STORMWATER MANAGEMENT REPORT

FOR

COOLIDGE CROSSING

RESIDENTIAL APARTMENT COMMUNITY

84 & 86 COOLIDGE STREET
(PORTIONS OF ASSESSORS MAP 5 LOTS 54 & 55)
SHERBORN, MA 01770

PREPARED FOR:

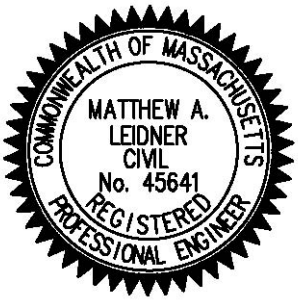
BAYSTONE DEVELOPMENT

21 CENTER STREET
WESTON, MA 02493

PREPARED BY:

CIVIL DESIGN GROUP, LLC

21 HIGH STREET, SUITE 207
NORTH ANDOVER, MA 01845



DATE: JANUARY 22, 2021

CONTENTS

1.0 INTRODUCTION

Civil Design Group, LLC (CDG) has been retained by Baystone Development to prepare this Stormwater Management Report for the construction of *Coolidge Crossing*, a multifamily residential apartment community to be located on a 15.19-acre site at 84 and 86 Coolidge Street in Sherborn, Massachusetts. A locus plan is included as Figure 1. The project includes three (3) multifamily buildings containing 120 total units. The multifamily buildings are proposed to contain three stories apiece and will consist of a mix of one-bedroom, two-bedroom and three-bedroom units. On-site amenities will include a clubhouse building, an outdoor pool and terrace area with a fire pit, grilling areas and dog park. Site access is proposed from the main full driveway on Coolidge Street with a gated emergency access at the rear of the project. Sustainable elements of the site include the utilization of existing and recycled materials and native plant species, the reclamation of surface run-off into infiltration systems, interpretive elements, public access and seating, low level and shielded lighting and bike racks to be located at each building and the clubhouse.

This study presents a comparative analysis of the pre-development and post-development hydrologic characteristics of the site, and outlines the proposed measures to mitigate flow, provide groundwater recharge, and maintain water quality from the site in accordance with the Massachusetts Department of Environmental Protection (DEP's) requirements. A detailed description of how this project meets the applicable DEP standards is included herein and the DEP *Checklist for Stormwater Report* is included as Attachment 1.

2.0 SITE DESCRIPTION

Coolidge Crossing is comprised of a portion of Assessor's Map 5 Lots 54 and 55 also known as 84 and 86 Coolidge Street. 84 Coolidge Street consists of 15.38 acres and is occupied by a single family home. 86 Coolidge Street consists of 6.14 acres and is also occupied by a single family home. The single family home at 86 Coolidge Street will be carved off on a 1.95-acre lot and is to remain. The single family home at 84 Coolidge Street, which is unoccupied and in serious disrepair, will be razed. A 4.38-acre portion of 84 Coolidge Street will be carved off and incorporated into the adjacent *Meadowbrook Commons* project site, which is a separate residential development being permitted and constructed by others. The remaining 11 acres of 84 Coolidge Street, along with the remaining 4.19 acres from 86 Coolidge Street, will be combined to form the 15.19-acre *Coolidge Crossing* project site. The *Coolidge Crossing* project site is bounded to the west by Coolidge Street, to the north by the future *Meadowbrook Commons* project site, to the east by residential properties, and the south by town-owned land. Topography on the project site generally slopes in a westerly direction and into wetlands prior to reaching Coolidge Street.

Wetland resource areas exist in the northwestern corner and south-central portion of the project site and extend into adjacent offsite land. These wetlands were delineated by Creative Land and Water Engineering, LLC in April 2020 and field-located by Levesque Geomatics in May 2020. The wetland lines were validated via Orders of Conditions under DEP file numbers 283-0401 and 283-0404 issued by the Sherborn Conservation Commission on March 3, 2020 and June 24, 2020, respectively.

According to the most recently available data provided by the Massachusetts Natural Heritage and Endangered Species Program (NHESP), no portion of the Project is within Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife and there are no Certified or Potential Vernal Pools in the vicinity of the Project. The most recently issued Flood Insurance Rate Map ("FIRM") for the area, produced by the Federal Emergency Management Agency ("FEMA"), indicates that no portions of the Project are within the mapped floodplain for the 100-year storm event. According to the Massachusetts Department of Environmental Protection ("DEP"), the Project is not located within an Area of Critical Environmental Concern (ACEC) or an area designated as an Outstanding Resource Water (ORW).

3.0 UNTREATED DISCHARGE (STANDARD 1)

Runoff from the proposed developed area that will contribute to the study points will be treated prior to discharging as further discussed herein. No untreated discharges are proposed.

4.0 PEAK RATE ATTENUATION (STANDARD 2)

Pre- and post-development hydrologic modeling was performed using HydroCad 10.0, an industry standard software package that develops a hydrologic model based on the SCS method. This software was used to study the peak discharges from rainfall runoff over the study area in both the pre- and post-development conditions at the points of analysis described below and utilizing curve numbers, times of concentration, and soil data inputs as described herein.

