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STORMWATER DESIGN REPORT

Casas Del Rio
Camden Lutheran Housing, Inc.

Ray, Borton and N. 10th Streets

Block 804, Lots 47-86
Block 805, Lots 1-40
City of Camden

Camden County, NJ

June 2024

Prepared by:

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Date: 6/28/2024

I. SUMMARY

This Report concerns the Stormwater Management System (SWMS) for the proposed subdivision of Block 804, Lots 47-86 lying between Ray and Borton Streets and Block 805, Lots 1-40 lying between Borton and North 10th Streets in the City of Camden, NJ. The total property area is 51,200 SF (1.175 acres).

EXISTING CONDITIONS (PRE-DEVELOPMENT)

The existing property is vacant and has been for some time having an impervious area of 0 SF (0%). Site grades are relatively flat varying from a high of 28.9 To a low of 27.0 generally sloping from the center of each block to the abutting streets and from the north (Elm Street) to the south (toward the lots fronting on Pearl Street).

The NRCS Soil Survey (provided in Appendix A) identifies the existing soil to be Urban Land (UR) which has is an HSG "D". Current land use is considered "Open Space, Good Condition (Grass Cover >75%)" with a CN Value of 80 for an HSG "D".

All stormwater runoff flows uncontrolled out the abutting streets.

PROPOSED CONDITIONS (POST-DEVELOPMENT)

The proposed development includes subdividing each block into 13 new lots and constructing new 2 story residential houses on each lot.

The area of proposed Lots 1 in each block (fronting on Elm Street) will be 1,972 SF (0.0453 acre) with an impervious area of 1,331 SF (67.5%), excluding the 210 SF porous paver car parking area which will recharge stormwater directly back into the ground.

All the other proposed lots will be 1,969 SF (0.0452 acres) with an impervious area of 1,330 SF (67.5%), excluding the 210 SF porous paver car parking area which will recharge stormwater directly back into the ground.

The proposed houses extend across the entire lot width of the properties.

Stormwater runoff from the front yards (197 SF comprised of the front door step/walk and grass/planting area) will flow overland to the sidewalk/curb/street gutter.

Stormwater runoff from the rear yards will flow to the pervious paving system under the parking area (587 SF) to recharge into the ground by means of a stone/pipe recharge system located below the parking areas, or overland to the sidewalk/curb/street gutter (175 SF planter area).

Stormwater runoff from the roof area (1,010 SF) will be directed into the stone/pipe recharge system located below the grass area.

The proposed Grass and Landscape Planting areas are considered "Open Space, Good Condition (Grass Cover >75%)" with a CN Value of 74 for an HSG "C" reflecting the new soils that will be constructed on.

STORMWATER MANAGEMENT SYSTEM DESIGN

The Stormwater System (SWMS) for each lot will include a stone/recharge system consisting of a pervious paving area 10.5' x 20' (the vehicle parking area) comprised of pervious pavers underlain with a 4" of #57 stone as a choker course (0.60' total thickness). The recharge area below will consist of two 30 LF lengths of 30" HDPE perforated pipe within 4.25' deep, 10.5' x 30' bed of AASHTO No.2 stone. The total depth of the system will be 4.85'

Overflow from the system is provided by a 6" SDR35 pipe system in the upper 0.5' of No. 2 stone bed which outfalls at a 2% minimum slope to the combined sewer system in Borton Street.

Stormwater from the roof area will be directed by a 6" SDR35 pipe at 2% minimum slope into one of the 30" HDPE perforated pipes at a point nearest to the rear of the house.

Preliminary soil testing indicates that the soil infiltration rates on the site range from 0.34 to 3.16 inches per hour with depth to high water of 4' to 9.2'. Accordingly, the systems on some lots will function properly with no extra-ordinary measures required while the systems on other lots may require an underdrain (2" perforated pipe), and/or excavation of the existing soil to a point as much as 4' below the bottom of the proposed system. Details for a range of possible systems is included on the design plans. The final design to be used for each property will be determined based on soil testing at each system location to be undertaken as part of the individual lot site plan preparation.

DESIGN REQUIREMENTS

The project will disturb approximately 82,955 SF (1.90 acres) including work within the public right-of-way and street pavement reconstruction/resurfacing, and will create 34,580 SF of new impervious area and thus the project is subject to the New Jersey Stormwater requirements outlined in N.J.A.C 7:8-1.2 (July 2023), and the City of Camden Stormwater Ordinance. Stormwater management is proposed for this project to meet the requirements of N.J.A.C 7:8 (July 2023).

In accordance with Green Infrastructure standards set forth in N.J.A.C.7:8-5.3 and City requirements, Green Infrastructure BMP's shall be used as identified in Table 5.1 at N.J.A.C. 7:8-5.2(f) and/or alternative stormwater management measures approved in accordance with N.J.A.C. 7:8-5.2(g).

In accordance with Groundwater Recharge standards set forth in N.J.A.C 7:8-5.4(b)2 and City requirements, the groundwater recharge requirements do not apply to the project because the project is in an Urban Redevelopment Area.

In accordance with Stormwater Runoff Quality standards set forth in N.J.A.C 7:8-5.5(a) and City requirements, the groundwater recharge requirements do not apply to the project because the project will result in an increase of 5,460 SF (0.125 acres) of regulated motor vehicle surface which is less than the 0.25 acres or more increase that triggers this requirement.

In accordance with the Stormwater Runoff Quantity standards set forth in N.J.A.C 7:8-5.6(b)3 and City requirements, there will be an increase in stormwater runoff quantity for the 2-, 10- and 100-year storm events and therefore a stormwater management system (SWMS) is being proposed to reduce the post-development peak flows to less than 50%, 75% and 80% (respectively) of the pre-development peak flows.

In accordance with the green infrastructure standards set forth in N.J.A.C 7:8-5.3(d) and City requirements, a pervious paving system in the proposed parking area (210 SF) is proposed which complies with the BMP methods listed in Table 5-1.

STORMWATER MANAGEMENT APPROACH

Drainage Areas

Each of the 26 proposed lots are considered separate drainage areas as they do not combine with other lots within the project. As each lot is identical (except for 3 SF additional area on Lots 1 in each block), a single hydrograph analysis for one "representative lot" is used for calculation of the peak flows from a "representative lot."

Since front and rear yards flow separately to the abutting street systems and do not combine on the lot, the point of interest is taken at "hypothetical point" calculated by adding the calculated stormwater runoff from the front and rear yard areas.

The pre-development condition drainage area for the "representative" lot is shown in Figure 3. This area is identified as Node 1EX in the HydroCAD model.

The post-development condition drainage area for the "representative" lot is shown in Figure 4. The individual subareas are identified as:

- Node 2PR in HydroCAD model (Proposed Roof to SWMS, Rear Yard)
- Node 3PR in HydroCAD model (Proposed Parking Area to SWMS, Rear Yard)
- Node 4PR in HydroCAD model (Proposed Patio/Sidewalk to SWMS, Rear Yard)
- Node 5PR in HydroCAD model (Proposed RY Grass to SWMS, Rear Yard)
- Node 6PR in HydroCAD model (Proposed RY Landscaping, Rear Yard)
- Node 7PR in HydroCAD model (Proposed Front Yard))

NRCS Methodology

In accordance with N.J.A.C 7:8-5.7, stormwater runoff is calculated using the USDA Natural Resources Conservation Service (NRCS) Methodology. Pre-development and post-development hydrographs are developed for each drainage area/subarea described in the previous section using an area, hydrologic soil group (HSG), land cover, rainfall depth and time of concentration. A table summarizing the area, HSG, and land cover with curve numbers for the pre- and post-development conditions is provided in Appendices B and C.

The HydroCAD computer software was utilized to undertake the NRCS Methodology calculations.

The time of concentration for all areas is taken as 6 minutes (NRCS minimum) for each subarea.

In accordance with N.J.A.C 7:8-5.6, stormwater analysis must be performed for current and projected storm events, as defined and determined pursuant with N.J.A.C 7:8-5.7(c) and (d). The analysis used is based on the county-specific New Jersey 24-hour rainfall frequency data for Camden County as provided in Table 5-1 of the New Jersey Stormwater Best Management Practices Manual (July 2023) because it has larger depths than the site specific rainfall data from NOAA Atlas 14 and, therefore, results in a more conservative design. The rainfall depths are provided in the Table below with design current and future rainfall depths in bold.

Design Rainfall Depths

Design Storm Event	Site Specific Rainfall Depth (NOAA Atlas 14, Vol2, Ver3 (inches)	Table 5-1: County Specific Rainfall (inches), Camden	Current Adj. Factor Camden	Current Rainfall (inches)	Future Adj. Factor Camden	Future Rainfall (inches)
2-year	3.28	3.31	1.03	**3.41**	1.18	**3.91**
10-year	5.98	5.06	1.04	**5.26**	1.22	**6.17**
100-year	7.92	8.52	1.05	**8.95**	1.39	**11.84**

The hydrograph summaries calculated with the NRCS methodology using the HydroCAD computer software are provided in Appendix B for the Current Rainfall Conditions and in Appendix C for the Future Rainfall Conditions.

Stormwater Runoff Quality

Although the project will not increase the regulated motor vehicle surface area by 0.25 acres or more and runoff quality measures are not required, stormwater runoff from the total of 5,460 SF (0.125 acres) of vehicle parking area (210 SF per lot) will all be treated for water quality by the proposed pervious paving with recharge into the ground by means of a stone/pipe recharge system located below the parking pervious paving area.

Green Infrastructure

Stormwater runoff from the rear yard will incorporate a pervious paving system (an allowable BMP in Table 5-1) under the parking area to recharge runoff from the vehicle parking area and the adjacent impervious and grass areas into the ground by means of a stone/pipe recharge system located below the parking areas. For each lot, the pervious paving area is 210 SF with an additional patio/sidewalk/grass area draining of 379 SF. This additional area is 1.8x the pervious paving area which is less than the maximum allowed of 3x.

Therefore, the project complies with N.J.A.C 7:8-5.6(b)3 and City requirements.

Stormwater Runoff Quantity

The table below shows a comparison of peak flow rates for pre- and post-development for a "representative lot" at Node POI in the HydroCAD model.

The post-development peak flow rates for under Current and Projected Rainfall Conditions for the 2-, 10- and 100-year storm events do not exceed the pre-development peak flow rates.

Therefore, the project complies with N.J.A.C 7:8-5.3(d) and City requirements.

CURRENT RAINFALL

Storm Event	Pre-Developed Peak Flow	Allowed Maximum Rate	Post-Developed Peak Flow
2-year	0.11	0.055 (50%)	0.02
10-year	0.14	0.105 (75%)	0.03
100-year	0.39	0.312 (80%)	0.23

PROJECTED RAINFALL

Storm Event	Pre-Developed Peak Flow	Allowed Maximum Rate	Post-Developed Peak Flow
2-year	0.14	0.17 (50%)	0.03
10-year	0.18	0.135 (75%)	0.03
100-year	0.41	0.328 (80%)	0.29

STORMWATER CONVEYANCE SYSTEM

The existing sewer in Borton Street is a 10" VCP combined sewer. Due to the unknown condition of the existing pipe and the need for new sanitary and storm overflow pipe connections from each house, the existing pipe will be replaced with a new 10" SDR35 pipe. The new pipe will be constructed at the same grade as the existing pipe between the two existing manholes and be extended an additional 60LF toward Elm Street to service Lots 1, 2 and 3 in each Block, terminating in a new manhole.

CONCLUSION

The proposed stormwater management system meets the requirements of N.J.A.C 7:8 that are applicable at the time of the initial application to the City, as well as the City of Camden requirements, by managing the post-development peak discharge rates to not exceed the allowed percentage of the pre-development peak flows.

As a result, the proposed development meets the intent of the state and city requirements and will have no adverse impact on the existing stormwater conveyance system that services the site and adjacent properties.

OPERATIONS AND MAINTENANCE MANUAL

Each property will have its own SWMS with the responsibility for maintenance lying with each individual property owner.

As shown on Sheets C-301 and C-302 of the Site Plans:

1. The property owner of each individual lot is responsible for maintaining the stormwater management system, overflow pipe and house sanitary pipe for that lot to the point of connection with the street main.

2. Visual inspections shall be made at least annually as well as after every storm exceeding two (2) inches of rainfall. Any accumulated debris shall be removed immediately so that the system operates as designed. All work shall be done by a qualified contractor complying with OSHA standards with removal and disposal of materials in compliance with all local, state and federal laws.

3. All structural components must be inspected for cracking, subsidence, breaching, wear and deterioration at least annually. The condition of the surrounding and above lying materials shall be inspected for evidence of potential failures or deterioration.

4. Routine maintenance of the system should typically be undertaken by 2 people for safety considerations. Equipment anticipated for may include a jet vacuum vehicle, shovels, lighting equipment and wheel barrel or truck for hauling away debris. No manufacturer's instructions or user manuals are available for the maintenance of these components. Water, mosquito control chemicals, paver or pipe component replacement may also be required depending on the condition of the components.

5. Maintenance records must be maintained on-site for a minimum period of three years.

FIGURES

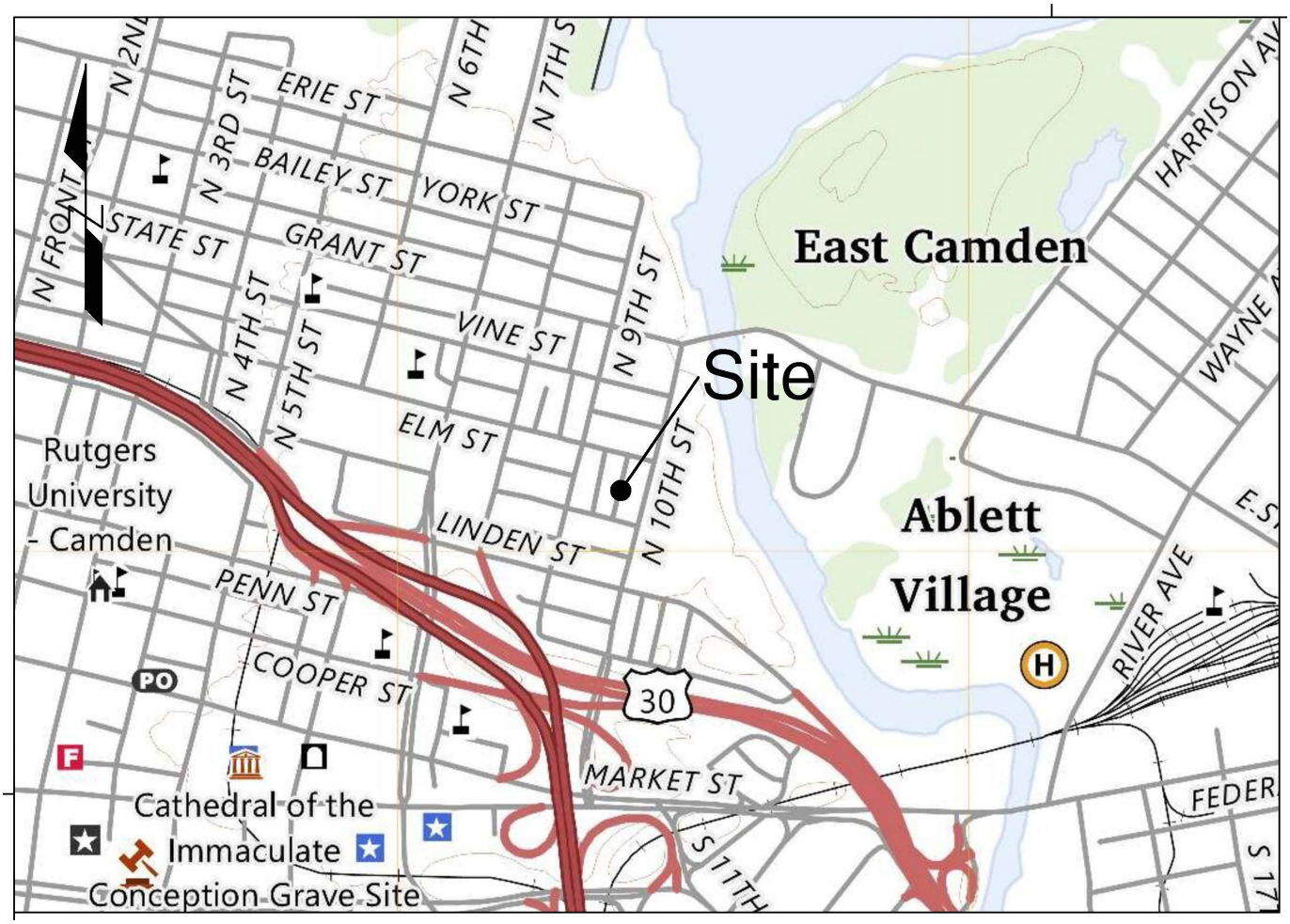
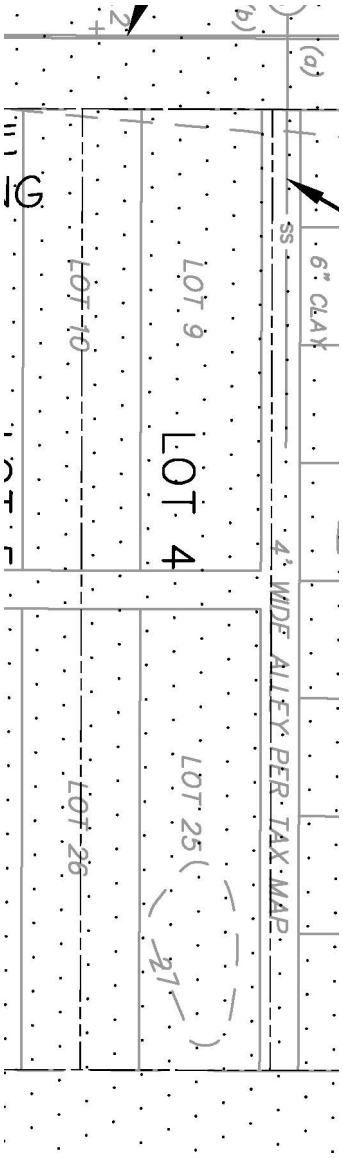


Figure 1 - Location Map

(Source: USGS Quad)

Figure 2 - NRCS Soils Map



Lot Area = 1,969 SF

Existing Ground Cover - "Open Space, Good Condition (Grass Cover >75%)"

Figure 3 - Pre-Development Condition Drainage Area Map (Typical Lot)

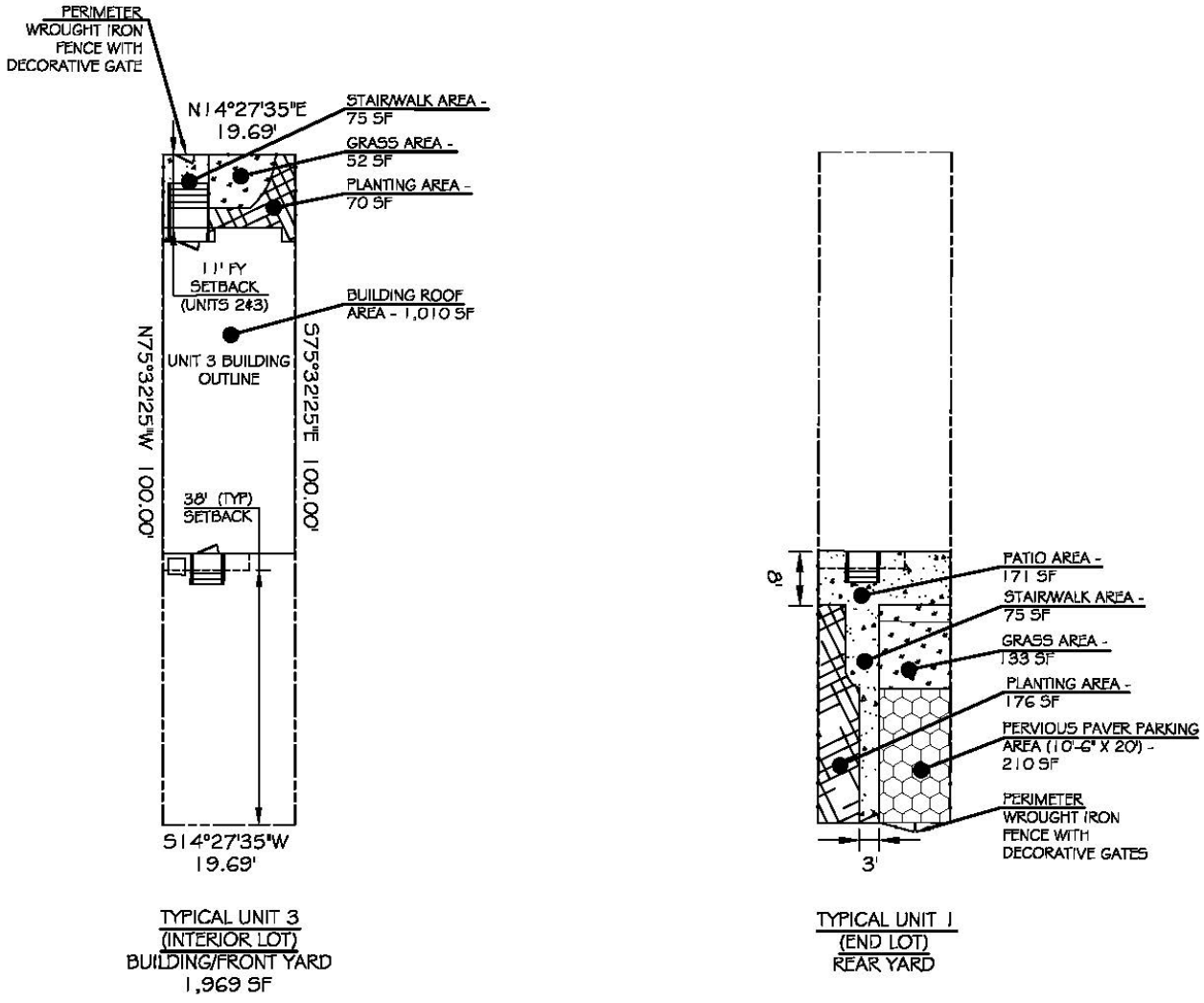


Figure 4 - Post-Development Condition Drainage Area Map (Typical Lot)

APPENDIX A

NRCS Soils Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Camden County, New Jersey

Casas Del Rio, Blocks 804 & 805

June 24, 2024

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Map Scale: 1:730 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 35 70 140 210

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Camden County, New Jersey
Survey Area Data: Version 17, Aug 28, 2023

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

Date(s) aerial images were photographed: Jun 5, 2022—Jul 4, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
UR	Urban land	1.5	100.0%
Totals for Area of Interest		**1.5**	**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.

Camden County, New Jersey

UR—Urban land

Map Unit Setting

National map unit symbol: rvrf
Elevation: 0 to 170 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Interpretive groups

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

Minor Components

Udorthents

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

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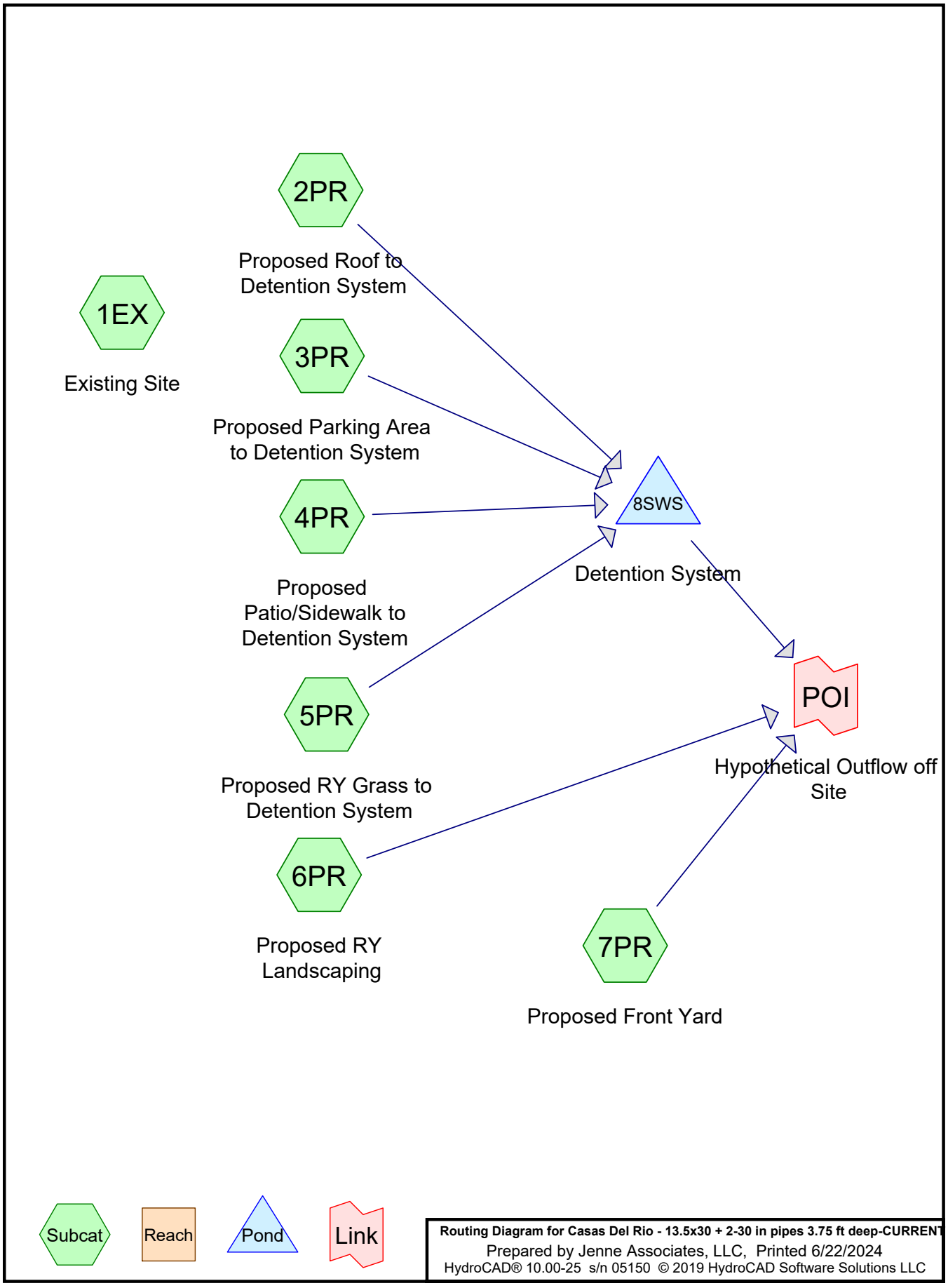
APPENDIX B

Pre- and Post-Development Hydrograph Analysis

Current Rainfall



Routing Diagram for Casas Del Rio - 13.5x30 + 2-30 in pipes 3.75 ft deep-CURRENT

Prepared by Jenne Associates, LLC, Printed 6/22/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.007	74	>75% Grass cover, Good, HSG C (Replaced Soil) (5PR, 6PR)
0.003	80	>75% Grass cover, Good, HSG C (Replaced Soil) (7PR)
0.045	80	>75% Grass cover, Good, HSG D (1EX)
0.002	98	Concrete Sidewalk (7PR)
0.006	98	Impervious Concrete (4PR)
0.023	98	Impervious Roof (2PR)
0.005	98	Pervious Pavers (3PR)
0.091	**87**	**TOTAL AREA**

Time span=1.00-24.00 hrs, dt=0.03 hrs, 768 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1EX: Existing Site Runoff Area=1,972 sf 0.00% Impervious Runoff Depth>1.56"
Tc=10.0 min CN=80 Runoff=0.11 cfs 0.006 af

Subcatchment 2PR: Proposed Roof to Runoff Area=1,010 sf 100.00% Impervious Runoff Depth>3.17"
Tc=10.0 min CN=98 Runoff=0.10 cfs 0.006 af

Subcatchment 3PR: Proposed Parking Area Runoff Area=210 sf 100.00% Impervious Runoff Depth>3.17"
Tc=10.0 min CN=98 Runoff=0.02 cfs 0.001 af

