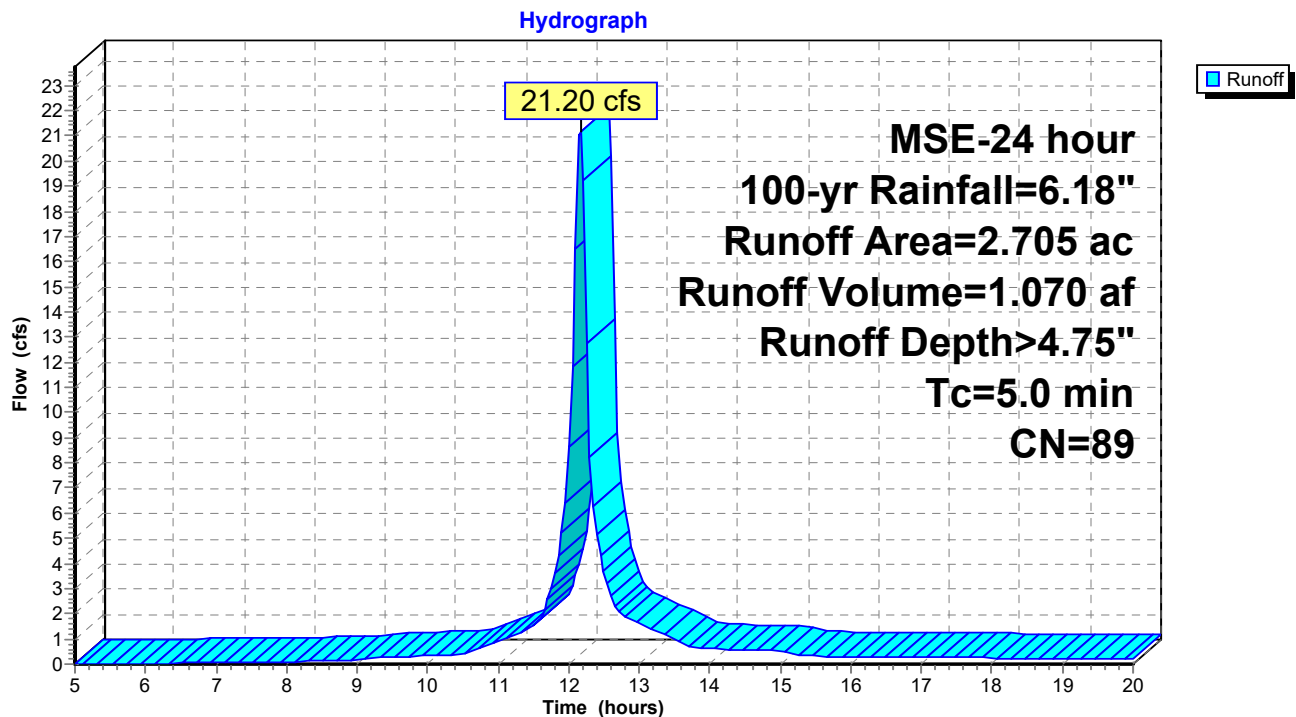
Summary for Subcatchment EX: Existing Condition Runoff

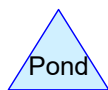
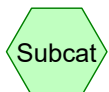
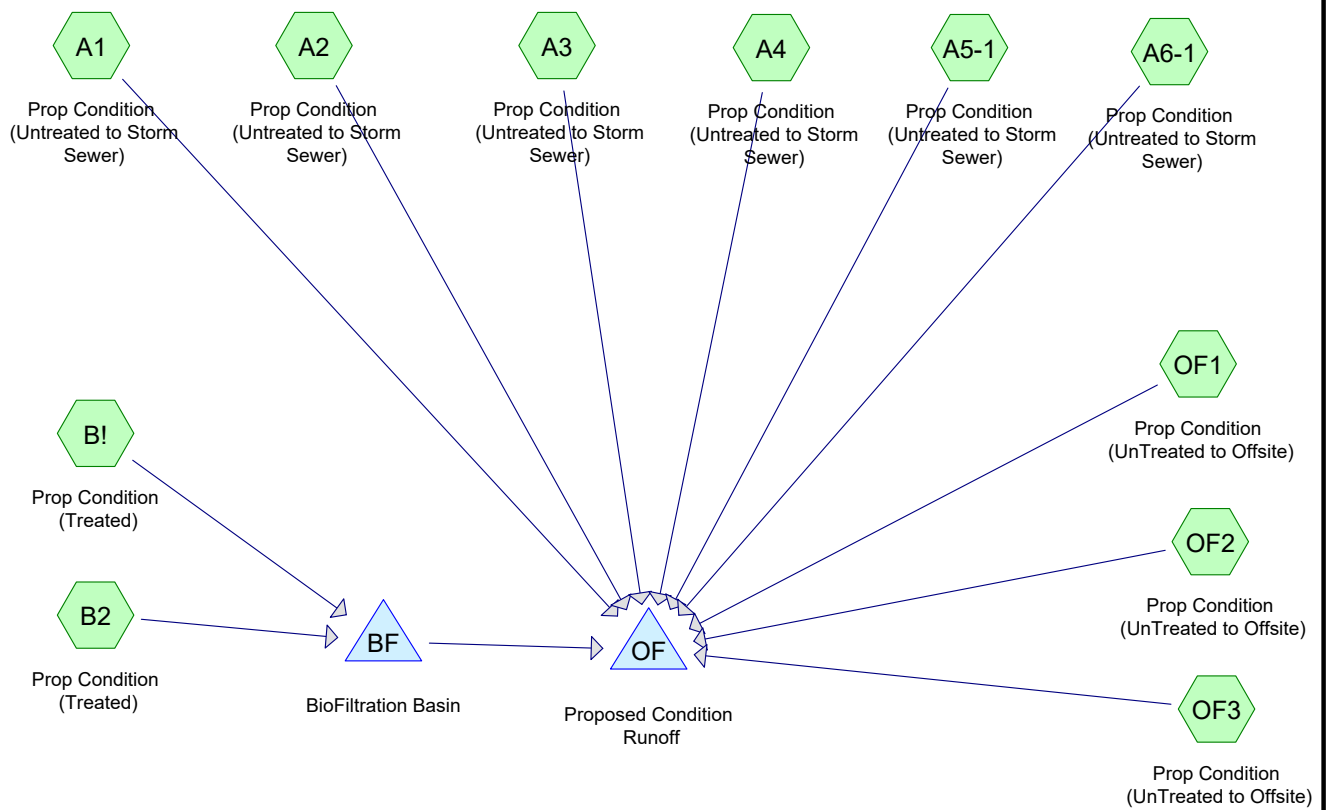
Runoff = 21.20 cfs @ 12.16 hrs, Volume= 1.070 af, Depth> 4.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

Area (ac)	CN	Description
0.133	98	Roofs, HSG D
0.260	98	Water Surface, HSG D
* 0.620	98	Pool Deck, HSG D
* 0.484	98	Hardscape, HSG D
* 1.208	78	Grassland, HSG D
2.705	89	Weighted Average
1.208		44.66% Pervious Area
1.497		55.34% Impervious Area

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

Subcatchment EX: Existing Condition Runoff



Routing Diagram for Buchner Park Pool
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Buchner Park Pool

Prepared by Ayres Associates

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.907	78	Grassland, HSG D (A1, A2, A3, A5-1, A6-1, B!, B2, OF1, OF2, OF3)
0.577	98	Hardscape, HSG D (A1, A2, A3, A5-1, A6-1, B!, B2, OF1, OF2, OF3)
0.078	98	Parking Lot, HSG D (B2)
0.569	98	Pool Deck, HSG D (A4)
0.235	98	Roofs, HSG D (A4)
0.339	98	Water Surface, HSG D (A4)
2.705	91	TOTAL AREA

Buchner Park Pool

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
2.705	HSG D	A1, A2, A3, A4, A5-1, A6-1, B1, B2, OF1, OF2, OF3
0.000	Other	
2.705		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.907	0.000	0.907	Grassland	A1, A2, A3, A5-1, A6-1, B1, B2, OF1, OF2, OF3
0.000	0.000	0.000	0.577	0.000	0.577	Hardscape	A1, A2, A3, A5-1, A6-1, B1, B2, OF1, OF2, OF3
0.000	0.000	0.000	0.078	0.000	0.078	Parking Lot	B2
0.000	0.000	0.000	0.569	0.000	0.569	Pool Deck	A4
0.000	0.000	0.000	0.235	0.000	0.235	Roofs	A4
0.000	0.000	0.000	0.339	0.000	0.339	Water Surface	A4
0.000	0.000	0.000	2.705	0.000	2.705	TOTAL AREA	

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Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	BF	862.50	860.00	50.0	0.0500	0.013	6.0	0.0	0.0

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MSE-24 hour 1-yr Rainfall=2.40"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentA1: Prop Condition	Runoff Area=7,283 sf 42.37% Impervious Runoff Depth>1.11" Tc=5.0 min CN=86 Runoff=0.33 cfs 0.015 af
SubcatchmentA2: Prop Condition	Runoff Area=3,356 sf 5.45% Impervious Runoff Depth>0.73" Tc=5.0 min CN=79 Runoff=0.10 cfs 0.005 af
SubcatchmentA3: Prop Condition	Runoff Area=2,267 sf 33.04% Impervious Runoff Depth>1.05" Tc=5.0 min CN=85 Runoff=0.10 cfs 0.005 af
SubcatchmentA4: Prop Condition	Runoff Area=49,790 sf 100.00% Impervious Runoff Depth>2.10" Tc=5.0 min CN=98 Runoff=3.73 cfs 0.200 af
SubcatchmentA5-1: Prop Condition	Runoff Area=2,968 sf 45.96% Impervious Runoff Depth>1.17" Tc=5.0 min CN=87 Runoff=0.14 cfs 0.007 af
SubcatchmentA6-1: Prop Condition	Runoff Area=2,157 sf 25.17% Impervious Runoff Depth>0.93" Tc=5.0 min CN=83 Runoff=0.08 cfs 0.004 af
SubcatchmentB1: Prop Condition (Treated)	Runoff Area=4,787 sf 28.85% Impervious Runoff Depth>0.99" Tc=5.0 min CN=84 Runoff=0.20 cfs 0.009 af
SubcatchmentB2: Prop Condition	Runoff Area=10,181 sf 56.98% Impervious Runoff Depth>1.31" Tc=5.0 min CN=89 Runoff=0.54 cfs 0.026 af
SubcatchmentOF1: Prop Condition	Runoff Area=11,574 sf 31.45% Impervious Runoff Depth>0.99" Tc=5.0 min CN=84 Runoff=0.47 cfs 0.022 af
SubcatchmentOF2: Prop Condition	Runoff Area=12,628 sf 25.06% Impervious Runoff Depth>0.93" Tc=5.0 min CN=83 Runoff=0.48 cfs 0.023 af
SubcatchmentOF3: Prop Condition	Runoff Area=10,836 sf 79.37% Impervious Runoff Depth>1.71" Tc=5.0 min CN=94 Runoff=0.72 cfs 0.035 af
Pond BF: BioFiltration Basin	Peak Elev=865.28' Storage=258 cf Inflow=0.74 cfs 0.035 af Primary=0.00 cfs 0.000 af Secondary=0.30 cfs 0.035 af Outflow=0.30 cfs 0.035 af
Pond OF: Proposed Condition Runoff	Inflow=6.15 cfs 0.315 af Primary=6.15 cfs 0.315 af

Total Runoff Area = 2.705 ac Runoff Volume = 0.350 af Average Runoff Depth = 1.55"
33.55% Pervious = 0.907 ac 66.45% Impervious = 1.798 ac

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MSE-24 hour 1-yr Rainfall=2.40"

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Summary for Subcatchment A1: Prop Condition (Untreated to Storm Sewer)

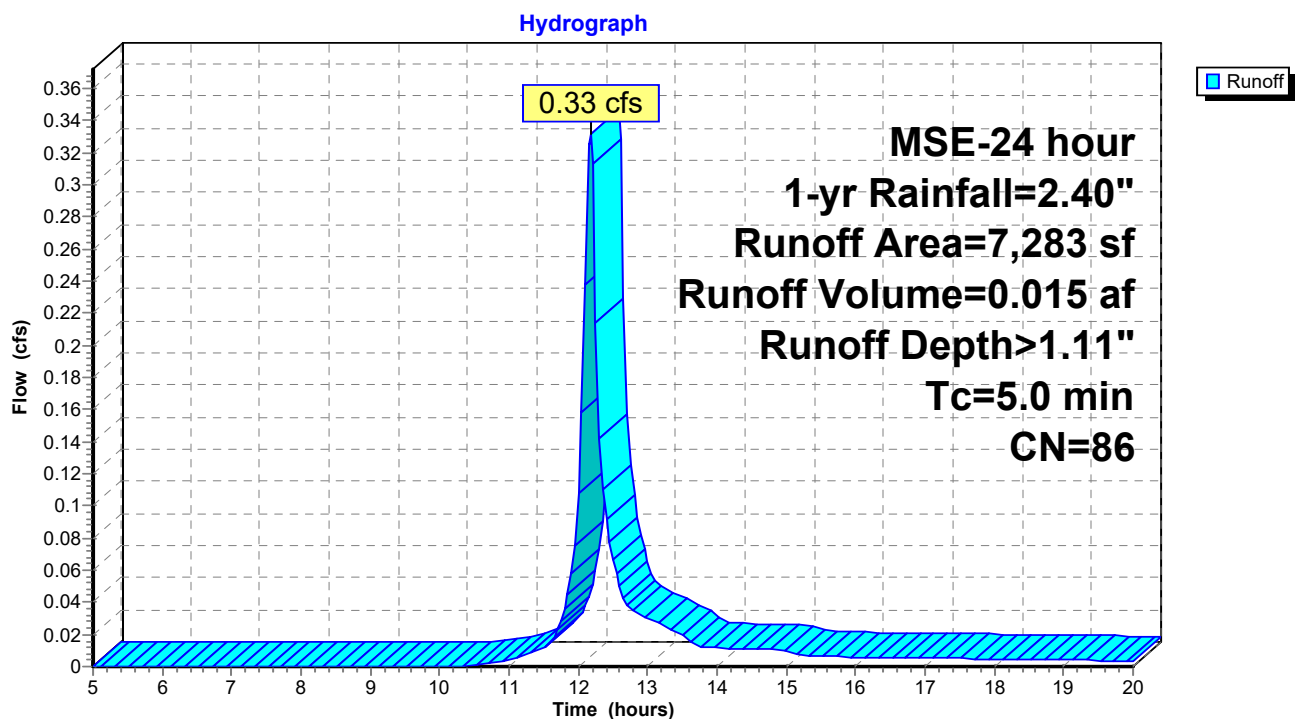
Runoff = 0.33 cfs @ 12.17 hrs, Volume= 0.015 af, Depth> 1.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 1-yr Rainfall=2.40"

	Area (sf)	CN	Description
*	3,086	98	Hardscape, HSG D
*	4,197	78	Grassland, HSG D
	7,283	86	Weighted Average
	4,197		57.63% Pervious Area
	3,086		42.37% Impervious Area

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

Subcatchment A1: Prop Condition (Untreated to Storm Sewer)



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MSE-24 hour 1-yr Rainfall=2.40"

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Summary for Subcatchment A2: Prop Condition (Untreated to Storm Sewer)

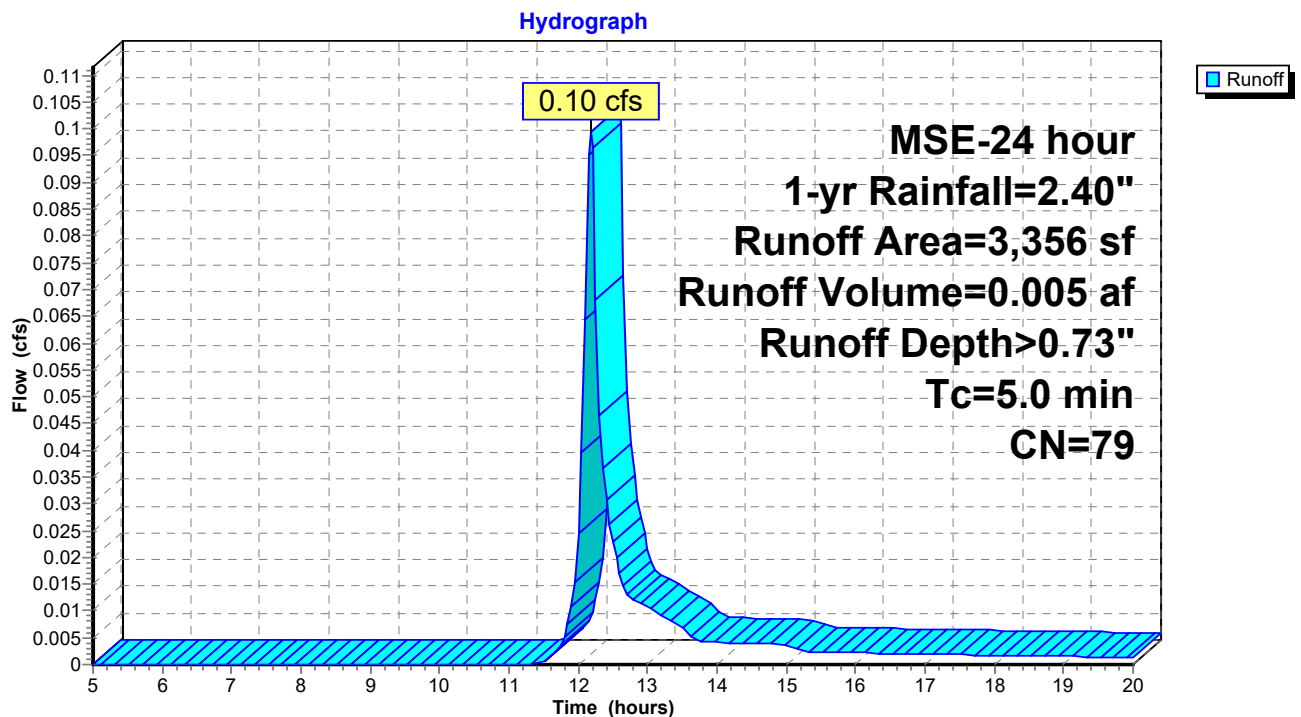
Runoff = 0.10 cfs @ 12.18 hrs, Volume= 0.005 af, Depth> 0.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 1-yr Rainfall=2.40"

	Area (sf)	CN	Description
*	183	98	Hardscape, HSG D
*	3,173	78	Grassland, HSG D
	3,356	79	Weighted Average
	3,173		94.55% Pervious Area
	183		5.45% Impervious Area

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

Subcatchment A2: Prop Condition (Untreated to Storm Sewer)



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Summary for Subcatchment A3: Prop Condition (Untreated to Storm Sewer)

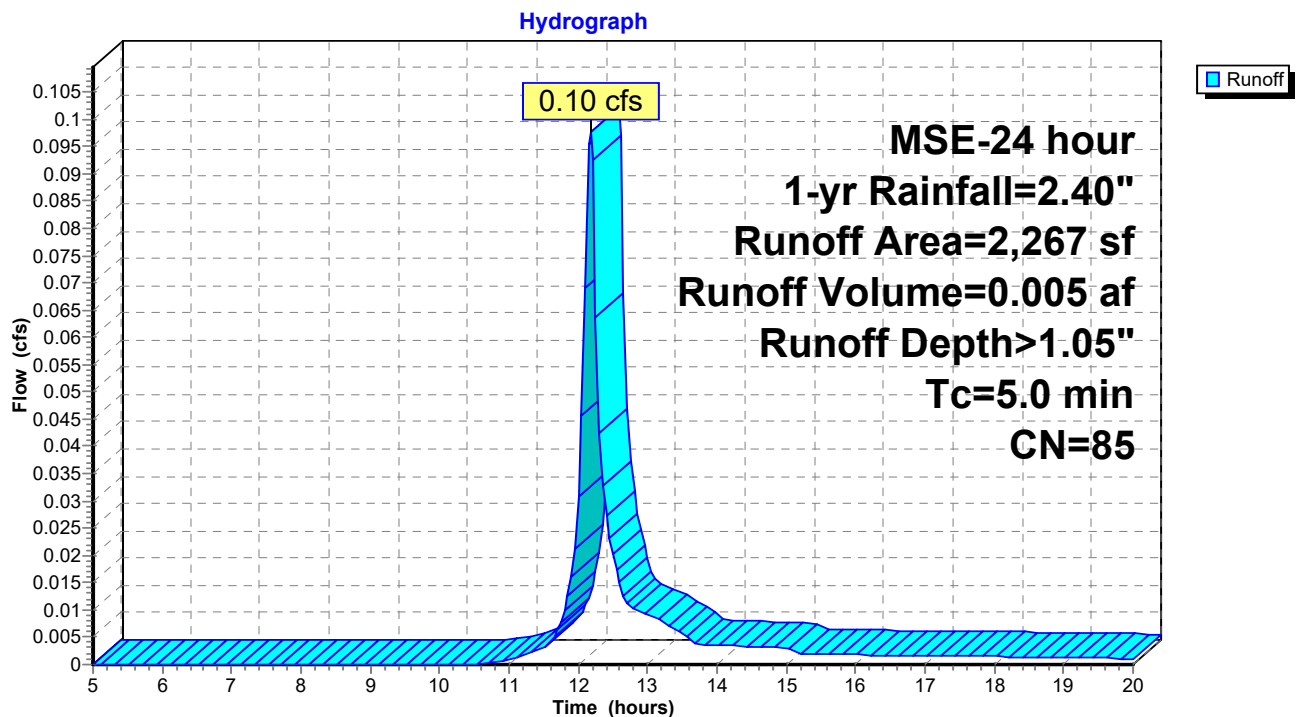
Runoff = 0.10 cfs @ 12.17 hrs, Volume= 0.005 af, Depth> 1.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 1-yr Rainfall=2.40"

	Area (sf)	CN	Description
*	749	98	Hardscape, HSG D
*	1,518	78	Grassland, HSG D
	2,267	85	Weighted Average
	1,518		66.96% Pervious Area
	749		33.04% Impervious Area

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

Subcatchment A3: Prop Condition (Untreated to Storm Sewer)



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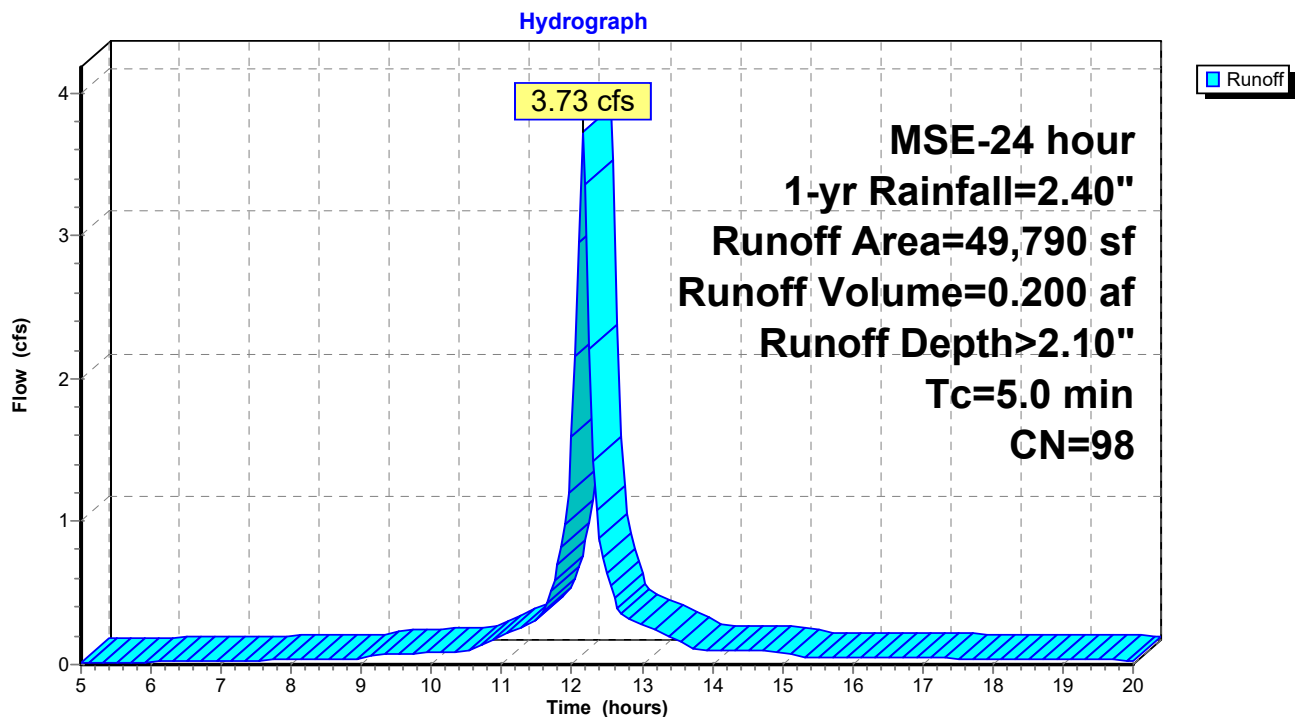
Summary for Subcatchment A4: Prop Condition (Untreated to Storm Sewer)

Runoff = 3.73 cfs @ 12.16 hrs, Volume= 0.200 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 1-yr Rainfall=2.40"

Area (sf)	CN	Description
10,237	98	Roofs, HSG D
14,767	98	Water Surface, HSG D
* 24,786	98	Pool Deck, HSG D
49,790	98	Weighted Average
49,790		100.00% Impervious Area

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

Subcatchment A4: Prop Condition (Untreated to Storm Sewer)