4.1 Points of Analysis

This study utilizes several points of analysis (POAs) that serve as comparison points for the peak discharge rates of the pre- and post-development hydrologic conditions. These design points are illustrated in Figures 3 and 4 and can be described as follows:

POA-1 – This POA is associated with the adjacent *Meadowbrook Commons* project by others and is not utilized in the *Coolidge Crossing* stormwater analysis (see note below).

POA-2 – This POA represents the westerly-flowing section of the "A" series wetland at the point it discharges into an existing receiving culvert running beneath Coolidge Street.

POA-3 – This POA represents a point at the southwest corner of the site adjacent to Coolidge Street, where runoff from portion of the site concentrates before flowing offsite to the adjacent property to the south of the site. The existing grades in this area keep the water from flowing onto Coolidge Street.

POA-4 – This POA represents the "C" series wetland at the point it discharges to the adjacent property to the south of the site.

POA-5 – This POA is associated with the adjacent *Meadowbrook Commons* project by others and is not utilized in the *Coolidge Crossing* stormwater analysis (see note below).

POA-6 – This POA is associated with the adjacent *Meadowbrook Commons* project by others and is not utilized in the *Coolidge Crossing* stormwater analysis (see note below).

POA-7 – This POA represents the northerly-flowing section of the "A" series wetland, which continues off-site, at the point it enters an existing receiving culvert which crosses the MWRA aqueduct to the north of the site.

Note: This engineer has also been retained by the developer of the adjacent *Meadowbrook Commons* project. POA-1, POA-5, and POA-6 were established for that project and are not utilized in the *Coolidge Crossing* stormwater analysis.

4.2 Subcatchments

The existing and proposed subcatchments are delineated based on topography and other physical characteristics. This report analyzes the project subcatchments as well as offsite subcatchments that flow onto the project site. Subcatchments numbering corresponds to its associated POA. Subcatchments

with the prefix "CC" are those within the *Coolidge Crossing* project site and those with the prefix "MC" are those within the adjacent *Meadowbrook Commons* site that flow onto the *Coolidge Crossing* site.

The existing conditions analysis encompasses a total of seven (7) subcatchments totaling 20.90 acres, including five (5) on-site subcatchments and two (2) subcatchments from the *Meadowbrook Commons* site that flow onto the *Coolidge Crossing* site. The proposed conditions analysis encompasses a total of seventeen (17) subcatchments totaling 18.31 acres, including fourteen (14) on-site subcatchments and three (3) subcatchments from the *Meadowbrook Commons* site that flow onto the *Coolidge Crossing* site.

In the proposed condition, 2.59 acres of the offsite area that flows onto the *Coolidge Crossing* site in the existing condition will be redirected to remain on the *Meadowbrook Commons* project site, and as such, the total study area is reduced to 18.31 acres in the proposed condition.

4.3 Times of Concentration

The times of concentration (Tcs) for each of the existing and proposed watersheds have been calculated. The areas that do not show a Tc travel path on the accompanying figures resulted in travel times of less than 6 minutes.

4.4 Curve Numbers

For purposes of generating the weighted Curve Numbers (CNs), the following values were utilized:

- pavement and concrete were classified as "paved parking"
- gravel paths and drives were classified as "gravel surface"
- roof tops were classified as "roofs"
- wooded upland areas were classified as "woods, good"
- fallow areas were classified as "meadow, non-grazed"
- areas within the power line easement were classified as "brush, good"
- lawn areas were classified as ">75% grass cover, good"
- proposed stormwater basin was classified as "water surface"
- wetlands were assigned a CN of 77 regardless of soil type

4.5 Soils

According to Natural Resources Conservation Service (NRCS) data, as detailed in Figure 2 and also shown on Figures 3 and 4, the on-site soils fall into Hydrologic Soil Groups (HSGs) A, B, C, and D. These HSGs were used in determining the CNs for the various ground covers utilized in this analysis as listed above.

In addition to the NRCS data, subsurface testing was conducted by Ransom Environmental in January 2019 and Civil Design Group, LLC in October 2020, the results of which are included in Attachments 2 and 3 of this report. This data was utilized in determining the design depths and infiltration rates associated with the proposed stormwater best management practices (BMPs) as further described in the "Mitigation Measures" section of this report.

4.6 Mitigation Measures

Peak flow from the project has been mitigated primarily through the use of infiltration (BMPs) including infiltration basins and subsurface infiltration systems, each of which is described further below and shown in detail on the corresponding design plans.