Subcatchment 4PR: Proposed Runoff Area=246 sf 100.00% Impervious Runoff Depth>3.17"
Tc=10.0 min CN=98 Runoff=0.02 cfs 0.001 af

Subcatchment 5PR: Proposed RY Grass to Runoff Area=133 sf 0.00% Impervious Runoff Depth>1.17"
Tc=10.0 min CN=74 Runoff=0.01 cfs 0.000 af

Subcatchment 6PR: Proposed RY Landscaping Runoff Area=176 sf 0.00% Impervious Runoff Depth>1.17"
Tc=10.0 min CN=74 Runoff=0.01 cfs 0.000 af

Subcatchment 7PR: Proposed Front Yard Runoff Area=197 sf 38.07% Impervious Runoff Depth>2.10"
Tc=10.0 min CN=87 Runoff=0.01 cfs 0.001 af

Pond 8SWS: Detention System Peak Elev=21.98' Storage=400 cf Inflow=0.15 cfs 0.009 af
Outflow=0.00 cfs 0.000 af

Link POI: Hypothetical Outflow off Site Inflow=0.02 cfs 0.001 af
Primary=0.02 cfs 0.001 af

Total Runoff Area = 0.091 ac Runoff Volume = 0.016 af Average Runoff Depth = 2.16"
60.93% Pervious = 0.055 ac 39.07% Impervious = 0.035 ac

Summary for Subcatchment 1EX: Existing Site

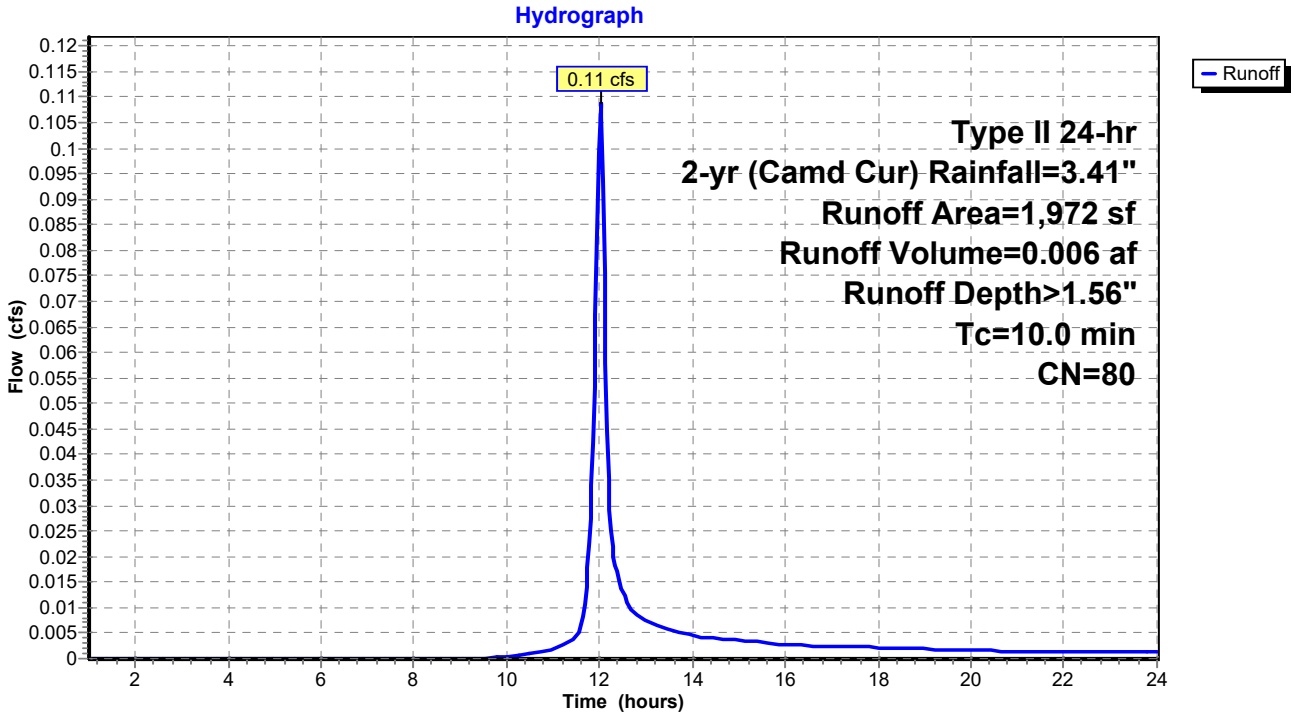
Runoff = 0.11 cfs @ 12.02 hrs, Volume= 0.006 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Cur) Rainfall=3.41"

	Area (sf)	CN	Description
*	1,972	80	>75% Grass cover, Good, HSG D
	1,972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 1EX: Existing Site



Summary for Subcatchment 2PR: Proposed Roof to Detention System

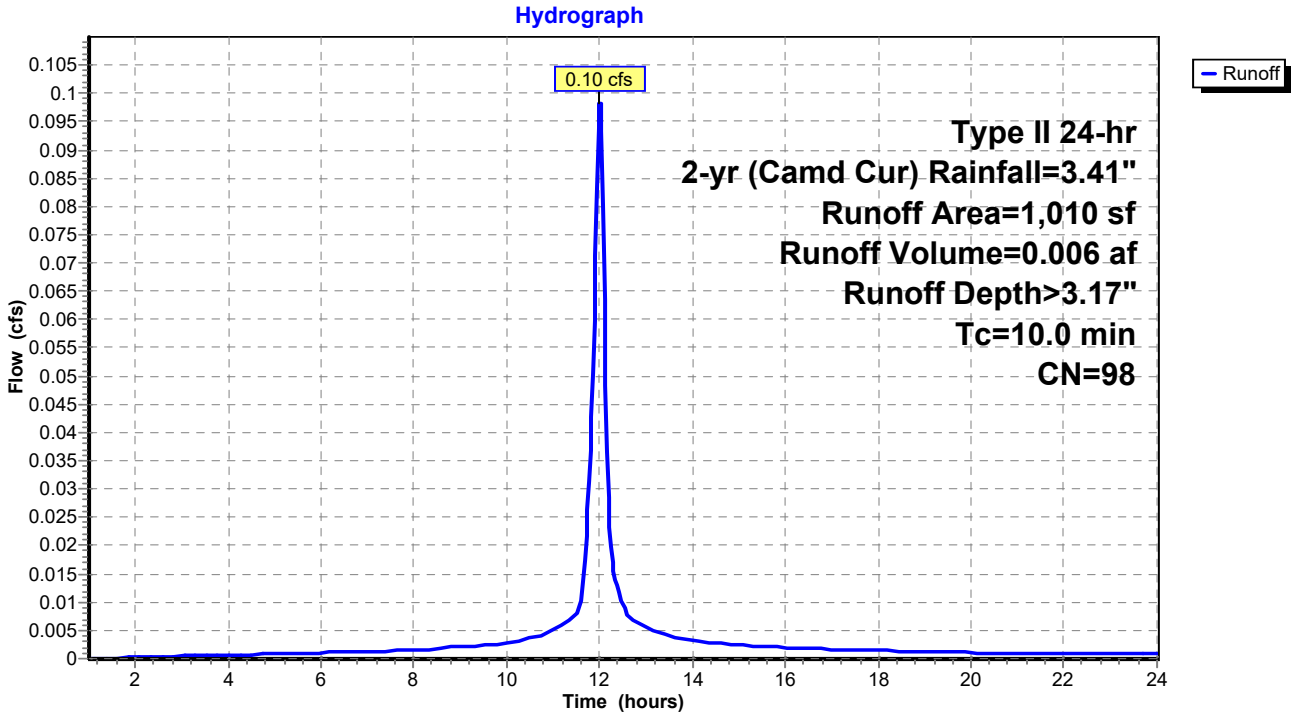
Runoff = 0.10 cfs @ 12.01 hrs, Volume= 0.006 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Cur) Rainfall=3.41"

	Area (sf)	CN	Description
*	1,010	98	Impervious Roof
	1,010		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 2PR: Proposed Roof to Detention System



Summary for Subcatchment 3PR: Proposed Parking Area to Detention System

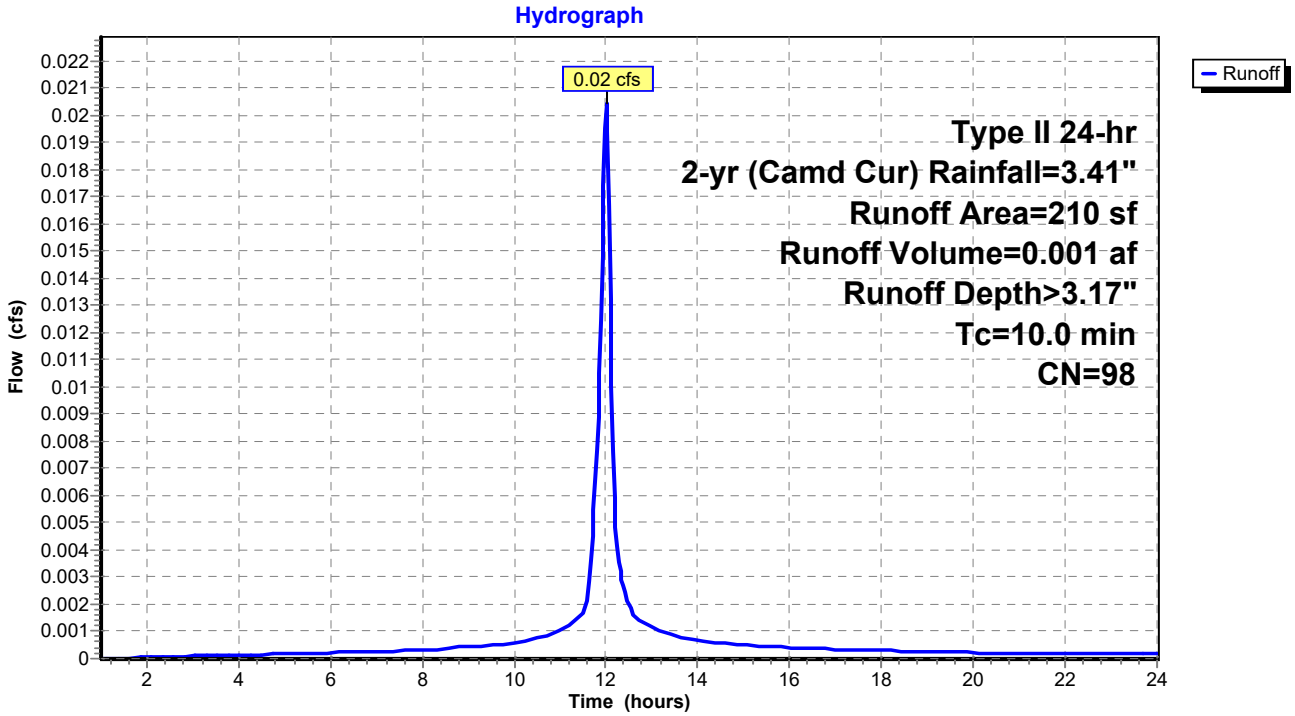
Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Cur) Rainfall=3.41"

	Area (sf)	CN	Description
*	210	98	Pervious Pavers
	210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 3PR: Proposed Parking Area to Detention System



Summary for Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System

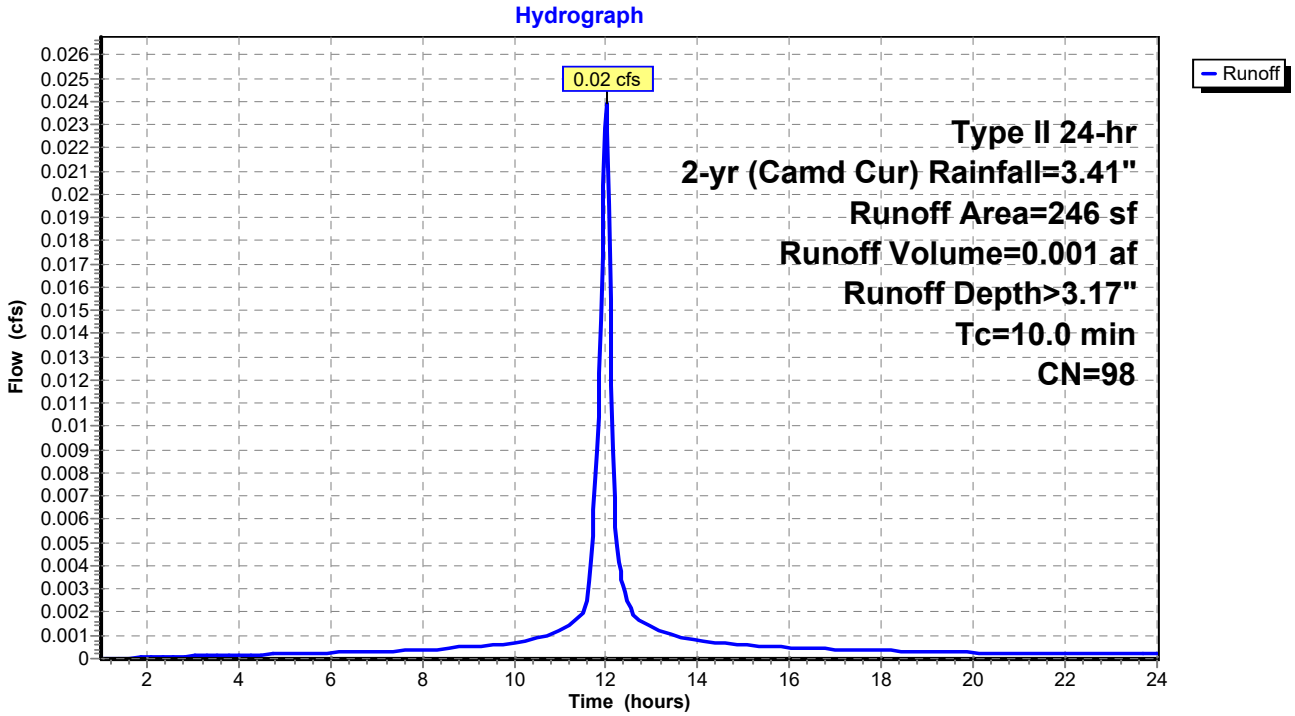
Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Cur) Rainfall=3.41"

	Area (sf)	CN	Description
*	246	98	Impervious Concrete
	246		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System



Summary for Subcatchment 5PR: Proposed RY Grass to Detention System

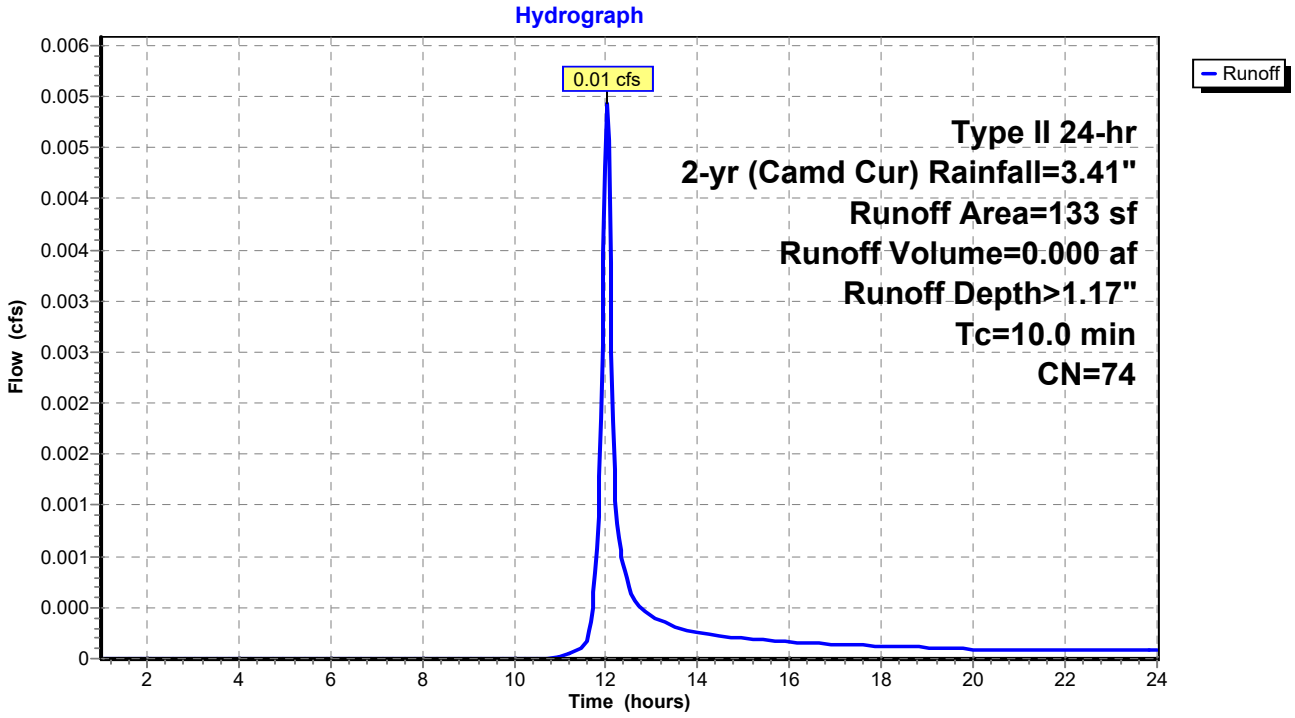
Runoff = 0.01 cfs @ 12.02 hrs, Volume= 0.000 af, Depth> 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Cur) Rainfall=3.41"

	Area (sf)	CN	Description
*	133	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	133		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 5PR: Proposed RY Grass to Detention System



Summary for Subcatchment 6PR: Proposed RY Landscaping

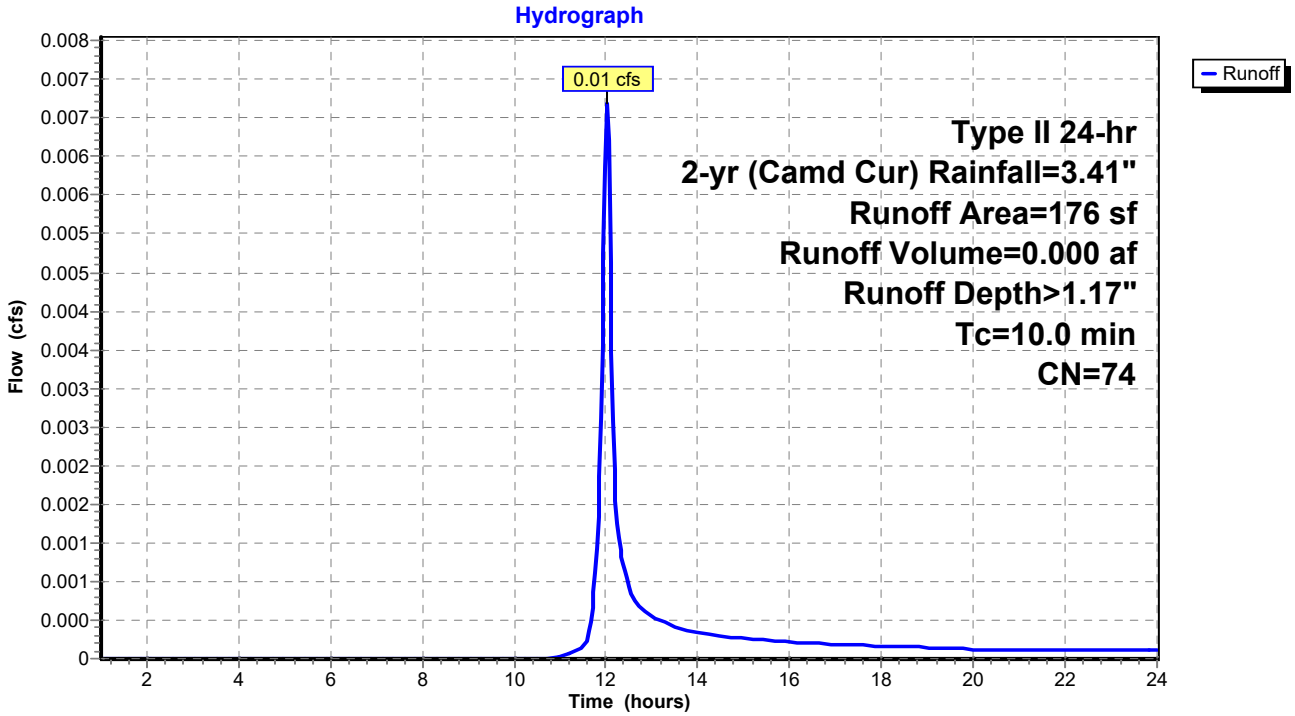
Runoff = 0.01 cfs @ 12.02 hrs, Volume= 0.000 af, Depth> 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Cur) Rainfall=3.41"

	Area (sf)	CN	Description
*	176	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	176		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 6PR: Proposed RY Landscaping



Summary for Subcatchment 7PR: Proposed Front Yard

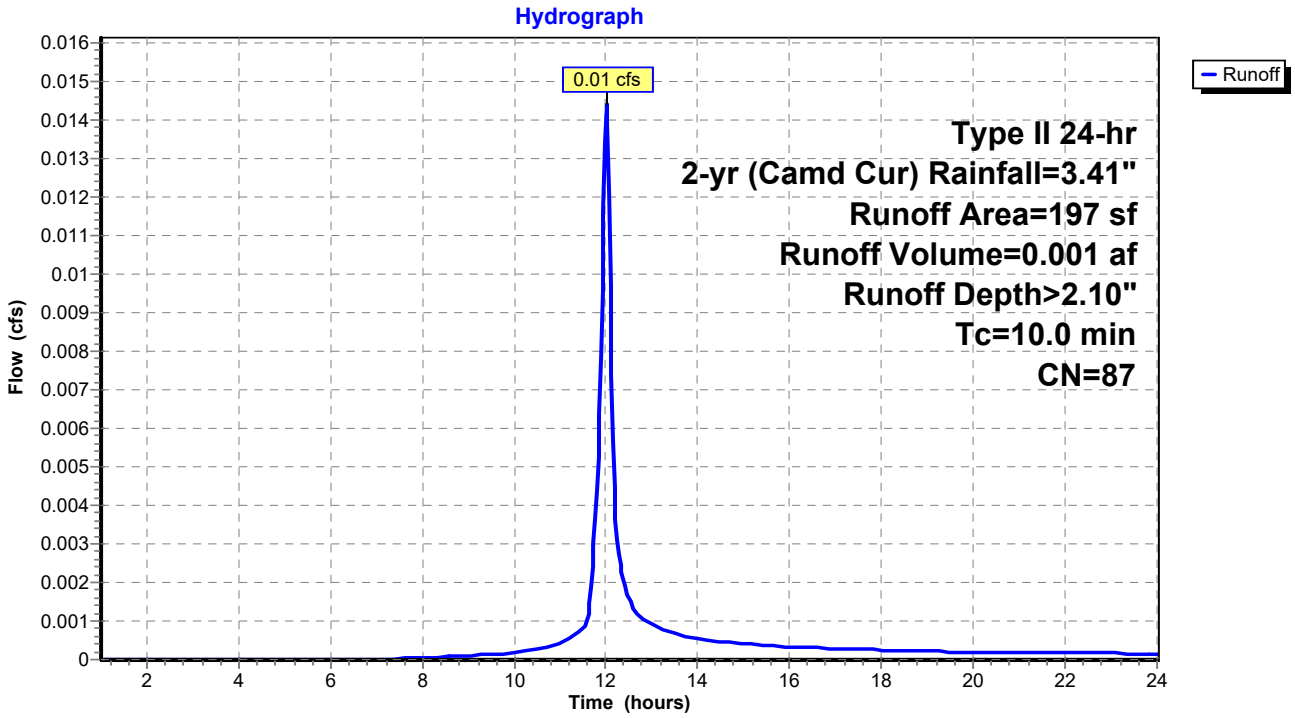
Runoff = 0.01 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Cur) Rainfall=3.41"

	Area (sf)	CN	Description
*	75	98	Concrete Sidewalk
*	122	80	>75% Grass cover, Good, HSG C (Replaced Soil)
	197	87	Weighted Average
	122		61.93% Pervious Area
	75		38.07% Impervious Area

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

Subcatchment 7PR: Proposed Front Yard



Summary for Pond 8SWS: Detention System

[92] Warning: Device #1 is above defined storage

Inflow Area = 0.037 ac, 91.68% Impervious, Inflow Depth > 3.01" for 2-yr (Camd Cur) event
Inflow = 0.15 cfs @ 12.01 hrs, Volume= 0.009 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs / 8
Peak Elev= 21.98' @ 24.01 hrs Surf.Area= 315 sf Storage= 400 cf

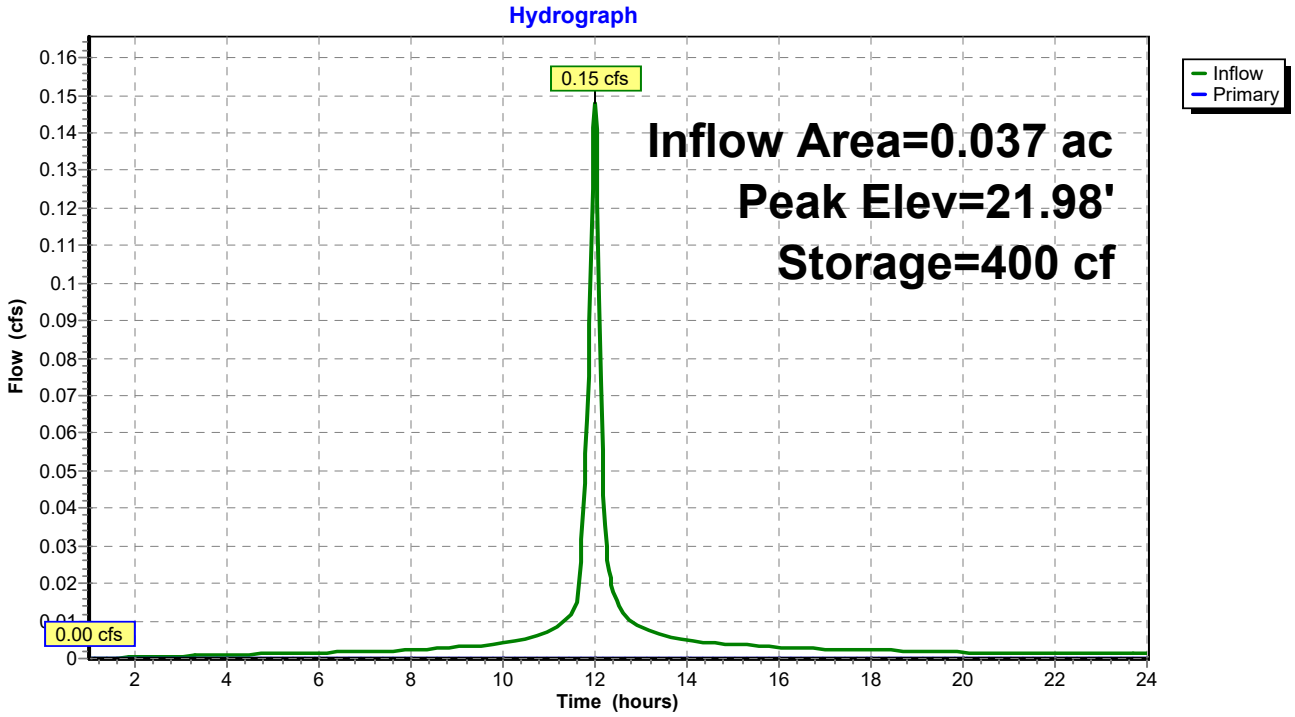
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	355 cf	**10.50'W x 30.00'L x 3.75'H 10.5' x 30' Stone 3.75' Deep** 1,181 cf Overall - 295 cf Embedded = 887 cf x 40.0% Voids
#2	20.00'	295 cf	**30.0" Round 2 @ 30' Perf 30" HDPE** x 2 Inside #1 L= 30.0'
		649 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	23.75'	**6.0" Vert. 6" Overflow Pipe** C= 0.600

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=20.00' (Free Discharge)
↑—**1=6" Overflow Pipe** (Controls 0.00 cfs)