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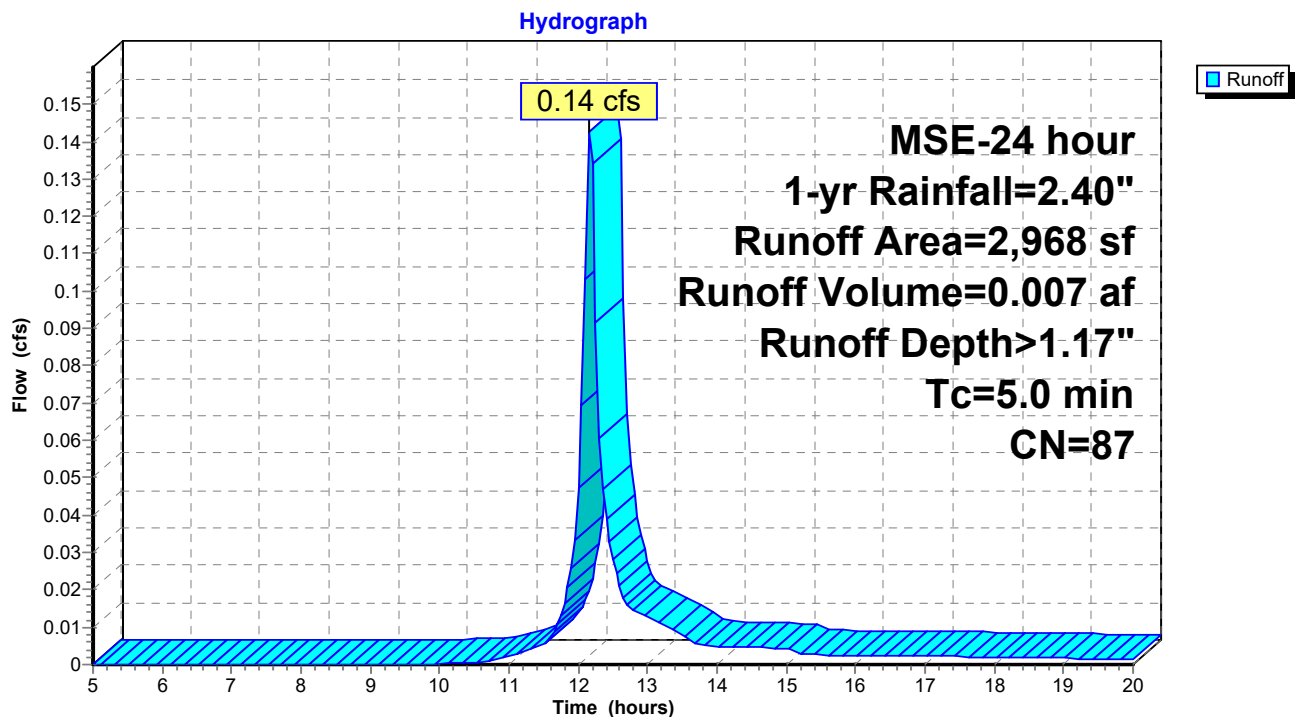
Summary for Subcatchment A5-1: Prop Condition (Untreated to Storm Sewer)

Runoff = 0.14 cfs @ 12.17 hrs, Volume= 0.007 af, Depth> 1.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 1-yr Rainfall=2.40"

	Area (sf)	CN	Description
*	1,364	98	Hardscape, HSG D
*	1,604	78	Grassland, HSG D
	2,968	87	Weighted Average
	1,604		54.04% Pervious Area
	1,364		45.96% Impervious Area

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

Subcatchment A5-1: Prop Condition (Untreated to Storm Sewer)

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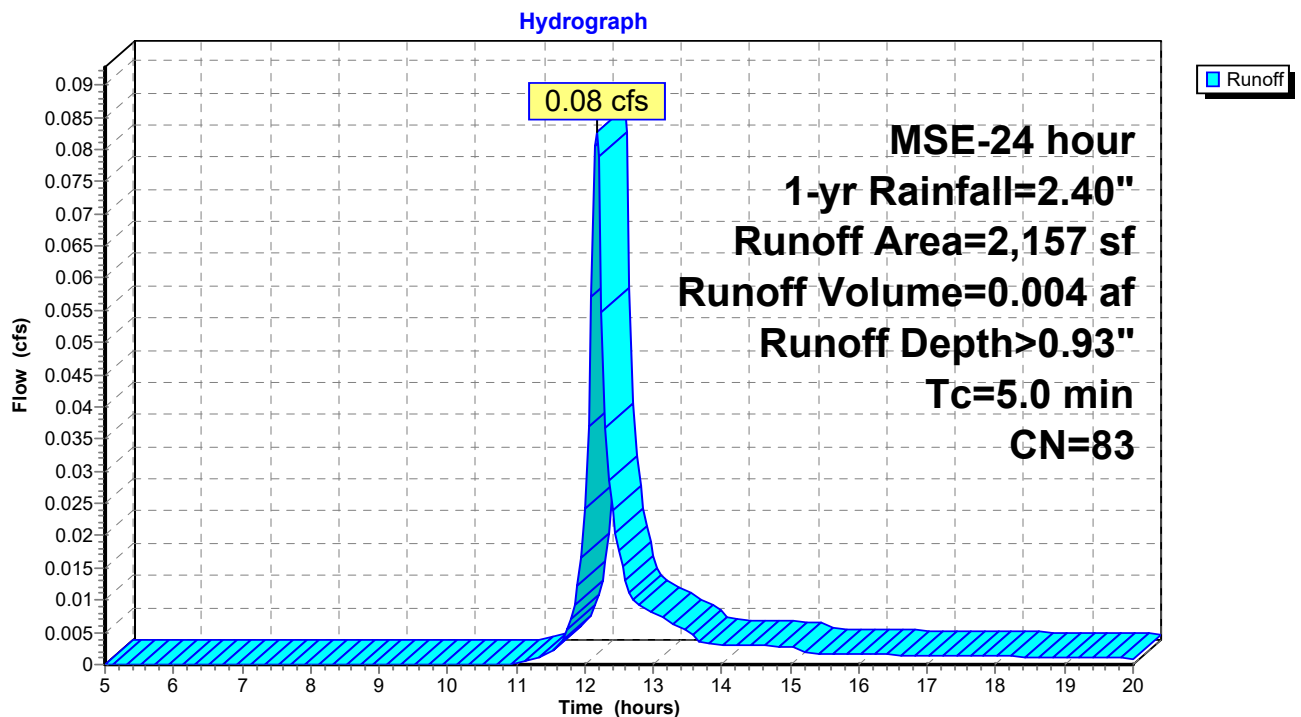
Summary for Subcatchment A6-1: Prop Condition (Untreated to Storm Sewer)

Runoff = 0.08 cfs @ 12.17 hrs, Volume= 0.004 af, Depth> 0.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 1-yr Rainfall=2.40"

	Area (sf)	CN	Description
*	543	98	Hardscape, HSG D
*	1,614	78	Grassland, HSG D
	2,157	83	Weighted Average
	1,614		74.83% Pervious Area
	543		25.17% Impervious Area

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

Subcatchment A6-1: Prop Condition (Untreated to Storm Sewer)

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Summary for Subcatchment B!: Prop Condition (Treated)

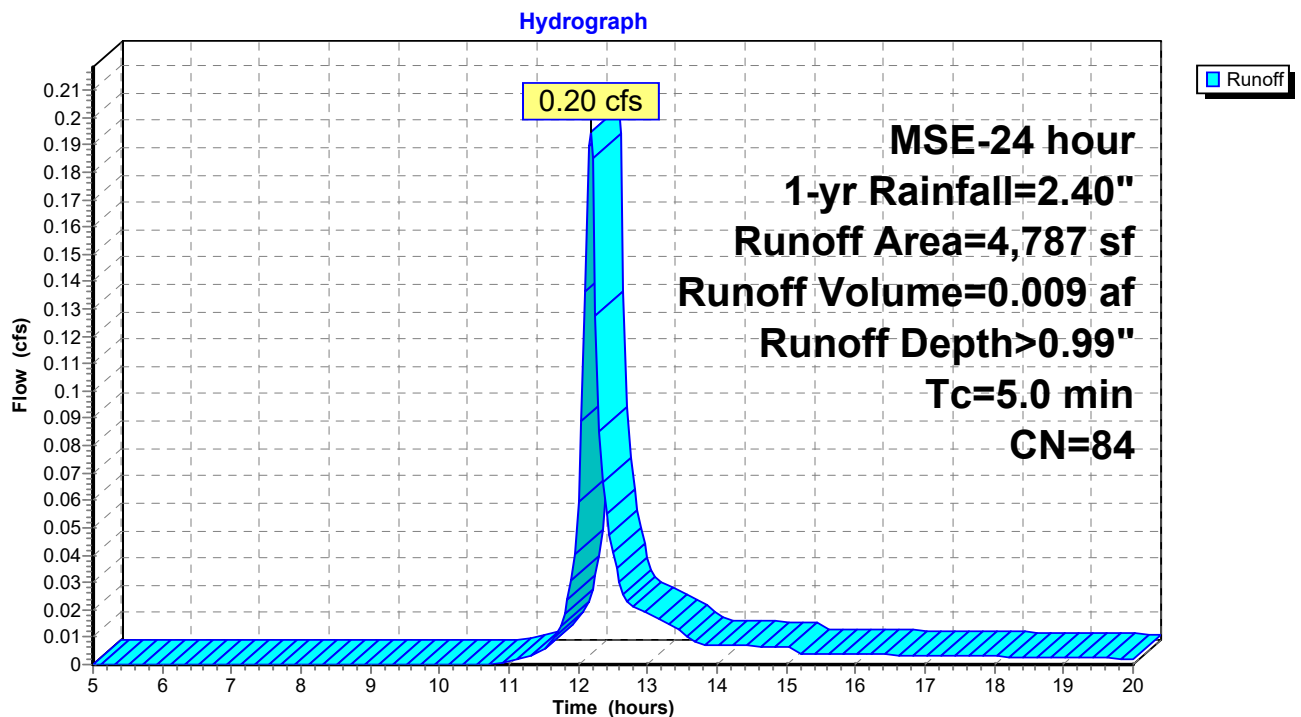
Runoff = 0.20 cfs @ 12.17 hrs, Volume= 0.009 af, Depth> 0.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 1-yr Rainfall=2.40"

	Area (sf)	CN	Description
*	1,381	98	Hardscape, HSG D
*	3,406	78	Grassland, HSG D
	4,787	84	Weighted Average
	3,406		71.15% Pervious Area
	1,381		28.85% Impervious Area

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

Subcatchment B!: Prop Condition (Treated)



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MSE-24 hour 1-yr Rainfall=2.40"

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Summary for Subcatchment B2: Prop Condition (Treated)

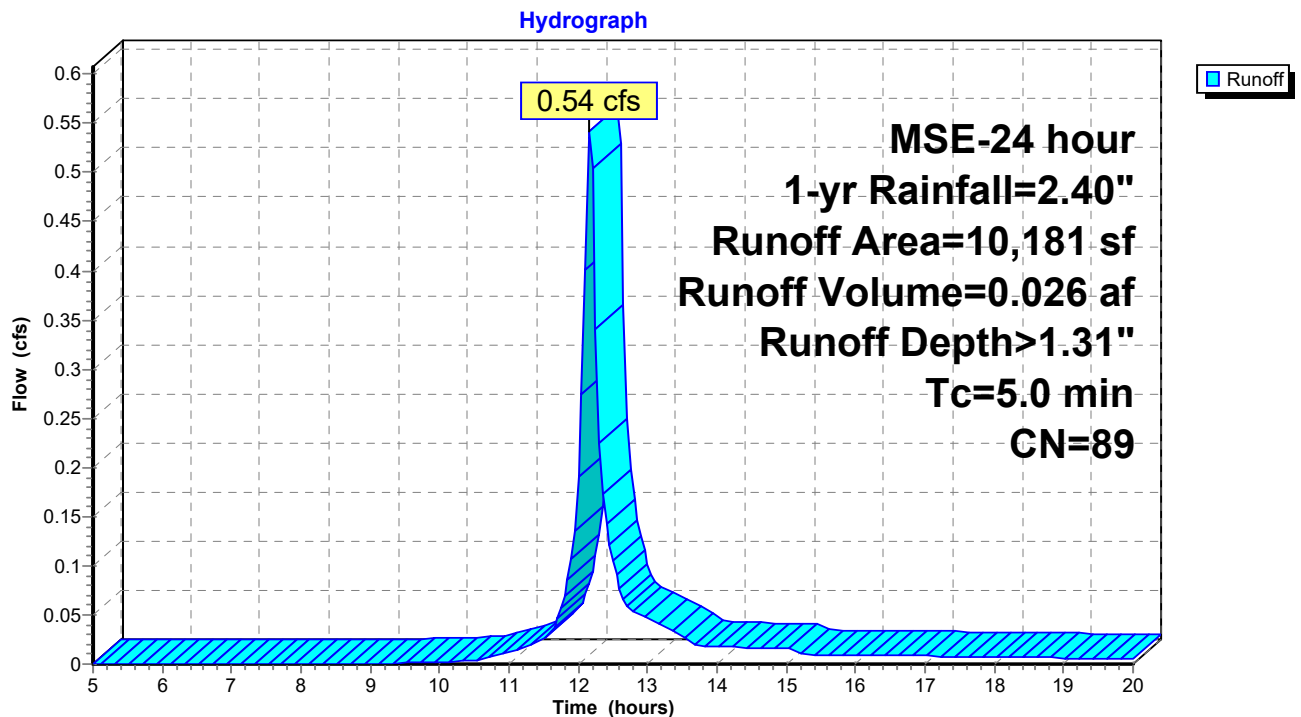
Runoff = 0.54 cfs @ 12.17 hrs, Volume= 0.026 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 1-yr Rainfall=2.40"

	Area (sf)	CN	Description
*	3,387	98	Parking Lot, HSG D
*	2,414	98	Hardscape, HSG D
*	4,380	78	Grassland, HSG D
	10,181	89	Weighted Average
	4,380		43.02% Pervious Area
	5,801		56.98% Impervious Area

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

Subcatchment B2: Prop Condition (Treated)



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Summary for Subcatchment OF1: Prop Condition (UnTreated to Offsite)

Runoff = 0.47 cfs @ 12.17 hrs, Volume= 0.022 af, Depth> 0.99"

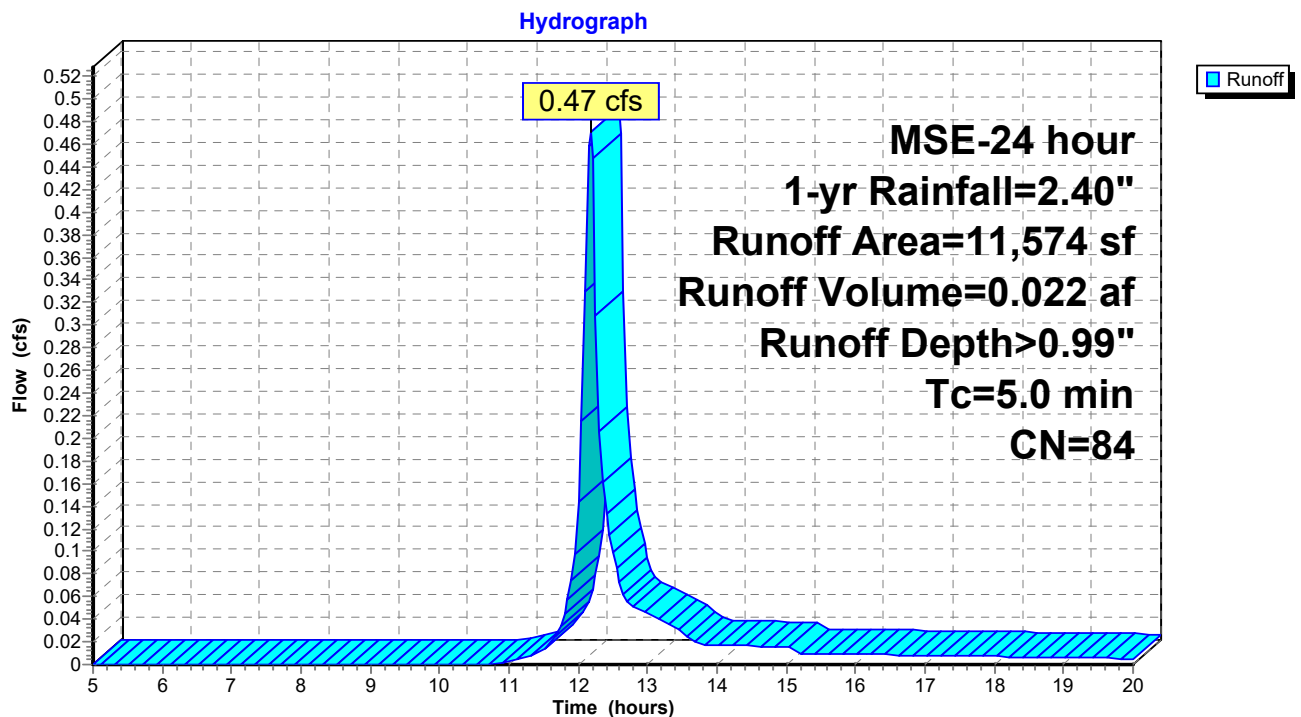
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 1-yr Rainfall=2.40"

	Area (sf)	CN	Description
*	3,640	98	Hardscape, HSG D
*	7,934	78	Grassland, HSG D
	11,574	84	Weighted Average
	7,934		68.55% Pervious Area
	3,640		31.45% Impervious Area

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

Subcatchment OF1: Prop Condition (UnTreated to Offsite)



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Summary for Subcatchment OF2: Prop Condition (UnTreated to Offsite)

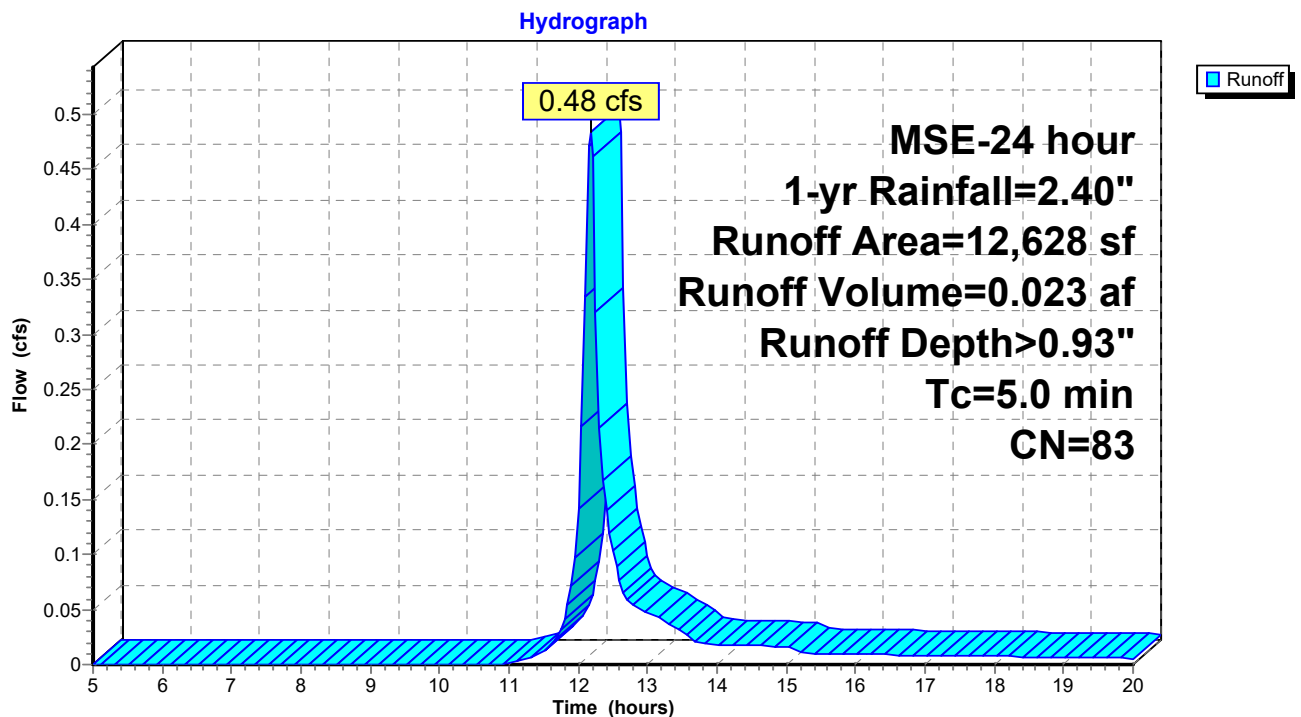
Runoff = 0.48 cfs @ 12.17 hrs, Volume= 0.023 af, Depth> 0.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 1-yr Rainfall=2.40"

	Area (sf)	CN	Description
*	3,164	98	Hardscape, HSG D
*	9,464	78	Grassland, HSG D
	12,628	83	Weighted Average
	9,464		74.94% Pervious Area
	3,164		25.06% Impervious Area

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

Subcatchment OF2: Prop Condition (UnTreated to Offsite)

Buchner Park Pool

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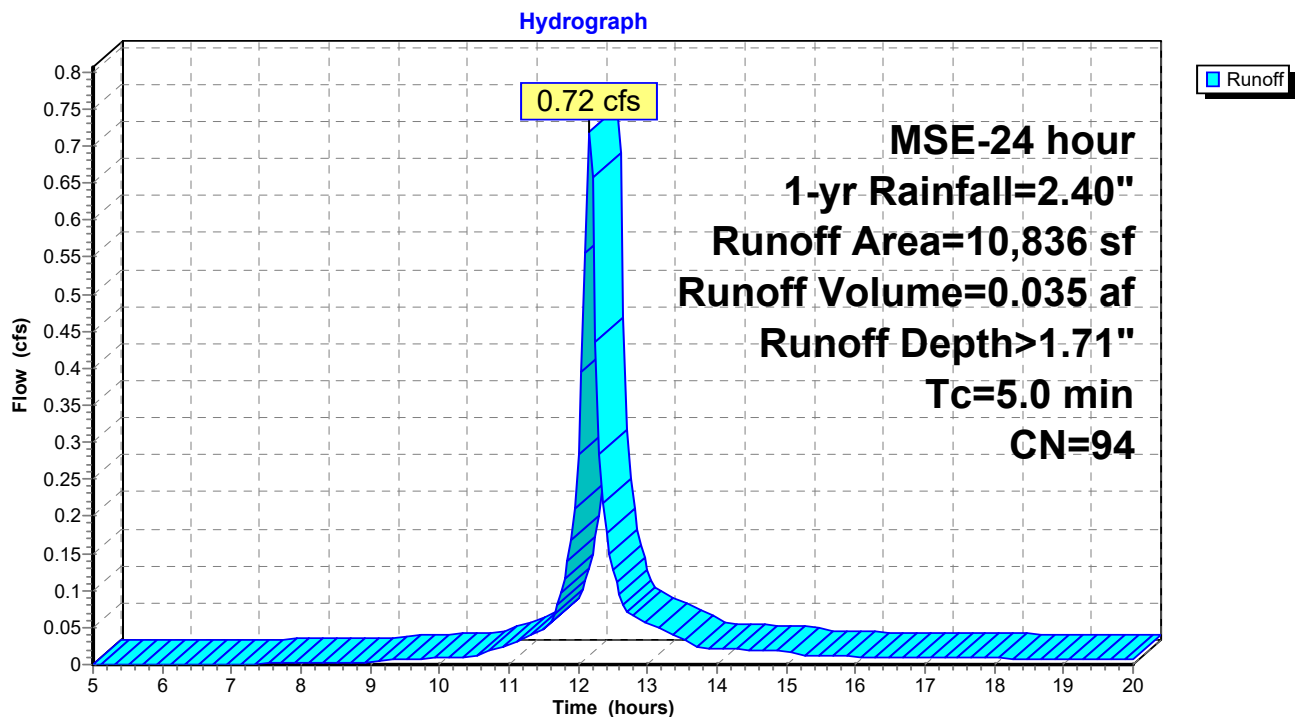
Summary for Subcatchment OF3: Prop Condition (UnTreated to Offsite)

Runoff = 0.72 cfs @ 12.16 hrs, Volume= 0.035 af, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 1-yr Rainfall=2.40"

	Area (sf)	CN	Description
*	8,600	98	Hardscape, HSG D
*	2,236	78	Grassland, HSG D
	10,836	94	Weighted Average
	2,236		20.63% Pervious Area
	8,600		79.37% Impervious Area

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

Subcatchment OF3: Prop Condition (UnTreated to Offsite)

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MSE-24 hour 1-yr Rainfall=2.40"

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Summary for Pond BF: BioFiltration Basin

Inflow Area = 0.344 ac, 47.98% Impervious, Inflow Depth > 1.21" for 1-yr event
 Inflow = 0.74 cfs @ 12.17 hrs, Volume= 0.035 af
 Outflow = 0.30 cfs @ 12.32 hrs, Volume= 0.035 af, Atten= 60%, Lag= 8.9 min
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Secondary = 0.30 cfs @ 12.32 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 865.28' @ 12.32 hrs Surf.Area= 981 sf Storage= 258 cf
 Flood Elev= 865.50' Surf.Area= 1,073 sf Storage= 485 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 4.6 min (788.8 - 784.2)

Volume	Invert	Avail.Storage	Storage Description	
#1	865.00'	485 cf	Custom Stage Data (Conic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
865.00	872	0	0	872
865.50	1,073	485	485	1,080

Device	Routing	Invert	Outlet Devices
#1	Primary	865.50'	1.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Secondary	862.50'	6.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 862.50' / 860.00' S= 0.0500 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	865.00'	13.000 in/hr Exfiltration over Surface area from 863.00' - 865.50' Excluded Surface area = 0 sf

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=865.00' (Free Discharge)

↑ **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.30 cfs @ 12.32 hrs HW=865.28' (Free Discharge)

↑ **2=Culvert** (Passes 0.30 cfs of 1.19 cfs potential flow)

↑ **3=Exfiltration** (Exfiltration Controls 0.30 cfs)