Pond 8SWS: Detention System

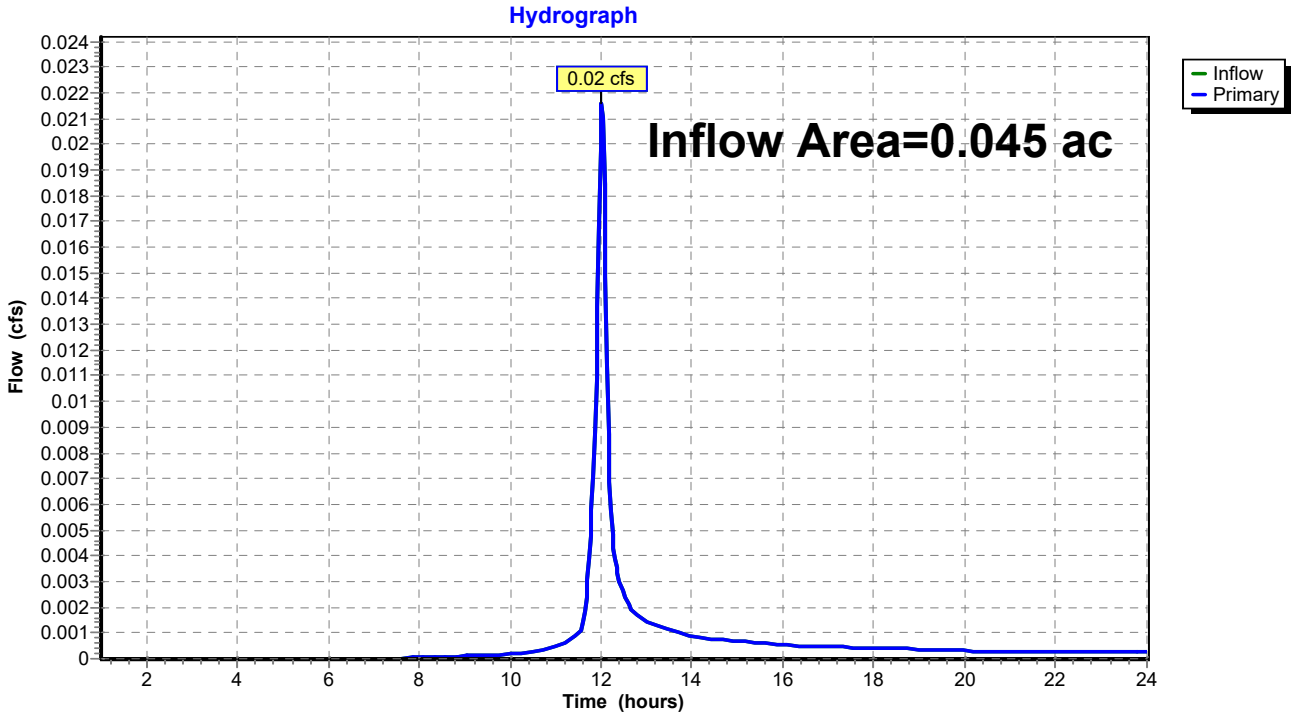


Summary for Link POI: Hypothetical Outflow off Site

Inflow Area = 0.045 ac, 78.14% Impervious, Inflow Depth > 0.31" for 2-yr (Camd Cur) event
Inflow = 0.02 cfs @ 12.02 hrs, Volume= 0.001 af
Primary = 0.02 cfs @ 12.02 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs

Link POI: Hypothetical Outflow off Site



Time span=1.00-24.00 hrs, dt=0.03 hrs, 768 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1EX: Existing Site Runoff Area=1,972 sf 0.00% Impervious Runoff Depth>3.12"
Tc=10.0 min CN=80 Runoff=0.14 cfs 0.012 af

Subcatchment 2PR: Proposed Roof to Runoff Area=1,010 sf 100.00% Impervious Runoff Depth>5.02"
Tc=10.0 min CN=98 Runoff=0.10 cfs 0.010 af

Subcatchment 3PR: Proposed Parking Area Runoff Area=210 sf 100.00% Impervious Runoff Depth>5.02"
Tc=10.0 min CN=98 Runoff=0.02 cfs 0.002 af

Subcatchment 4PR: Proposed Runoff Area=246 sf 100.00% Impervious Runoff Depth>5.02"
Tc=10.0 min CN=98 Runoff=0.03 cfs 0.002 af

Subcatchment 5PR: Proposed RY Grass to Runoff Area=133 sf 0.00% Impervious Runoff Depth>2.57"
Tc=10.0 min CN=74 Runoff=0.01 cfs 0.001 af

Subcatchment 6PR: Proposed RY Landscaping Runoff Area=176 sf 0.00% Impervious Runoff Depth>2.57"
Tc=10.0 min CN=74 Runoff=0.01 cfs 0.001 af

Subcatchment 7PR: Proposed Front Yard Runoff Area=197 sf 38.07% Impervious Runoff Depth>3.81"
Tc=10.0 min CN=87 Runoff=0.02 cfs 0.001 af

Pond 8SWS: Detention System Peak Elev=23.69' Storage=641 cf Inflow=0.16 cfs 0.015 af
Outflow=0.00 cfs 0.000 af

Link POI: Hypothetical Outflow off Site Inflow=0.03 cfs 0.002 af
Primary=0.03 cfs 0.002 af

Total Runoff Area = 0.091 ac Runoff Volume = 0.029 af Average Runoff Depth = 3.81"
60.93% Pervious = 0.055 ac 39.07% Impervious = 0.035 ac

Summary for Subcatchment 1EX: Existing Site

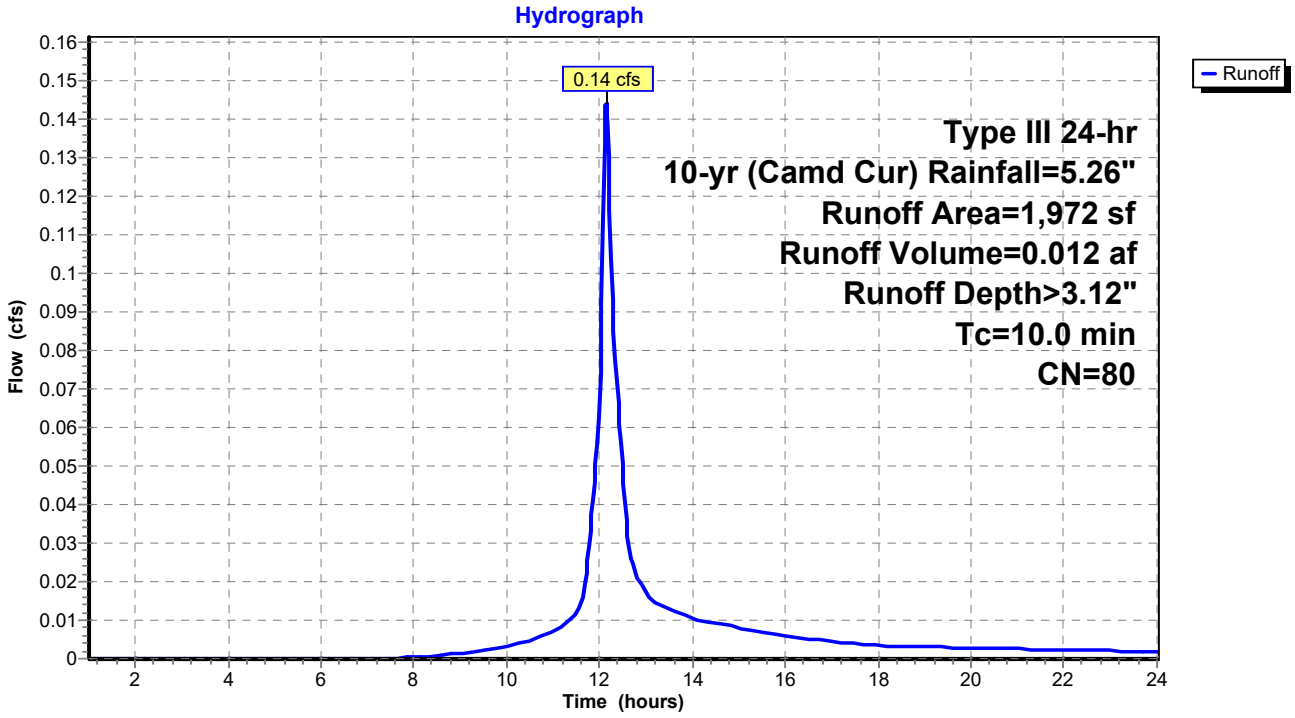
Runoff = 0.14 cfs @ 12.14 hrs, Volume= 0.012 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Cur) Rainfall=5.26"

	Area (sf)	CN	Description
*	1,972	80	>75% Grass cover, Good, HSG D
	1,972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 1EX: Existing Site



Summary for Subcatchment 2PR: Proposed Roof to Detention System

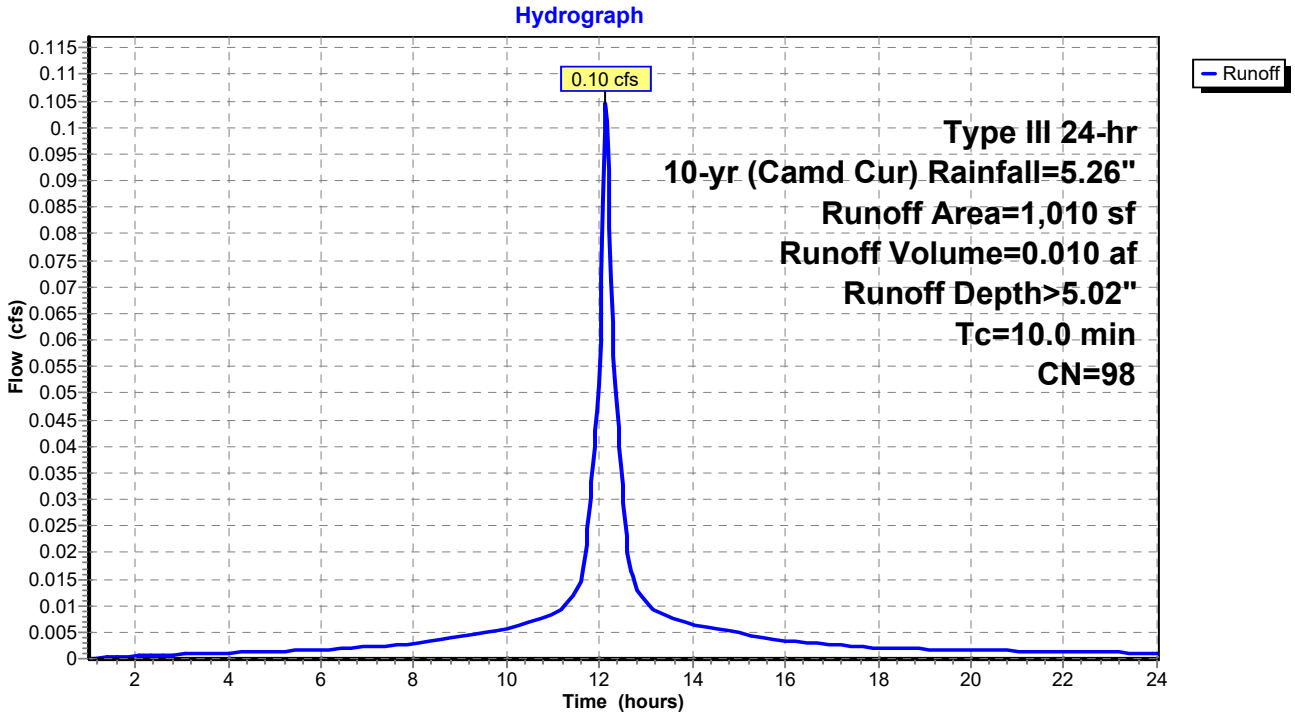
Runoff = 0.10 cfs @ 12.13 hrs, Volume= 0.010 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Cur) Rainfall=5.26"

	Area (sf)	CN	Description
*	1,010	98	Impervious Roof
	1,010		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 2PR: Proposed Roof to Detention System



Summary for Subcatchment 3PR: Proposed Parking Area to Detention System

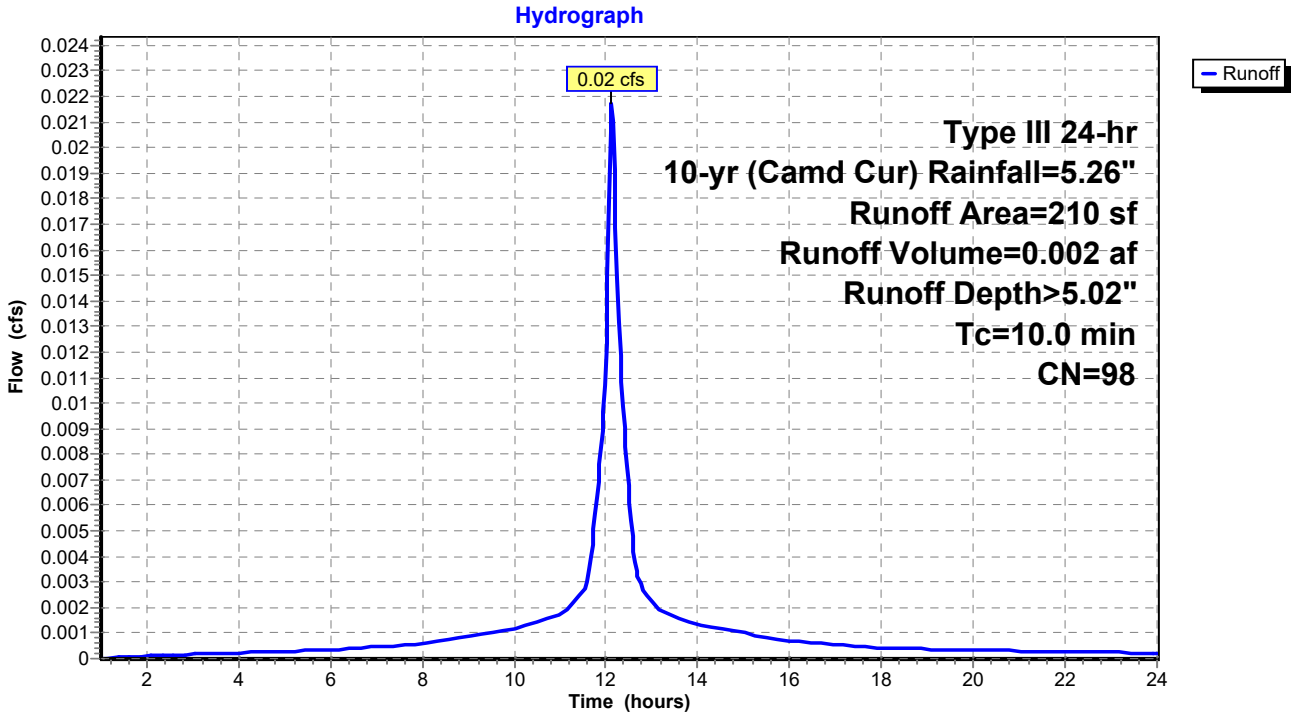
Runoff = 0.02 cfs @ 12.13 hrs, Volume= 0.002 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Cur) Rainfall=5.26"

	Area (sf)	CN	Description
*	210	98	Pervious Pavers
	210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 3PR: Proposed Parking Area to Detention System



Summary for Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System

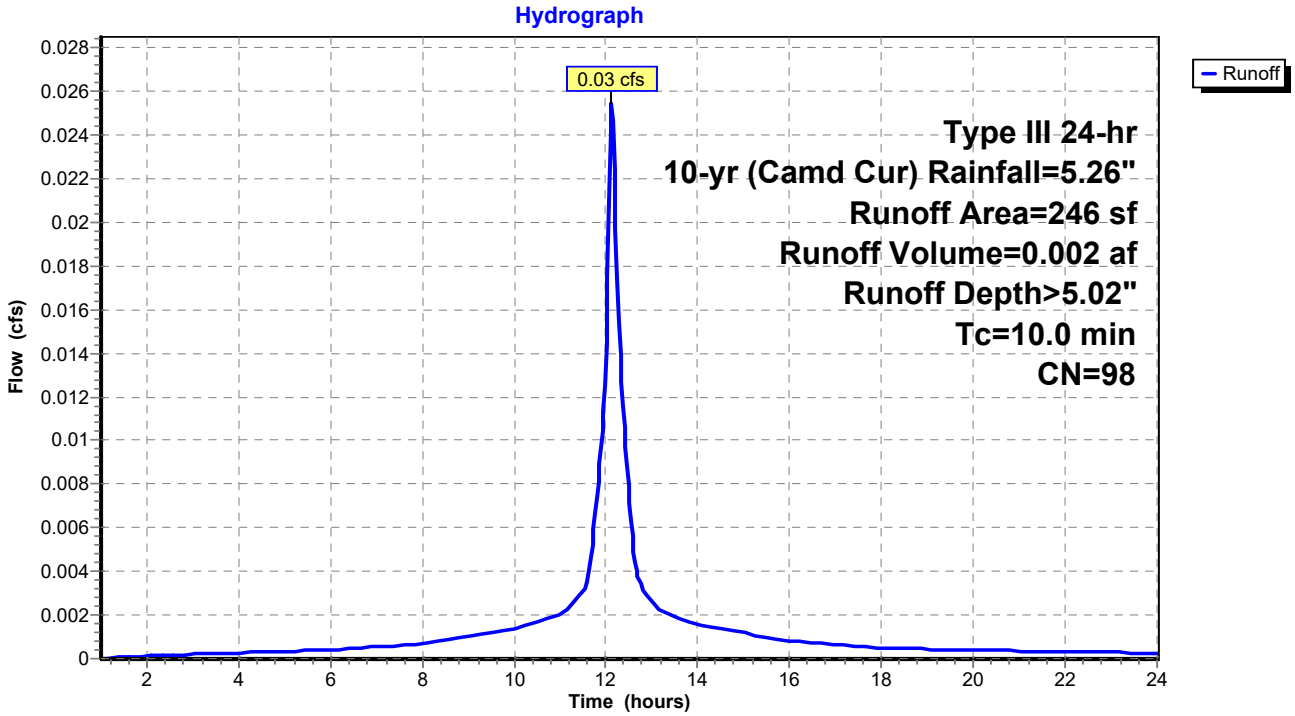
Runoff = 0.03 cfs @ 12.13 hrs, Volume= 0.002 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Cur) Rainfall=5.26"

	Area (sf)	CN	Description
*	246	98	Impervious Concrete
	246		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System



Summary for Subcatchment 5PR: Proposed RY Grass to Detention System

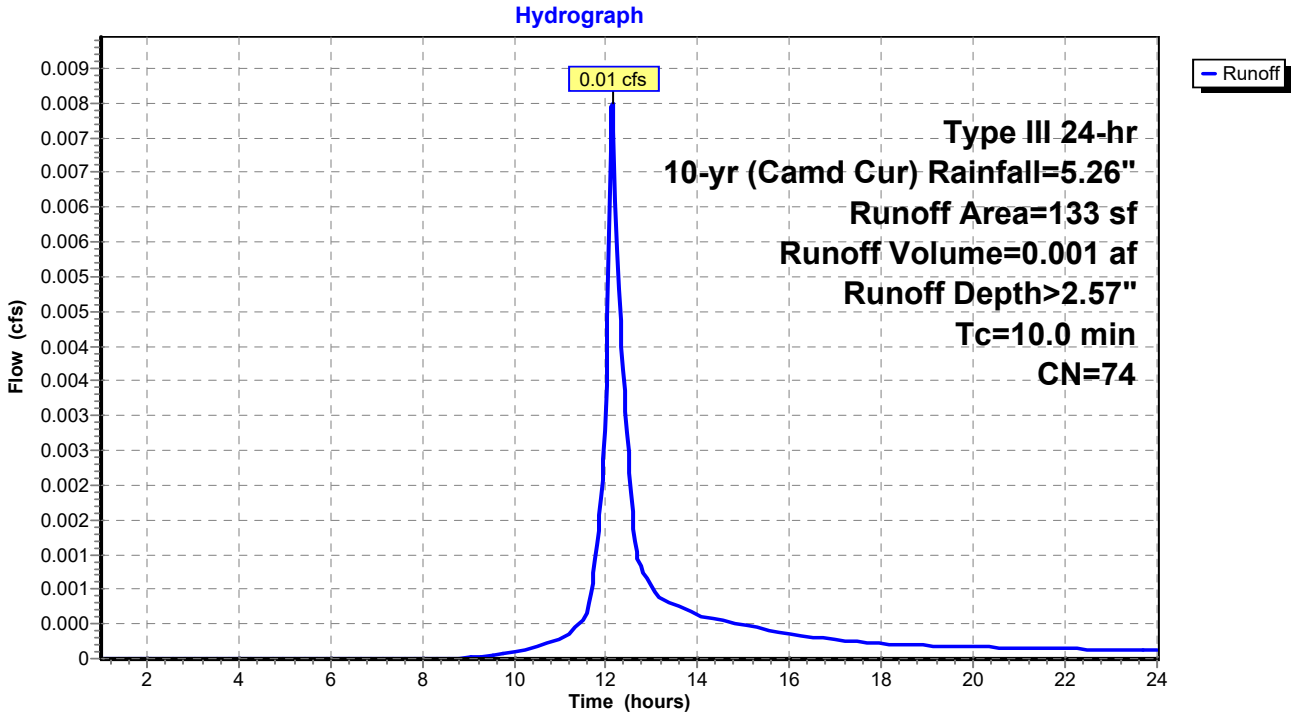
Runoff = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af, Depth> 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Cur) Rainfall=5.26"

	Area (sf)	CN	Description
*	133	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	133		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 5PR: Proposed RY Grass to Detention System



Summary for Subcatchment 6PR: Proposed RY Landscaping

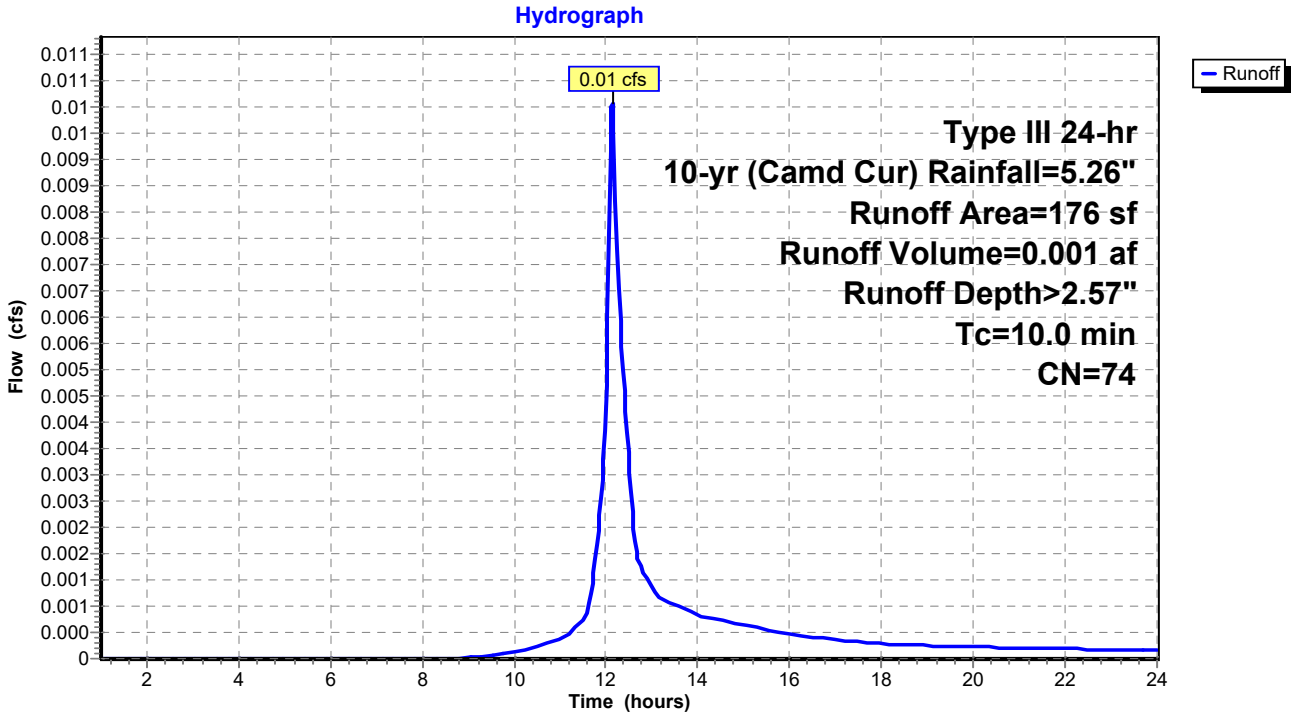
Runoff = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af, Depth> 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Cur) Rainfall=5.26"

	Area (sf)	CN	Description
*	176	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	176		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 6PR: Proposed RY Landscaping



Summary for Subcatchment 7PR: Proposed Front Yard

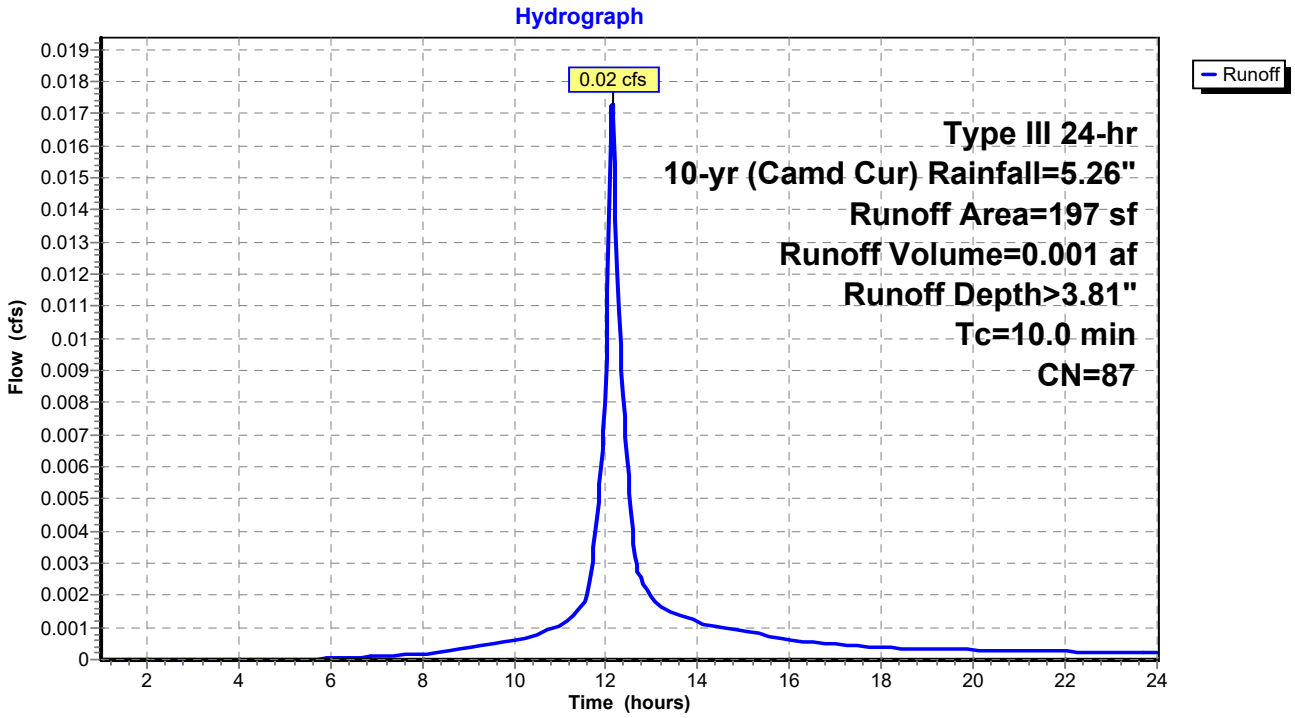
Runoff = 0.02 cfs @ 12.14 hrs, Volume= 0.001 af, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Cur) Rainfall=5.26"