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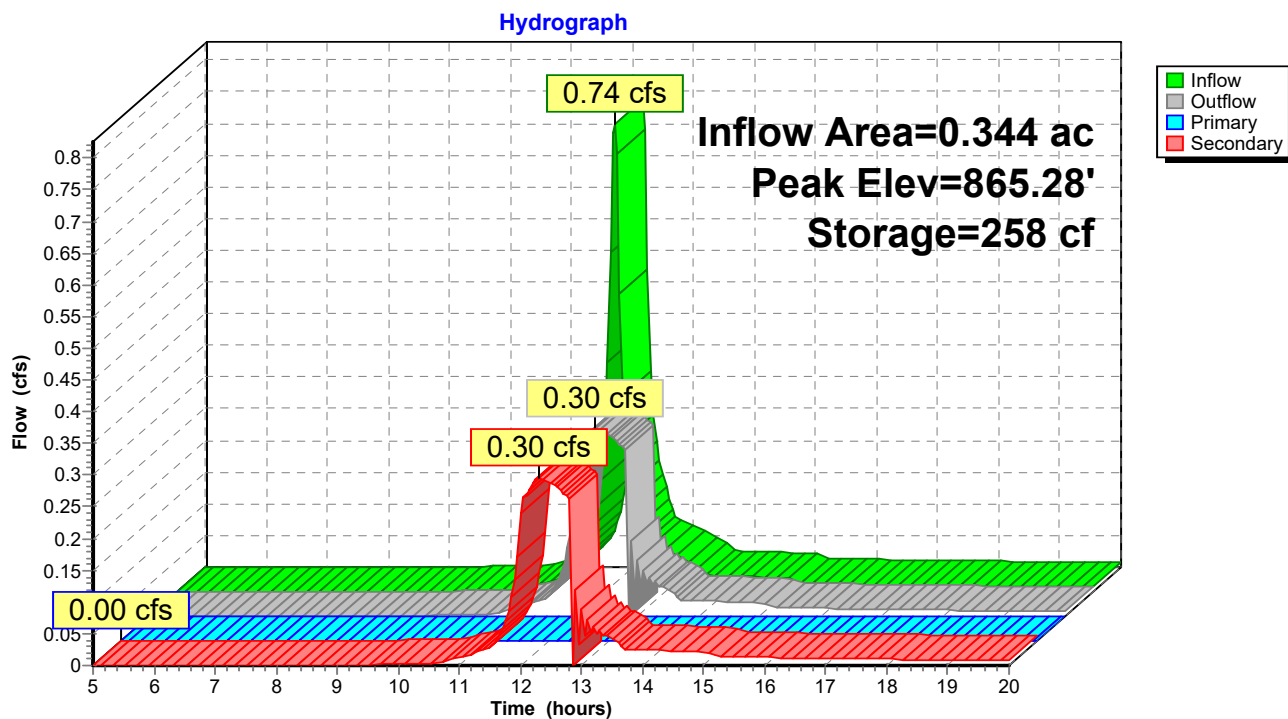
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MSE-24 hour 1-yr Rainfall=2.40"

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Pond BF: BioFiltration Basin



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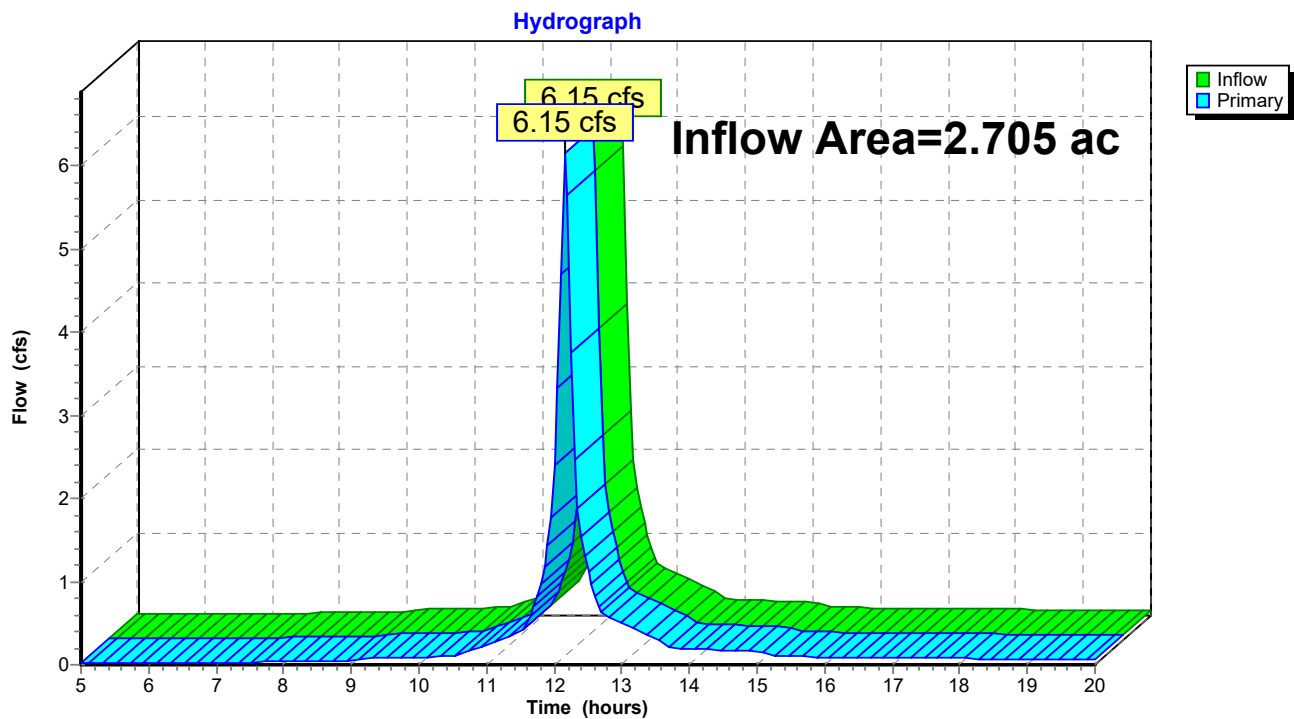
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Summary for Pond OF: Proposed Condition Runoff

Inflow Area = 2.705 ac, 66.45% Impervious, Inflow Depth > 1.40" for 1-yr event
Inflow = 6.15 cfs @ 12.16 hrs, Volume= 0.315 af
Primary = 6.15 cfs @ 12.16 hrs, Volume= 0.315 af, Atten= 0%, Lag= 0.0 min

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

Pond OF: Proposed Condition Runoff



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MSE-24 hour 2-yr Rainfall=2.70"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentA1: Prop Condition	Runoff Area=7,283 sf 42.37% Impervious Runoff Depth>1.35" Tc=5.0 min CN=86 Runoff=0.40 cfs 0.019 af
SubcatchmentA2: Prop Condition	Runoff Area=3,356 sf 5.45% Impervious Runoff Depth>0.92" Tc=5.0 min CN=79 Runoff=0.13 cfs 0.006 af
SubcatchmentA3: Prop Condition	Runoff Area=2,267 sf 33.04% Impervious Runoff Depth>1.28" Tc=5.0 min CN=85 Runoff=0.12 cfs 0.006 af
SubcatchmentA4: Prop Condition	Runoff Area=49,790 sf 100.00% Impervious Runoff Depth>2.39" Tc=5.0 min CN=98 Runoff=4.21 cfs 0.227 af
SubcatchmentA5-1: Prop Condition	Runoff Area=2,968 sf 45.96% Impervious Runoff Depth>1.42" Tc=5.0 min CN=87 Runoff=0.17 cfs 0.008 af
SubcatchmentA6-1: Prop Condition	Runoff Area=2,157 sf 25.17% Impervious Runoff Depth>1.15" Tc=5.0 min CN=83 Runoff=0.10 cfs 0.005 af
SubcatchmentB1: Prop Condition (Treated)	Runoff Area=4,787 sf 28.85% Impervious Runoff Depth>1.22" Tc=5.0 min CN=84 Runoff=0.24 cfs 0.011 af
SubcatchmentB2: Prop Condition	Runoff Area=10,181 sf 56.98% Impervious Runoff Depth>1.57" Tc=5.0 min CN=89 Runoff=0.64 cfs 0.031 af
SubcatchmentOF1: Prop Condition	Runoff Area=11,574 sf 31.45% Impervious Runoff Depth>1.22" Tc=5.0 min CN=84 Runoff=0.58 cfs 0.027 af
SubcatchmentOF2: Prop Condition	Runoff Area=12,628 sf 25.06% Impervious Runoff Depth>1.15" Tc=5.0 min CN=83 Runoff=0.60 cfs 0.028 af
SubcatchmentOF3: Prop Condition	Runoff Area=10,836 sf 79.37% Impervious Runoff Depth>1.99" Tc=5.0 min CN=94 Runoff=0.83 cfs 0.041 af
Pond BF: BioFiltration Basin	Peak Elev=865.39' Storage=366 cf Inflow=0.88 cfs 0.042 af Primary=0.00 cfs 0.000 af Secondary=0.31 cfs 0.042 af Outflow=0.31 cfs 0.042 af
Pond OF: Proposed Condition Runoff	Inflow=7.13 cfs 0.366 af Primary=7.13 cfs 0.366 af

Total Runoff Area = 2.705 ac Runoff Volume = 0.408 af Average Runoff Depth = 1.81"
33.55% Pervious = 0.907 ac 66.45% Impervious = 1.798 ac

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MSE-24 hour 2-yr Rainfall=2.70"

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Summary for Subcatchment A1: Prop Condition (Untreated to Storm Sewer)

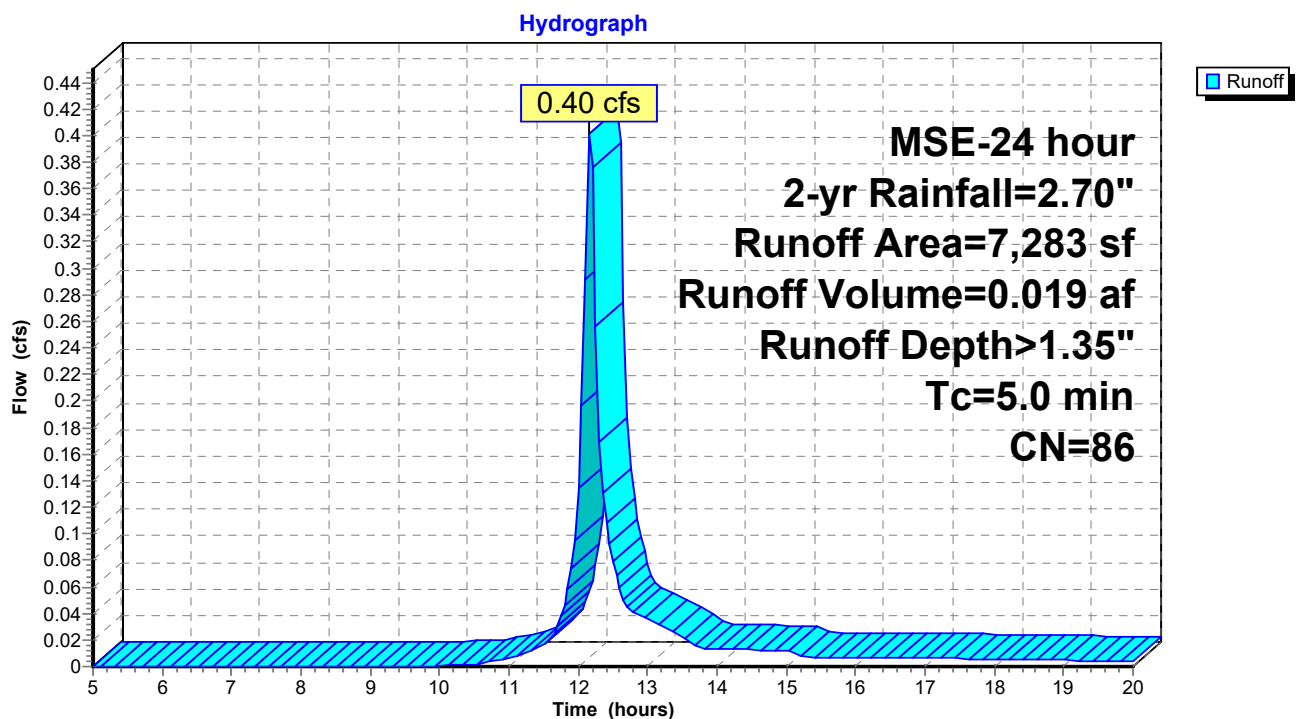
Runoff = 0.40 cfs @ 12.17 hrs, Volume= 0.019 af, Depth> 1.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 2-yr Rainfall=2.70"

	Area (sf)	CN	Description
*	3,086	98	Hardscape, HSG D
*	4,197	78	Grassland, HSG D
	7,283	86	Weighted Average
	4,197		57.63% Pervious Area
	3,086		42.37% Impervious Area

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

Subcatchment A1: Prop Condition (Untreated to Storm Sewer)



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MSE-24 hour 2-yr Rainfall=2.70"

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Summary for Subcatchment A2: Prop Condition (Untreated to Storm Sewer)

Runoff = 0.13 cfs @ 12.17 hrs, Volume= 0.006 af, Depth> 0.92"

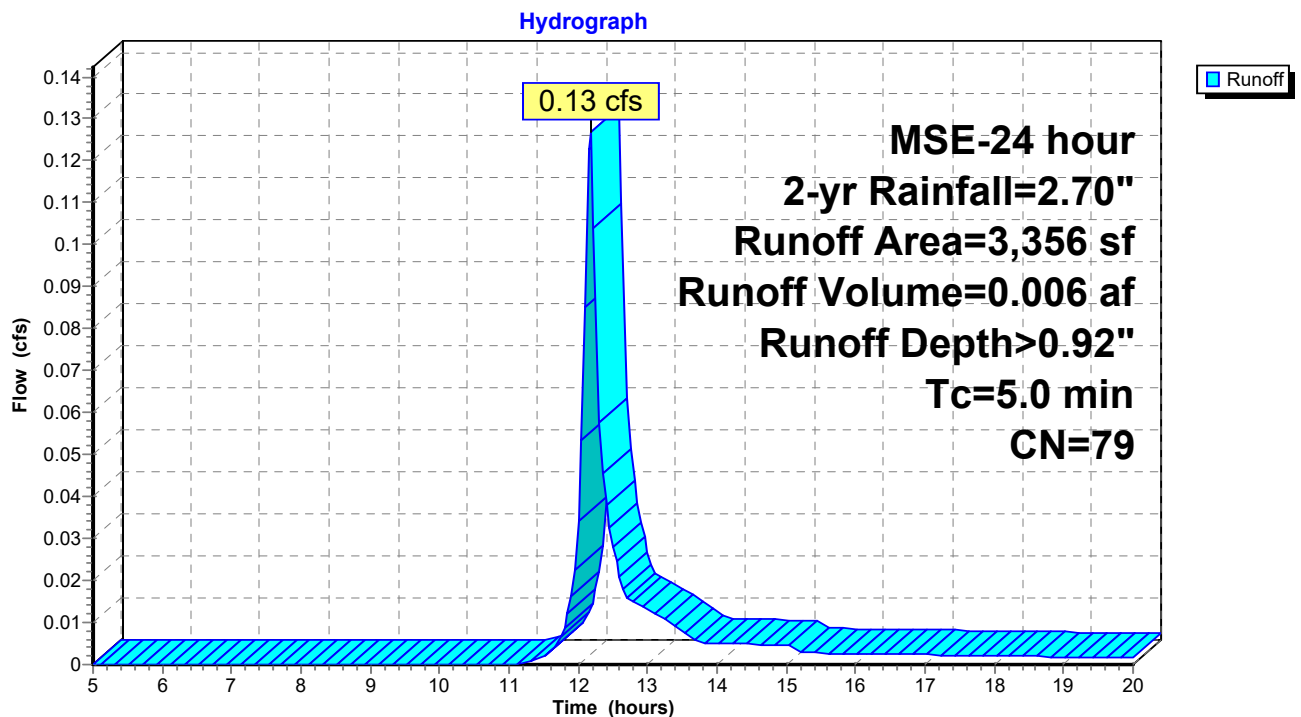
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 2-yr Rainfall=2.70"

	Area (sf)	CN	Description
*	183	98	Hardscape, HSG D
*	3,173	78	Grassland, HSG D
	3,356	79	Weighted Average
	3,173		94.55% Pervious Area
	183		5.45% Impervious Area

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

Subcatchment A2: Prop Condition (Untreated to Storm Sewer)



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MSE-24 hour 2-yr Rainfall=2.70"

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Summary for Subcatchment A3: Prop Condition (Untreated to Storm Sewer)

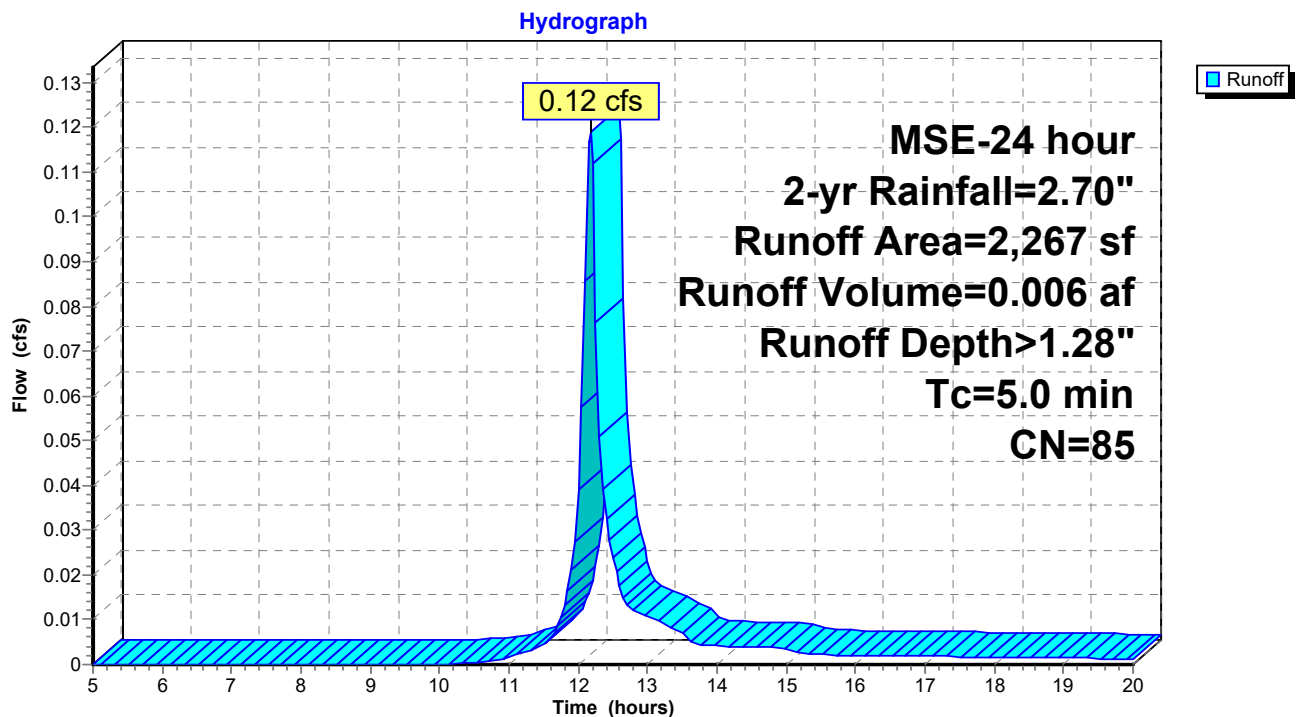
Runoff = 0.12 cfs @ 12.17 hrs, Volume= 0.006 af, Depth> 1.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 2-yr Rainfall=2.70"

	Area (sf)	CN	Description
*	749	98	Hardscape, HSG D
*	1,518	78	Grassland, HSG D
	2,267	85	Weighted Average
	1,518		66.96% Pervious Area
	749		33.04% Impervious Area

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

Subcatchment A3: Prop Condition (Untreated to Storm Sewer)

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MSE-24 hour 2-yr Rainfall=2.70"

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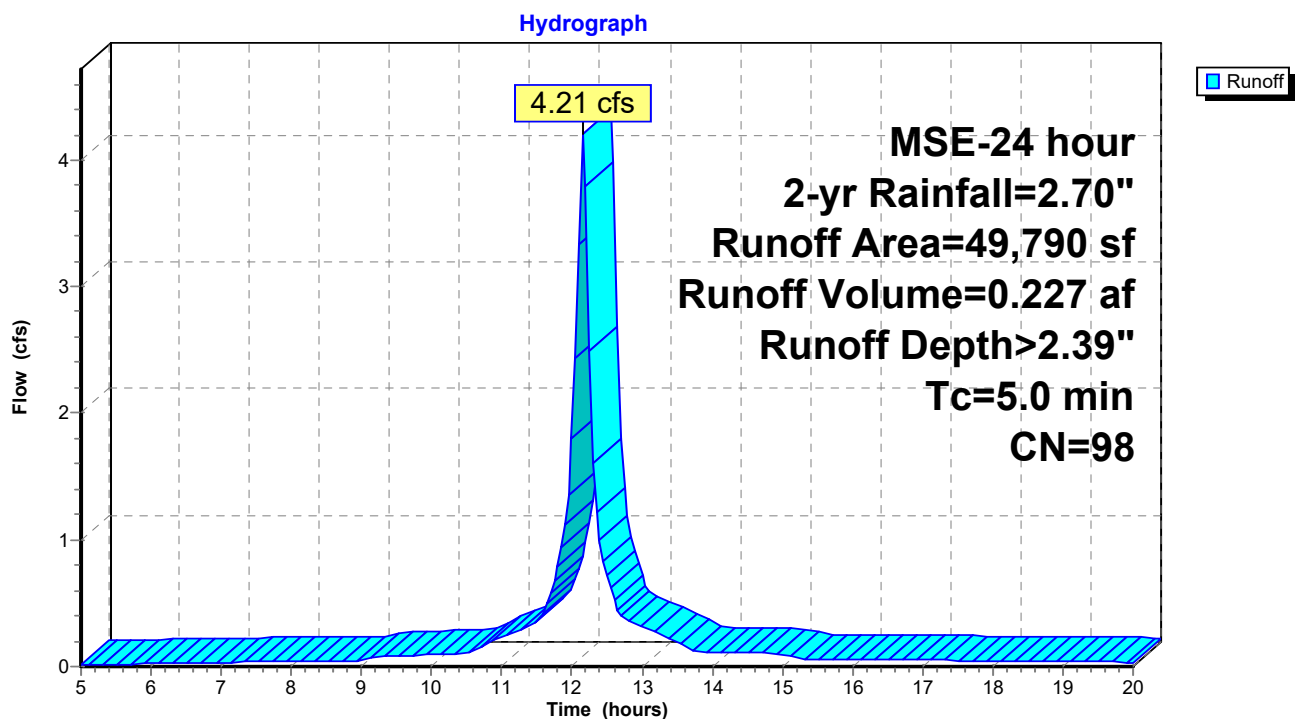
Summary for Subcatchment A4: Prop Condition (Untreated to Storm Sewer)

Runoff = 4.21 cfs @ 12.16 hrs, Volume= 0.227 af, Depth> 2.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 2-yr Rainfall=2.70"

Area (sf)	CN	Description
10,237	98	Roofs, HSG D
14,767	98	Water Surface, HSG D
* 24,786	98	Pool Deck, HSG D
49,790	98	Weighted Average
49,790		100.00% Impervious Area

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

Subcatchment A4: Prop Condition (Untreated to Storm Sewer)

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Summary for Subcatchment A5-1: Prop Condition (Untreated to Storm Sewer)

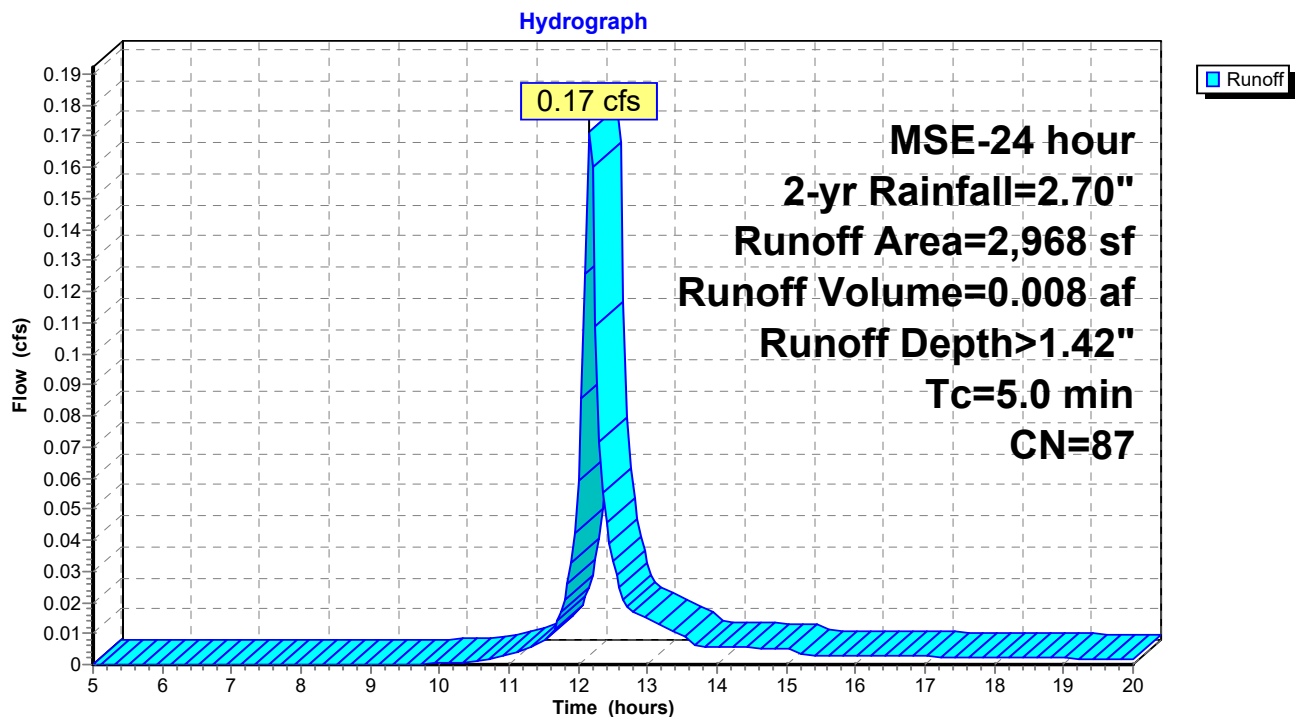
Runoff = 0.17 cfs @ 12.17 hrs, Volume= 0.008 af, Depth> 1.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 2-yr Rainfall=2.70"

	Area (sf)	CN	Description
*	1,364	98	Hardscape, HSG D
*	1,604	78	Grassland, HSG D
	2,968	87	Weighted Average
	1,604		54.04% Pervious Area
	1,364		45.96% Impervious Area

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

Subcatchment A5-1: Prop Condition (Untreated to Storm Sewer)



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Summary for Subcatchment A6-1: Prop Condition (Untreated to Storm Sewer)

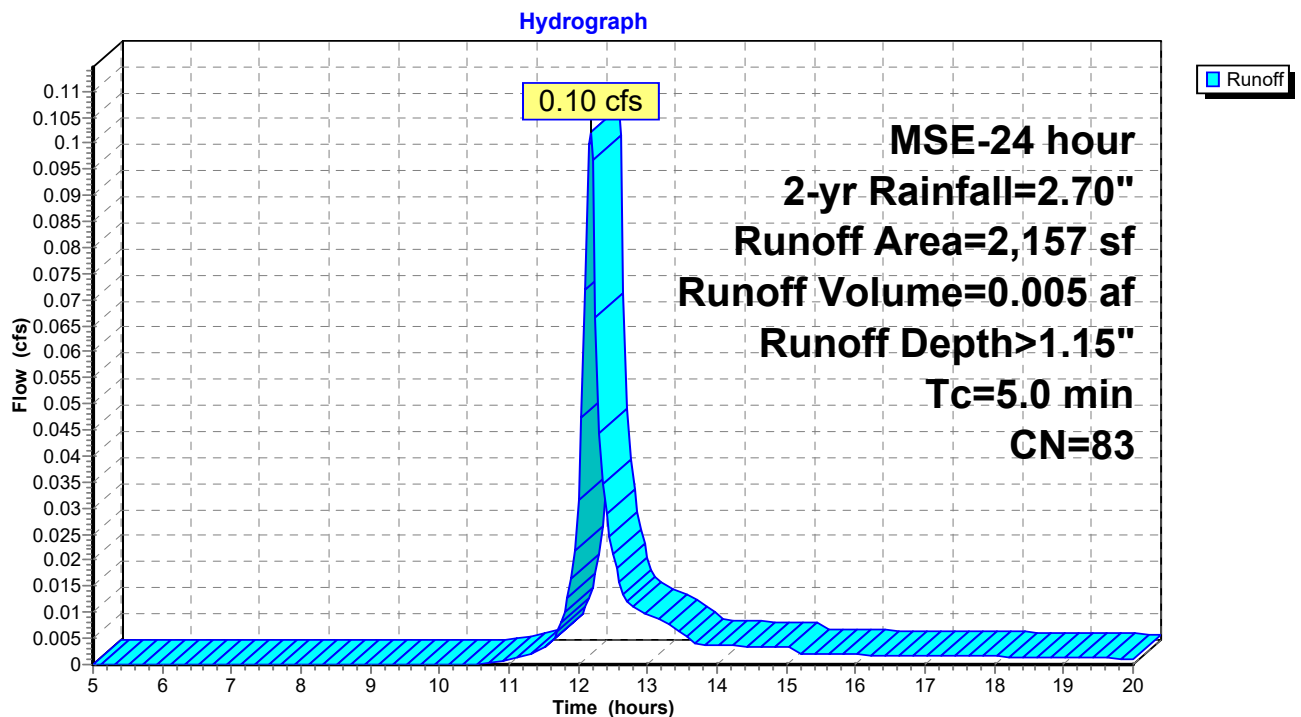
Runoff = 0.10 cfs @ 12.17 hrs, Volume= 0.005 af, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 2-yr Rainfall=2.70"

	Area (sf)	CN	Description
*	543	98	Hardscape, HSG D
*	1,614	78	Grassland, HSG D
	2,157	83	Weighted Average
	1,614		74.83% Pervious Area
	543		25.17% Impervious Area

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

Subcatchment A6-1: Prop Condition (Untreated to Storm Sewer)

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Summary for Subcatchment B1: Prop Condition (Treated)

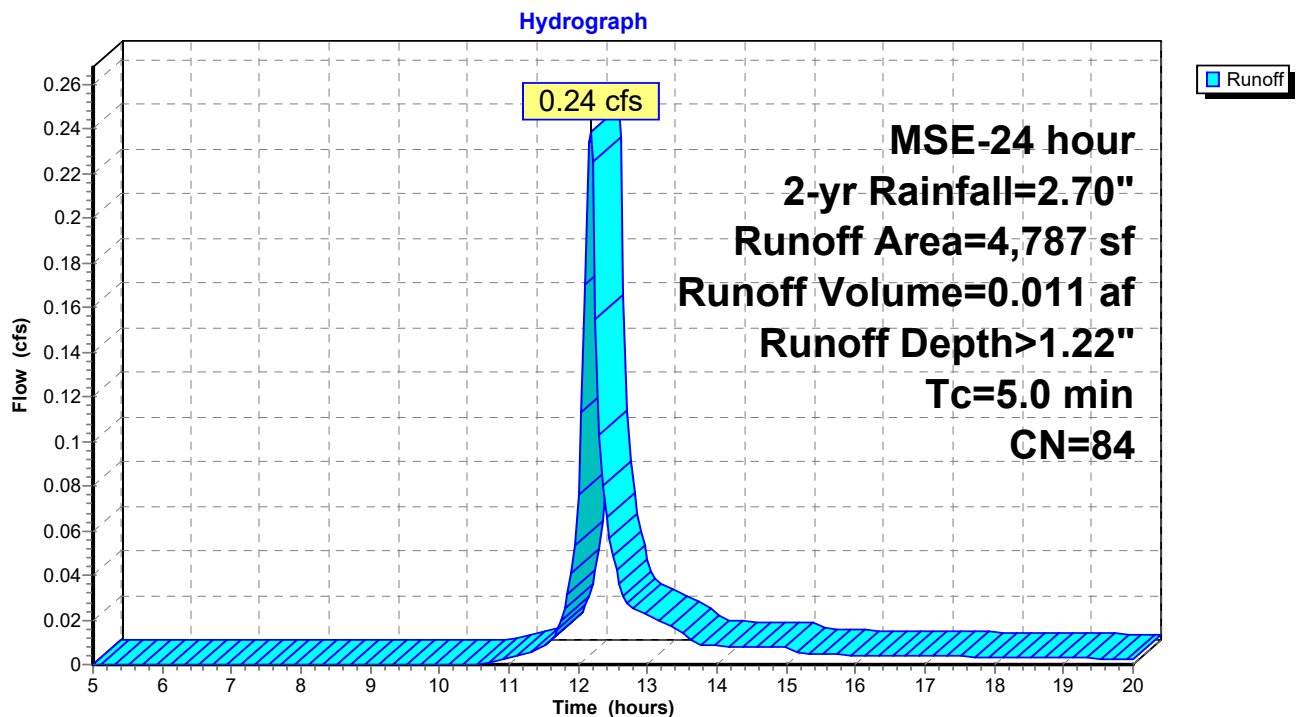
Runoff = 0.24 cfs @ 12.17 hrs, Volume= 0.011 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 2-yr Rainfall=2.70"

	Area (sf)	CN	Description
*	1,381	98	Hardscape, HSG D
*	3,406	78	Grassland, HSG D
	4,787	84	Weighted Average
	3,406		71.15% Pervious Area
	1,381		28.85% Impervious Area

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

Subcatchment B1: Prop Condition (Treated)



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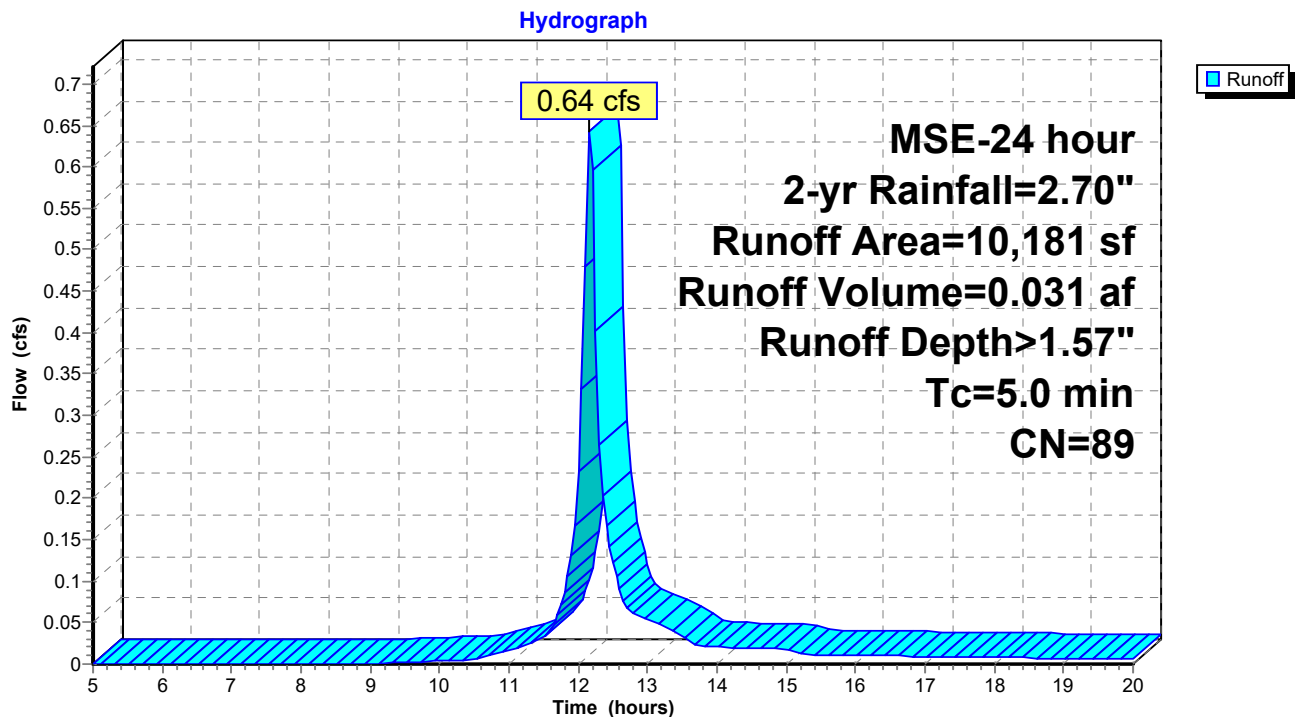
Summary for Subcatchment B2: Prop Condition (Treated)

Runoff = 0.64 cfs @ 12.17 hrs, Volume= 0.031 af, Depth> 1.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 2-yr Rainfall=2.70"

	Area (sf)	CN	Description
*	3,387	98	Parking Lot, HSG D
*	2,414	98	Hardscape, HSG D
*	4,380	78	Grassland, HSG D
	10,181	89	Weighted Average
	4,380		43.02% Pervious Area
	5,801		56.98% Impervious Area

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

Subcatchment B2: Prop Condition (Treated)

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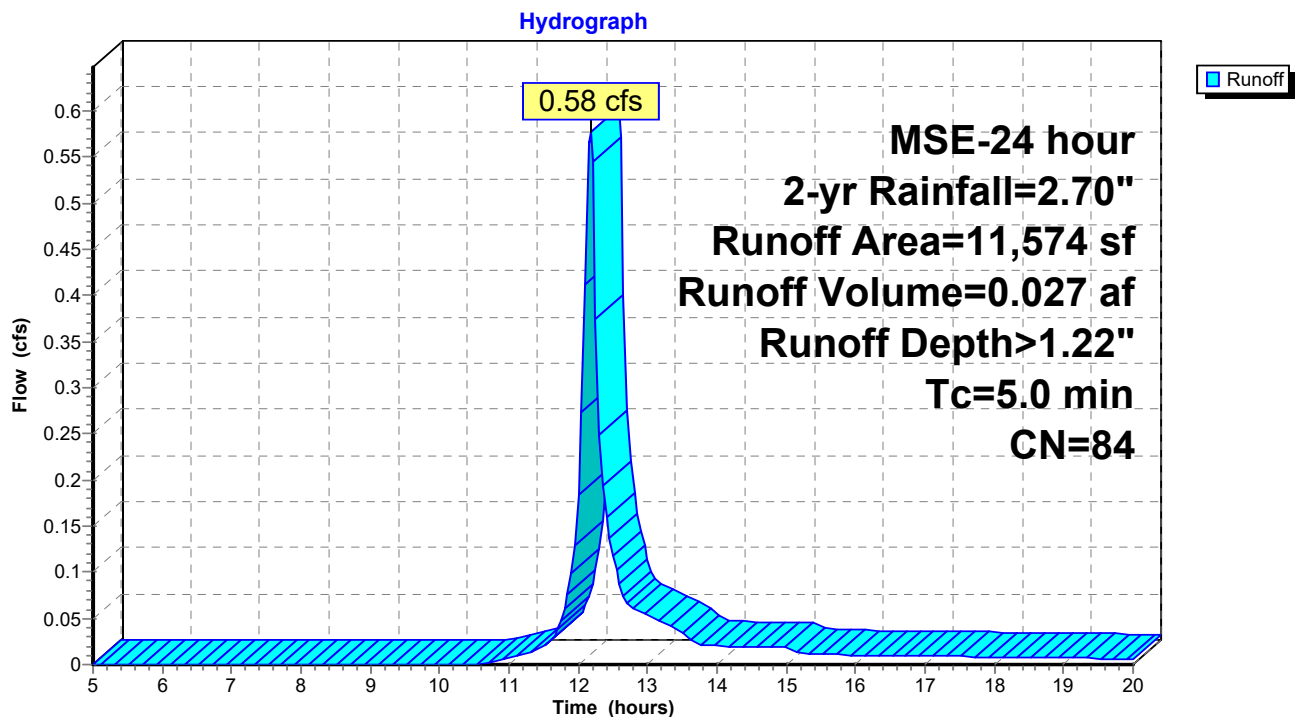
Summary for Subcatchment OF1: Prop Condition (UnTreated to Offsite)

Runoff = 0.58 cfs @ 12.17 hrs, Volume= 0.027 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 2-yr Rainfall=2.70"

	Area (sf)	CN	Description
*	3,640	98	Hardscape, HSG D
*	7,934	78	Grassland, HSG D
	11,574	84	Weighted Average
	7,934		68.55% Pervious Area
	3,640		31.45% Impervious Area

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

Subcatchment OF1: Prop Condition (UnTreated to Offsite)

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Summary for Subcatchment OF2: Prop Condition (UnTreated to Offsite)

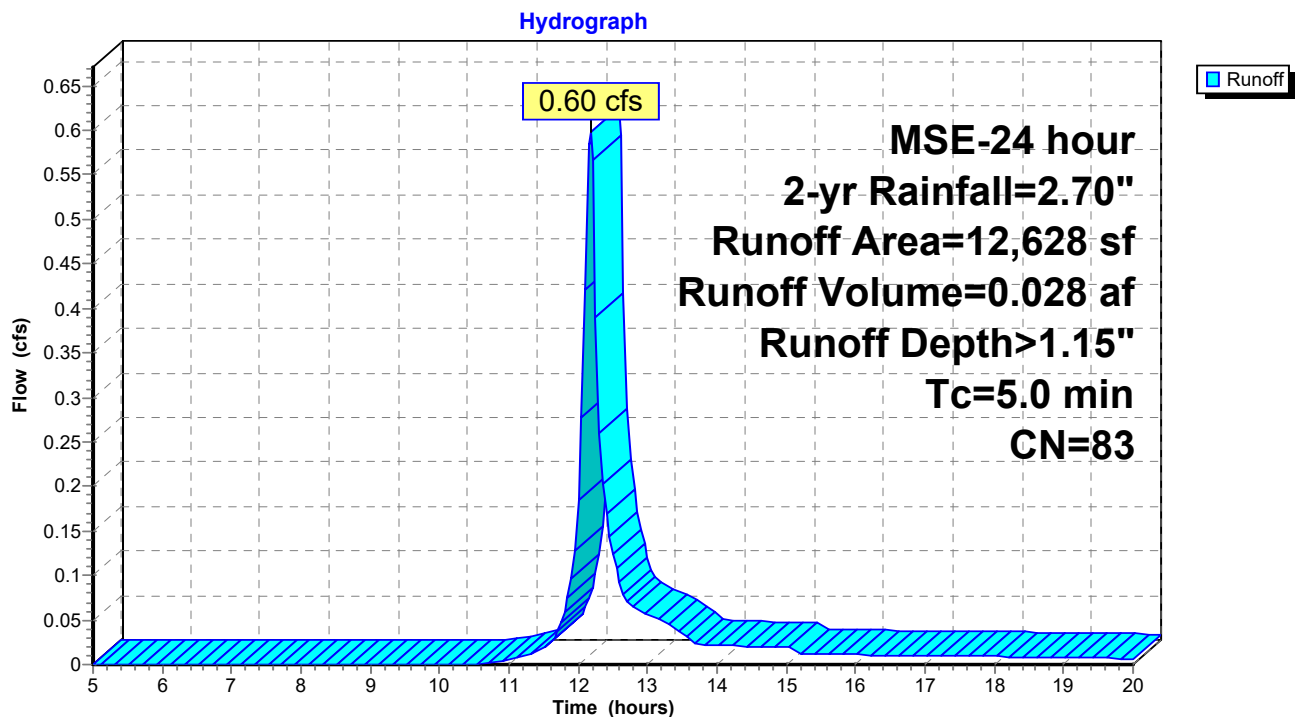
Runoff = 0.60 cfs @ 12.17 hrs, Volume= 0.028 af, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 2-yr Rainfall=2.70"

	Area (sf)	CN	Description
*	3,164	98	Hardscape, HSG D
*	9,464	78	Grassland, HSG D
	12,628	83	Weighted Average
	9,464		74.94% Pervious Area
	3,164		25.06% Impervious Area

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

Subcatchment OF2: Prop Condition (UnTreated to Offsite)



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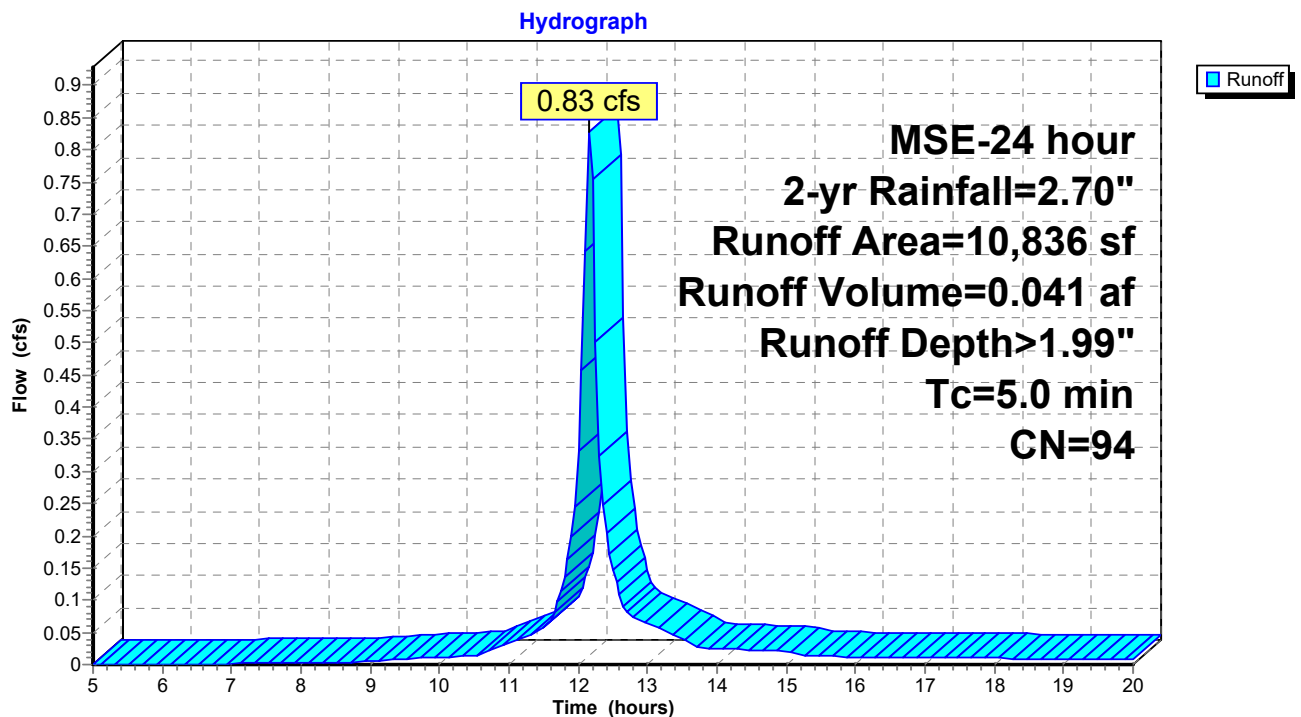
Summary for Subcatchment OF3: Prop Condition (UnTreated to Offsite)

Runoff = 0.83 cfs @ 12.16 hrs, Volume= 0.041 af, Depth> 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 2-yr Rainfall=2.70"

	Area (sf)	CN	Description
*	8,600	98	Hardscape, HSG D
*	2,236	78	Grassland, HSG D
	10,836	94	Weighted Average
	2,236		20.63% Pervious Area
	8,600		79.37% Impervious Area

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

Subcatchment OF3: Prop Condition (UnTreated to Offsite)

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Summary for Pond BF: BioFiltration Basin

Inflow Area = 0.344 ac, 47.98% Impervious, Inflow Depth > 1.45" for 2-yr event
 Inflow = 0.88 cfs @ 12.17 hrs, Volume= 0.042 af
 Outflow = 0.31 cfs @ 12.34 hrs, Volume= 0.042 af, Atten= 65%, Lag= 10.3 min
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Secondary = 0.31 cfs @ 12.34 hrs, Volume= 0.042 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 865.39' @ 12.34 hrs Surf.Area= 1,025 sf Storage= 366 cf
 Flood Elev= 865.50' Surf.Area= 1,073 sf Storage= 485 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 6.8 min (788.0 - 781.2)

Volume	Invert	Avail.Storage	Storage Description	
#1	865.00'	485 cf	Custom Stage Data (Conic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
865.00	872	0	0	872
865.50	1,073	485	485	1,080

Device	Routing	Invert	Outlet Devices
#1	Primary	865.50'	1.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Secondary	862.50'	6.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 862.50' / 860.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	865.00'	13.000 in/hr Exfiltration over Surface area from 863.00' - 865.50' Excluded Surface area = 0 sf

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=865.00' (Free Discharge)

↑ **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.31 cfs @ 12.34 hrs HW=865.39' (Free Discharge)

↑ **2=Culvert** (Passes 0.31 cfs of 1.21 cfs potential flow)

↑ **3=Exfiltration** (Exfiltration Controls 0.31 cfs)

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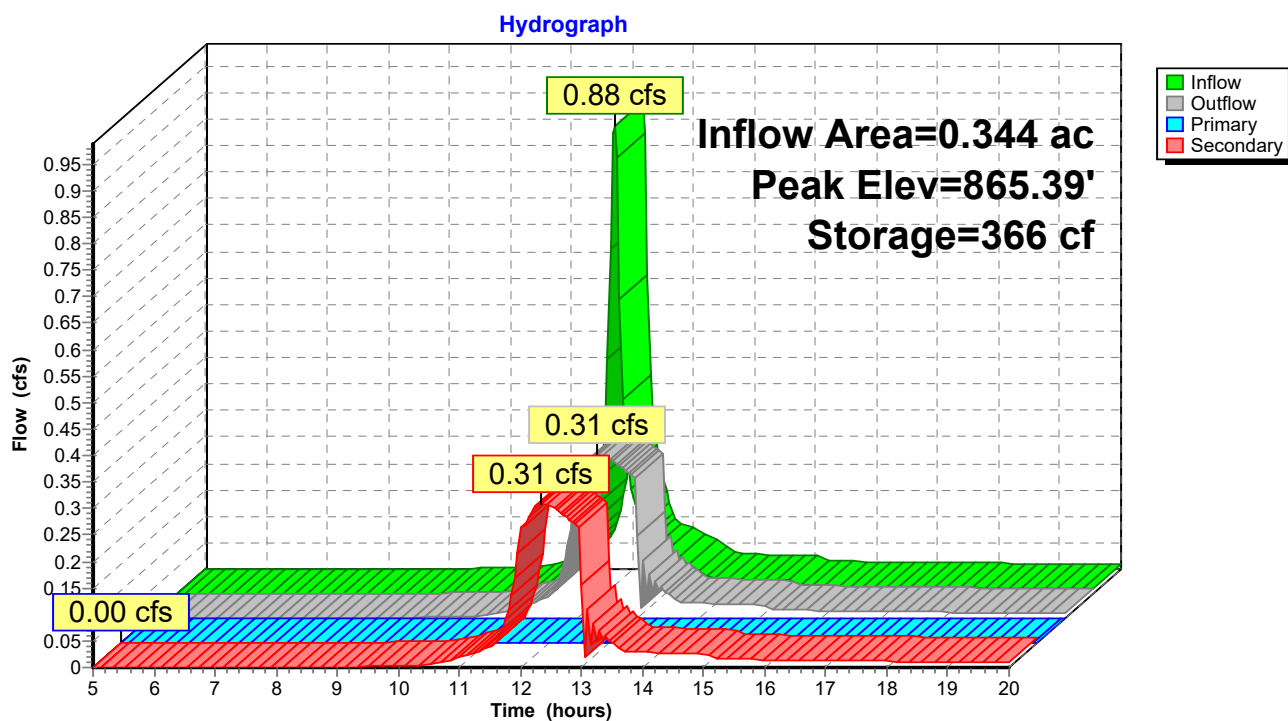
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MSE-24 hour 2-yr Rainfall=2.70"

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Pond BF: BioFiltration Basin