	Area (sf)	CN	Description
*	75	98	Concrete Sidewalk
*	122	80	>75% Grass cover, Good, HSG C (Replaced Soil)
	197	87	Weighted Average
	122		61.93% Pervious Area
	75		38.07% Impervious Area

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

Subcatchment 7PR: Proposed Front Yard



Summary for Pond 8SWS: Detention System

[92] Warning: Device #1 is above defined storage

Inflow Area = 0.037 ac, 91.68% Impervious, Inflow Depth > 4.81" for 10-yr (Camd Cur) event
Inflow = 0.16 cfs @ 12.13 hrs, Volume= 0.015 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs / 8
Peak Elev= 23.69' @ 24.01 hrs Surf.Area= 315 sf Storage= 641 cf

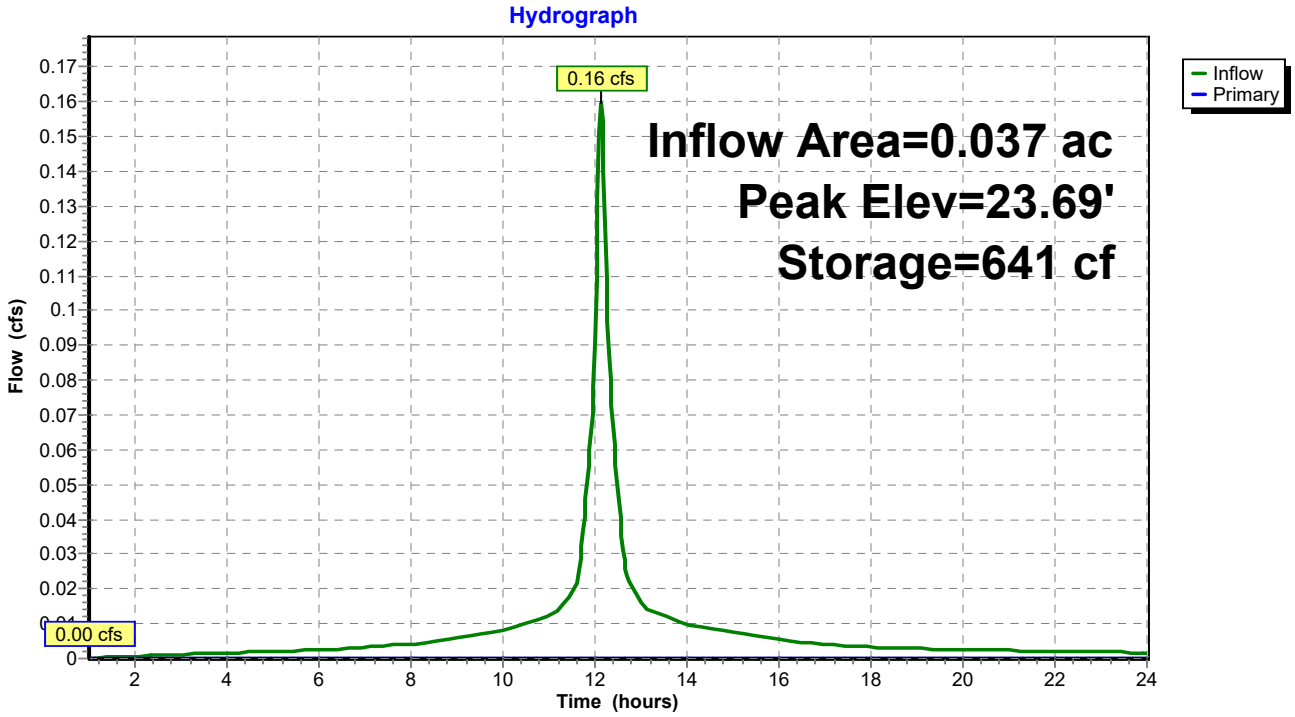
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	355 cf	**10.50'W x 30.00'L x 3.75'H 10.5' x 30' Stone 3.75' Deep** 1,181 cf Overall - 295 cf Embedded = 887 cf x 40.0% Voids
#2	20.00'	295 cf	**30.0" Round 2 @ 30' Perf 30" HDPE** x 2 Inside #1 L= 30.0'
		649 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	23.75'	**6.0" Vert. 6" Overflow Pipe** C= 0.600

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=20.00' (Free Discharge)
↑—**1=6" Overflow Pipe** (Controls 0.00 cfs)

Pond 8SWS: Detention System

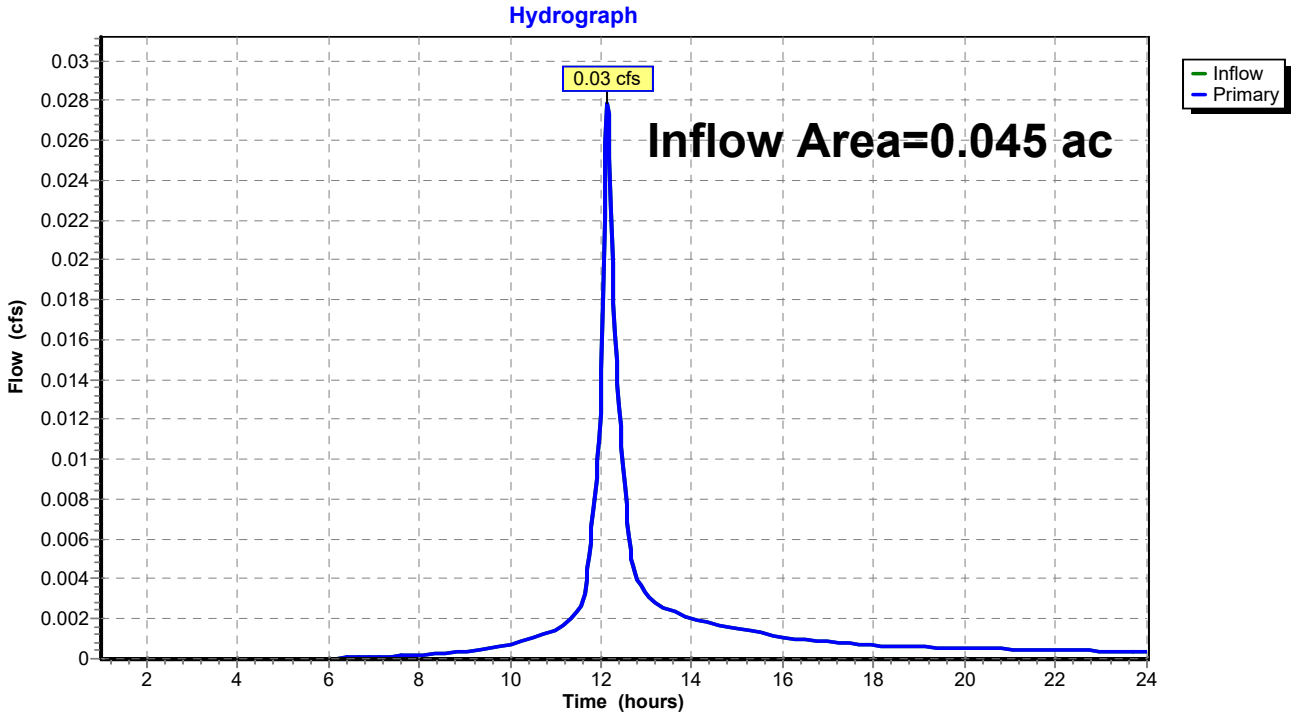


Summary for Link POI: Hypothetical Outflow off Site

Inflow Area = 0.045 ac, 78.14% Impervious, Inflow Depth > 0.61" for 10-yr (Camd Cur) event
Inflow = 0.03 cfs @ 12.14 hrs, Volume= 0.002 af
Primary = 0.03 cfs @ 12.14 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs

Link POI: Hypothetical Outflow off Site



Time span=1.00-24.00 hrs, dt=0.03 hrs, 768 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1EX: Existing Site Runoff Area=1,972 sf 0.00% Impervious Runoff Depth>8.79"
Tc=10.0 min CN=80 Runoff=0.39 cfs 0.033 af

Subcatchment 2PR: Proposed Roof to Runoff Area=1,010 sf 100.00% Impervious Runoff Depth>11.06"
Tc=10.0 min CN=98 Runoff=0.23 cfs 0.021 af

Subcatchment 3PR: Proposed Parking Runoff Area=210 sf 100.00% Impervious Runoff Depth>11.06"
Tc=10.0 min CN=98 Runoff=0.05 cfs 0.004 af

Subcatchment 4PR: Proposed Runoff Area=246 sf 100.00% Impervious Runoff Depth>11.06"
Tc=10.0 min CN=98 Runoff=0.06 cfs 0.005 af

Subcatchment 5PR: Proposed RY Grass to Runoff Area=133 sf 0.00% Impervious Runoff Depth>7.97"
Tc=10.0 min CN=74 Runoff=0.02 cfs 0.002 af

Subcatchment 6PR: Proposed RY Landscaping Runoff Area=176 sf 0.00% Impervious Runoff Depth>7.97"
Tc=10.0 min CN=74 Runoff=0.03 cfs 0.003 af

Subcatchment 7PR: Proposed Front Yard Runoff Area=197 sf 38.07% Impervious Runoff Depth>9.70"
Tc=10.0 min CN=87 Runoff=0.04 cfs 0.004 af

Pond 8SWS: Detention System Peak Elev=24.02' Storage=649 cf Inflow=0.35 cfs 0.033 af
Outflow=0.15 cfs 0.001 af

Link POI: Hypothetical Outflow off Site Inflow=0.23 cfs 0.007 af
Primary=0.23 cfs 0.007 af

Total Runoff Area = 0.091 ac Runoff Volume = 0.073 af Average Runoff Depth = 9.62"
60.93% Pervious = 0.055 ac 39.07% Impervious = 0.035 ac

Summary for Subcatchment 1EX: Existing Site

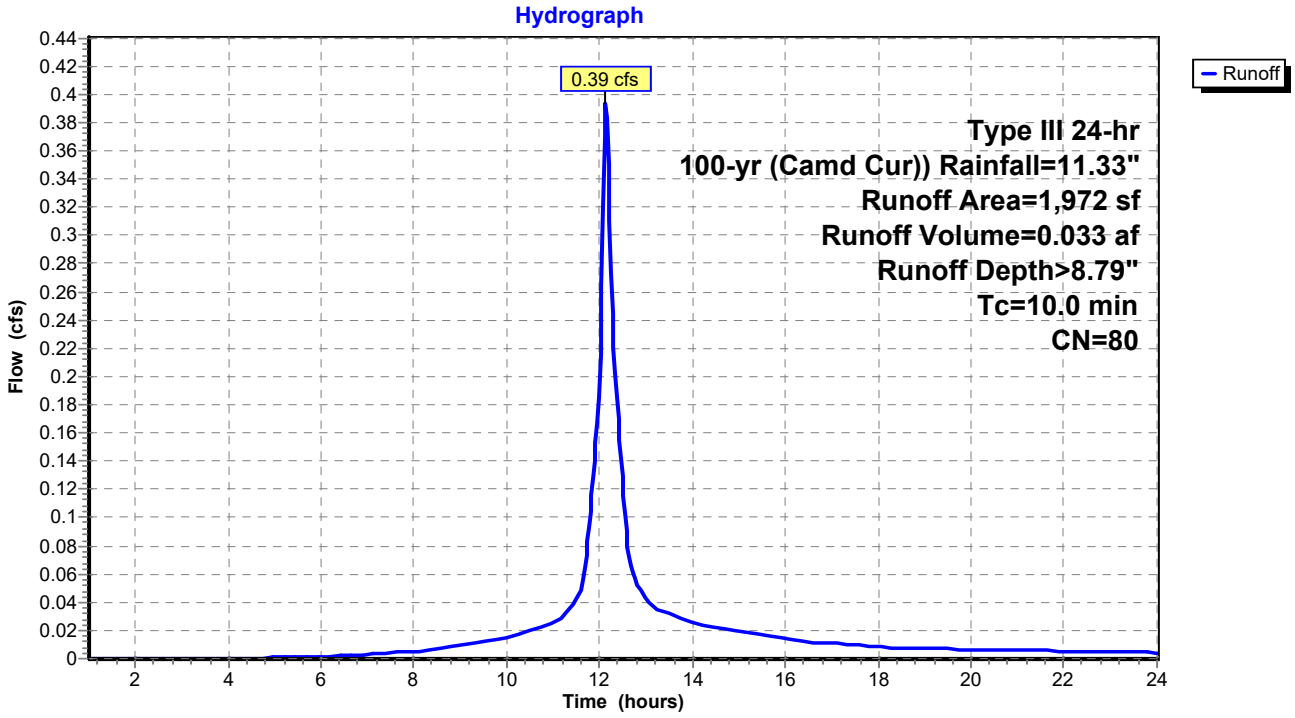
Runoff = 0.39 cfs @ 12.14 hrs, Volume= 0.033 af, Depth> 8.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Cur)) Rainfall=11.33"

	Area (sf)	CN	Description
*	1,972	80	>75% Grass cover, Good, HSG D
	1,972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 1EX: Existing Site



Summary for Subcatchment 2PR: Proposed Roof to Detention System

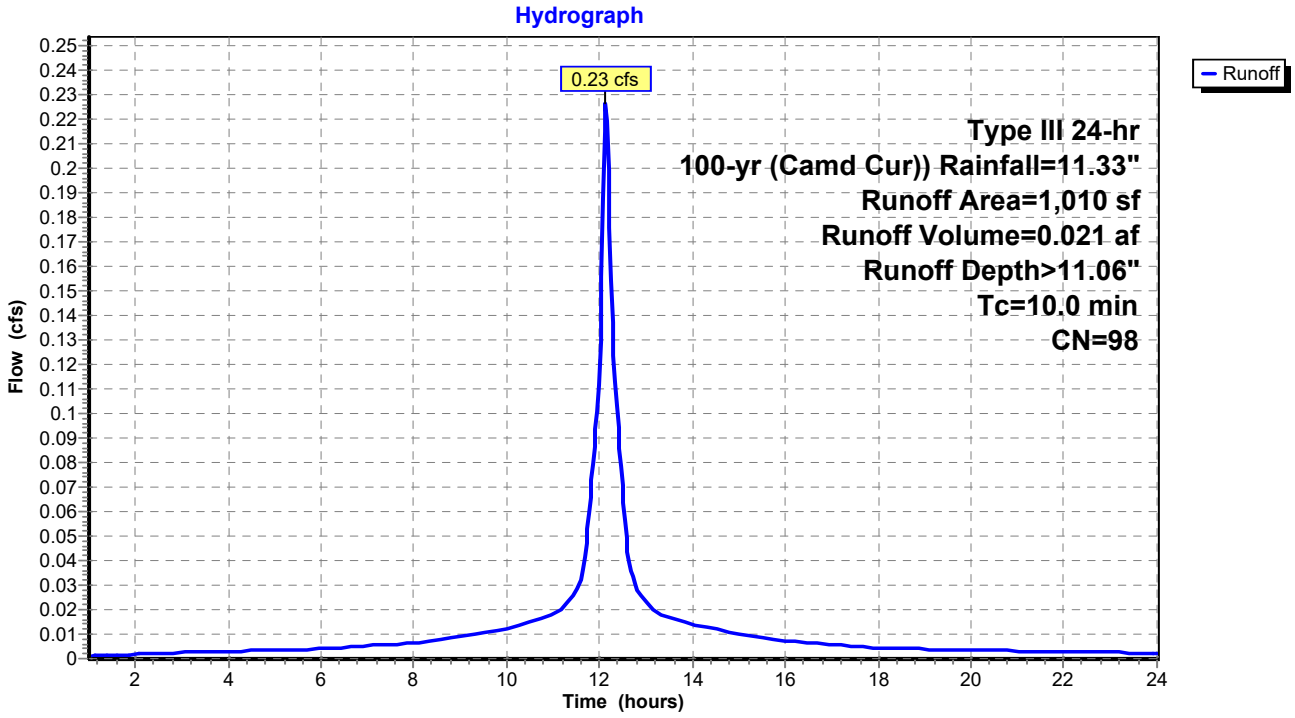
Runoff = 0.23 cfs @ 12.13 hrs, Volume= 0.021 af, Depth>11.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Cur)) Rainfall=11.33"

	Area (sf)	CN	Description
*	1,010	98	Impervious Roof
	1,010		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 2PR: Proposed Roof to Detention System



Summary for Subcatchment 3PR: Proposed Parking Area to Detention System

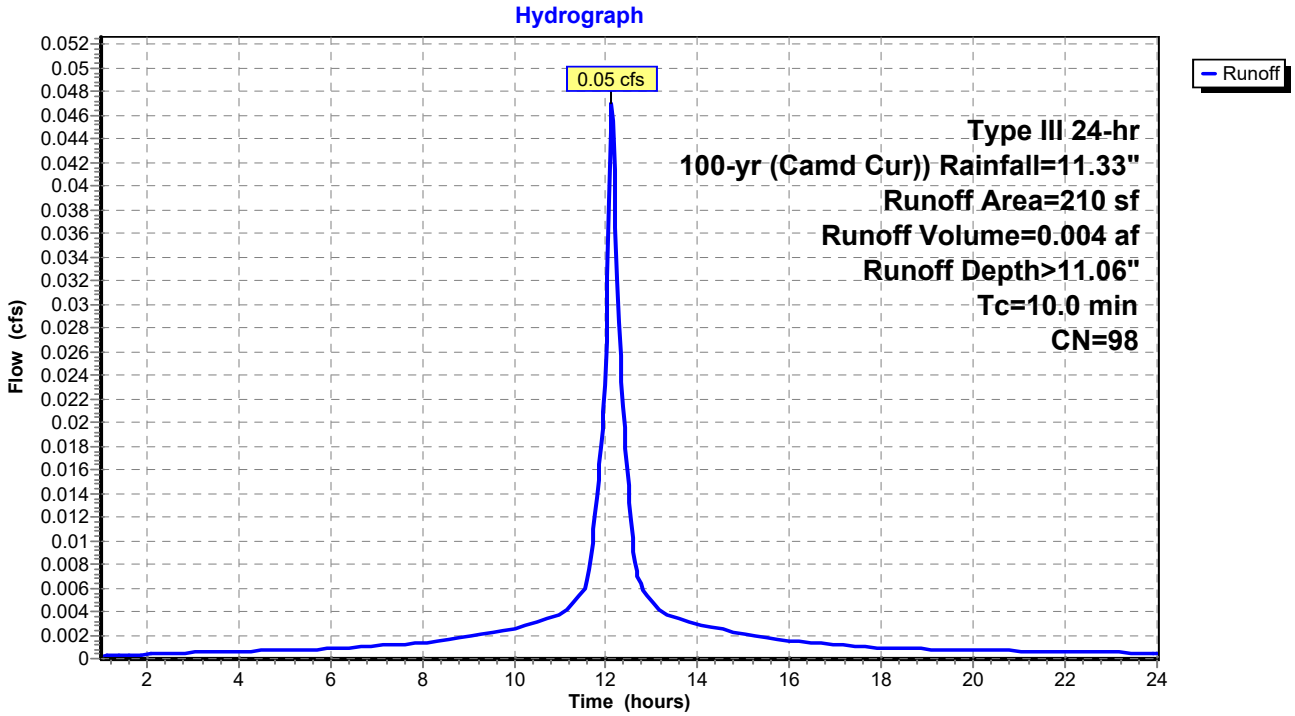
Runoff = 0.05 cfs @ 12.13 hrs, Volume= 0.004 af, Depth>11.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Cur)) Rainfall=11.33"

	Area (sf)	CN	Description
*	210	98	Pervious Pavers
	210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 3PR: Proposed Parking Area to Detention System



Summary for Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System

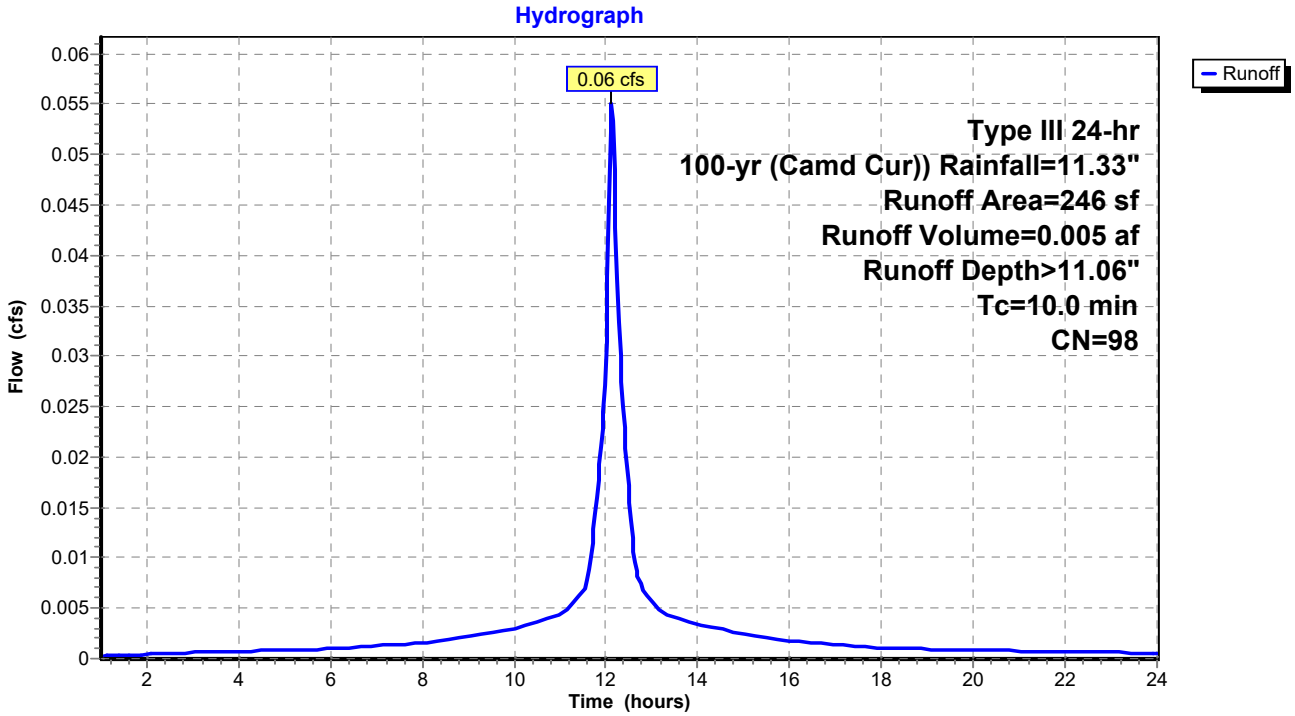
Runoff = 0.06 cfs @ 12.13 hrs, Volume= 0.005 af, Depth>11.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Cur)) Rainfall=11.33"

	Area (sf)	CN	Description
*	246	98	Impervious Concrete
	246		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System



Summary for Subcatchment 5PR: Proposed RY Grass to Detention System

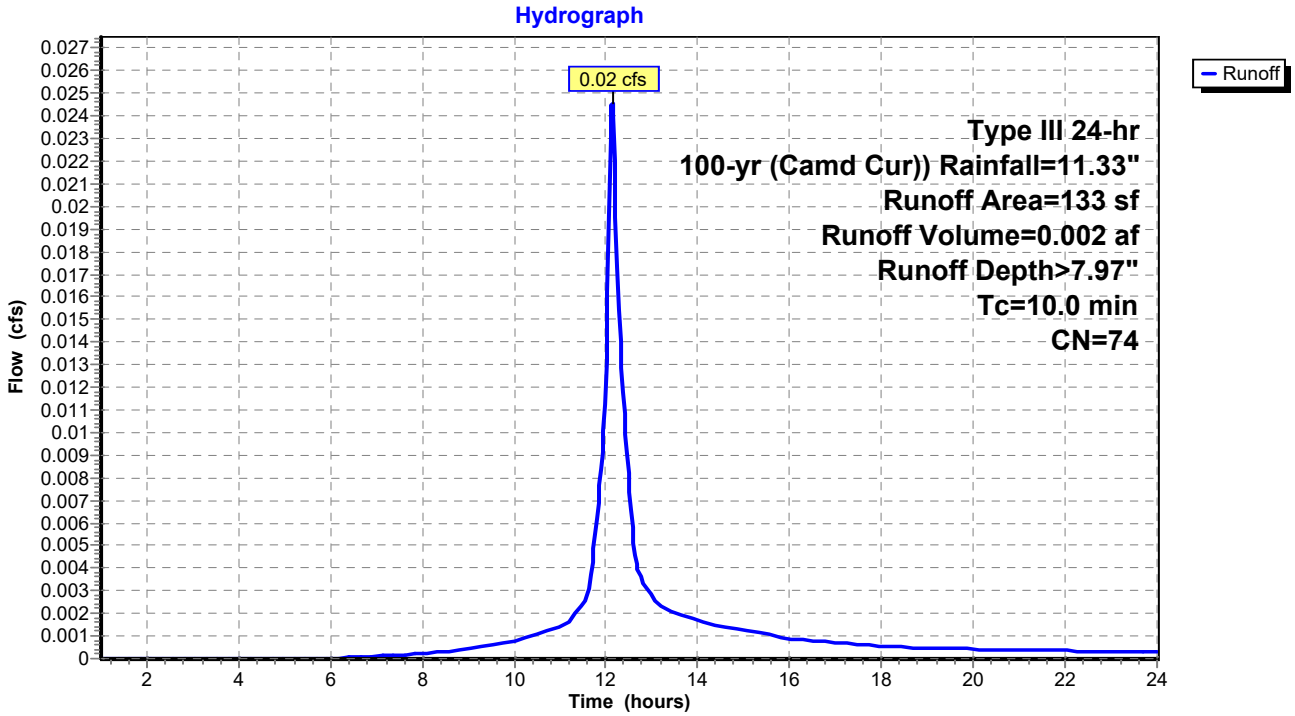
Runoff = 0.02 cfs @ 12.14 hrs, Volume= 0.002 af, Depth> 7.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Cur)) Rainfall=11.33"

	Area (sf)	CN	Description
*	133	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	133		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 5PR: Proposed RY Grass to Detention System



Summary for Subcatchment 6PR: Proposed RY Landscaping

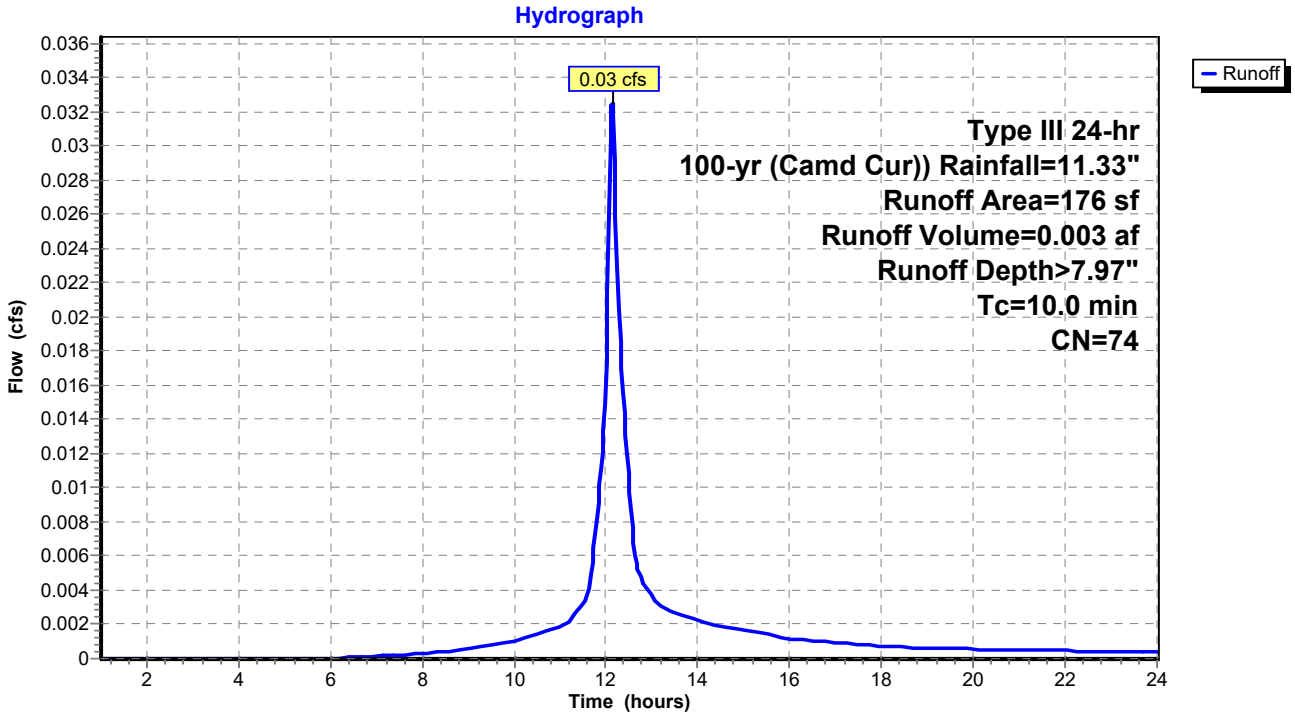
Runoff = 0.03 cfs @ 12.14 hrs, Volume= 0.003 af, Depth> 7.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Cur)) Rainfall=11.33"

	Area (sf)	CN	Description
*	176	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	176		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 6PR: Proposed RY Landscaping



Summary for Subcatchment 7PR: Proposed Front Yard

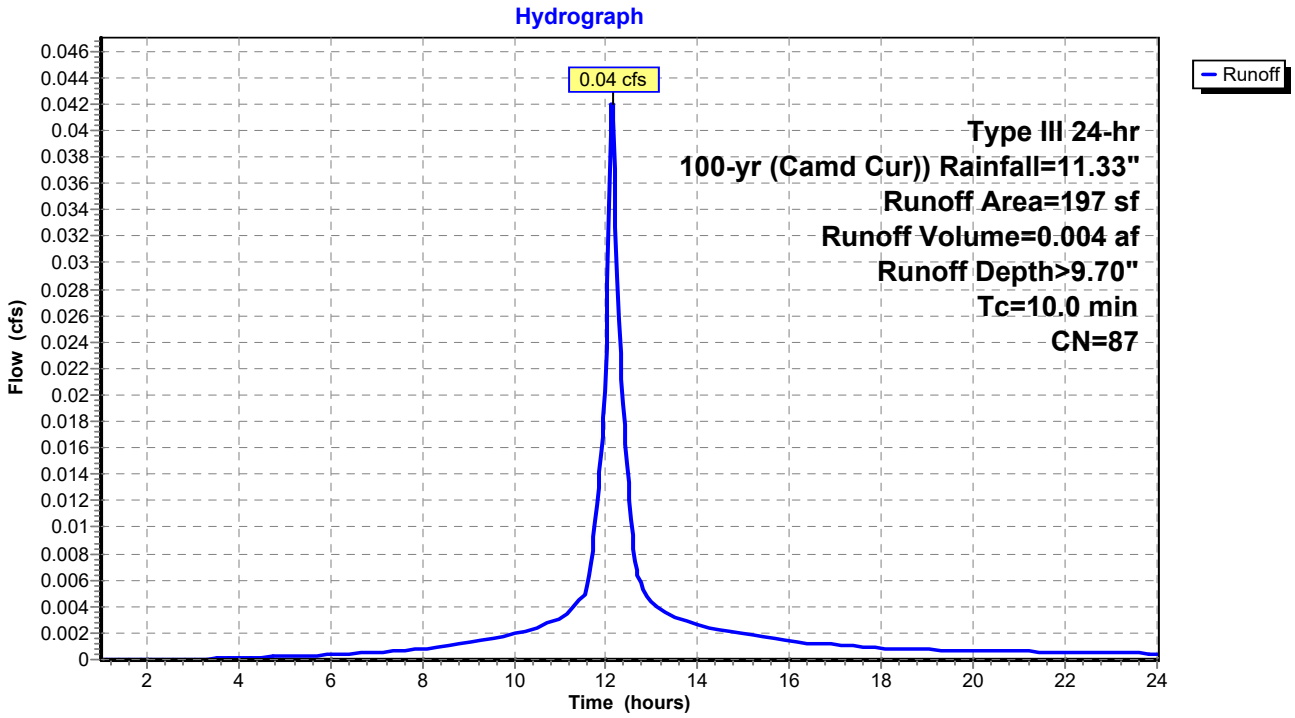
Runoff = 0.04 cfs @ 12.13 hrs, Volume= 0.004 af, Depth> 9.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Cur)) Rainfall=11.33"

	Area (sf)	CN	Description
*	75	98	Concrete Sidewalk
*	122	80	>75% Grass cover, Good, HSG C (Replaced Soil)
	197	87	Weighted Average
	122		61.93% Pervious Area
	75		38.07% Impervious Area

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

Subcatchment 7PR: Proposed Front Yard



Summary for Pond 8SWS: Detention System

[82] Warning: Early inflow requires earlier time span
[92] Warning: Device #1 is above defined storage
[93] Warning: Storage range exceeded by 0.27'

Inflow Area = 0.037 ac, 91.68% Impervious, Inflow Depth > 10.81" for 100-yr (Camd Cur)) event
Inflow = 0.35 cfs @ 12.13 hrs, Volume= 0.033 af
Outflow = 0.15 cfs @ 12.14 hrs, Volume= 0.001 af, Atten= 57%, Lag= 0.5 min
Primary = 0.15 cfs @ 12.14 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs / 8
Peak Elev= 24.02' @ 12.14 hrs Surf.Area= 315 sf Storage= 649 cf

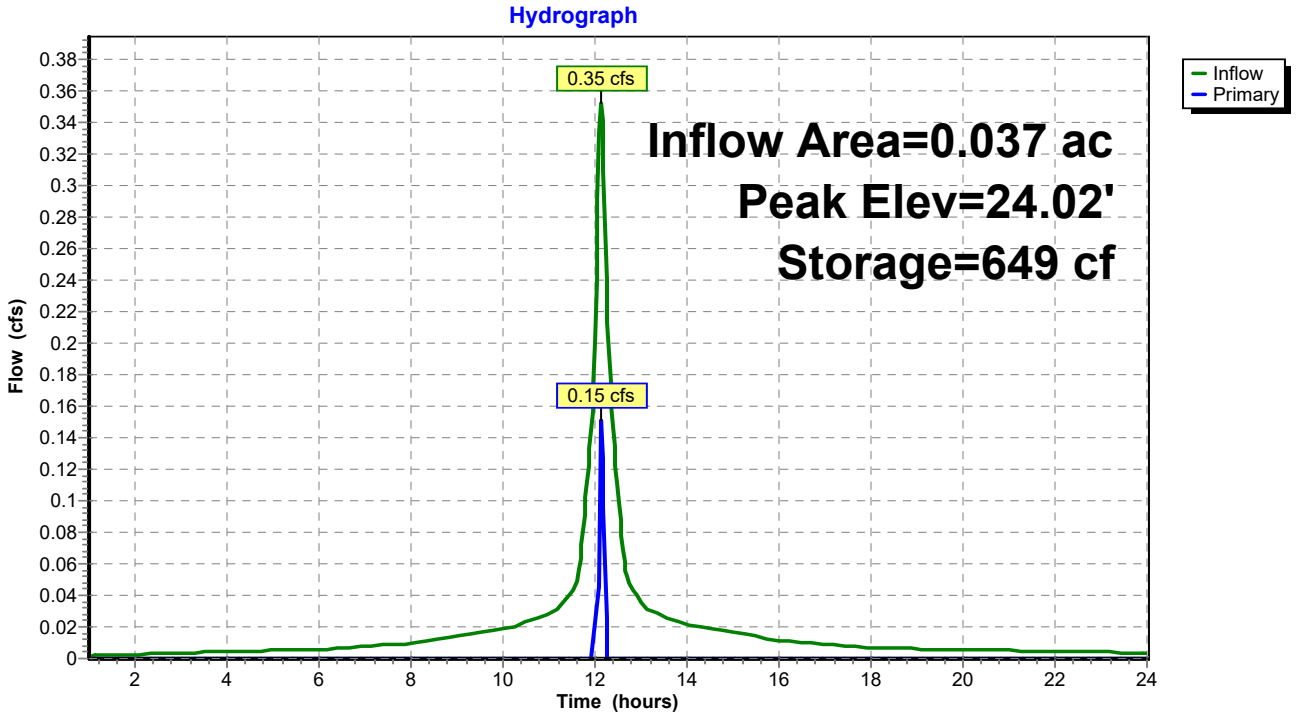
Plug-Flow detention time= 536.1 min calculated for 0.001 af (3% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	355 cf	**10.50'W x 30.00'L x 3.75'H 10.5' x 30' Stone 3.75' Deep** 1,181 cf Overall - 295 cf Embedded = 887 cf x 40.0% Voids
#2	20.00'	295 cf	**30.0" Round 2 @ 30' Perf 30" HDPE** x 2 Inside #1 L= 30.0'
		649 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	23.75'	**6.0" Vert. 6" Overflow Pipe** C= 0.600

Primary OutFlow Max=0.13 cfs @ 12.14 hrs HW=23.97' (Free Discharge)
↑**1=6" Overflow Pipe** (Orifice Controls 0.13 cfs @ 1.60 fps)

Pond 8SWS: Detention System

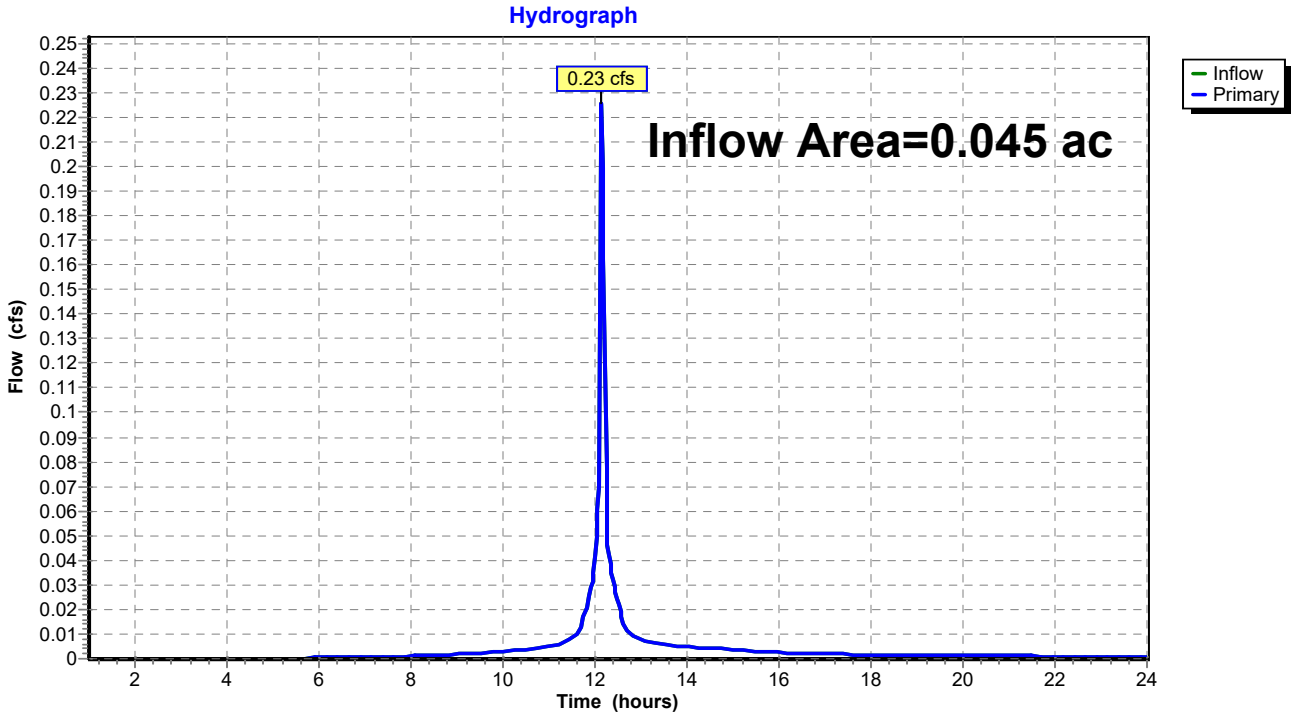


Summary for Link POI: Hypothetical Outflow off Site

Inflow Area = 0.045 ac, 78.14% Impervious, Inflow Depth > 1.97" for 100-yr (Camd Cur)) event
Inflow = 0.23 cfs @ 12.14 hrs, Volume= 0.007 af
Primary = 0.23 cfs @ 12.14 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs

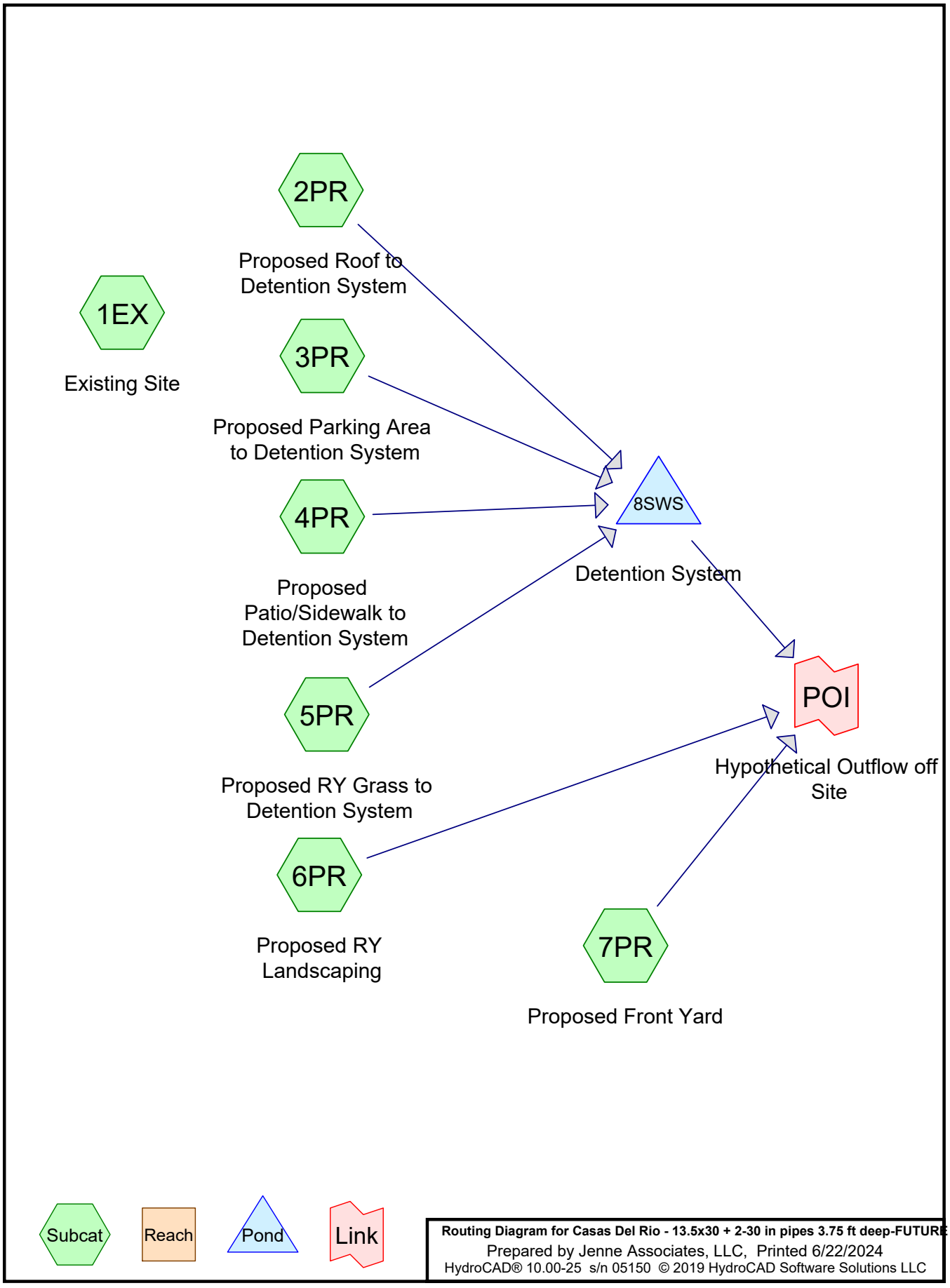
Link POI: Hypothetical Outflow off Site



APPENDIX C

Pre- and Post-Development Hydrograph Analysis

Future Rainfall



Routing Diagram for Casas Del Rio - 13.5x30 + 2-30 in pipes 3.75 ft deep-FUTURE

Prepared by Jenne Associates, LLC, Printed 6/22/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.007	74	>75% Grass cover, Good, HSG C (Replaced Soil) (5PR, 6PR)
0.003	80	>75% Grass cover, Good, HSG C (Replaced Soil) (7PR)
0.045	80	>75% Grass cover, Good, HSG D (1EX)
0.002	98	Concrete Sidewalk (7PR)
0.006	98	Impervious Concrete (4PR)
0.023	98	Impervious Roof (2PR)
0.005	98	Pervious Pavers (3PR)
0.091	**87**	**TOTAL AREA**

Time span=1.00-24.00 hrs, dt=0.03 hrs, 768 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1EX: Existing Site Runoff Area=1,972 sf 0.00% Impervious Runoff Depth>1.96"
Tc=10.0 min CN=80 Runoff=0.14 cfs 0.007 af

Subcatchment 2PR: Proposed Roof to Runoff Area=1,010 sf 100.00% Impervious Runoff Depth>3.67"
Tc=10.0 min CN=98 Runoff=0.11 cfs 0.007 af

Subcatchment 3PR: Proposed Parking Area Runoff Area=210 sf 100.00% Impervious Runoff Depth>3.67"
Tc=10.0 min CN=98 Runoff=0.02 cfs 0.001 af

Subcatchment 4PR: Proposed Runoff Area=246 sf 100.00% Impervious Runoff Depth>3.67"
Tc=10.0 min CN=98 Runoff=0.03 cfs 0.002 af

Subcatchment 5PR: Proposed RY Grass to Runoff Area=133 sf 0.00% Impervious Runoff Depth>1.53"
Tc=10.0 min CN=74 Runoff=0.01 cfs 0.000 af

Subcatchment 6PR: Proposed RY Landscaping Runoff Area=176 sf 0.00% Impervious Runoff Depth>1.53"
Tc=10.0 min CN=74 Runoff=0.01 cfs 0.001 af

Subcatchment 7PR: Proposed Front Yard Runoff Area=197 sf 38.07% Impervious Runoff Depth>2.55"
Tc=10.0 min CN=87 Runoff=0.02 cfs 0.001 af

Pond 8SWS: Detention System Peak Elev=22.33' Storage=465 cf Inflow=0.17 cfs 0.011 af
Outflow=0.00 cfs 0.000 af

Link POI: Hypothetical Outflow off Site Inflow=0.03 cfs 0.001 af
Primary=0.03 cfs 0.001 af

Total Runoff Area = 0.091 ac Runoff Volume = 0.020 af Average Runoff Depth = 2.59"
60.93% Pervious = 0.055 ac 39.07% Impervious = 0.035 ac

Summary for Subcatchment 1EX: Existing Site

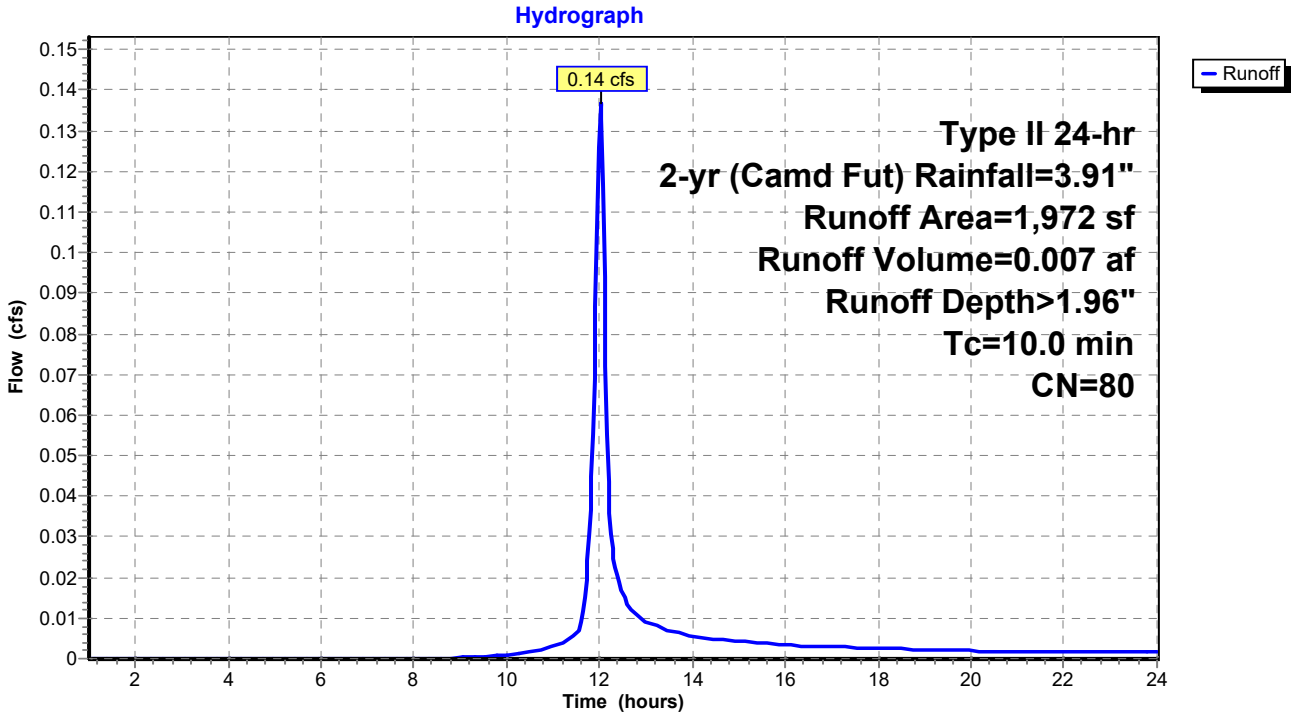
Runoff = 0.14 cfs @ 12.02 hrs, Volume= 0.007 af, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Fut) Rainfall=3.91"

	Area (sf)	CN	Description
*	1,972	80	>75% Grass cover, Good, HSG D
	1,972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 1EX: Existing Site



Summary for Subcatchment 2PR: Proposed Roof to Detention System

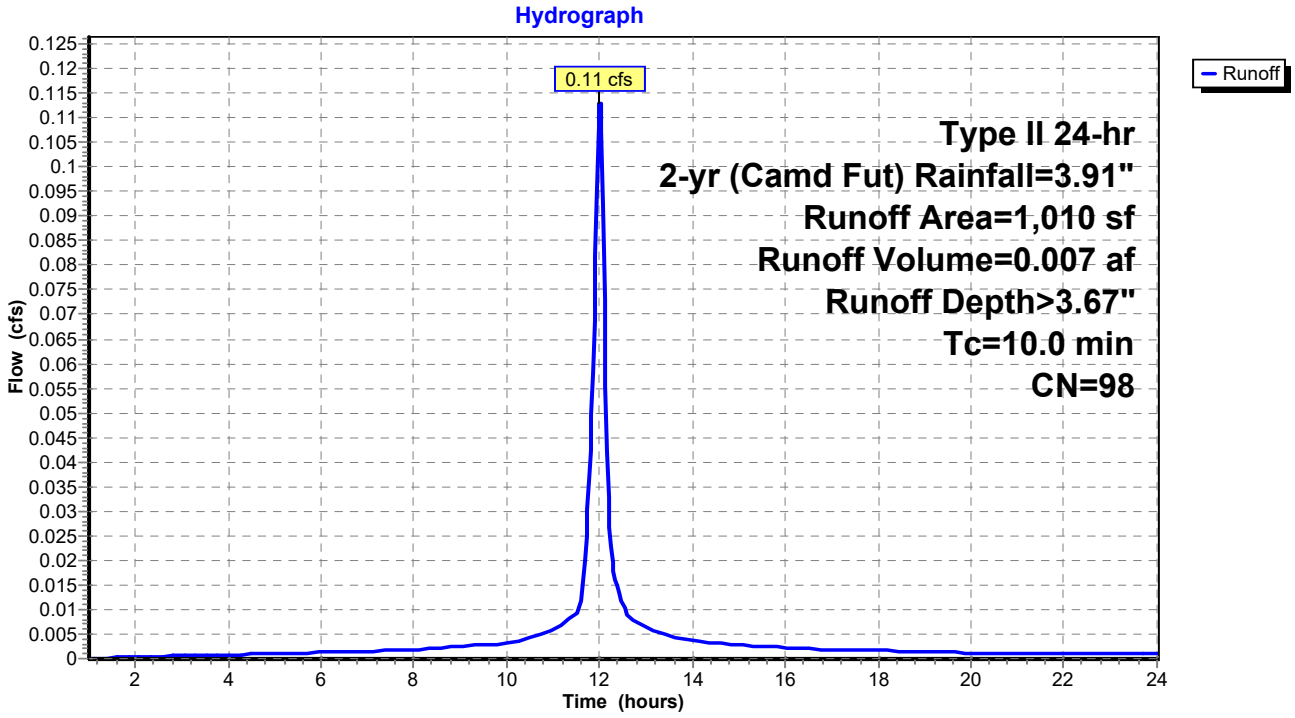
Runoff = 0.11 cfs @ 12.01 hrs, Volume= 0.007 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Fut) Rainfall=3.91"

	Area (sf)	CN	Description
*	1,010	98	Impervious Roof
	1,010		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 2PR: Proposed Roof to Detention System



Summary for Subcatchment 3PR: Proposed Parking Area to Detention System

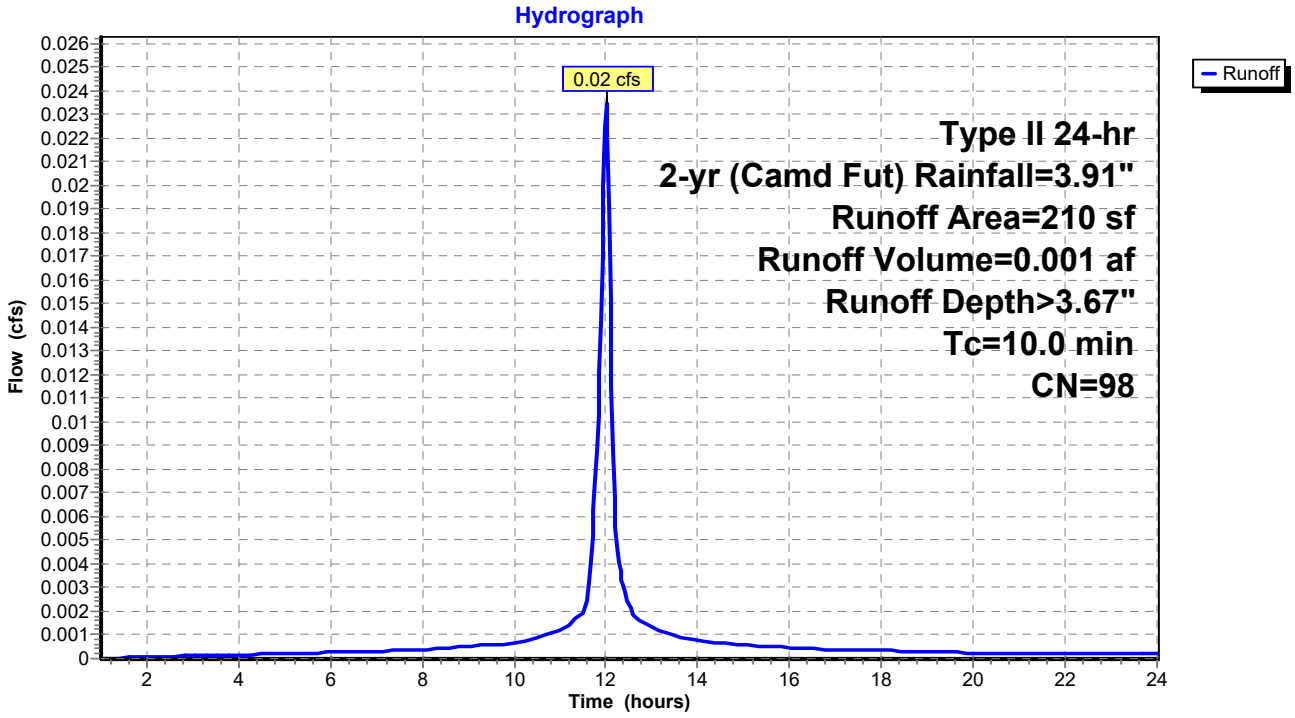
Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Fut) Rainfall=3.91"