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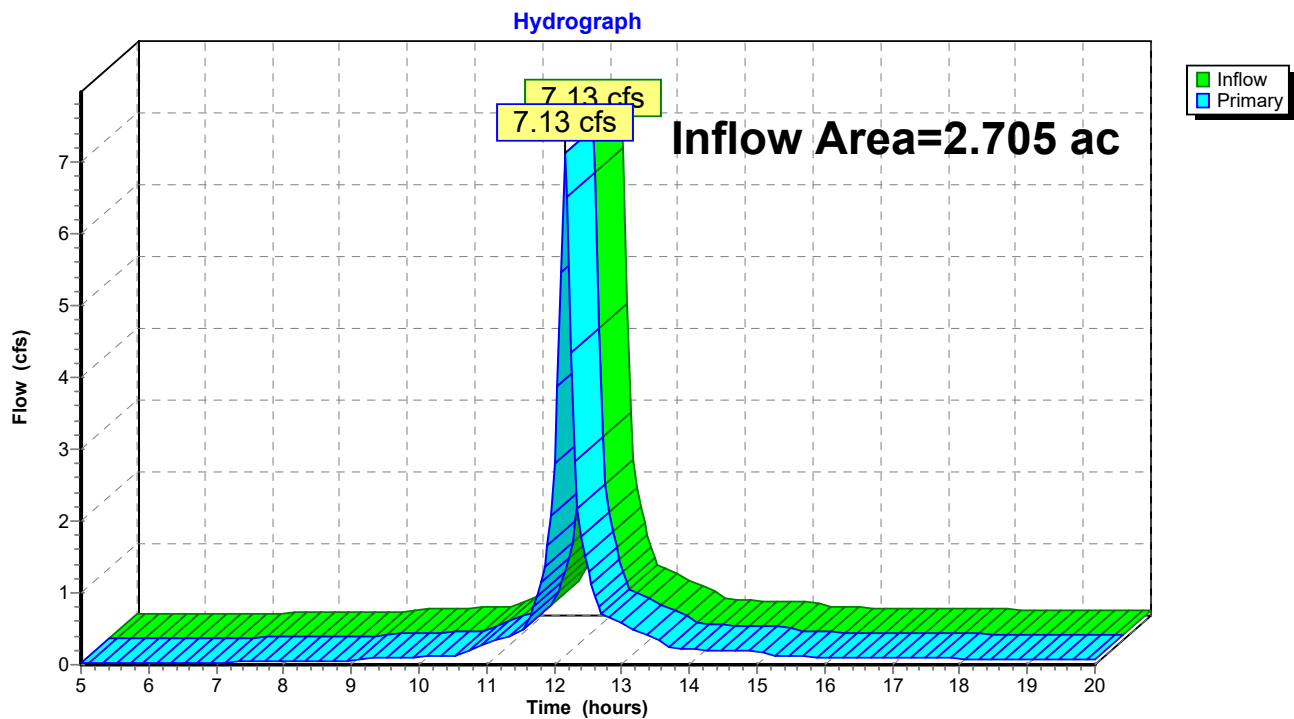
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Summary for Pond OF: Proposed Condition Runoff

Inflow Area = 2.705 ac, 66.45% Impervious, Inflow Depth > 1.63" for 2-yr event
Inflow = 7.13 cfs @ 12.16 hrs, Volume= 0.366 af
Primary = 7.13 cfs @ 12.16 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min

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

Pond OF: Proposed Condition Runoff



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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentA1: Prop Condition	Runoff Area=7,283 sf 42.37% Impervious Runoff Depth>2.28" Tc=5.0 min CN=86 Runoff=0.67 cfs 0.032 af
SubcatchmentA2: Prop Condition	Runoff Area=3,356 sf 5.45% Impervious Runoff Depth>1.73" Tc=5.0 min CN=79 Runoff=0.24 cfs 0.011 af
SubcatchmentA3: Prop Condition	Runoff Area=2,267 sf 33.04% Impervious Runoff Depth>2.20" Tc=5.0 min CN=85 Runoff=0.20 cfs 0.010 af
SubcatchmentA4: Prop Condition	Runoff Area=49,790 sf 100.00% Impervious Runoff Depth>3.44" Tc=5.0 min CN=98 Runoff=5.99 cfs 0.328 af
SubcatchmentA5-1: Prop Condition	Runoff Area=2,968 sf 45.96% Impervious Runoff Depth>2.37" Tc=5.0 min CN=87 Runoff=0.28 cfs 0.013 af
SubcatchmentA6-1: Prop Condition	Runoff Area=2,157 sf 25.17% Impervious Runoff Depth>2.03" Tc=5.0 min CN=83 Runoff=0.18 cfs 0.008 af
SubcatchmentB1: Prop Condition (Treated)	Runoff Area=4,787 sf 28.85% Impervious Runoff Depth>2.12" Tc=5.0 min CN=84 Runoff=0.41 cfs 0.019 af
SubcatchmentB2: Prop Condition	Runoff Area=10,181 sf 56.98% Impervious Runoff Depth>2.55" Tc=5.0 min CN=89 Runoff=1.02 cfs 0.050 af
SubcatchmentOF1: Prop Condition	Runoff Area=11,574 sf 31.45% Impervious Runoff Depth>2.12" Tc=5.0 min CN=84 Runoff=0.99 cfs 0.047 af
SubcatchmentOF2: Prop Condition	Runoff Area=12,628 sf 25.06% Impervious Runoff Depth>2.03" Tc=5.0 min CN=83 Runoff=1.05 cfs 0.049 af
SubcatchmentOF3: Prop Condition	Runoff Area=10,836 sf 79.37% Impervious Runoff Depth>3.04" Tc=5.0 min CN=94 Runoff=1.23 cfs 0.063 af
Pond BF: BioFiltration Basin	Peak Elev=866.13' Storage=485 cf Inflow=1.43 cfs 0.069 af Primary=1.33 cfs 0.009 af Secondary=0.32 cfs 0.060 af Outflow=1.65 cfs 0.069 af
Pond OF: Proposed Condition Runoff	Inflow=11.59 cfs 0.570 af Primary=11.59 cfs 0.570 af

Total Runoff Area = 2.705 ac Runoff Volume = 0.630 af Average Runoff Depth = 2.80"
33.55% Pervious = 0.907 ac 66.45% Impervious = 1.798 ac

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Summary for Subcatchment A1: Prop Condition (Untreated to Storm Sewer)

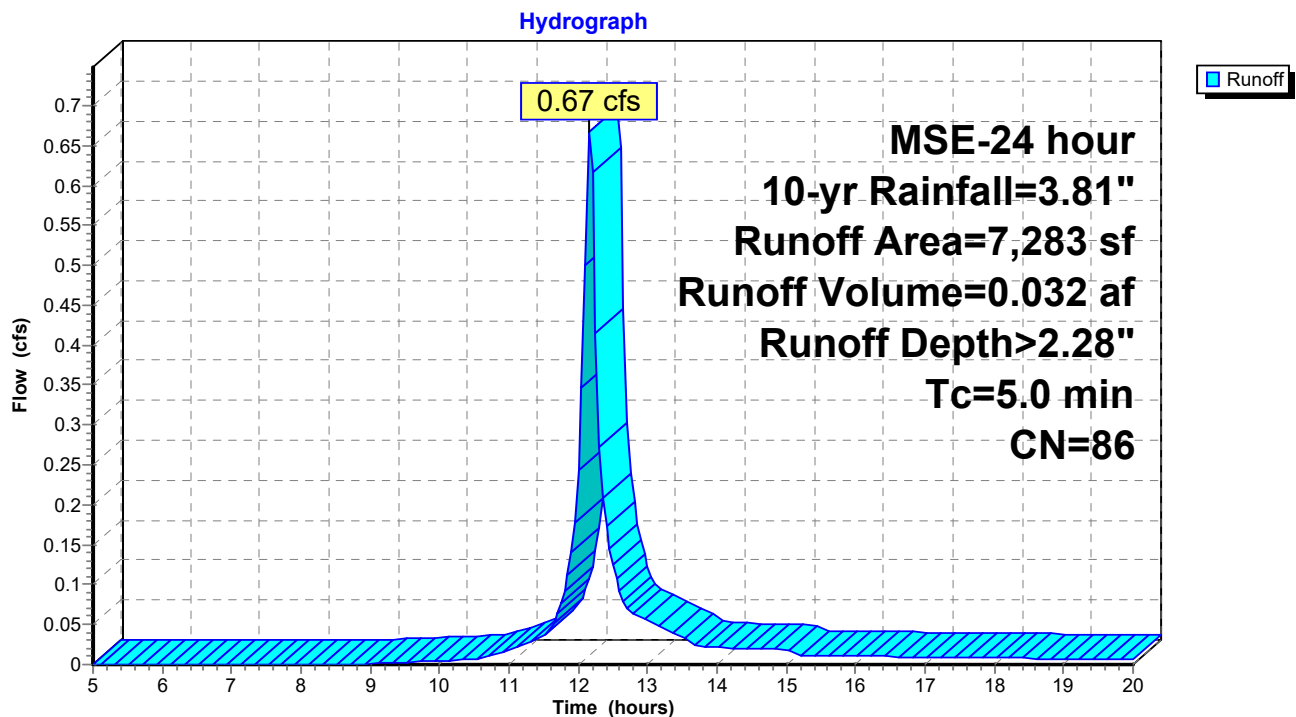
Runoff = 0.67 cfs @ 12.16 hrs, Volume= 0.032 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	3,086	98	Hardscape, HSG D
*	4,197	78	Grassland, HSG D
	7,283	86	Weighted Average
	4,197		57.63% Pervious Area
	3,086		42.37% Impervious Area

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

Subcatchment A1: Prop Condition (Untreated to Storm Sewer)

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Summary for Subcatchment A2: Prop Condition (Untreated to Storm Sewer)

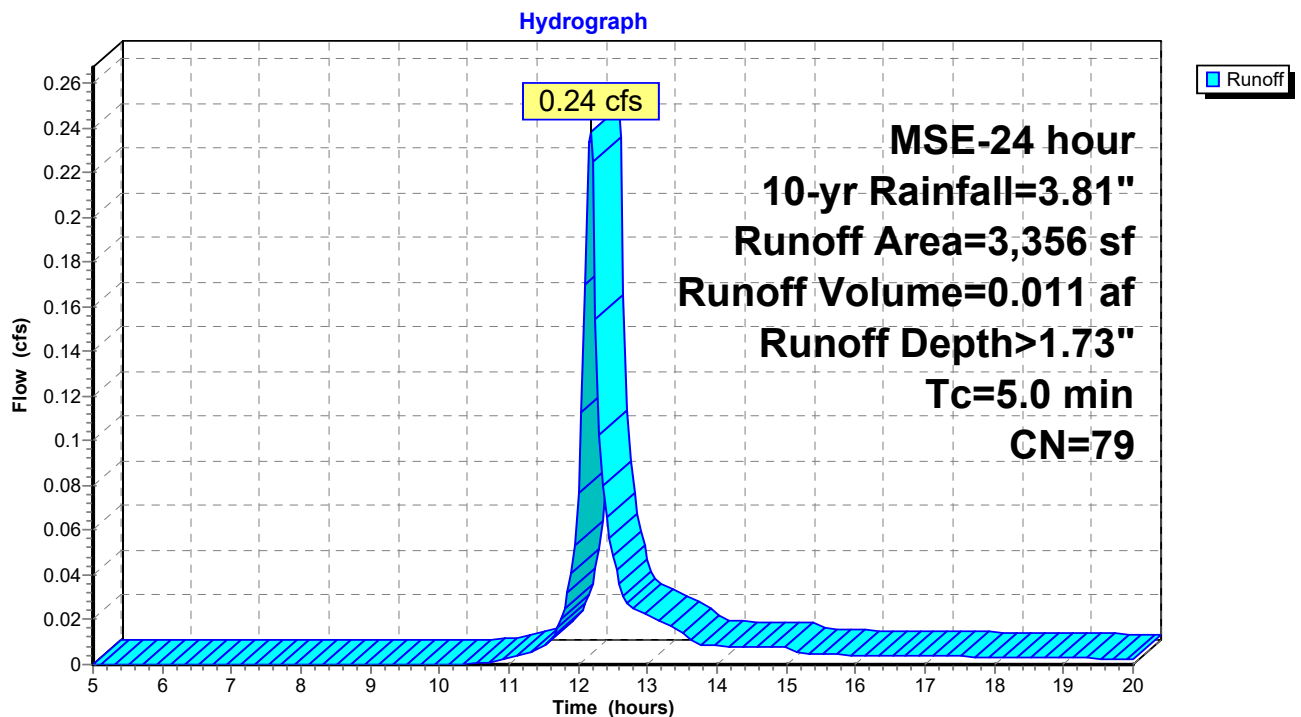
Runoff = 0.24 cfs @ 12.17 hrs, Volume= 0.011 af, Depth> 1.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	183	98	Hardscape, HSG D
*	3,173	78	Grassland, HSG D
	3,356	79	Weighted Average
	3,173		94.55% Pervious Area
	183		5.45% Impervious Area

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

Subcatchment A2: Prop Condition (Untreated to Storm Sewer)

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Summary for Subcatchment A3: Prop Condition (Untreated to Storm Sewer)

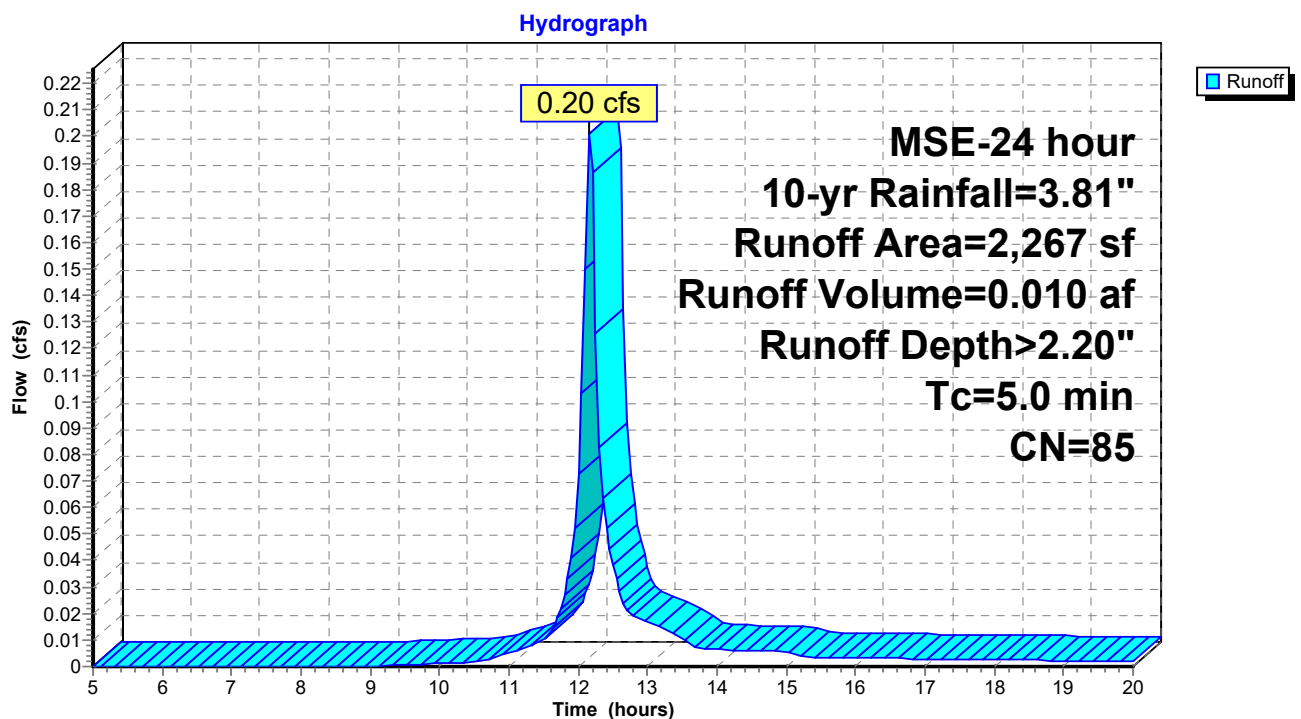
Runoff = 0.20 cfs @ 12.17 hrs, Volume= 0.010 af, Depth> 2.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	749	98	Hardscape, HSG D
*	1,518	78	Grassland, HSG D
	2,267	85	Weighted Average
	1,518		66.96% Pervious Area
	749		33.04% Impervious Area

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

Subcatchment A3: Prop Condition (Untreated to Storm Sewer)

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Summary for Subcatchment A4: Prop Condition (Untreated to Storm Sewer)

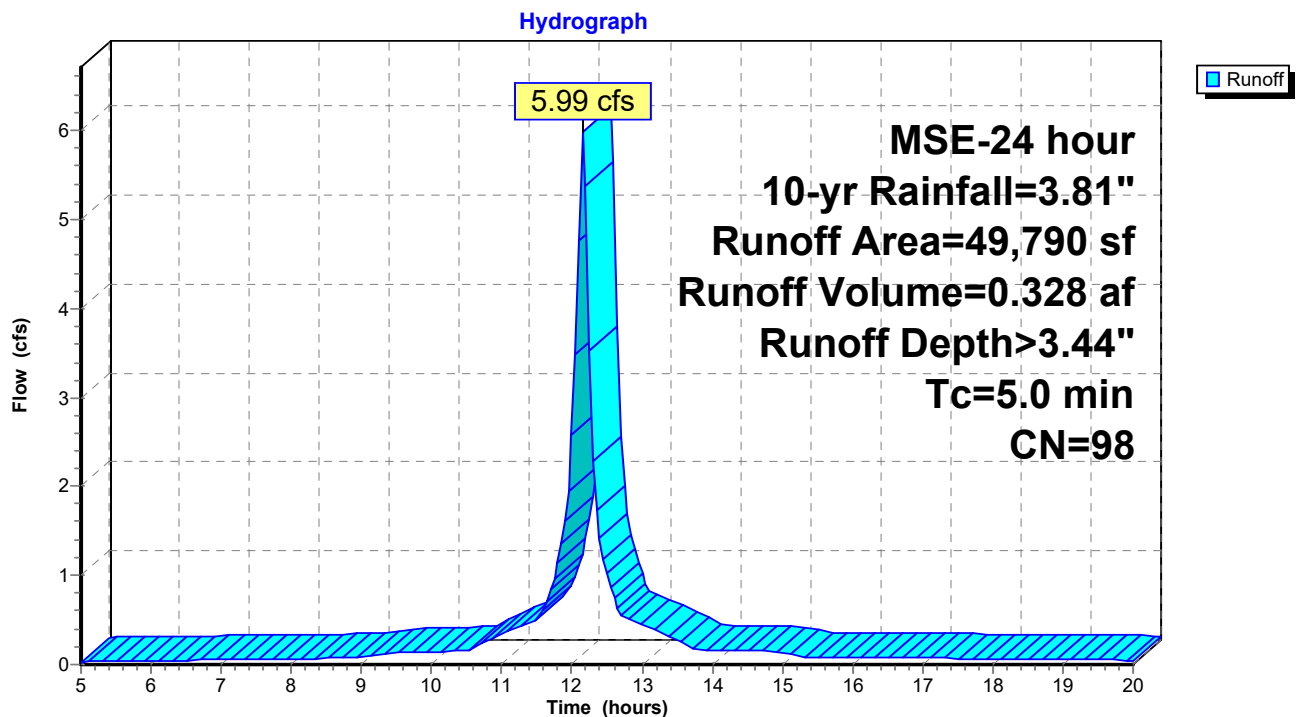
Runoff = 5.99 cfs @ 12.16 hrs, Volume= 0.328 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

Area (sf)	CN	Description
10,237	98	Roofs, HSG D
14,767	98	Water Surface, HSG D
* 24,786	98	Pool Deck, HSG D
49,790	98	Weighted Average
49,790		100.00% Impervious Area

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

Subcatchment A4: Prop Condition (Untreated to Storm Sewer)

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MSE-24 hour 10-yr Rainfall=3.81"

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Summary for Subcatchment A5-1: Prop Condition (Untreated to Storm Sewer)

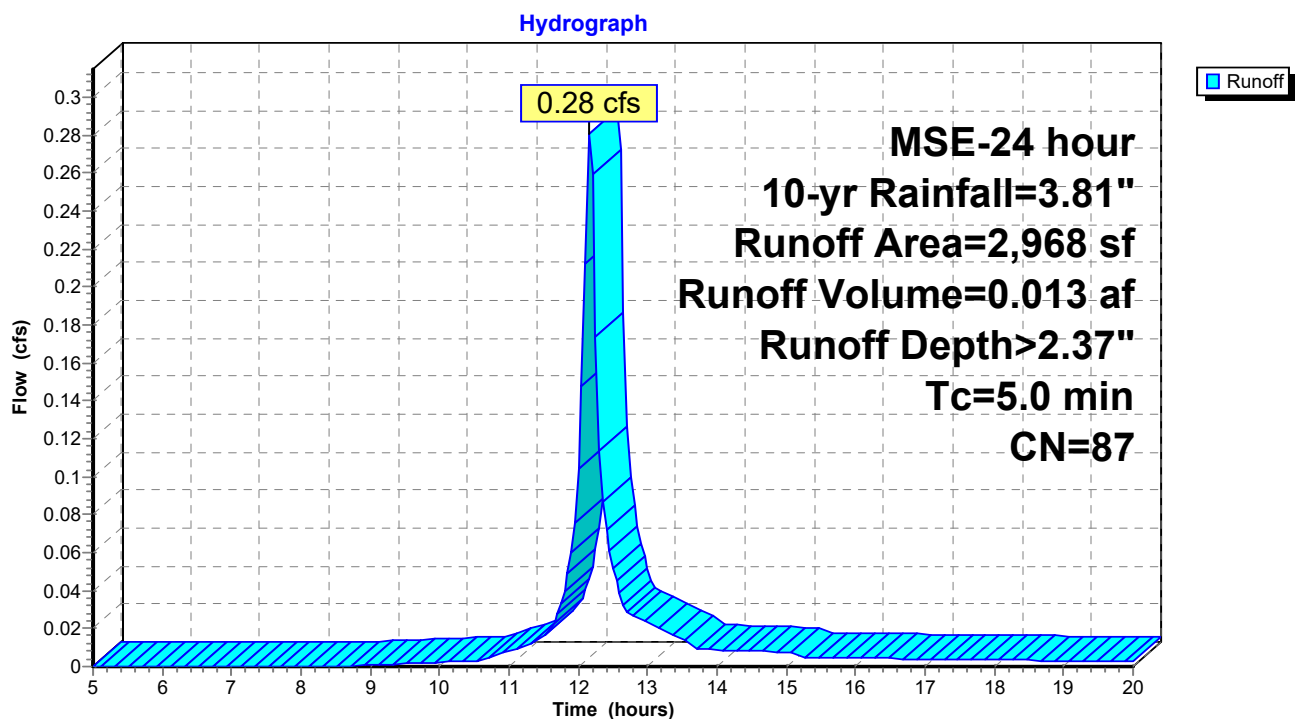
Runoff = 0.28 cfs @ 12.16 hrs, Volume= 0.013 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	1,364	98	Hardscape, HSG D
*	1,604	78	Grassland, HSG D
	2,968	87	Weighted Average
	1,604		54.04% Pervious Area
	1,364		45.96% Impervious Area

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

Subcatchment A5-1: Prop Condition (Untreated to Storm Sewer)

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MSE-24 hour 10-yr Rainfall=3.81"

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Summary for Subcatchment A6-1: Prop Condition (Untreated to Storm Sewer)

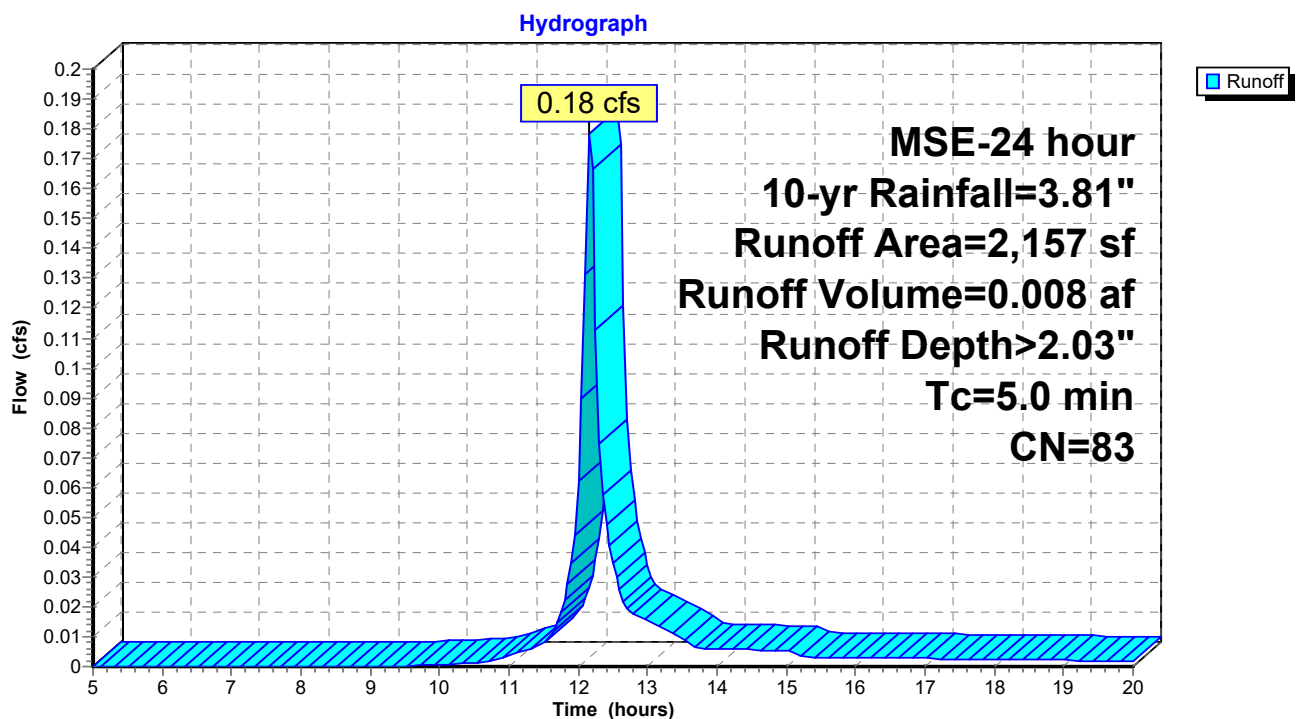
Runoff = 0.18 cfs @ 12.17 hrs, Volume= 0.008 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	543	98	Hardscape, HSG D
*	1,614	78	Grassland, HSG D
	2,157	83	Weighted Average
	1,614		74.83% Pervious Area
	543		25.17% Impervious Area