	Area (sf)	CN	Description
*	210	98	Pervious Pavers
	210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 3PR: Proposed Parking Area to Detention System



Summary for Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System

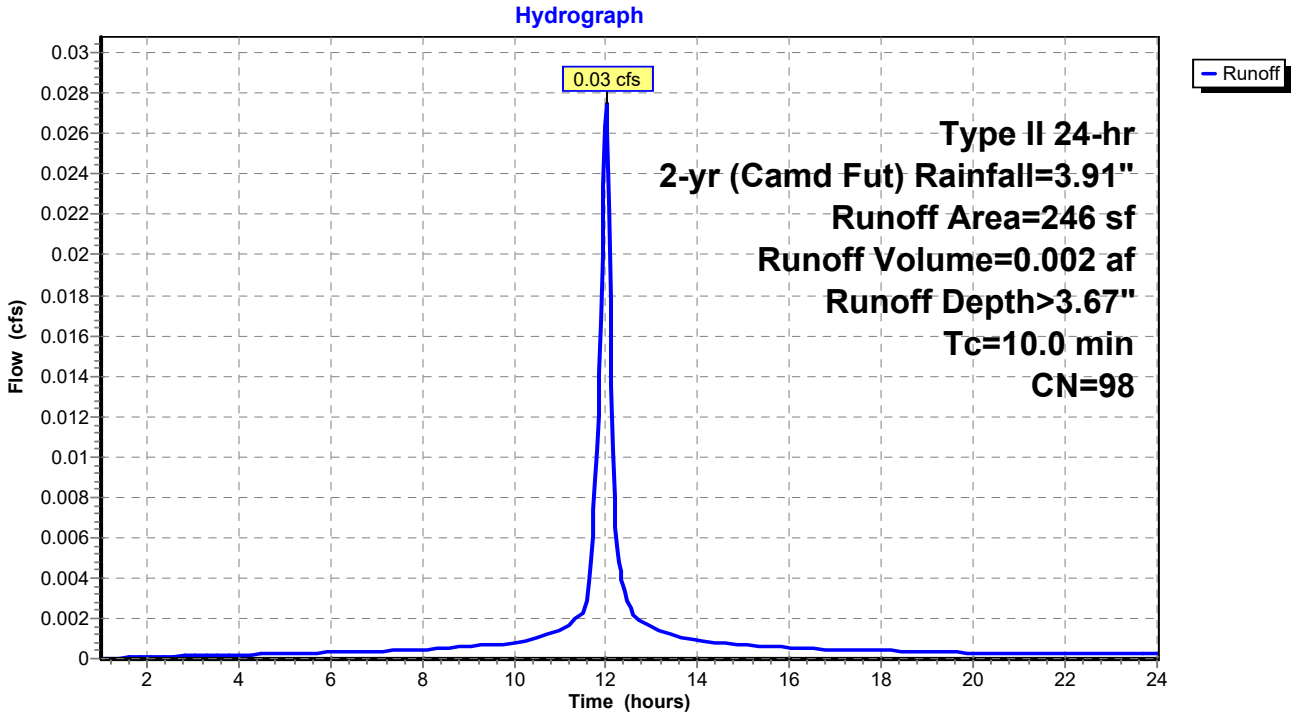
Runoff = 0.03 cfs @ 12.01 hrs, Volume= 0.002 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Fut) Rainfall=3.91"

	Area (sf)	CN	Description
*	246	98	Impervious Concrete
	246		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System



Summary for Subcatchment 5PR: Proposed RY Grass to Detention System

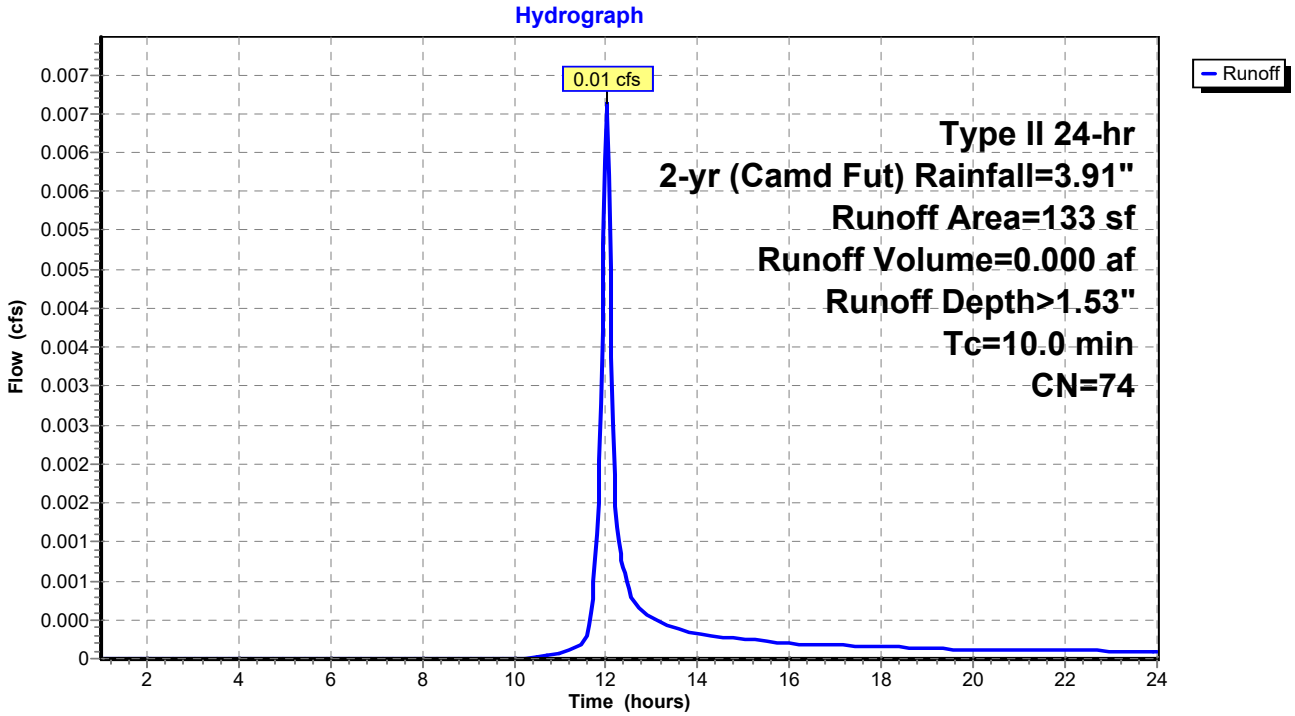
Runoff = 0.01 cfs @ 12.02 hrs, Volume= 0.000 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Fut) Rainfall=3.91"

	Area (sf)	CN	Description
*	133	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	133		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 5PR: Proposed RY Grass to Detention System



Summary for Subcatchment 6PR: Proposed RY Landscaping

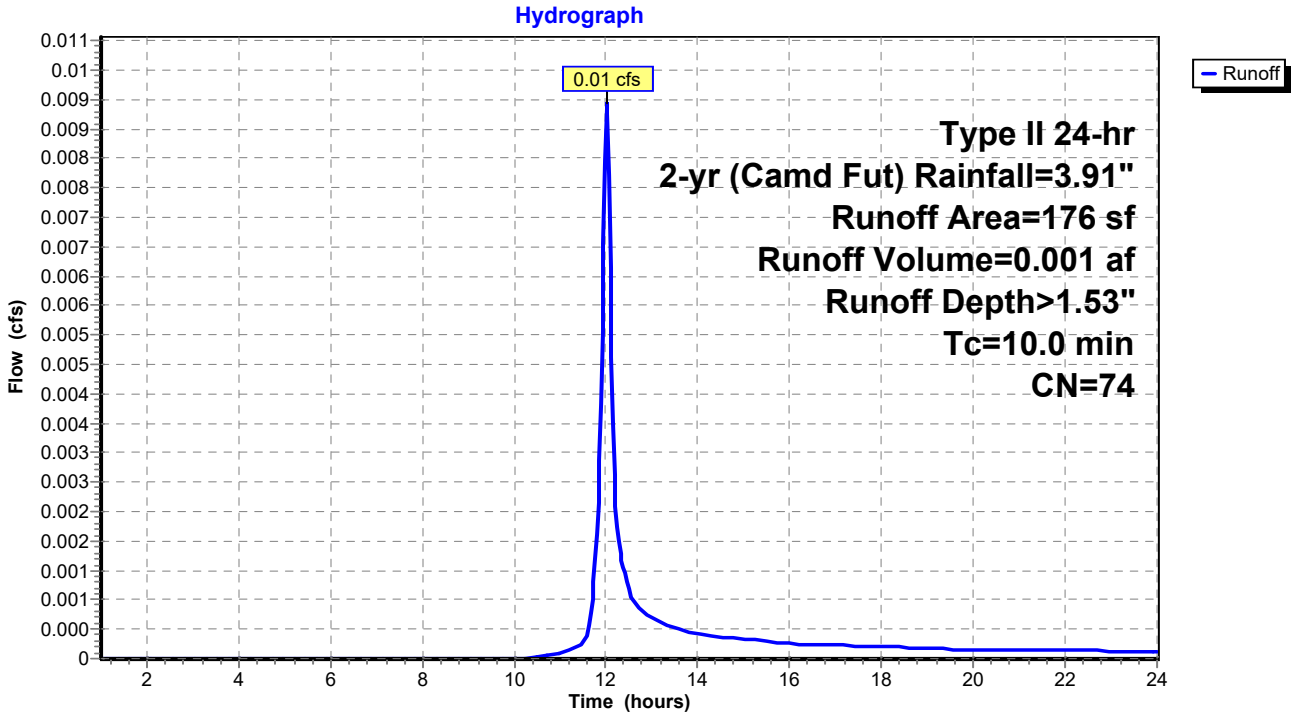
Runoff = 0.01 cfs @ 12.02 hrs, Volume= 0.001 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Fut) Rainfall=3.91"

	Area (sf)	CN	Description
*	176	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	176		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 6PR: Proposed RY Landscaping



Summary for Subcatchment 7PR: Proposed Front Yard

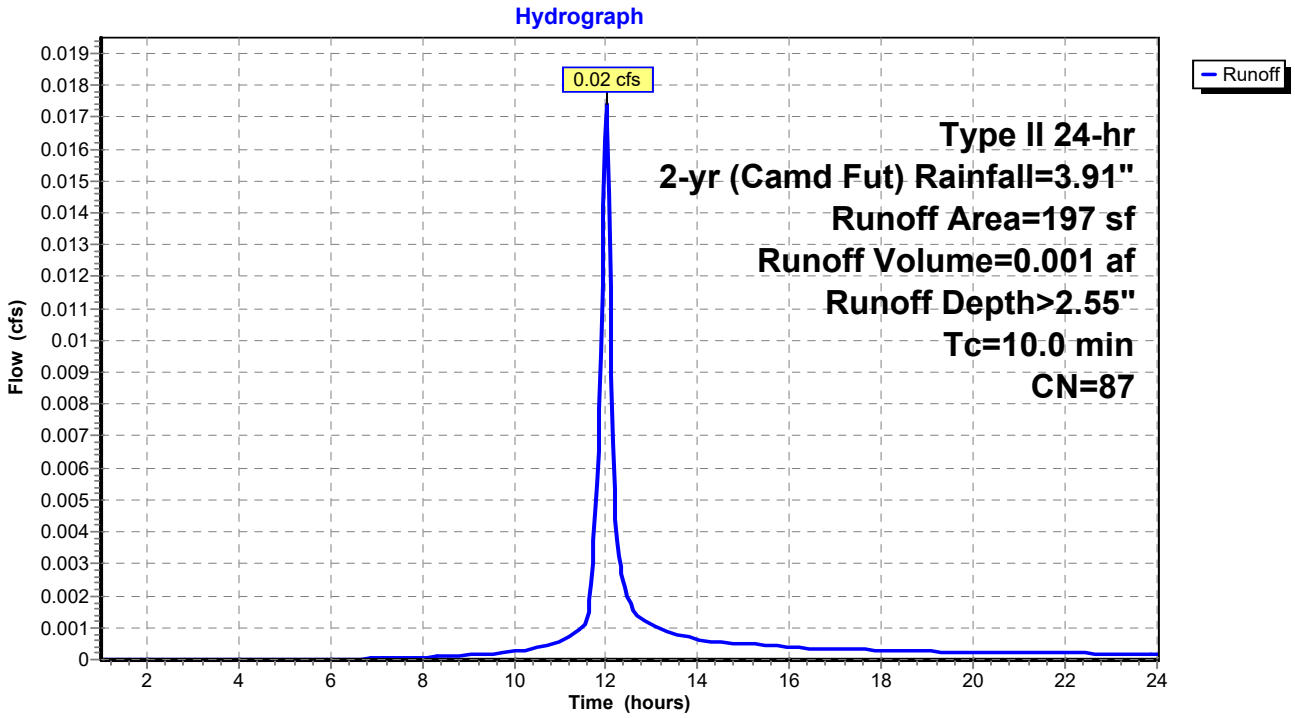
Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type II 24-hr 2-yr (Camd Fut) Rainfall=3.91"

	Area (sf)	CN	Description
*	75	98	Concrete Sidewalk
*	122	80	>75% Grass cover, Good, HSG C (Replaced Soil)
	197	87	Weighted Average
	122		61.93% Pervious Area
	75		38.07% Impervious Area

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

Subcatchment 7PR: Proposed Front Yard



Summary for Pond 8SWS: Detention System

[92] Warning: Device #1 is above defined storage

Inflow Area = 0.037 ac, 91.68% Impervious, Inflow Depth > 3.49" for 2-yr (Camd Fut) event
Inflow = 0.17 cfs @ 12.01 hrs, Volume= 0.011 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs / 6
Peak Elev= 22.33' @ 24.01 hrs Surf.Area= 315 sf Storage= 465 cf

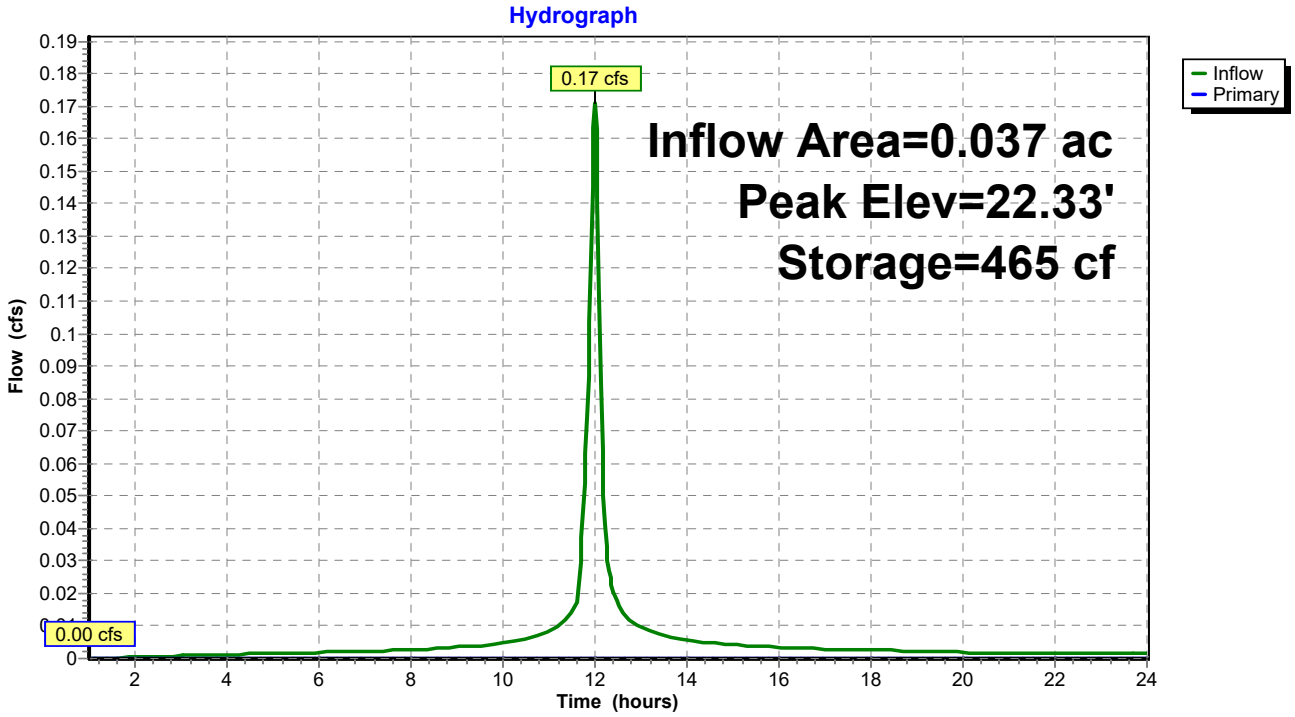
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	355 cf	**10.50'W x 30.00'L x 3.75'H 10.5' x 30' Stone 3.75' Deep** 1,181 cf Overall - 295 cf Embedded = 887 cf x 40.0% Voids
#2	20.00'	295 cf	**30.0" Round 2 @ 30' Perf 30" HDPE** x 2 Inside #1 L= 30.0'
		649 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	23.75'	**6.0" Vert. 6" Overflow Pipe** C= 0.600

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=20.00' (Free Discharge)
↑—**1=6" Overflow Pipe** (Controls 0.00 cfs)

Pond 8SWS: Detention System

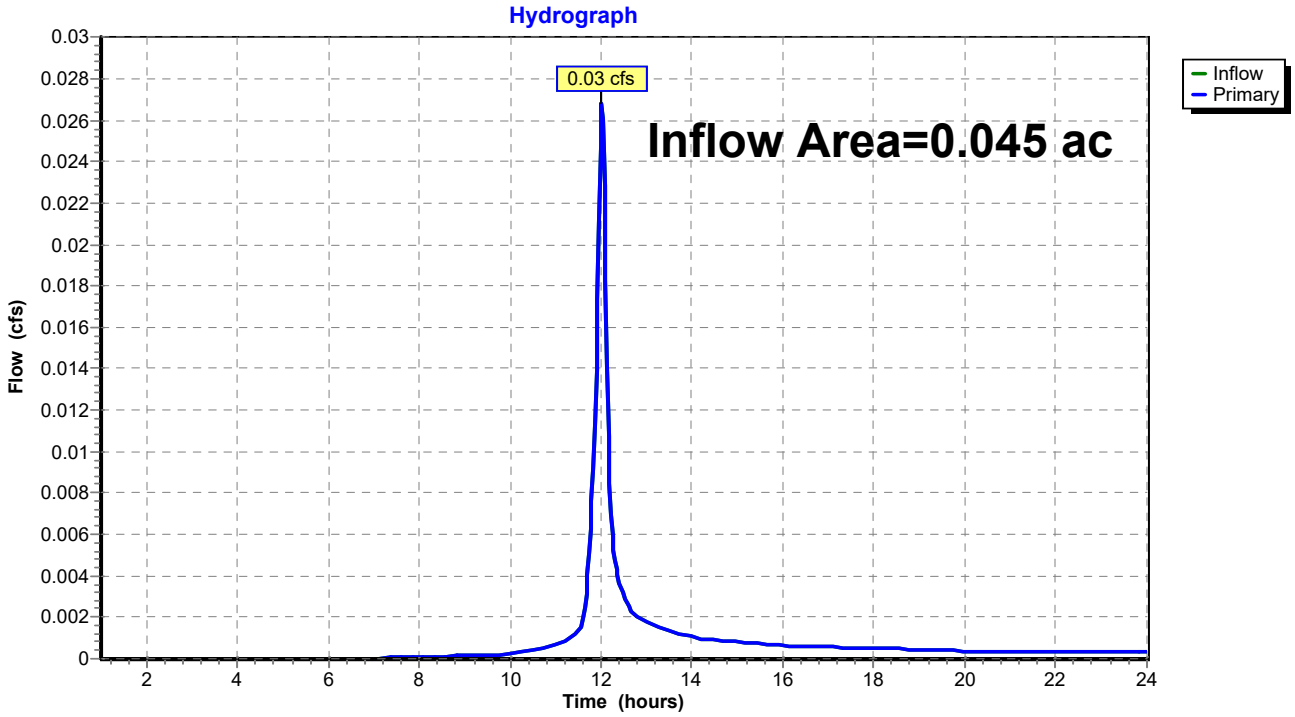


Summary for Link POI: Hypothetical Outflow off Site

Inflow Area = 0.045 ac, 78.14% Impervious, Inflow Depth > 0.39" for 2-yr (Camd Fut) event
Inflow = 0.03 cfs @ 12.02 hrs, Volume= 0.001 af
Primary = 0.03 cfs @ 12.02 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs

Link POI: Hypothetical Outflow off Site



Time span=1.00-24.00 hrs, dt=0.03 hrs, 768 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1EX: Existing Site Runoff Area=1,972 sf 0.00% Impervious Runoff Depth>3.93"
Tc=10.0 min CN=80 Runoff=0.18 cfs 0.015 af

Subcatchment 2PR: Proposed Roof to Runoff Area=1,010 sf 100.00% Impervious Runoff Depth>5.92"
Tc=10.0 min CN=98 Runoff=0.12 cfs 0.011 af

Subcatchment 3PR: Proposed Parking Area Runoff Area=210 sf 100.00% Impervious Runoff Depth>5.92"
Tc=10.0 min CN=98 Runoff=0.03 cfs 0.002 af

Subcatchment 4PR: Proposed Runoff Area=246 sf 100.00% Impervious Runoff Depth>5.92"
Tc=10.0 min CN=98 Runoff=0.03 cfs 0.003 af

Subcatchment 5PR: Proposed RY Grass to Runoff Area=133 sf 0.00% Impervious Runoff Depth>3.32"
Tc=10.0 min CN=74 Runoff=0.01 cfs 0.001 af

Subcatchment 6PR: Proposed RY Landscaping Runoff Area=176 sf 0.00% Impervious Runoff Depth>3.32"
Tc=10.0 min CN=74 Runoff=0.01 cfs 0.001 af

Subcatchment 7PR: Proposed Front Yard Runoff Area=197 sf 38.07% Impervious Runoff Depth>4.67"
Tc=10.0 min CN=87 Runoff=0.02 cfs 0.002 af

Pond 8SWS: Detention System Peak Elev=23.78' Storage=649 cf Inflow=0.19 cfs 0.017 af
Outflow=0.00 cfs 0.000 af

Link POI: Hypothetical Outflow off Site Inflow=0.03 cfs 0.003 af
Primary=0.03 cfs 0.003 af

Total Runoff Area = 0.091 ac Runoff Volume = 0.035 af Average Runoff Depth = 4.66"
60.93% Pervious = 0.055 ac 39.07% Impervious = 0.035 ac

Summary for Subcatchment 1EX: Existing Site

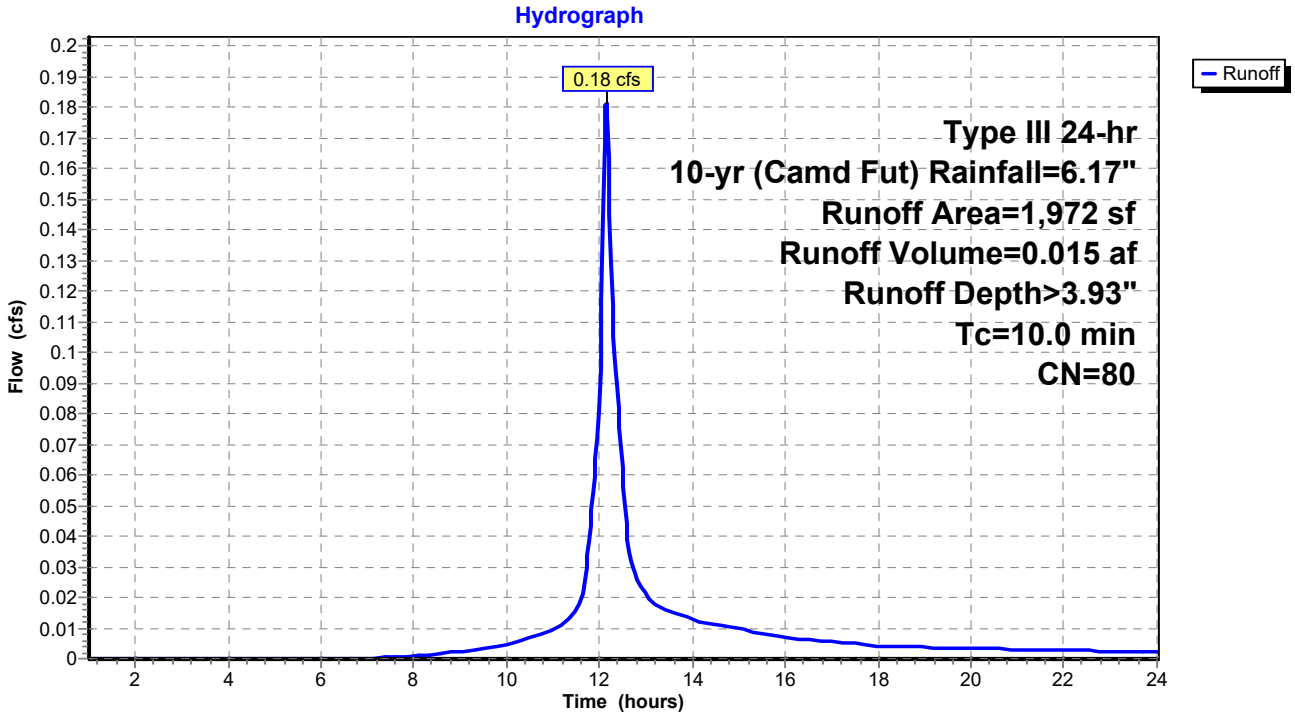
Runoff = 0.18 cfs @ 12.14 hrs, Volume= 0.015 af, Depth> 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Fut) Rainfall=6.17"

	Area (sf)	CN	Description
*	1,972	80	>75% Grass cover, Good, HSG D
	1,972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 1EX: Existing Site



Summary for Subcatchment 2PR: Proposed Roof to Detention System

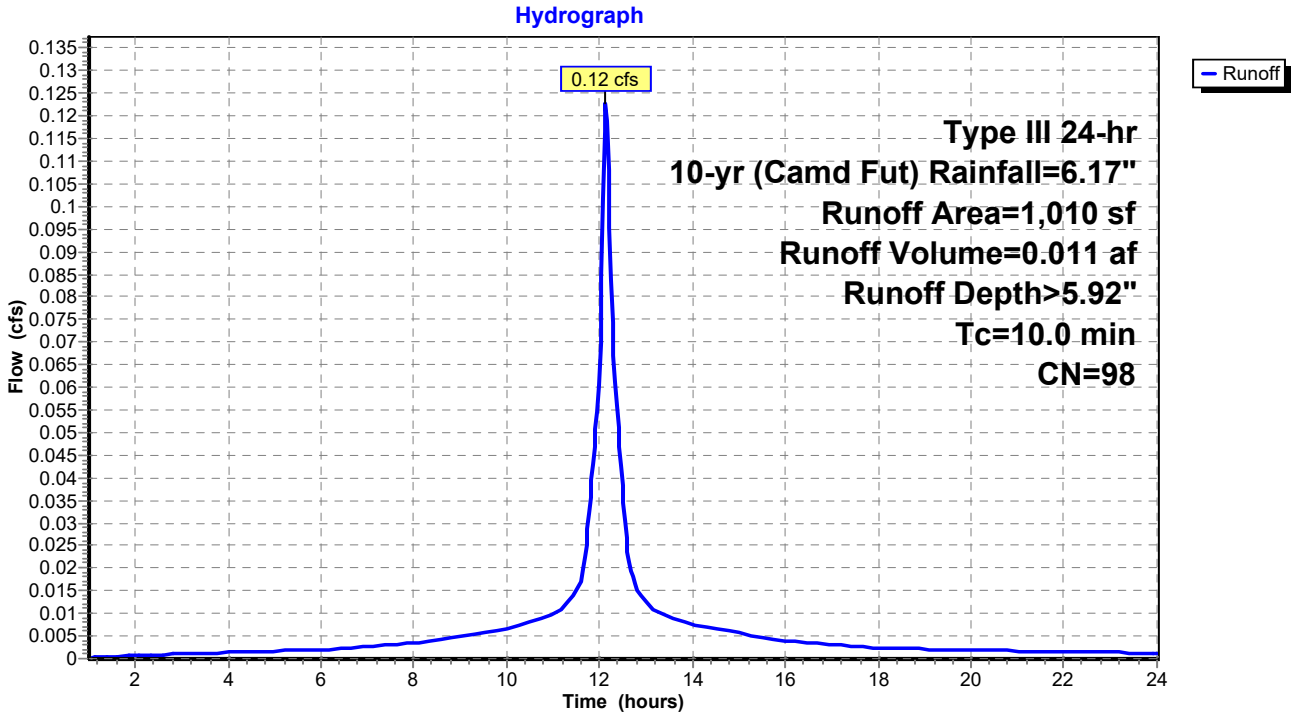
Runoff = 0.12 cfs @ 12.13 hrs, Volume= 0.011 af, Depth> 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Fut) Rainfall=6.17"