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

Subcatchment A6-1: Prop Condition (Untreated to Storm Sewer)

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MSE-24 hour 10-yr Rainfall=3.81"

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Summary for Subcatchment B1: Prop Condition (Treated)

Runoff = 0.41 cfs @ 12.17 hrs, Volume= 0.019 af, Depth> 2.12"

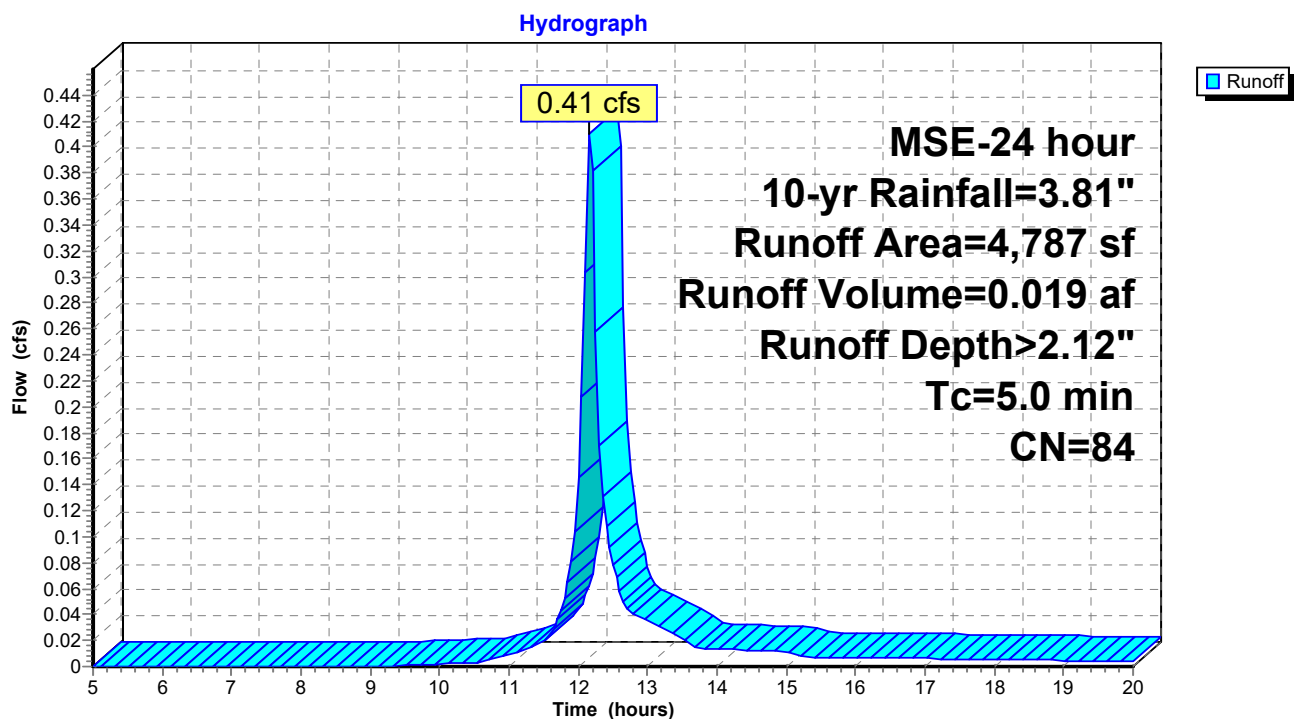
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	1,381	98	Hardscape, HSG D
*	3,406	78	Grassland, HSG D
	4,787	84	Weighted Average
	3,406		71.15% Pervious Area
	1,381		28.85% Impervious Area

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

Subcatchment B1: Prop Condition (Treated)



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MSE-24 hour 10-yr Rainfall=3.81"

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Summary for Subcatchment B2: Prop Condition (Treated)

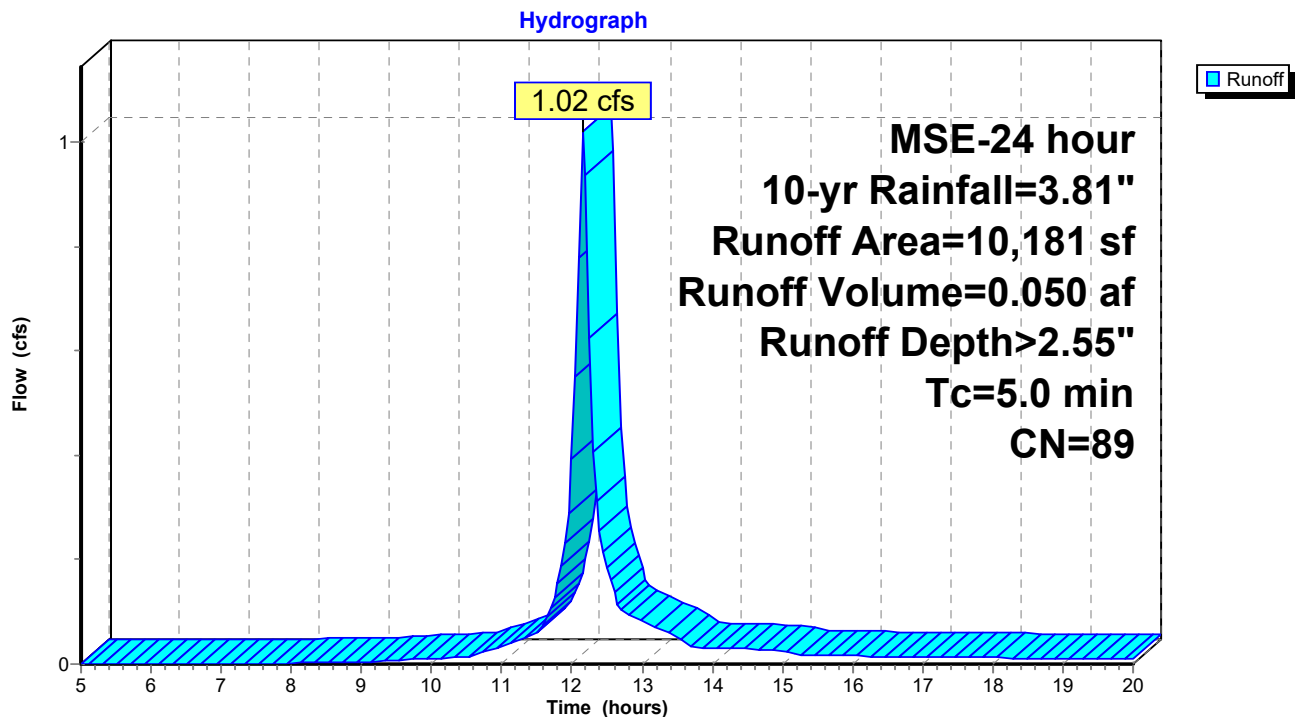
Runoff = 1.02 cfs @ 12.16 hrs, Volume= 0.050 af, Depth> 2.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	3,387	98	Parking Lot, HSG D
*	2,414	98	Hardscape, HSG D
*	4,380	78	Grassland, HSG D
	10,181	89	Weighted Average
	4,380		43.02% Pervious Area
	5,801		56.98% Impervious Area

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

Subcatchment B2: Prop Condition (Treated)

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MSE-24 hour 10-yr Rainfall=3.81"

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Summary for Subcatchment OF1: Prop Condition (UnTreated to Offsite)

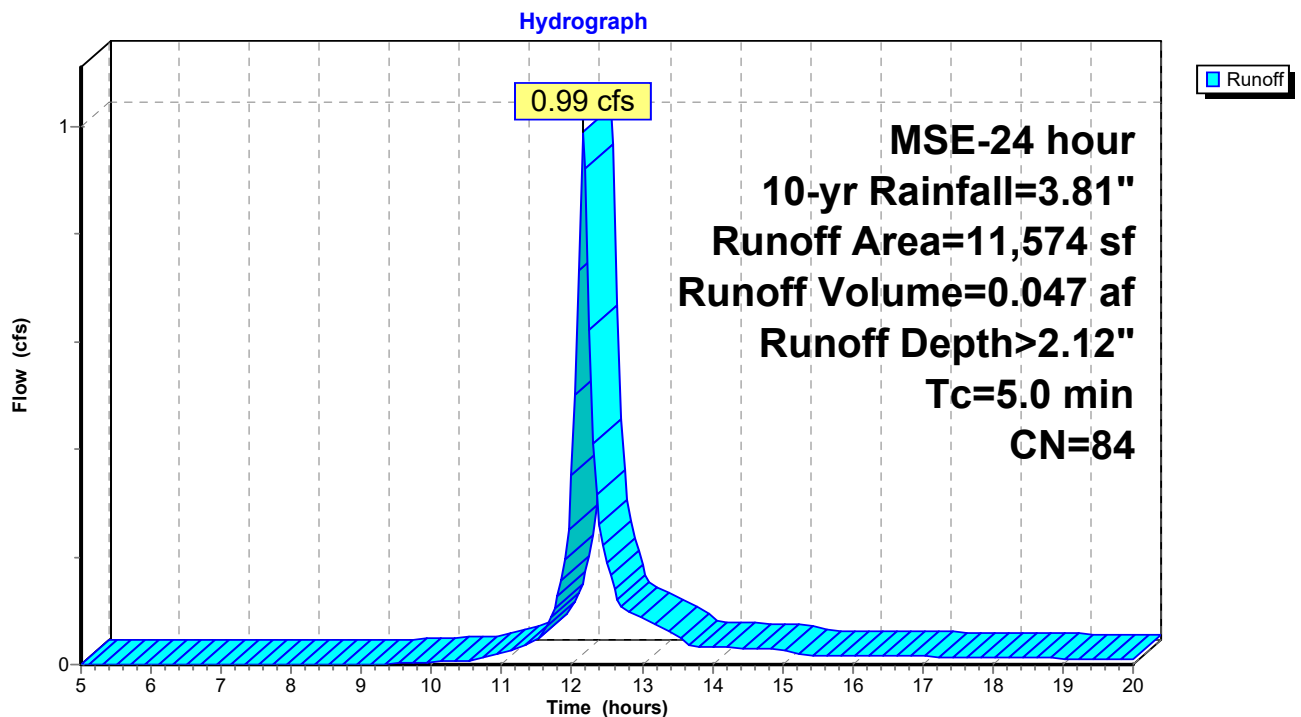
Runoff = 0.99 cfs @ 12.17 hrs, Volume= 0.047 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	3,640	98	Hardscape, HSG D
*	7,934	78	Grassland, HSG D
	11,574	84	Weighted Average
	7,934		68.55% Pervious Area
	3,640		31.45% Impervious Area

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

Subcatchment OF1: Prop Condition (UnTreated to Offsite)

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MSE-24 hour 10-yr Rainfall=3.81"

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Summary for Subcatchment OF2: Prop Condition (UnTreated to Offsite)

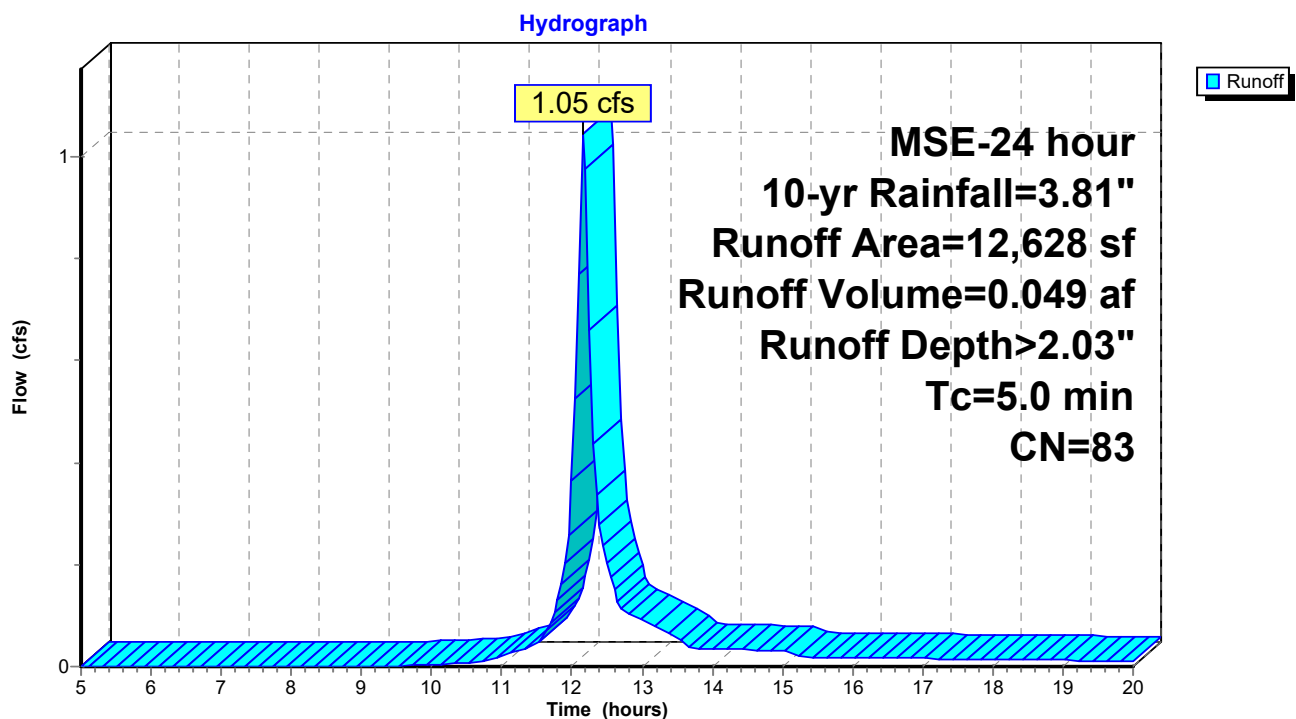
Runoff = 1.05 cfs @ 12.17 hrs, Volume= 0.049 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	3,164	98	Hardscape, HSG D
*	9,464	78	Grassland, HSG D
	12,628	83	Weighted Average
	9,464		74.94% Pervious Area
	3,164		25.06% Impervious Area

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

Subcatchment OF2: Prop Condition (UnTreated to Offsite)

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MSE-24 hour 10-yr Rainfall=3.81"

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Summary for Subcatchment OF3: Prop Condition (UnTreated to Offsite)

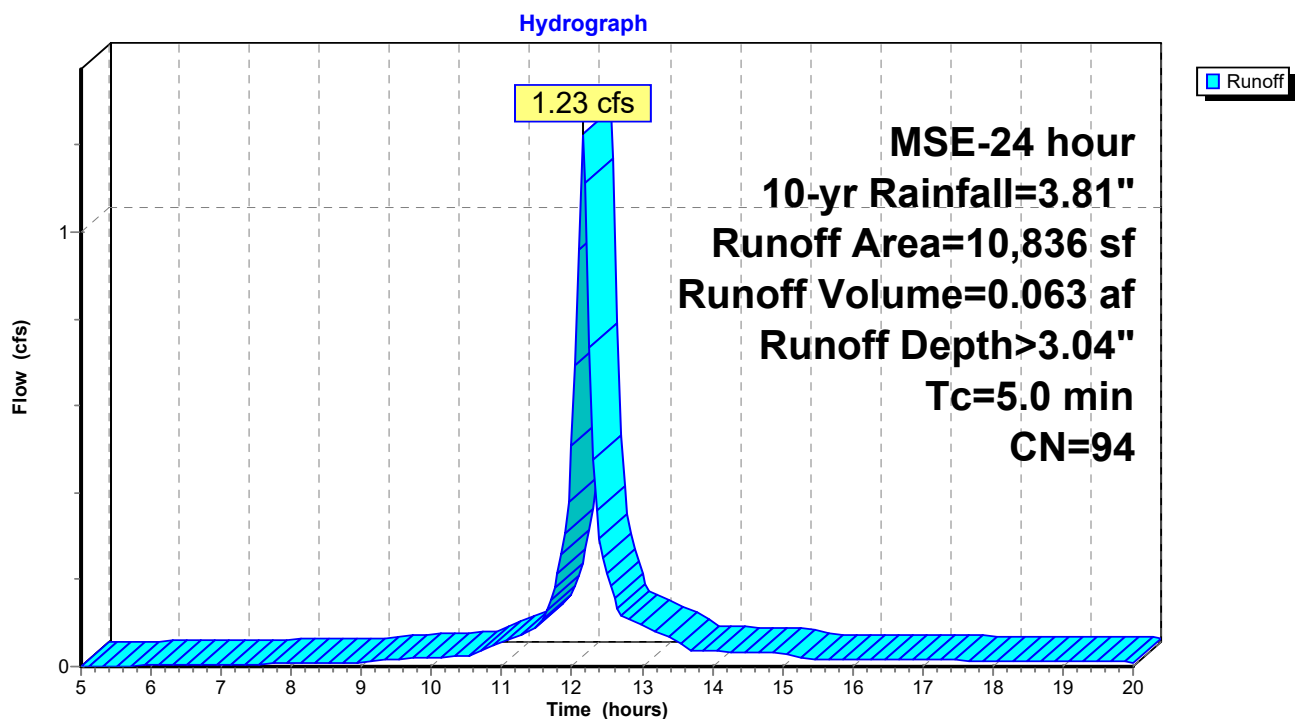
Runoff = 1.23 cfs @ 12.16 hrs, Volume= 0.063 af, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

MSE-24 hour 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	8,600	98	Hardscape, HSG D
*	2,236	78	Grassland, HSG D
	10,836	94	Weighted Average
	2,236		20.63% Pervious Area
	8,600		79.37% Impervious Area

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

Subcatchment OF3: Prop Condition (UnTreated to Offsite)

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Summary for Pond BF: BioFiltration Basin

Inflow Area = 0.344 ac, 47.98% Impervious, Inflow Depth > 2.41" for 10-yr event
 Inflow = 1.43 cfs @ 12.16 hrs, Volume= 0.069 af
 Outflow = 1.65 cfs @ 12.20 hrs, Volume= 0.069 af, Atten= 0%, Lag= 2.3 min
 Primary = 1.33 cfs @ 12.20 hrs, Volume= 0.009 af
 Secondary = 0.32 cfs @ 12.20 hrs, Volume= 0.060 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 866.13' @ 12.21 hrs Surf.Area= 1,073 sf Storage= 485 cf
 Flood Elev= 865.50' Surf.Area= 1,073 sf Storage= 485 cf

Plug-Flow detention time= 8.5 min calculated for 0.069 af (100% of inflow)
 Center-of-Mass det. time= 8.4 min (781.3 - 772.9)

Volume	Invert	Avail.Storage	Storage Description	
#1	865.00'	485 cf	Custom Stage Data (Conic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
865.00	872	0	0	872
865.50	1,073	485	485	1,080

Device	Routing	Invert	Outlet Devices
#1	Primary	865.50'	1.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Secondary	862.50'	6.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 862.50' / 860.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	865.00'	13.000 in/hr Exfiltration over Surface area from 863.00' - 865.50' Excluded Surface area = 0 sf

Primary OutFlow Max=1.27 cfs @ 12.20 hrs HW=866.10' (Free Discharge)

↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 1.27 cfs @ 2.10 fps)

Secondary OutFlow Max=0.32 cfs @ 12.20 hrs HW=866.12' (Free Discharge)

↑ **2=Culvert** (Passes 0.32 cfs of 1.37 cfs potential flow)

↑ **3=Exfiltration** (Exfiltration Controls 0.32 cfs)

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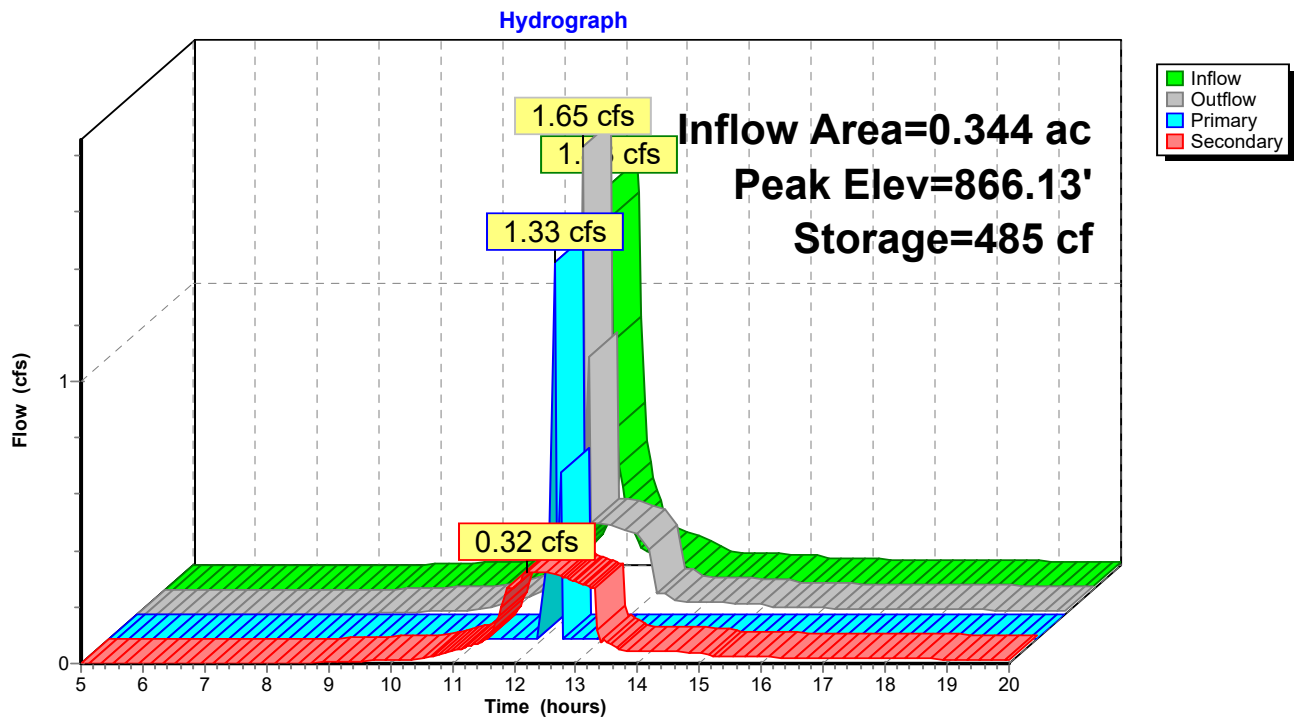
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MSE-24 hour 10-yr Rainfall=3.81"

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Pond BF: BioFiltration Basin



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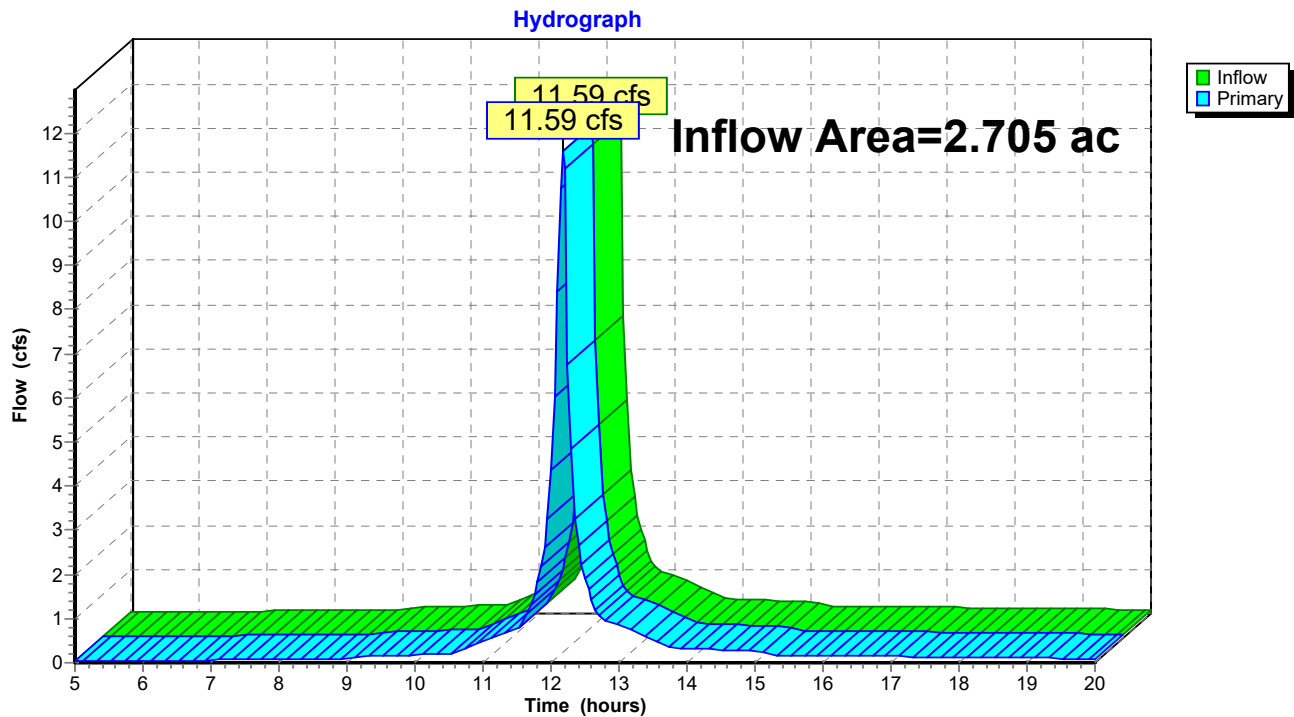
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Summary for Pond OF: Proposed Condition Runoff

Inflow Area = 2.705 ac, 66.45% Impervious, Inflow Depth > 2.53" for 10-yr event
Inflow = 11.59 cfs @ 12.18 hrs, Volume= 0.570 af
Primary = 11.59 cfs @ 12.18 hrs, Volume= 0.570 af, Atten= 0%, Lag= 0.0 min

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

Pond OF: Proposed Condition Runoff



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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentA1: Prop Condition	Runoff Area=7,283 sf 42.37% Impervious Runoff Depth>4.42" Tc=5.0 min CN=86 Runoff=1.25 cfs 0.062 af
SubcatchmentA2: Prop Condition	Runoff Area=3,356 sf 5.45% Impervious Runoff Depth>3.69" Tc=5.0 min CN=79 Runoff=0.50 cfs 0.024 af
SubcatchmentA3: Prop Condition	Runoff Area=2,267 sf 33.04% Impervious Runoff Depth>4.31" Tc=5.0 min CN=85 Runoff=0.38 cfs 0.019 af
SubcatchmentA4: Prop Condition	Runoff Area=49,790 sf 100.00% Impervious Runoff Depth>5.69" Tc=5.0 min CN=98 Runoff=9.78 cfs 0.542 af
SubcatchmentA5-1: Prop Condition	Runoff Area=2,968 sf 45.96% Impervious Runoff Depth>4.53" Tc=5.0 min CN=87 Runoff=0.52 cfs 0.026 af
SubcatchmentA6-1: Prop Condition	Runoff Area=2,157 sf 25.17% Impervious Runoff Depth>4.10" Tc=5.0 min CN=83 Runoff=0.35 cfs 0.017 af
SubcatchmentB1: Prop Condition (Treated)	Runoff Area=4,787 sf 28.85% Impervious Runoff Depth>4.21" Tc=5.0 min CN=84 Runoff=0.79 cfs 0.039 af
SubcatchmentB2: Prop Condition	Runoff Area=10,181 sf 56.98% Impervious Runoff Depth>4.75" Tc=5.0 min CN=89 Runoff=1.83 cfs 0.092 af
SubcatchmentOF1: Prop Condition	Runoff Area=11,574 sf 31.45% Impervious Runoff Depth>4.21" Tc=5.0 min CN=84 Runoff=1.91 cfs 0.093 af
SubcatchmentOF2: Prop Condition	Runoff Area=12,628 sf 25.06% Impervious Runoff Depth>4.10" Tc=5.0 min CN=83 Runoff=2.05 cfs 0.099 af
SubcatchmentOF3: Prop Condition	Runoff Area=10,836 sf 79.37% Impervious Runoff Depth>5.30" Tc=5.0 min CN=94 Runoff=2.07 cfs 0.110 af
Pond BF: BioFiltration Basin	Peak Elev=866.61' Storage=485 cf Inflow=2.62 cfs 0.131 af Primary=3.10 cfs 0.041 af Secondary=0.32 cfs 0.090 af Outflow=3.43 cfs 0.131 af
Pond OF: Proposed Condition Runoff	Inflow=21.11 cfs 1.032 af Primary=21.11 cfs 1.032 af

Total Runoff Area = 2.705 ac Runoff Volume = 1.122 af Average Runoff Depth = 4.98"
33.55% Pervious = 0.907 ac 66.45% Impervious = 1.798 ac

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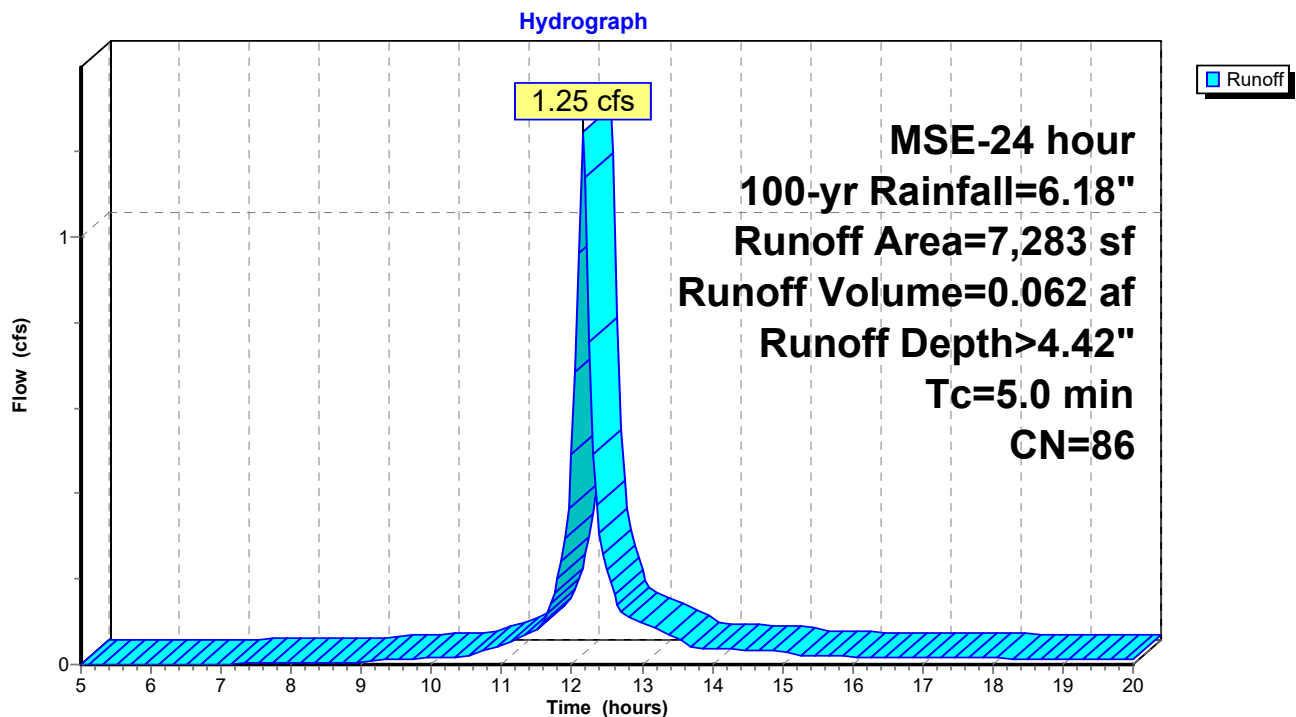
Summary for Subcatchment A1: Prop Condition (Untreated to Storm Sewer)

Runoff = 1.25 cfs @ 12.16 hrs, Volume= 0.062 af, Depth> 4.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

	Area (sf)	CN	Description
*	3,086	98	Hardscape, HSG D
*	4,197	78	Grassland, HSG D
	7,283	86	Weighted Average
	4,197		57.63% Pervious Area
	3,086		42.37% Impervious Area

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

Subcatchment A1: Prop Condition (Untreated to Storm Sewer)

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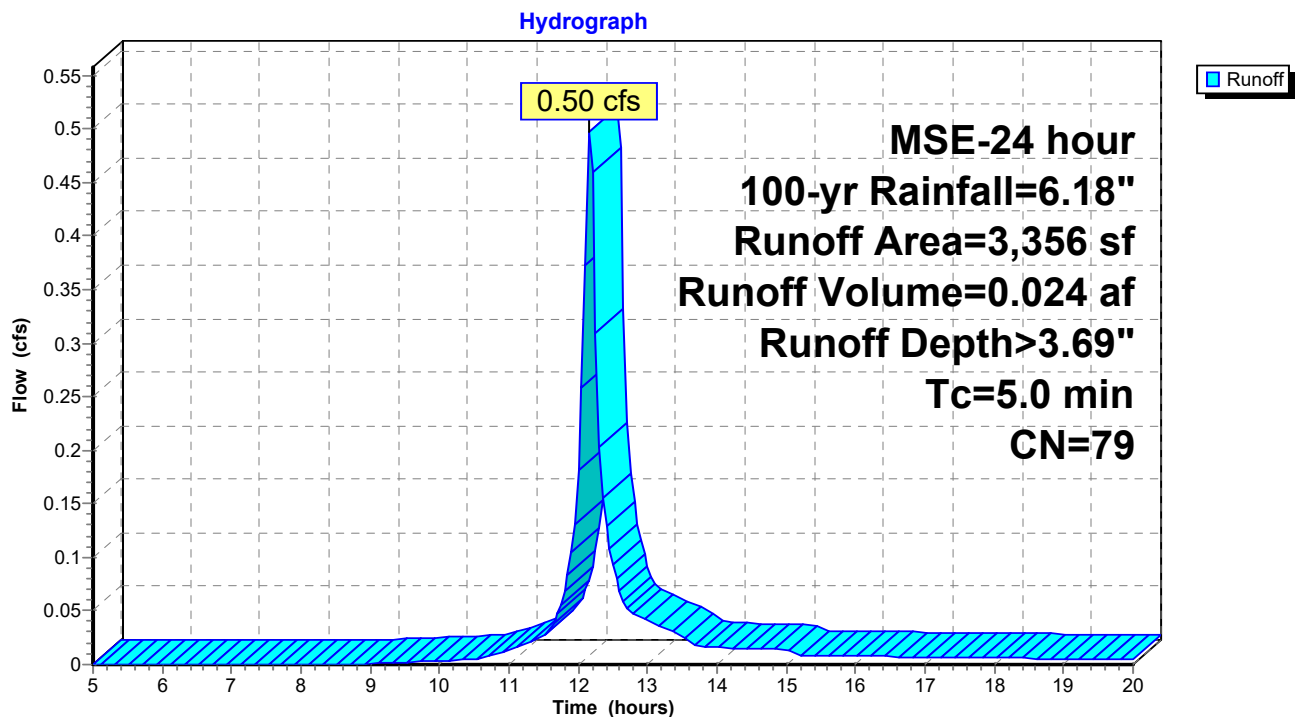
Summary for Subcatchment A2: Prop Condition (Untreated to Storm Sewer)

Runoff = 0.50 cfs @ 12.16 hrs, Volume= 0.024 af, Depth> 3.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

	Area (sf)	CN	Description
*	183	98	Hardscape, HSG D
*	3,173	78	Grassland, HSG D
	3,356	79	Weighted Average
	3,173		94.55% Pervious Area
	183		5.45% Impervious Area

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

Subcatchment A2: Prop Condition (Untreated to Storm Sewer)

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Summary for Subcatchment A3: Prop Condition (Untreated to Storm Sewer)

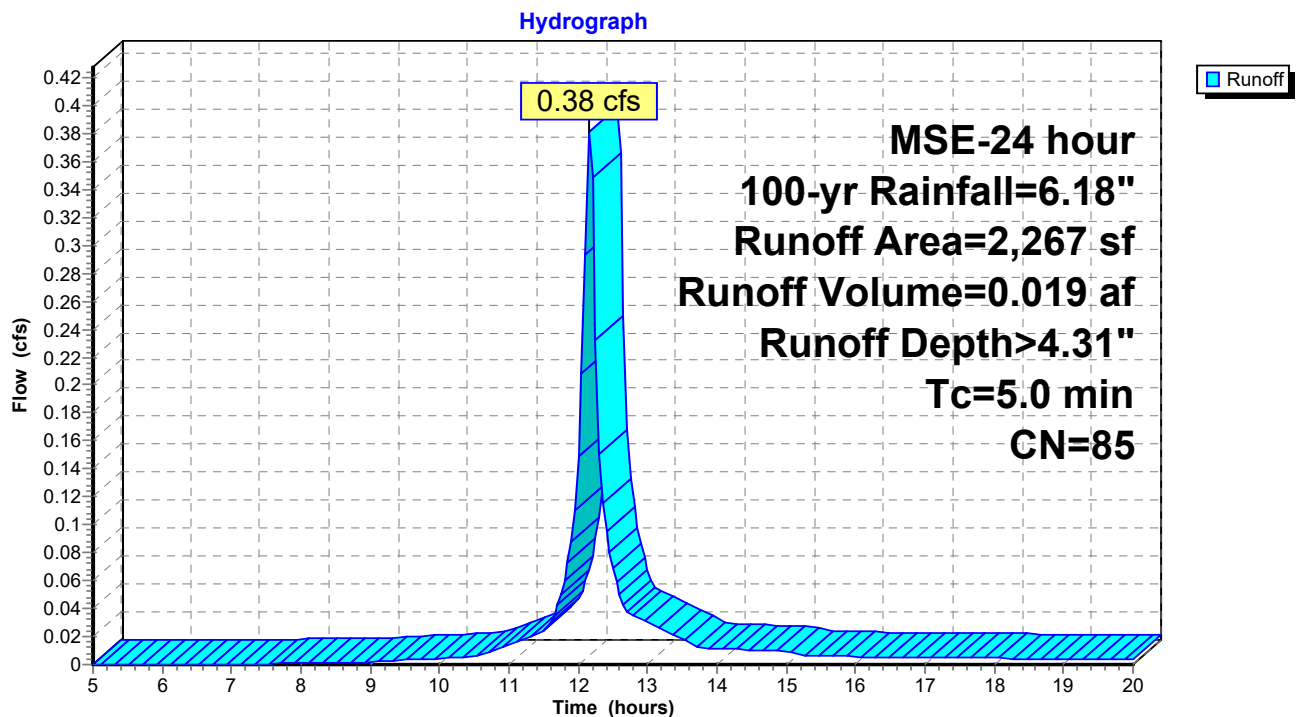
Runoff = 0.38 cfs @ 12.16 hrs, Volume= 0.019 af, Depth> 4.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

	Area (sf)	CN	Description
*	749	98	Hardscape, HSG D
*	1,518	78	Grassland, HSG D
	2,267	85	Weighted Average
	1,518		66.96% Pervious Area
	749		33.04% Impervious Area

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

Subcatchment A3: Prop Condition (Untreated to Storm Sewer)



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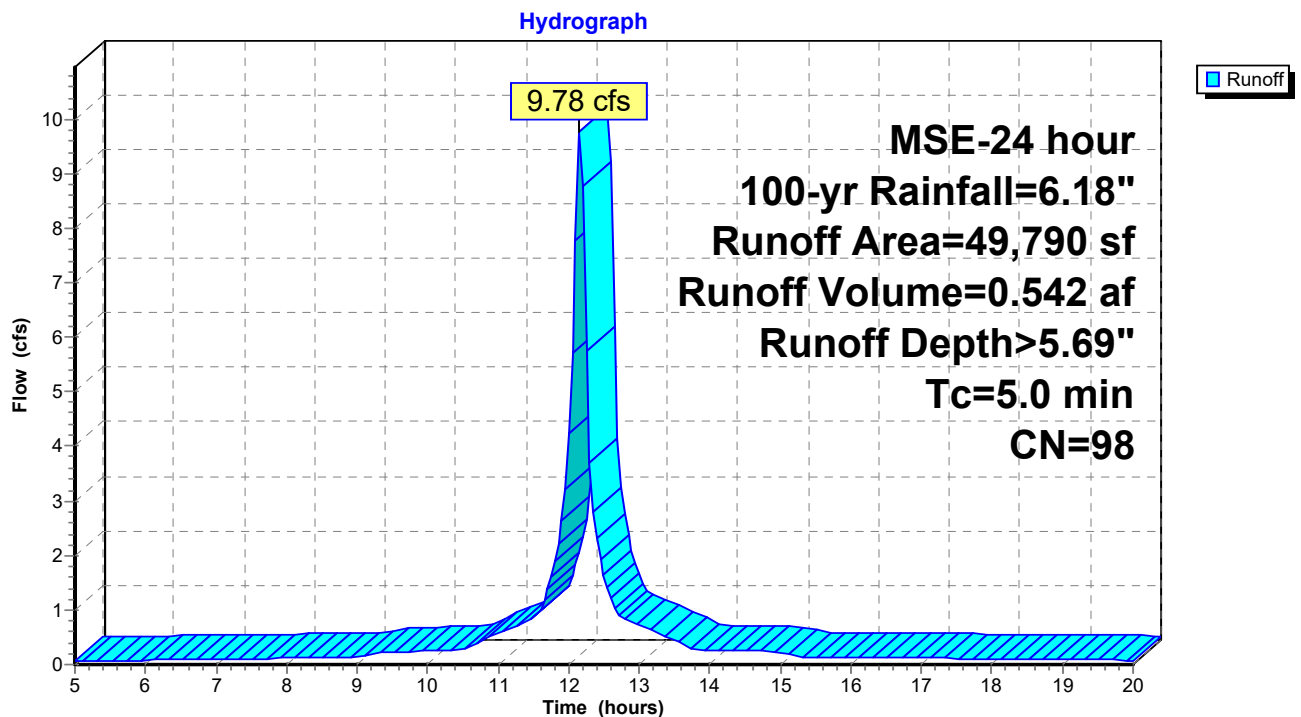
Summary for Subcatchment A4: Prop Condition (Untreated to Storm Sewer)

Runoff = 9.78 cfs @ 12.16 hrs, Volume= 0.542 af, Depth> 5.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

Area (sf)	CN	Description
10,237	98	Roofs, HSG D
14,767	98	Water Surface, HSG D
* 24,786	98	Pool Deck, HSG D
49,790	98	Weighted Average
49,790		100.00% Impervious Area

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

Subcatchment A4: Prop Condition (Untreated to Storm Sewer)

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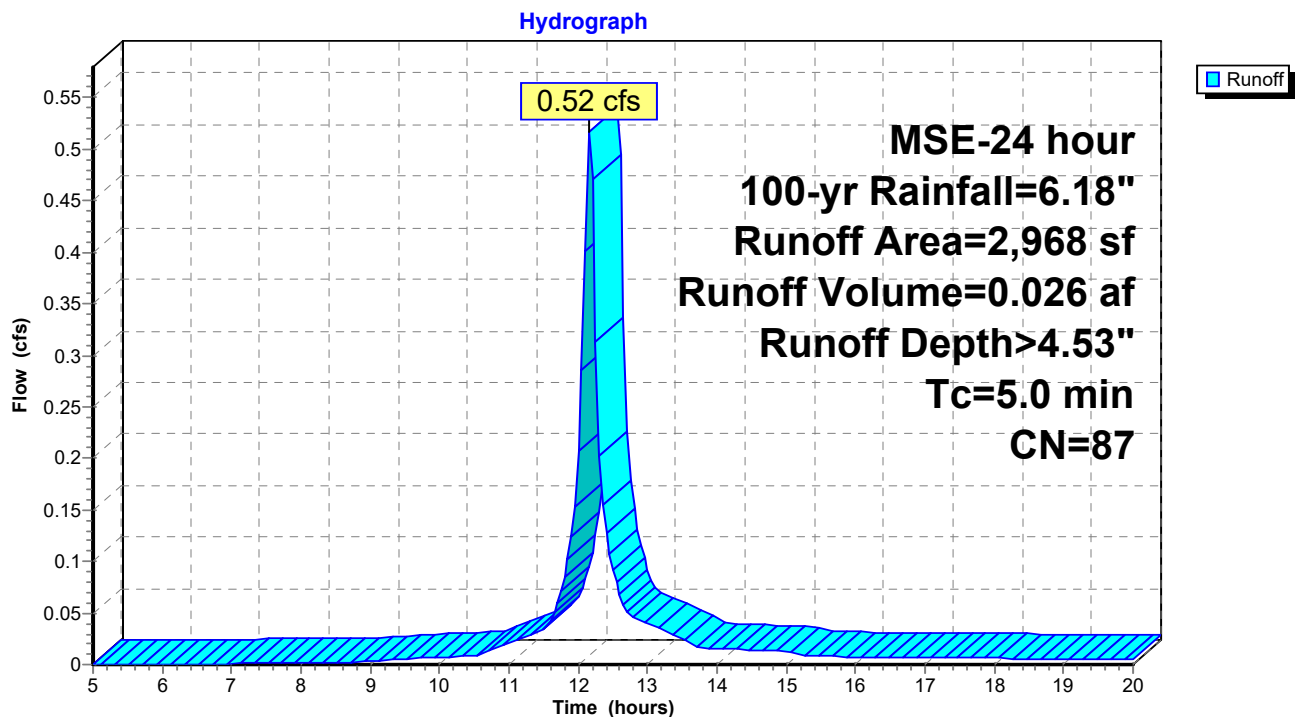
Summary for Subcatchment A5-1: Prop Condition (Untreated to Storm Sewer)

Runoff = 0.52 cfs @ 12.16 hrs, Volume= 0.026 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

	Area (sf)	CN	Description
*	1,364	98	Hardscape, HSG D
*	1,604	78	Grassland, HSG D
	2,968	87	Weighted Average
	1,604		54.04% Pervious Area
	1,364		45.96% Impervious Area

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

Subcatchment A5-1: Prop Condition (Untreated to Storm Sewer)

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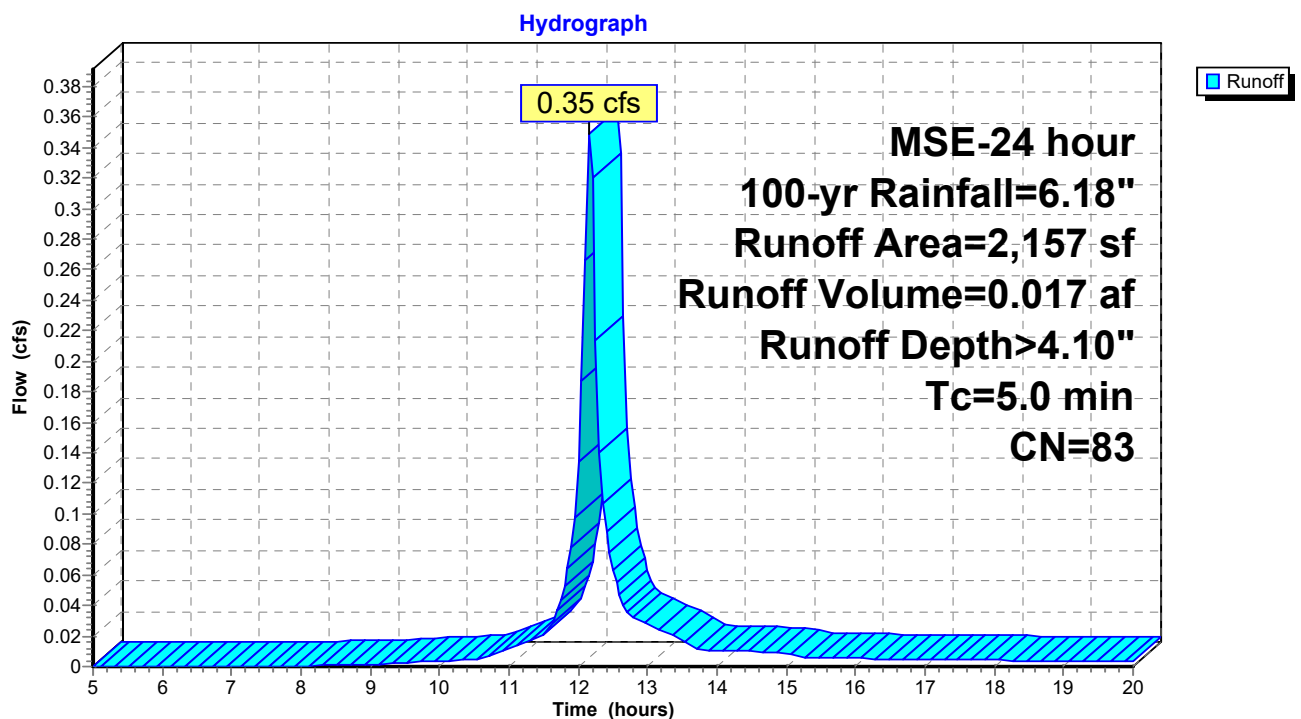
Summary for Subcatchment A6-1: Prop Condition (Untreated to Storm Sewer)

Runoff = 0.35 cfs @ 12.16 hrs, Volume= 0.017 af, Depth> 4.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

	Area (sf)	CN	Description
*	543	98	Hardscape, HSG D
*	1,614	78	Grassland, HSG D
	2,157	83	Weighted Average
	1,614		74.83% Pervious Area
	543		25.17% Impervious Area

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

Subcatchment A6-1: Prop Condition (Untreated to Storm Sewer)

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MSE-24 hour 100-yr Rainfall=6.18"

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Summary for Subcatchment B1: Prop Condition (Treated)

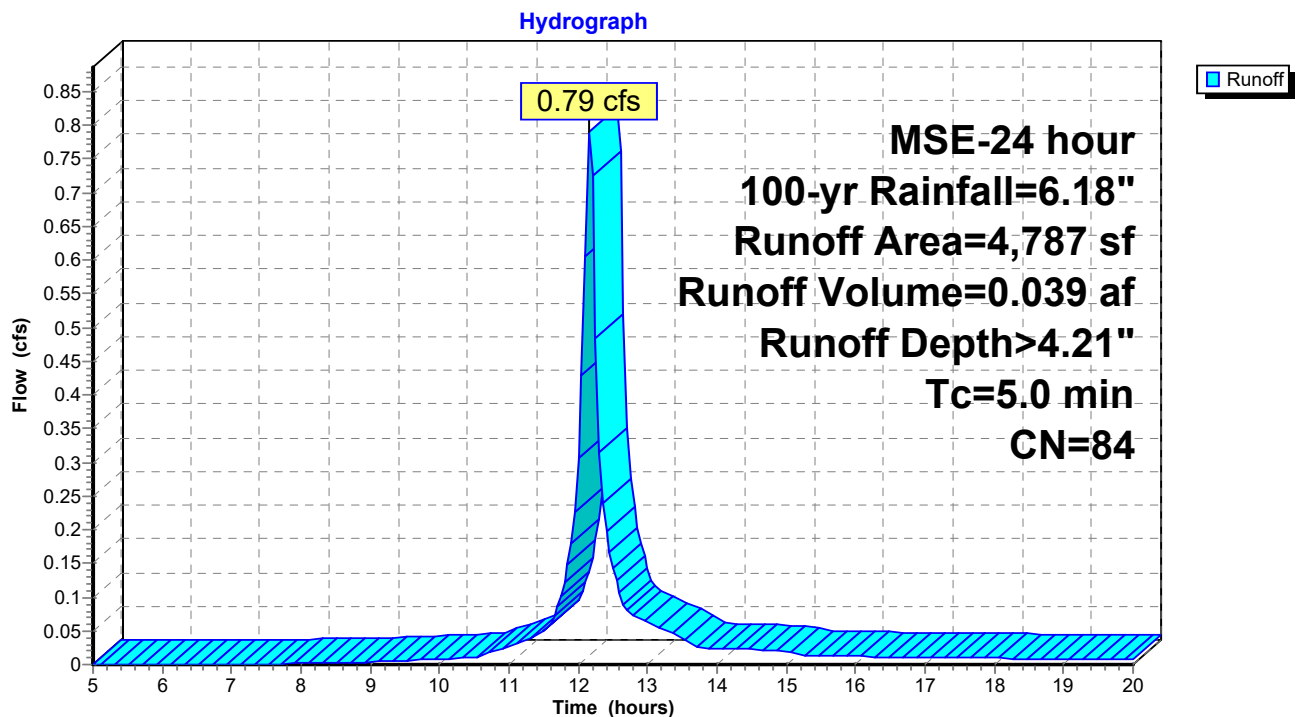
Runoff = 0.79 cfs @ 12.16 hrs, Volume= 0.039 af, Depth> 4.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