	Area (sf)	CN	Description
*	1,010	98	Impervious Roof
	1,010		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 2PR: Proposed Roof to Detention System



Summary for Subcatchment 3PR: Proposed Parking Area to Detention System

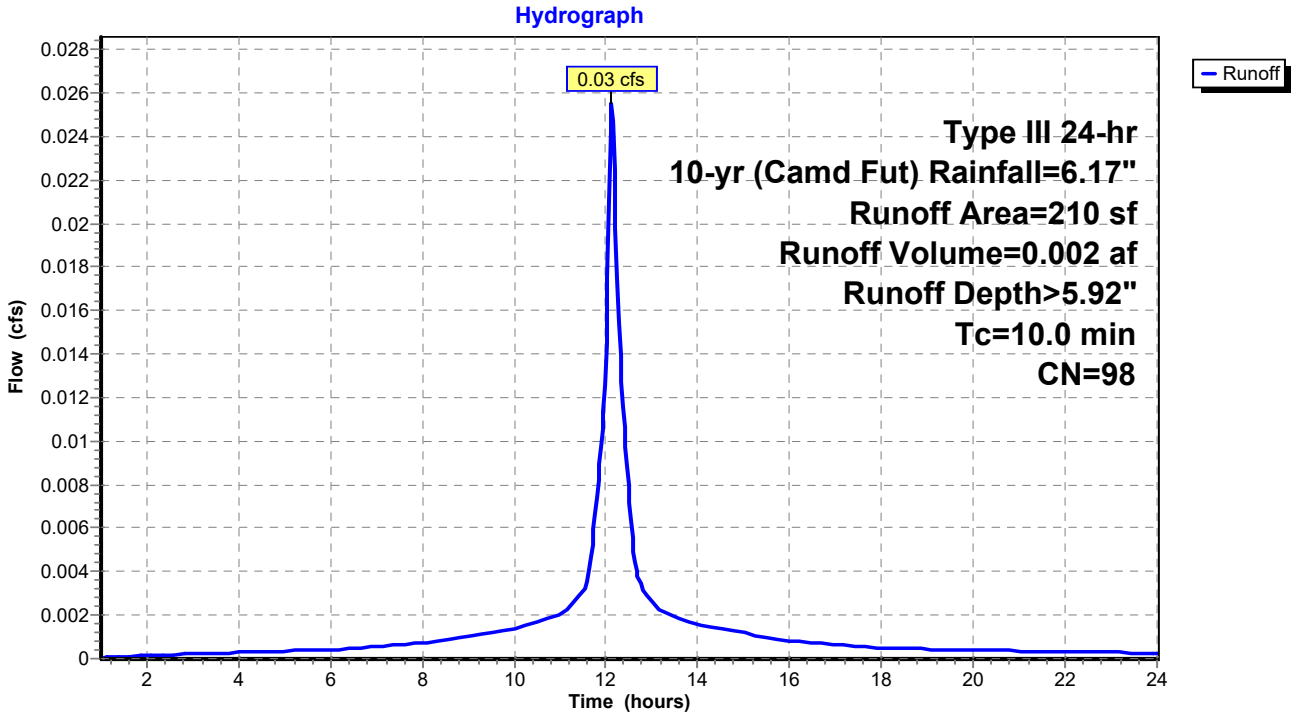
Runoff = 0.03 cfs @ 12.13 hrs, Volume= 0.002 af, Depth> 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Fut) Rainfall=6.17"

	Area (sf)	CN	Description
*	210	98	Pervious Pavers
	210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 3PR: Proposed Parking Area to Detention System



Summary for Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System

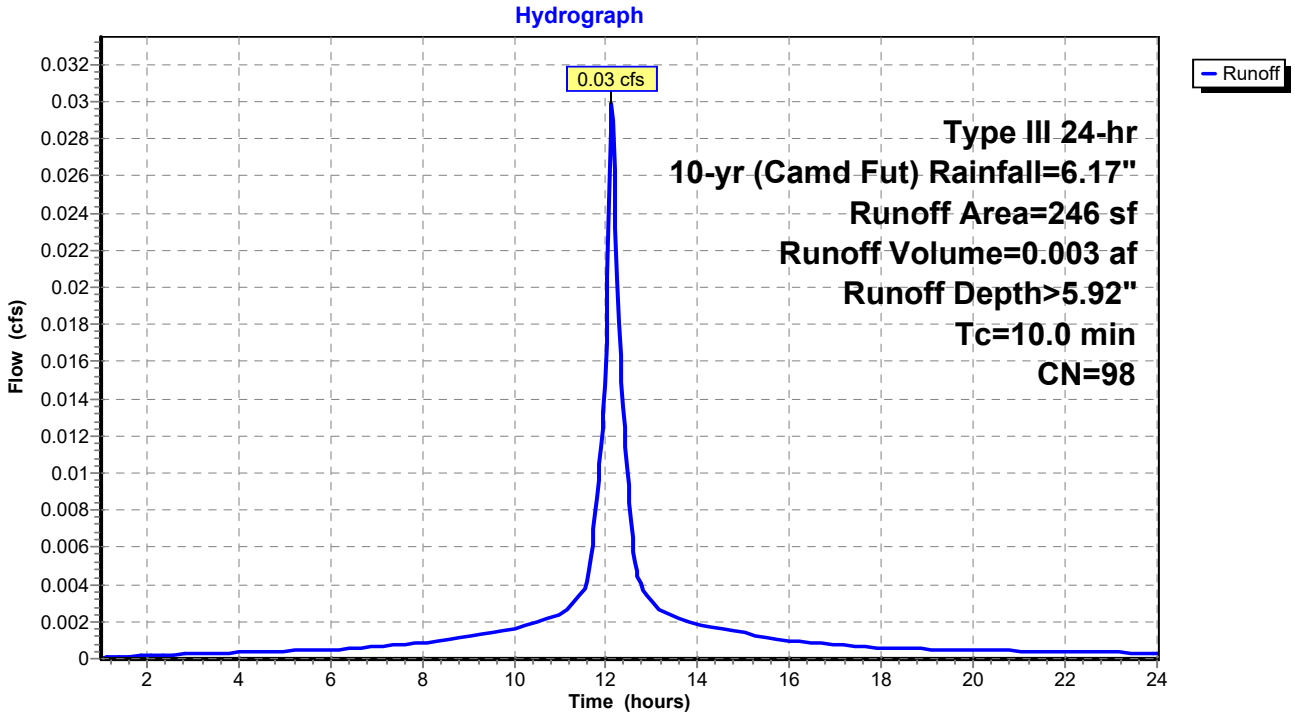
Runoff = 0.03 cfs @ 12.13 hrs, Volume= 0.003 af, Depth> 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Fut) Rainfall=6.17"

	Area (sf)	CN	Description
*	246	98	Impervious Concrete
	246		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System



Summary for Subcatchment 5PR: Proposed RY Grass to Detention System

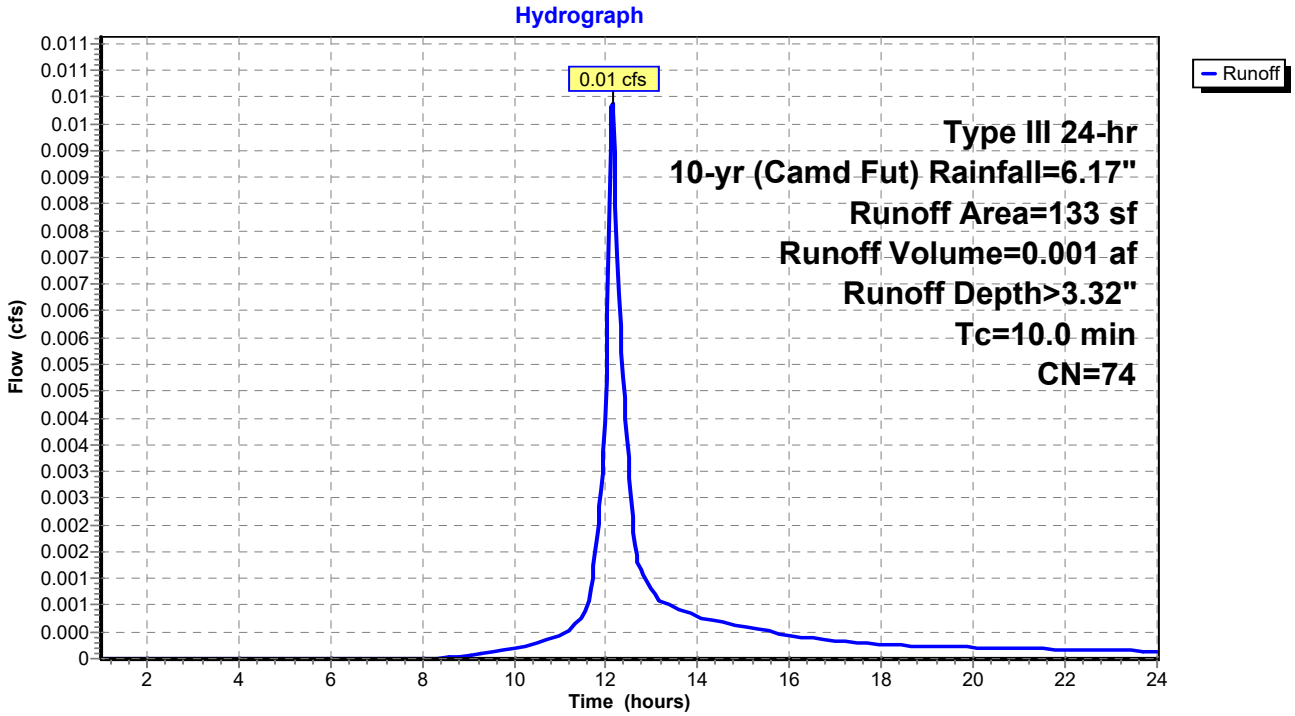
Runoff = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af, Depth> 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Fut) Rainfall=6.17"

	Area (sf)	CN	Description
*	133	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	133		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 5PR: Proposed RY Grass to Detention System



Summary for Subcatchment 6PR: Proposed RY Landscaping

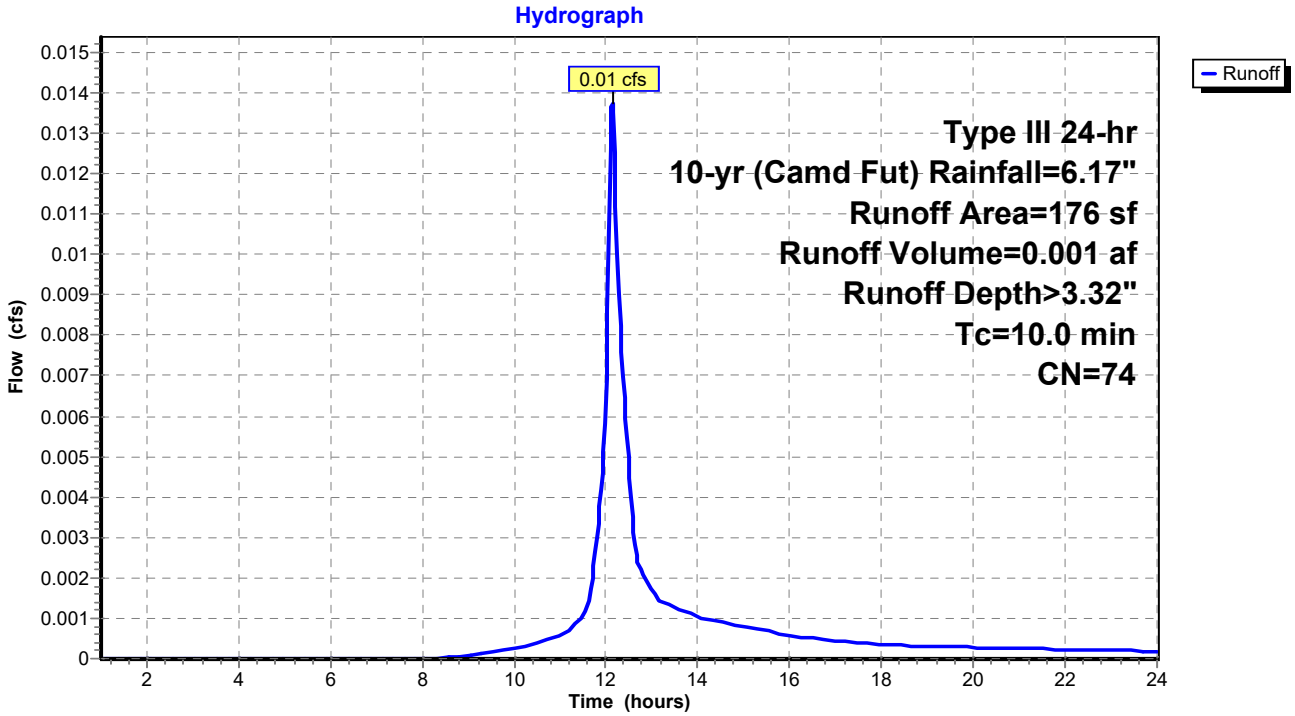
Runoff = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af, Depth> 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Fut) Rainfall=6.17"

	Area (sf)	CN	Description
*	176	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	176		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 6PR: Proposed RY Landscaping



Summary for Subcatchment 7PR: Proposed Front Yard

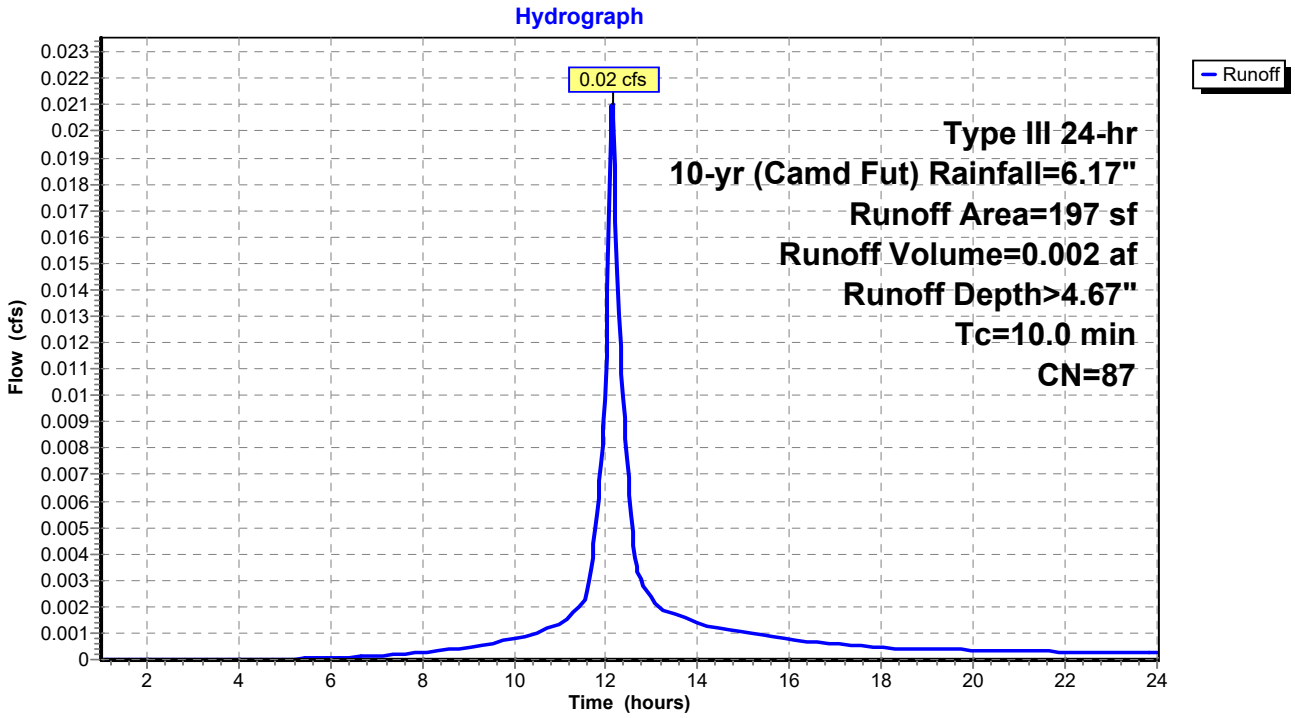
Runoff = 0.02 cfs @ 12.14 hrs, Volume= 0.002 af, Depth> 4.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr (Camd Fut) Rainfall=6.17"

	Area (sf)	CN	Description
*	75	98	Concrete Sidewalk
*	122	80	>75% Grass cover, Good, HSG C (Replaced Soil)
	197	87	Weighted Average
	122		61.93% Pervious Area
	75		38.07% Impervious Area

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

Subcatchment 7PR: Proposed Front Yard



Summary for Pond 8SWS: Detention System

[82] Warning: Early inflow requires earlier time span
[92] Warning: Device #1 is above defined storage
[93] Warning: Storage range exceeded by 0.03'

Inflow Area = 0.037 ac, 91.68% Impervious, Inflow Depth > 5.71" for 10-yr (Camd Fut) event
Inflow = 0.19 cfs @ 12.13 hrs, Volume= 0.017 af
Outflow = 0.00 cfs @ 15.37 hrs, Volume= 0.000 af, Atten= 98%, Lag= 194.1 min
Primary = 0.00 cfs @ 15.37 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs / 6
Peak Elev= 23.78' @ 15.37 hrs Surf.Area= 315 sf Storage= 649 cf

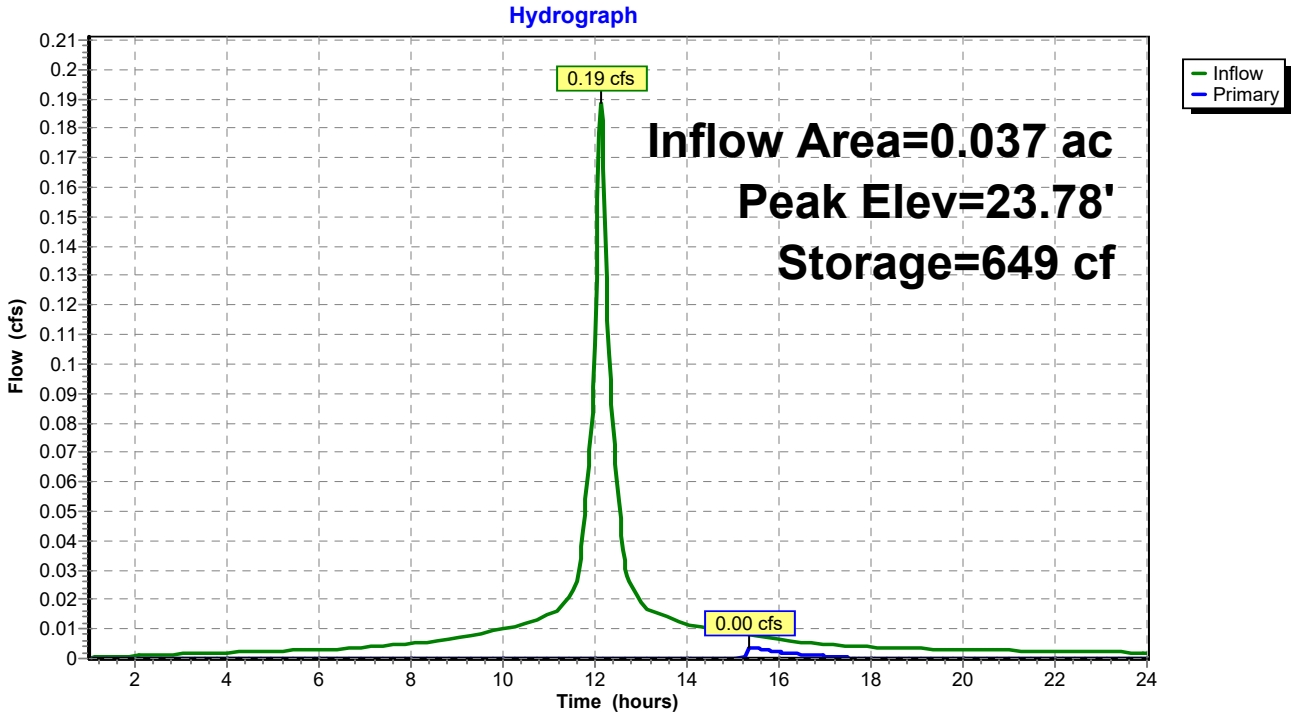
Plug-Flow detention time= 793.1 min calculated for 0.000 af (2% of inflow)
Center-of-Mass det. time= 213.6 min (965.3 - 751.7)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	355 cf	**10.50'W x 30.00'L x 3.75'H 10.5' x 30' Stone 3.75' Deep** 1,181 cf Overall - 295 cf Embedded = 887 cf x 40.0% Voids
#2	20.00'	295 cf	**30.0" Round 2 @ 30' Perf 30" HDPE** x 2 Inside #1 L= 30.0'
		649 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	23.75'	**6.0" Vert. 6" Overflow Pipe** C= 0.600

Primary OutFlow Max=0.00 cfs @ 15.37 hrs HW=23.78' (Free Discharge)
↑**1=6" Overflow Pipe** (Orifice Controls 0.00 cfs @ 0.63 fps)

Pond 8SWS: Detention System

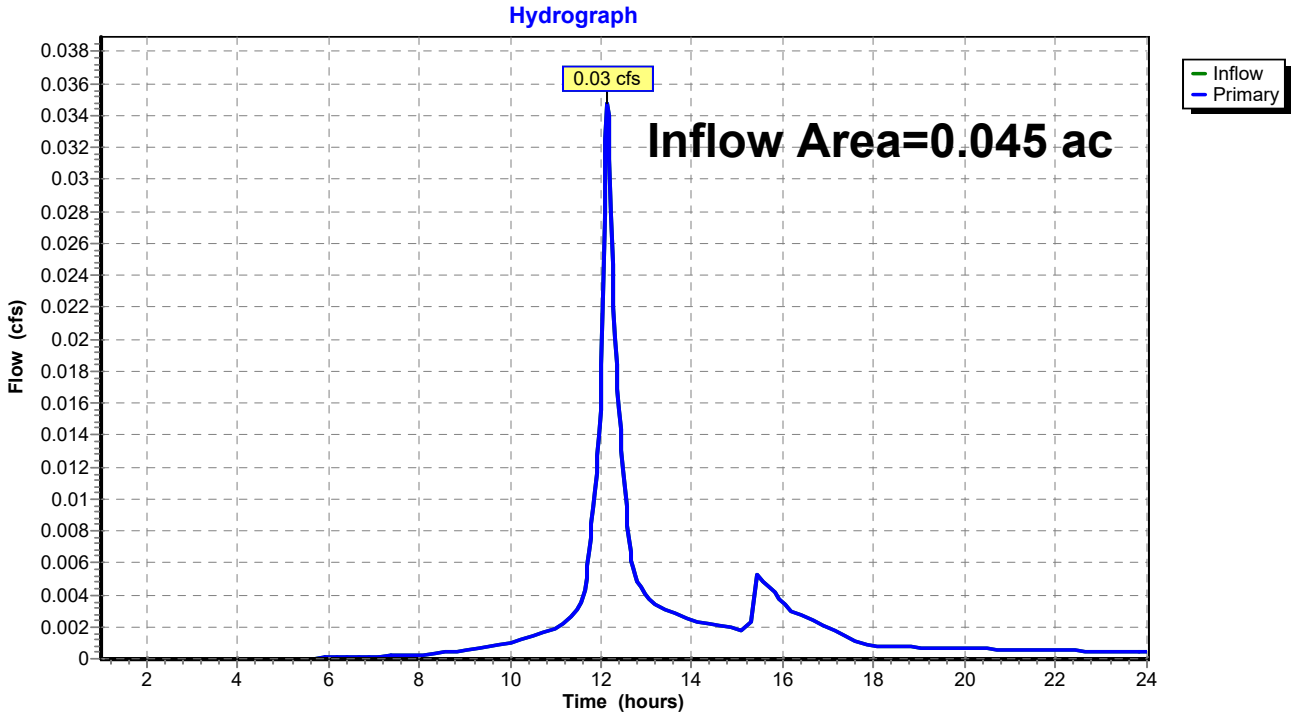


Summary for Link POI: Hypothetical Outflow off Site

Inflow Area = 0.045 ac, 78.14% Impervious, Inflow Depth > 0.84" for 10-yr (Camd Fut) event
Inflow = 0.03 cfs @ 12.14 hrs, Volume= 0.003 af
Primary = 0.03 cfs @ 12.14 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs

Link POI: Hypothetical Outflow off Site



Time span=1.00-24.00 hrs, dt=0.03 hrs, 768 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1EX: Existing Site Runoff Area=1,972 sf 0.00% Impervious Runoff Depth>9.28"
Tc=10.0 min CN=80 Runoff=0.41 cfs 0.035 af

Subcatchment 2PR: Proposed Roof to Runoff Area=1,010 sf 100.00% Impervious Runoff Depth>11.57"
Tc=10.0 min CN=98 Runoff=0.24 cfs 0.022 af

Subcatchment 3PR: Proposed Parking Runoff Area=210 sf 100.00% Impervious Runoff Depth>11.57"
Tc=10.0 min CN=98 Runoff=0.05 cfs 0.005 af

Subcatchment 4PR: Proposed Runoff Area=246 sf 100.00% Impervious Runoff Depth>11.57"
Tc=10.0 min CN=98 Runoff=0.06 cfs 0.005 af

Subcatchment 5PR: Proposed RY Grass to Runoff Area=133 sf 0.00% Impervious Runoff Depth>8.45"
Tc=10.0 min CN=74 Runoff=0.03 cfs 0.002 af

Subcatchment 6PR: Proposed RY Landscaping Runoff Area=176 sf 0.00% Impervious Runoff Depth>8.45"
Tc=10.0 min CN=74 Runoff=0.03 cfs 0.003 af

Subcatchment 7PR: Proposed Front Yard Runoff Area=197 sf 38.07% Impervious Runoff Depth>10.21"
Tc=10.0 min CN=87 Runoff=0.04 cfs 0.004 af

Pond 8SWS: Detention System Peak Elev=23.94' Storage=649 cf Inflow=0.37 cfs 0.035 af
Outflow=0.11 cfs 0.001 af

Link POI: Hypothetical Outflow off Site Inflow=0.19 cfs 0.008 af
Primary=0.19 cfs 0.008 af

Total Runoff Area = 0.091 ac Runoff Volume = 0.076 af Average Runoff Depth = 10.11"
60.93% Pervious = 0.055 ac 39.07% Impervious = 0.035 ac