	Area (sf)	CN	Description
*	1,381	98	Hardscape, HSG D
*	3,406	78	Grassland, HSG D
	4,787	84	Weighted Average
	3,406		71.15% Pervious Area
	1,381		28.85% Impervious Area

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

Subcatchment B1: Prop Condition (Treated)



Buchner Park Pool

Prepared by Ayres Associates

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MSE-24 hour 100-yr Rainfall=6.18"

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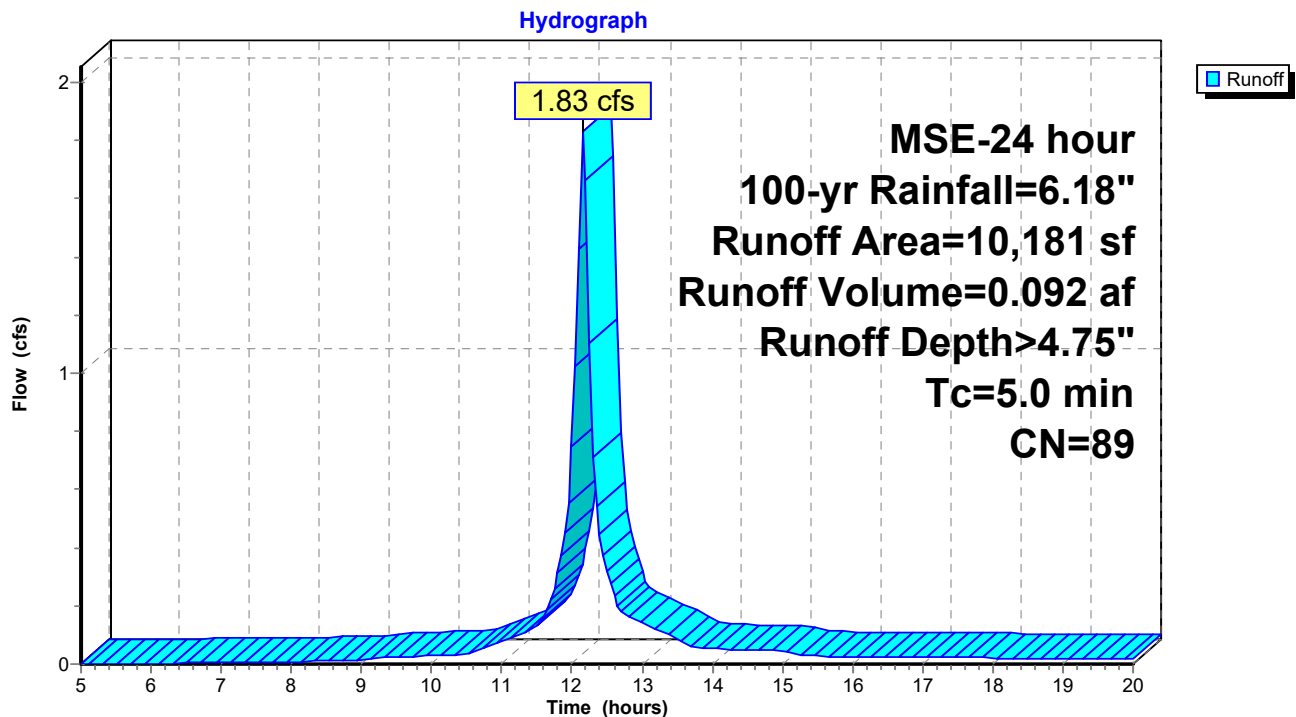
Summary for Subcatchment B2: Prop Condition (Treated)

Runoff = 1.83 cfs @ 12.16 hrs, Volume= 0.092 af, Depth> 4.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

	Area (sf)	CN	Description
*	3,387	98	Parking Lot, HSG D
*	2,414	98	Hardscape, HSG D
*	4,380	78	Grassland, HSG D
	10,181	89	Weighted Average
	4,380		43.02% Pervious Area
	5,801		56.98% Impervious Area

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

Subcatchment B2: Prop Condition (Treated)

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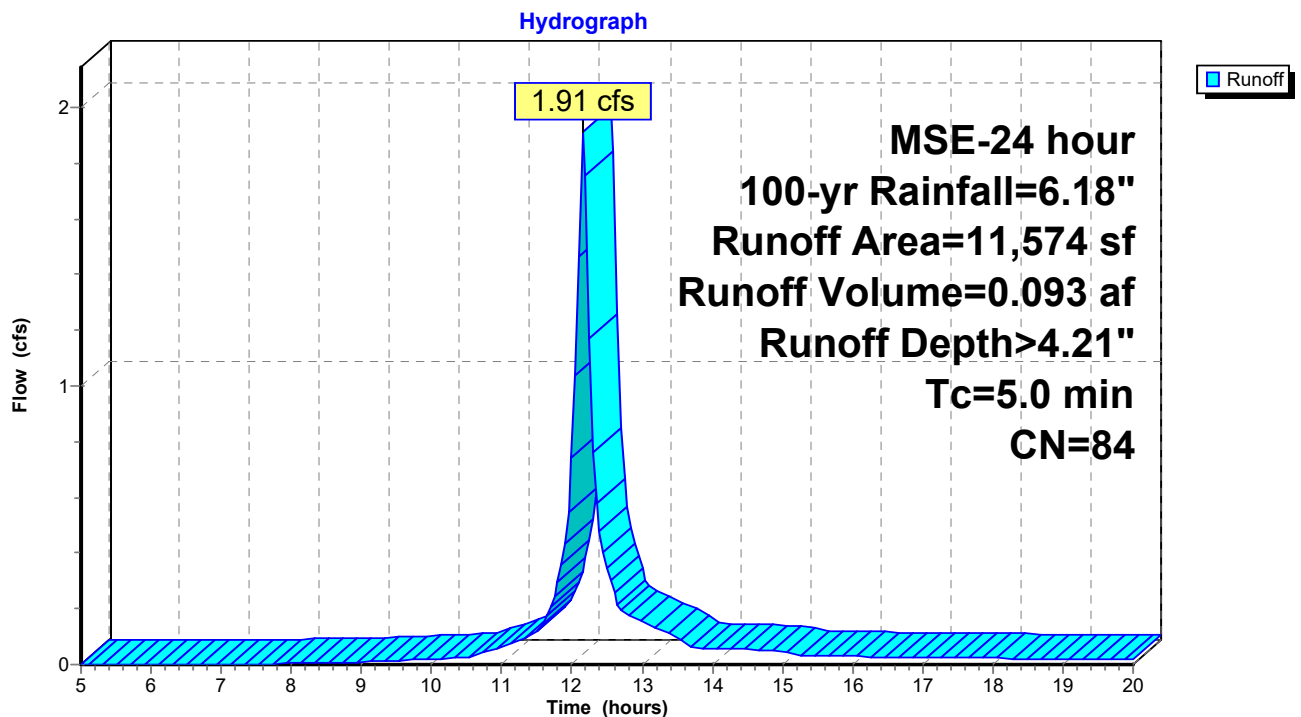
Summary for Subcatchment OF1: Prop Condition (UnTreated to Offsite)

Runoff = 1.91 cfs @ 12.16 hrs, Volume= 0.093 af, Depth> 4.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

	Area (sf)	CN	Description
*	3,640	98	Hardscape, HSG D
*	7,934	78	Grassland, HSG D
	11,574	84	Weighted Average
	7,934		68.55% Pervious Area
	3,640		31.45% Impervious Area

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

Subcatchment OF1: Prop Condition (UnTreated to Offsite)

Buchner Park Pool

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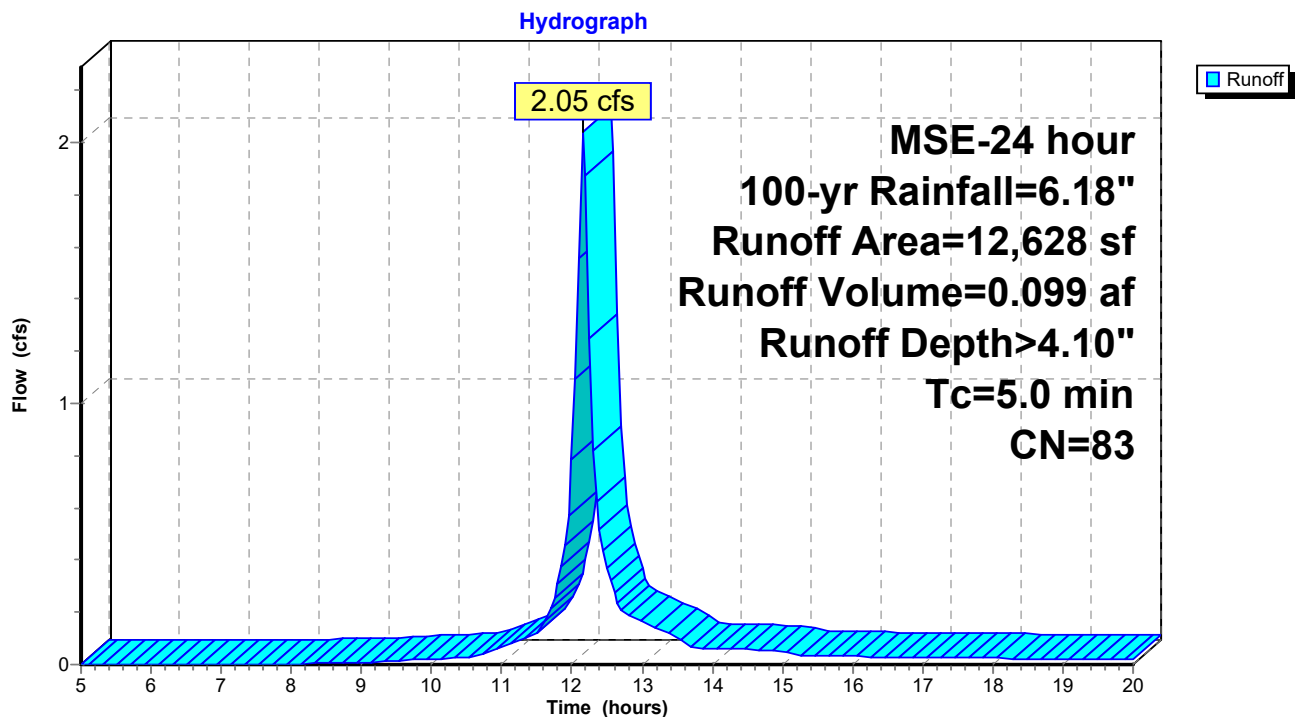
Summary for Subcatchment OF2: Prop Condition (UnTreated to Offsite)

Runoff = 2.05 cfs @ 12.16 hrs, Volume= 0.099 af, Depth> 4.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

	Area (sf)	CN	Description
*	3,164	98	Hardscape, HSG D
*	9,464	78	Grassland, HSG D
	12,628	83	Weighted Average
	9,464		74.94% Pervious Area
	3,164		25.06% Impervious Area

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

Subcatchment OF2: Prop Condition (UnTreated to Offsite)

Buchner Park Pool

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MSE-24 hour 100-yr Rainfall=6.18"

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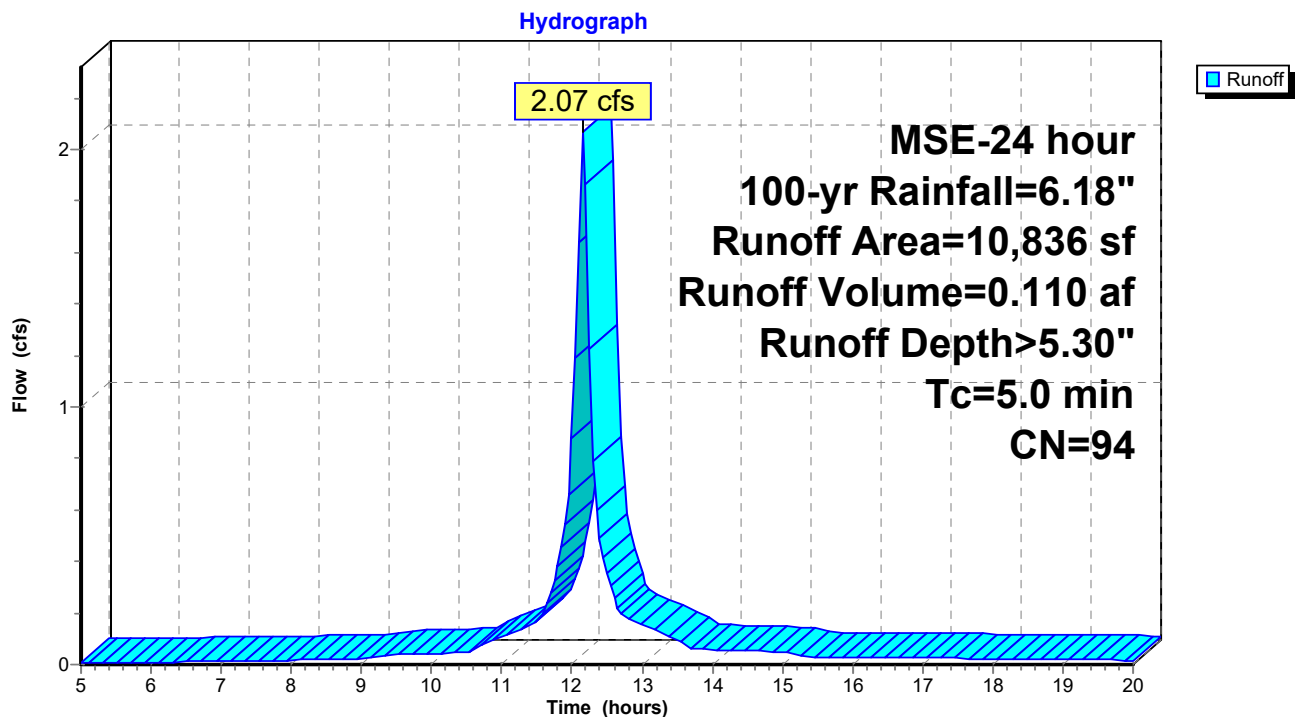
Summary for Subcatchment OF3: Prop Condition (UnTreated to Offsite)

Runoff = 2.07 cfs @ 12.16 hrs, Volume= 0.110 af, Depth> 5.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE-24 hour 100-yr Rainfall=6.18"

	Area (sf)	CN	Description
*	8,600	98	Hardscape, HSG D
*	2,236	78	Grassland, HSG D
	10,836	94	Weighted Average
	2,236		20.63% Pervious Area
	8,600		79.37% Impervious Area

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

Subcatchment OF3: Prop Condition (UnTreated to Offsite)

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MSE-24 hour 100-yr Rainfall=6.18"

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Summary for Pond BF: BioFiltration Basin

Inflow Area = 0.344 ac, 47.98% Impervious, Inflow Depth > 4.58" for 100-yr event
 Inflow = 2.62 cfs @ 12.16 hrs, Volume= 0.131 af
 Outflow = 3.43 cfs @ 12.19 hrs, Volume= 0.131 af, Atten= 0%, Lag= 2.0 min
 Primary = 3.10 cfs @ 12.19 hrs, Volume= 0.041 af
 Secondary = 0.32 cfs @ 12.05 hrs, Volume= 0.090 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 866.61' @ 12.19 hrs Surf.Area= 1,073 sf Storage= 485 cf
 Flood Elev= 865.50' Surf.Area= 1,073 sf Storage= 485 cf

Plug-Flow detention time= 7.0 min calculated for 0.131 af (100% of inflow)
 Center-of-Mass det. time= 6.9 min (768.9 - 762.0)

Volume	Invert	Avail.Storage	Storage Description	
#1	865.00'	485 cf	Custom Stage Data (Conic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
865.00	872	0	0	872
865.50	1,073	485	485	1,080

Device	Routing	Invert	Outlet Devices
#1	Primary	865.50'	1.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Secondary	862.50'	6.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 862.50' / 860.00' S= 0.0500 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	865.00'	13.000 in/hr Exfiltration over Surface area from 863.00' - 865.50' Excluded Surface area = 0 sf

Primary OutFlow Max=2.85 cfs @ 12.19 hrs HW=866.54' (Free Discharge)

↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 2.85 cfs @ 2.74 fps)

Secondary OutFlow Max=0.32 cfs @ 12.05 hrs HW=865.63' (Free Discharge)

↑ **2=Culvert** (Passes 0.32 cfs of 1.27 cfs potential flow)

↑ **3=Exfiltration** (Exfiltration Controls 0.32 cfs)

Buchner Park Pool

Prepared by Ayres Associates

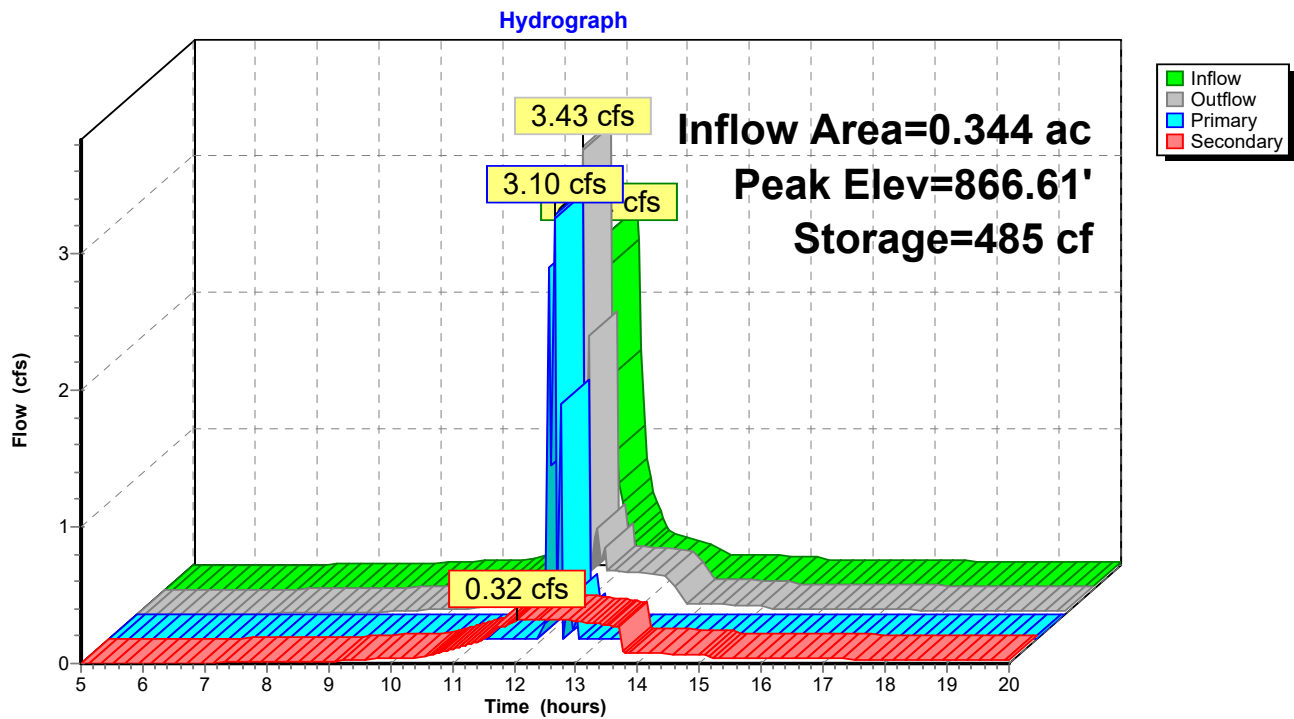
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MSE-24 hour 100-yr Rainfall=6.18"

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Pond BF: BioFiltration Basin



Buchner Park Pool

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MSE-24 hour 100-yr Rainfall=6.18"

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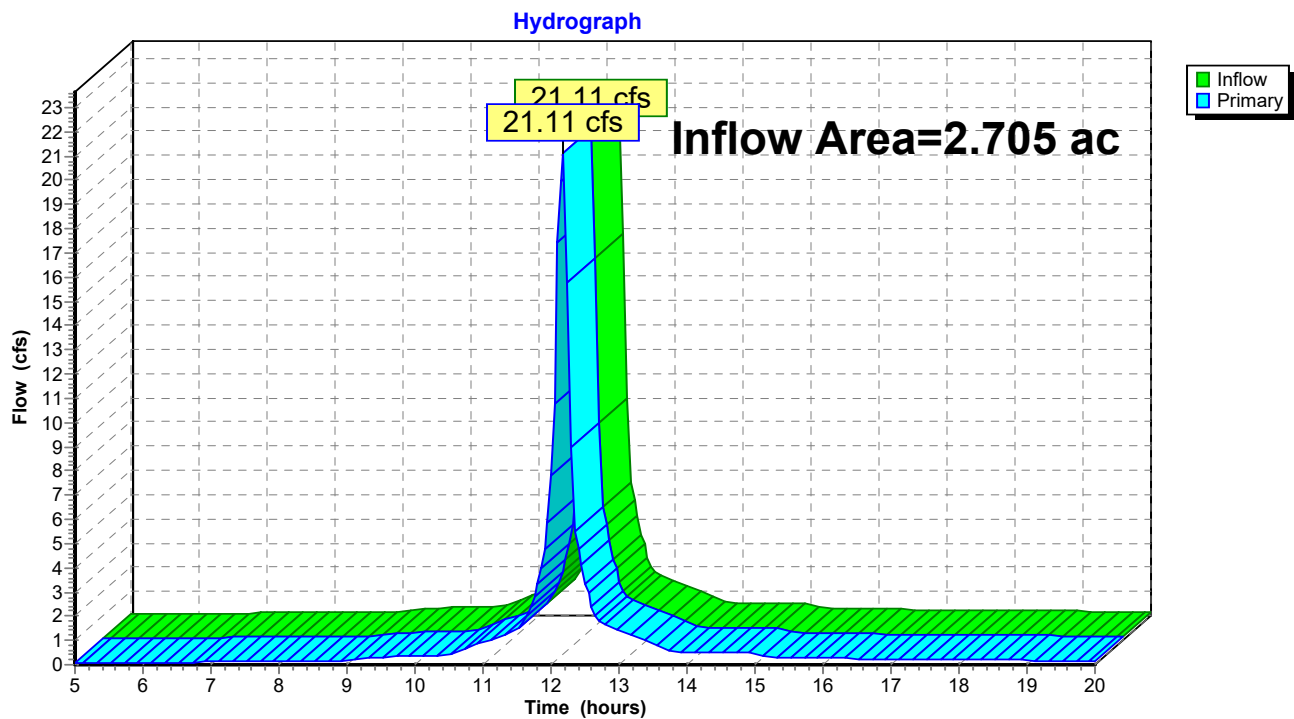
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Summary for Pond OF: Proposed Condition Runoff

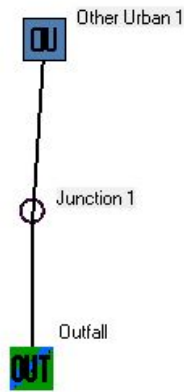
Inflow Area = 2.705 ac, 66.45% Impervious, Inflow Depth > 4.58" for 100-yr event
Inflow = 21.11 cfs @ 12.18 hrs, Volume= 1.032 af
Primary = 21.11 cfs @ 12.18 hrs, Volume= 1.032 af, Atten= 0%, Lag= 0.0 min

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

Pond OF: Proposed Condition Runoff



Appendix E
Infiltration Calculations



Data file name: I:\52\52-0600\0684 WaukeshaBuchnerPool\2SupDoc\Stormwater\Drainage Calculations\WinSlamm\Buchner Park Pool - Existing Infiltration.mdb
 WinSLAMM Version 10.4.0
 Rain file name: C:\WinSLAMM Files\Rain Files\WI_Multi_rain\Milwaukee\WisReg - Milwaukee Annual 1969.ran
 Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
 Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
 Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
 Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
 Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
 Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
 Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
 Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
 Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
 Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppd
 Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
 Cost Data file name:
 Seed for random number generator: -42
 Study period starting date: 03/28/69 Study period ending date: 12/06/69
 Start of Winter Season: 12/02 End of Winter Season: 03/12
 Date: 02-27-2020 Time: 13:59:22
 Site information:
 Buchnor Park Pool Existing Condition (For Infiltration Calculations)
 LU# 1 - Other Urban: Other Urban 1 Total area (ac): 2.705
 1 - Roofs 1: 0.133 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 31 - Sidewalks 1: 0.484 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 45 - Large Landscaped Areas 1: 1.208 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 63 - Paved Playground 1: 0.620 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 70 - Water Body Areas: 0.260 ac. Source Area PSD File:

File Name:
 I:\52\52-0600\0684\WaukeshaBuchnerPool\25upDoc\Stormwater\Drainage Calculations\WinSlamm\Buchner Park Pool - Existing Infiltration.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	129372		0.45	92.47	746.8	
Outfall Total with Controls	129375	0.00 %	0.45	92.47	746.8	0.00 %

Current File Output: Annualized Total
After Outfall Controls

194328	Years in Model Run:	0.67	1122
--------	---------------------	------	------

Print Output
Summary to Text
File

Print Output
Summary to .csv
File

Total Area Modeled (ac)

2.705

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall
Flow Duration
Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.45	Poor
With Controls	0.45	Poor

Buchner Park Pool
Infiltration Calculation



Calculation By: SES
Date: 2/27/2020

Total Site Area	2.705 acres
Rain Total	29.02 in
(Milwaukee Area 1969 annual rainfall 3/28/69 to 12/6/69)	

Existing Condition	
Total Runoff (ft3)*	129375 ft ³
Total Runoff (ac-ft)	2.97 acre-ft
Runoff Depth (ft)	1.10 ft
Runoff Depth (in)	13.18 in
Infiltration (in)	15.84 in
75 % INFILTRATION GOAL	11.88 in

Proposed Condition	
Total Runoff (ft3)*	141055 ft ³
Total Runoff (ac-ft)	3.24 acre-ft
Runoff Depth (ft)	1.20 ft
Runoff Depth (in)	14.37 in
Infiltration (in)	14.65 in
GOAL MET?	YES
% Infiltration:	92%

*Total Runoff from WinSLAMM Model Output Summary