Summary for Subcatchment 1EX: Existing Site

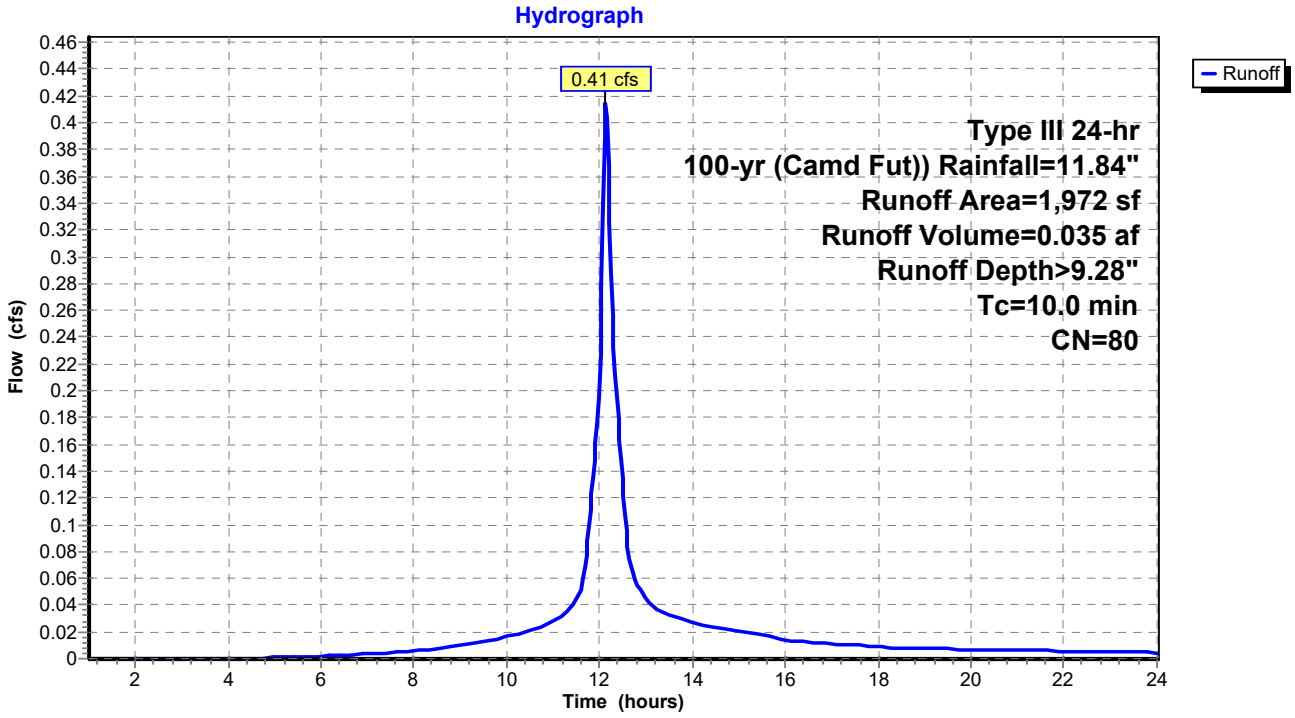
Runoff = 0.41 cfs @ 12.14 hrs, Volume= 0.035 af, Depth> 9.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Fut)) Rainfall=11.84"

	Area (sf)	CN	Description
*	1,972	80	>75% Grass cover, Good, HSG D
	1,972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 1EX: Existing Site



Summary for Subcatchment 2PR: Proposed Roof to Detention System

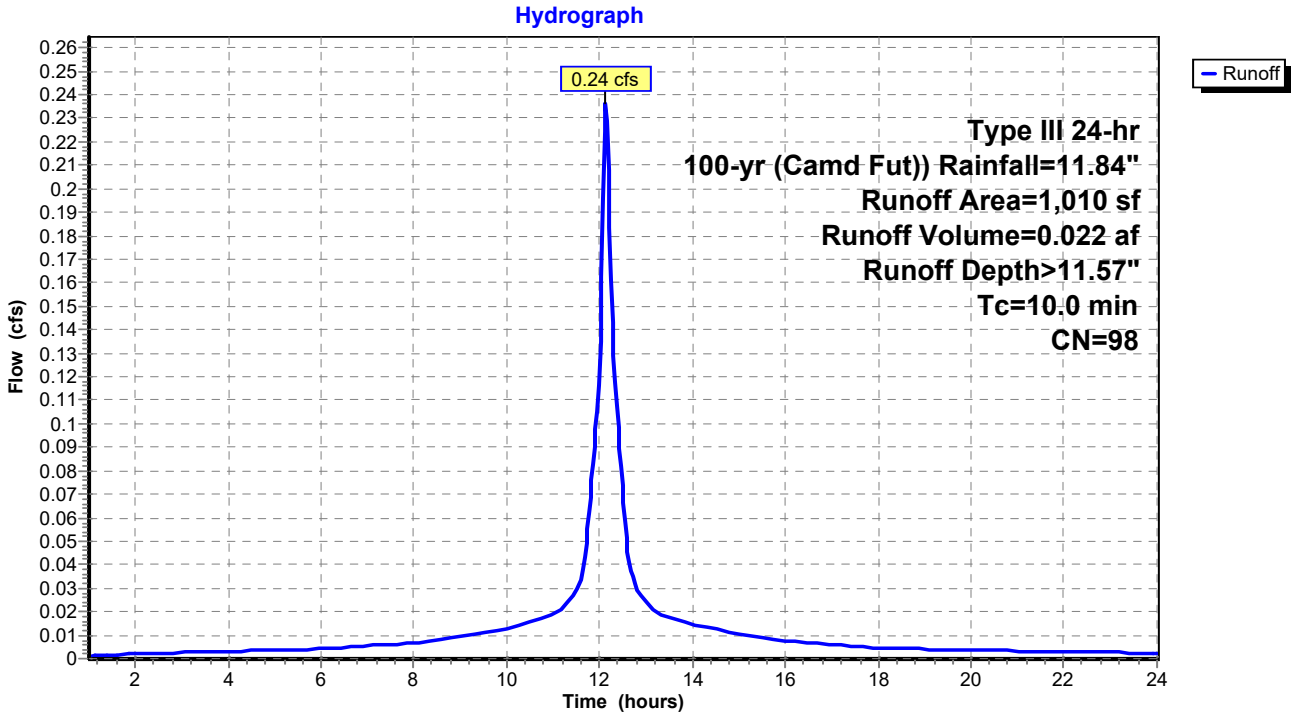
Runoff = 0.24 cfs @ 12.13 hrs, Volume= 0.022 af, Depth>11.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Fut)) Rainfall=11.84"

	Area (sf)	CN	Description
*	1,010	98	Impervious Roof
	1,010		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 2PR: Proposed Roof to Detention System



Summary for Subcatchment 3PR: Proposed Parking Area to Detention System

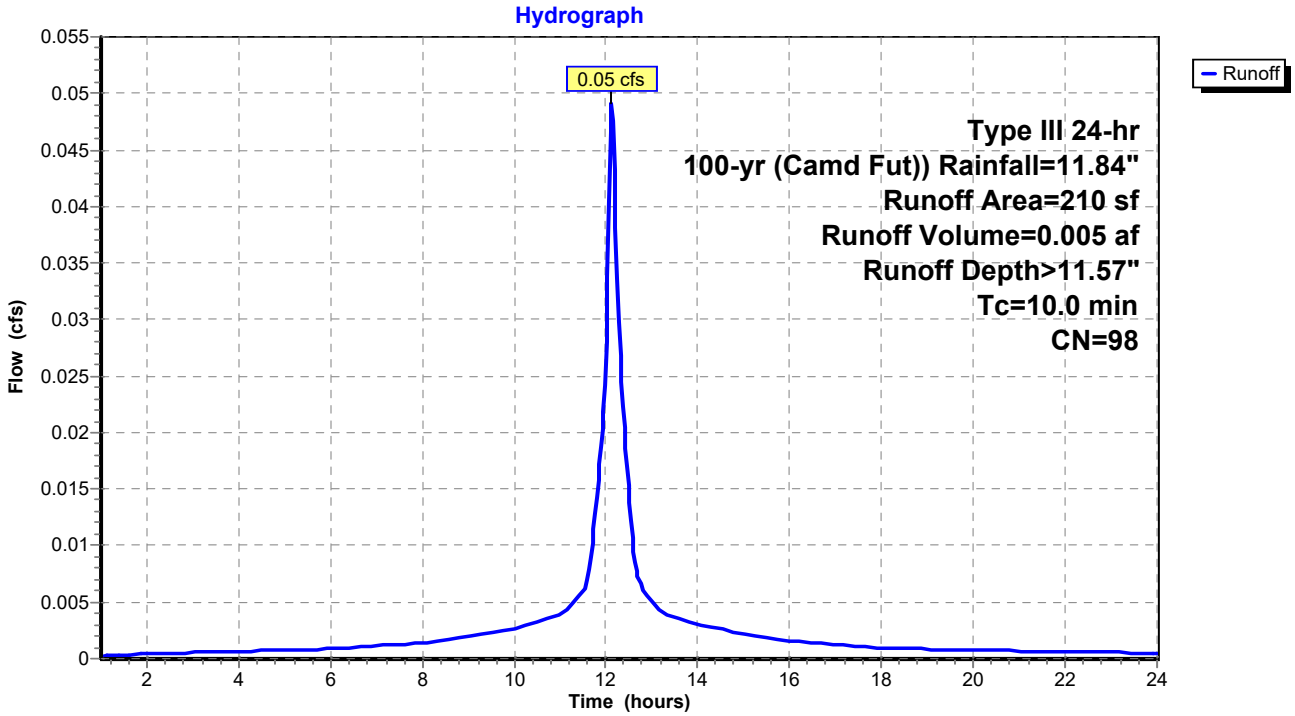
Runoff = 0.05 cfs @ 12.13 hrs, Volume= 0.005 af, Depth>11.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Fut)) Rainfall=11.84"

	Area (sf)	CN	Description
*	210	98	Pervious Pavers
	210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 3PR: Proposed Parking Area to Detention System



Summary for Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System

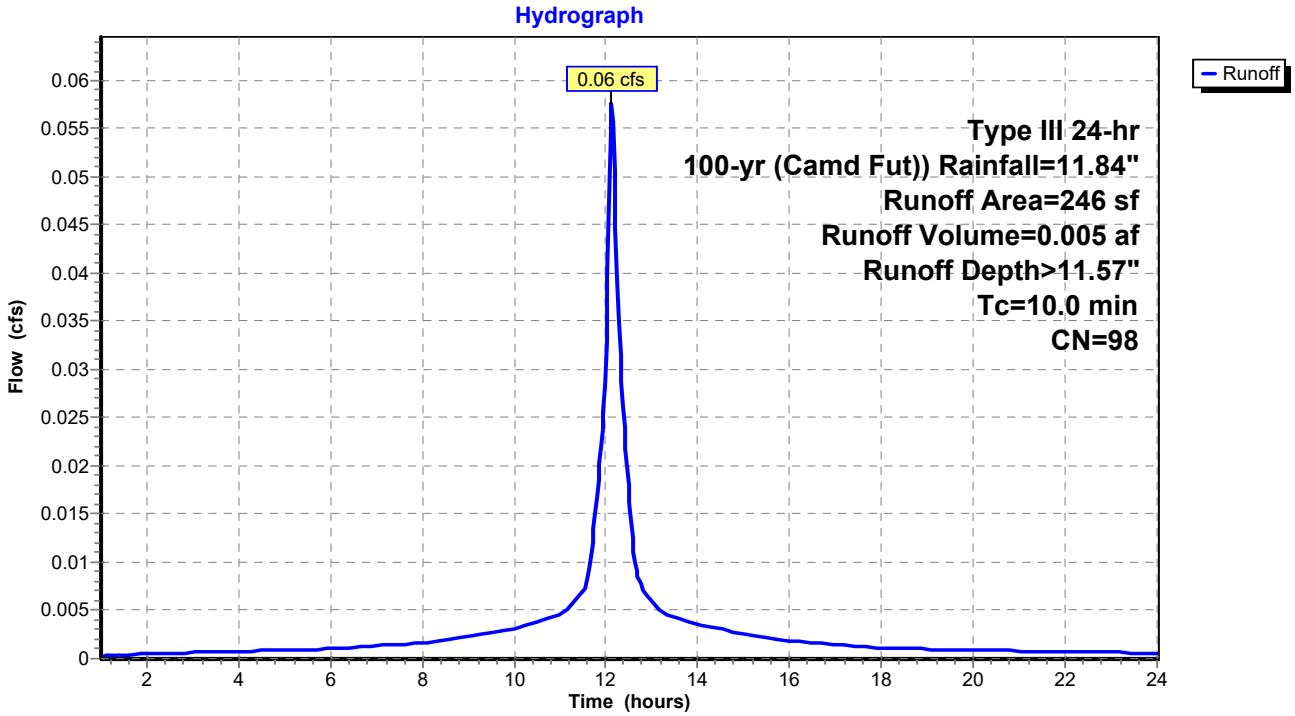
Runoff = 0.06 cfs @ 12.13 hrs, Volume= 0.005 af, Depth>11.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Fut)) Rainfall=11.84"

	Area (sf)	CN	Description
*	246	98	Impervious Concrete
	246		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 4PR: Proposed Patio/Sidewalk to Detention System



Summary for Subcatchment 5PR: Proposed RY Grass to Detention System

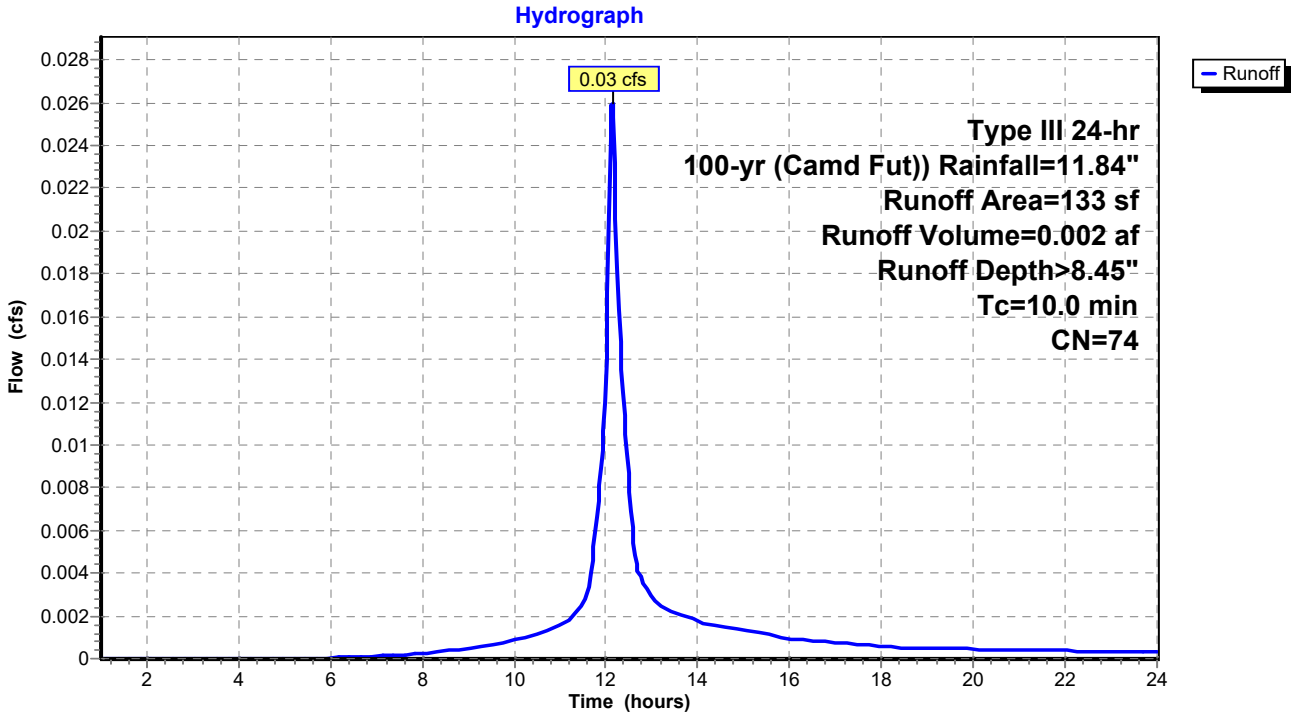
Runoff = 0.03 cfs @ 12.14 hrs, Volume= 0.002 af, Depth> 8.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Fut)) Rainfall=11.84"

	Area (sf)	CN	Description
*	133	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	133		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 5PR: Proposed RY Grass to Detention System



Summary for Subcatchment 6PR: Proposed RY Landscaping

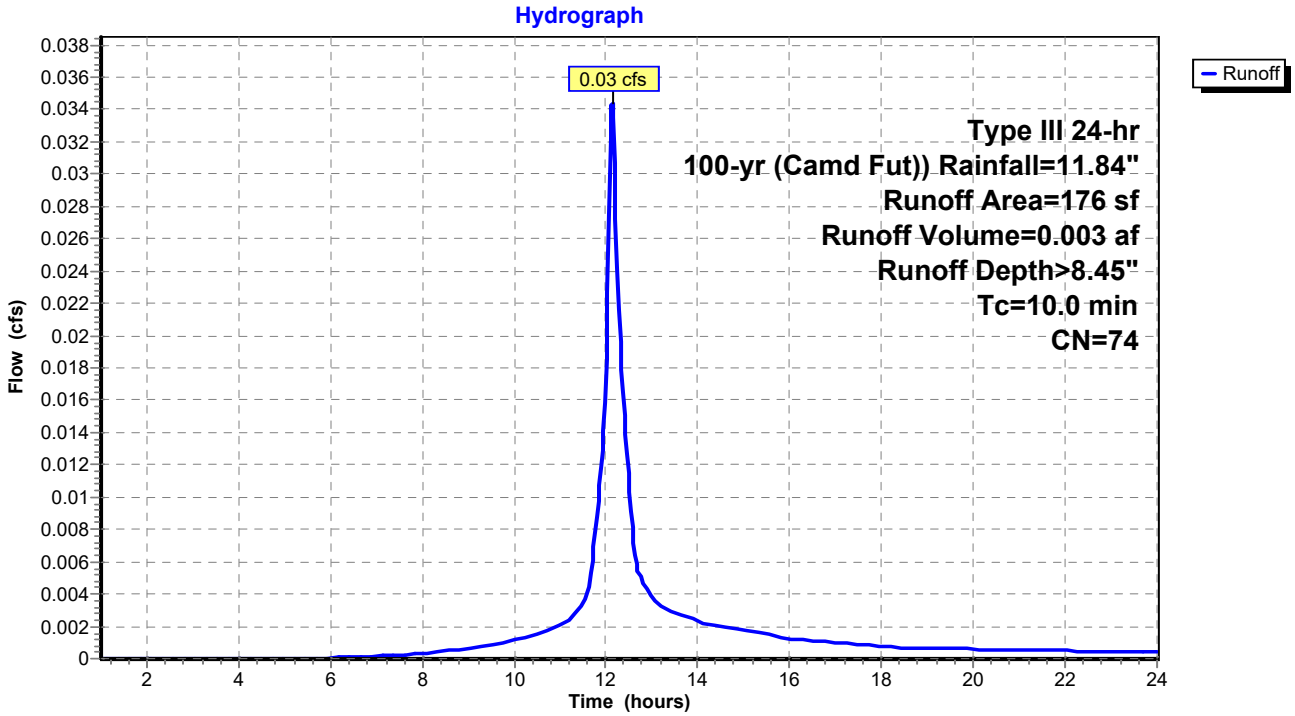
Runoff = 0.03 cfs @ 12.14 hrs, Volume= 0.003 af, Depth> 8.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Fut)) Rainfall=11.84"

	Area (sf)	CN	Description
*	176	74	>75% Grass cover, Good, HSG C (Replaced Soil)
	176		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum**
6.0	0	Total, Increased to minimum Tc = 10.0 min			

Subcatchment 6PR: Proposed RY Landscaping



Summary for Subcatchment 7PR: Proposed Front Yard

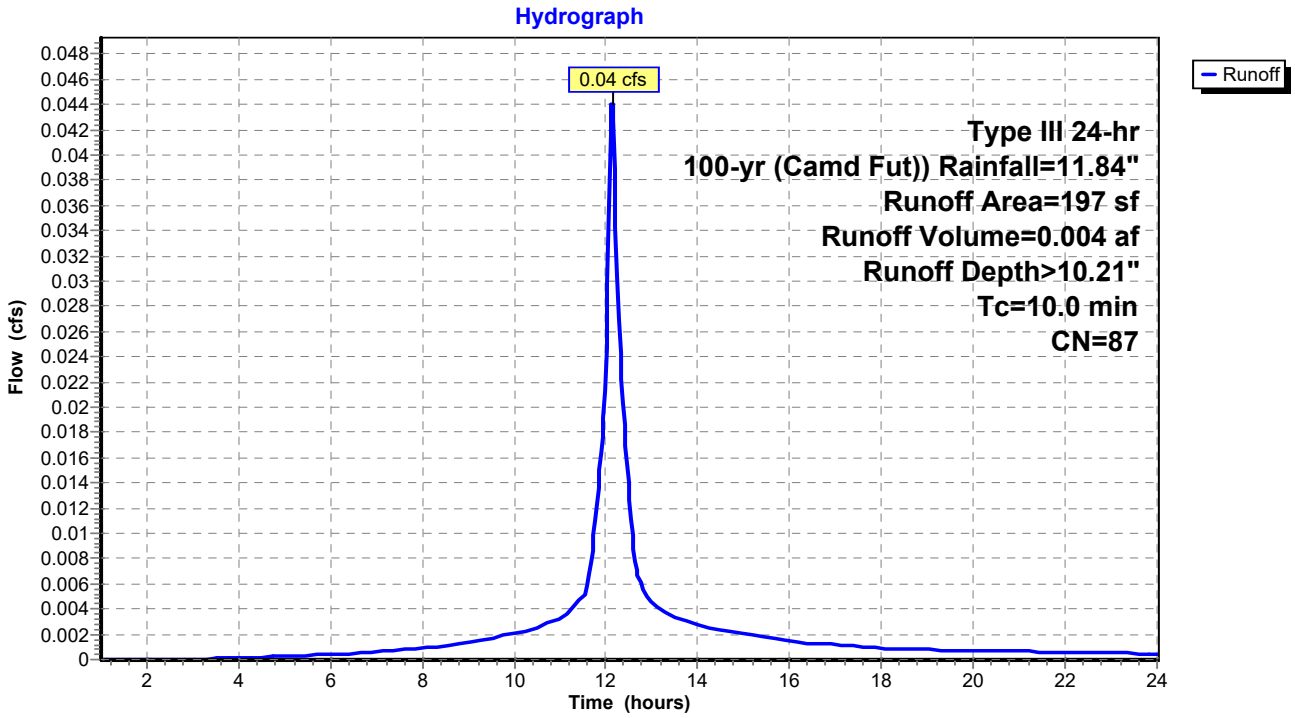
Runoff = 0.04 cfs @ 12.13 hrs, Volume= 0.004 af, Depth>10.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr (Camd Fut)) Rainfall=11.84"

	Area (sf)	CN	Description
*	75	98	Concrete Sidewalk
*	122	80	>75% Grass cover, Good, HSG C (Replaced Soil)
	197	87	Weighted Average
	122		61.93% Pervious Area
	75		38.07% Impervious Area

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

Subcatchment 7PR: Proposed Front Yard



Summary for Pond 8SWS: Detention System

[82] Warning: Early inflow requires earlier time span
[92] Warning: Device #1 is above defined storage
[93] Warning: Storage range exceeded by 0.19'

Inflow Area = 0.037 ac, 91.68% Impervious, Inflow Depth > 11.31" for 100-yr (Camd Fut)) event
Inflow = 0.37 cfs @ 12.13 hrs, Volume= 0.035 af
Outflow = 0.11 cfs @ 12.13 hrs, Volume= 0.001 af, Atten= 71%, Lag= 0.0 min
Primary = 0.11 cfs @ 12.13 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs / 6
Peak Elev= 23.94' @ 12.13 hrs Surf.Area= 315 sf Storage= 649 cf

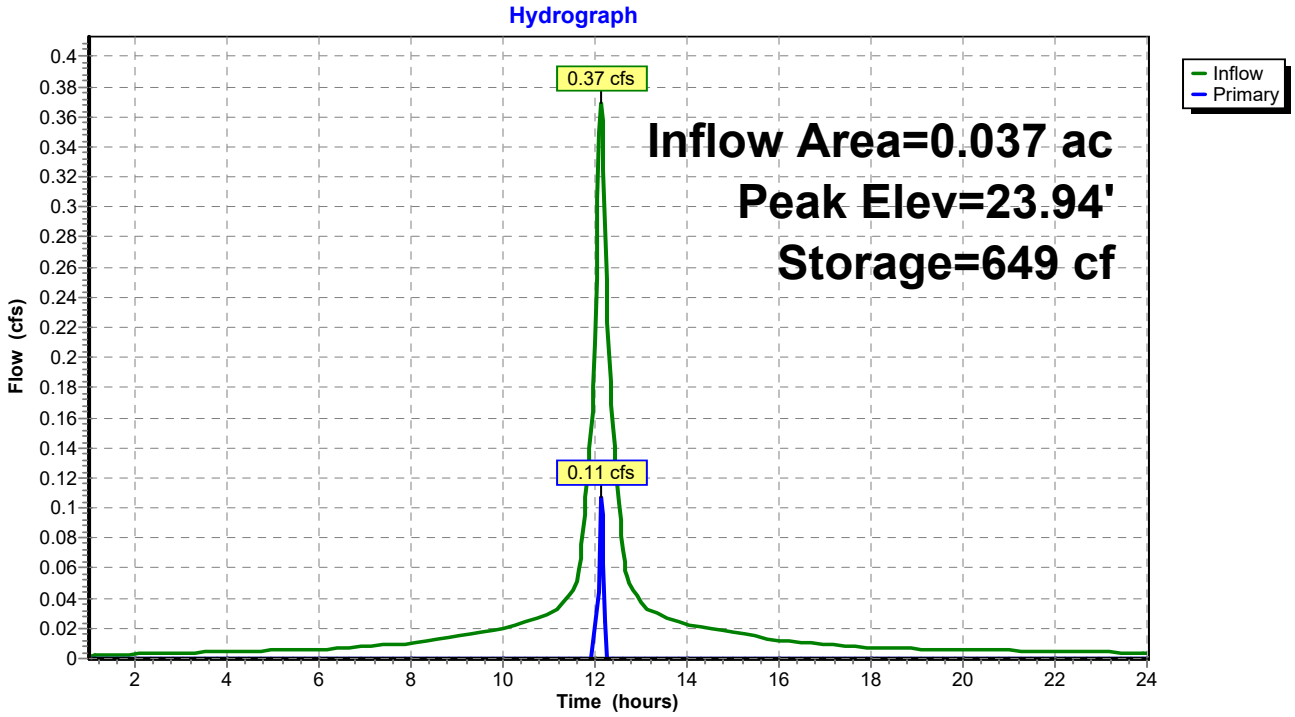
Plug-Flow detention time= 555.4 min calculated for 0.001 af (3% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	355 cf	**10.50'W x 30.00'L x 3.75'H 10.5' x 30' Stone 3.75' Deep** 1,181 cf Overall - 295 cf Embedded = 887 cf x 40.0% Voids
#2	20.00'	295 cf	**30.0" Round 2 @ 30' Perf 30" HDPE** x 2 Inside #1 L= 30.0'
		649 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	23.75'	**6.0" Vert. 6" Overflow Pipe** C= 0.600

Primary OutFlow Max=0.10 cfs @ 12.13 hrs HW=23.94' (Free Discharge)
↑**1=6" Overflow Pipe** (Orifice Controls 0.10 cfs @ 1.50 fps)

Pond 8SWS: Detention System



Summary for Link POI: Hypothetical Outflow off Site

Inflow Area = 0.045 ac, 78.14% Impervious, Inflow Depth > 2.02" for 100-yr (Camd Fut)) event
Inflow = 0.19 cfs @ 12.13 hrs, Volume= 0.008 af
Primary = 0.19 cfs @ 12.13 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.01 hrs, dt= 0.03 hrs

Link POI: Hypothetical Outflow off Site