Subsurface Infiltration System (SIS) CC-1: This BMP is a subsurface infiltration system consisting of a series of parallel pipes encased within a bed of stone. An outlet pipe has been provided at an invert elevation matching the top of the stone bed to maximize the amount of infiltration that this system will provide (note that the system is also equipped with an underdrain/valve so it can be drained for maintenance purposes should the need arise). The following considerations were factored into the design of this BMP:

- Groundwater: Test pit CDG-CC-13 (10/02/20) was used to evaluate high groundwater and ledge for this BMP. This test pit showed seasonal high groundwater at elevation 166.0± and ledge at elevation 159.5±. The bottom of the system is designed to be at elevation 170.00 and is therefore 4.0'± above seasonal high groundwater, which is the more limiting factor between groundwater/ledge based on the test pit data.
- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils, which was verified by the test pit data which documented a substantial thickness of sand. As such a "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.
- Drawdown Time: The highest possible ponded water depth in this system is 2.5' based on the lowest outlet invert. Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 30/8.27 = 3.6 hours thereby meeting the DEP drawdown requirement of <72 hours.

Subsurface Infiltration System (SIS) CC-2: This BMP is a subsurface infiltration system consisting of a series of parallel pipes encased within a bed of stone. An outlet pipe has been provided at an invert elevation matching the top of the stone bed to maximize the amount of infiltration that this system will provide (note that the system is also equipped with an underdrain/valve so it can be drained for maintenance purposes should the need arise). The following considerations were factored into the design of this BMP:

- Groundwater: Test pit CDG-CC-15 (10/02/20) was used to evaluate high groundwater and ledge for this BMP. This test pit showed seasonal high groundwater at elevation 167.0± and ledge at elevation 161.0±. The bottom of the system is designed to be at elevation 171.00 and is therefore 4.0'± above seasonal high groundwater, which is the more limiting factor between groundwater/ledge based on the test pit data.
- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils, which was verified by the test pit data which documented a substantial thickness of sand. As such a "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.
- Drawdown Time: The highest possible ponded water depth in this system is 1.5' based on the lowest outlet invert. Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 18/8.27 = 2.2 hours thereby meeting the DEP drawdown requirement of <72 hours.

Subsurface Infiltration System (SIS) CC-3: This BMP is a subsurface infiltration system consisting of a series of parallel pipes encased within a bed of stone. An outlet pipe has been provided at an invert elevation matching the top of the stone bed to maximize the amount of infiltration that this system will provide (note that the system is also equipped with an underdrain/valve so it can be drained for maintenance purposes should the need arise). The following considerations were factored into the design of this BMP:

- Groundwater: Test pits CDG-CC-21 (10/02/20) and ST-19 (01/10/19) were used to evaluate high groundwater and ledge for this BMP. Test pit CDG-CC-21 showed seasonal high groundwater at elevation 170.5± and ledge at elevation 166.5±. Test pit ST-19 showed water seeping at elevation 170.0± and did not encounter ledge down through elevation 161.00±. The bottom of the system is designed to be at elevation 174.50 and is therefore 4.0'± above seasonal high groundwater, which is the more limiting factor between groundwater/ledge based on the test pit data.
- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils, which was verified by the test pit data which documented a substantial thickness of sand. As such a "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: The highest possible ponded water depth in this system is 2.0' based on the lowest outlet invert. Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 24/8.27 = 2.9 hours thereby meeting the DEP drawdown requirement of <72 hours.

Subsurface Infiltration System (SIS) CC-4: This BMP is a subsurface infiltration system consisting of a series of parallel pipes encased within a bed of stone. An outlet pipe has been provided at an invert elevation matching the top of the stone bed to maximize the amount of infiltration that this system will provide (note that the system is also equipped with an underdrain/valve so it can be drained for maintenance purposes should the need arise). The following considerations were factored into the design of this BMP:

- Groundwater: Test pits CDG-CC-10 (10/02/20), CDG-CC-21 (10/02/20), and ST-19 (01/10/19) were used to evaluate high groundwater and ledge for this BMP. Test pit CDG-CC-10 showed seasonal high groundwater at elevation 171.0± and ledge at elevation 164.5±. Test pit CDG-CC-21 showed seasonal high groundwater at elevation 170.5± and ledge at elevation 166.5±. Test pit ST-19 showed water seeping at elevation 170.0± and did not encounter ledge down through elevation 161.00±. The bottom of the system is designed to be at elevation 175.00 and is therefore 4.0'± above seasonal high groundwater, which is the more limiting factor between groundwater/ledge based on the test pit data.
- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils, which was verified by the test pit data which documented a substantial thickness of sand. As such a "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.
- Drawdown Time: The highest possible ponded water depth in this system is 1.5' based on the lowest outlet invert. Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 18/8.27 = 2.2 hours thereby meeting the DEP drawdown requirement of <72 hours.

Basin CC-1: This BMP is a surficial infiltration basin. An overflow weir has been provided at an elevation to help maximize the amount of infiltration that this system will provide (note that the system is equipped with an underdrain/valve so it can be drained for maintenance purposes should the need arise). The following considerations were factored into the design of this BMP:

- Groundwater: Test pit CDG-CC-6 (10/02/20) was used to evaluate high groundwater and ledge for this BMP. This test pit showed seasonal high groundwater at elevation 170.0± and ledge at elevation 162.5±. The bottom of the system is designed to be at elevation 174.00 and is therefore 4.0'± above seasonal high groundwater, which is the more limiting factor between groundwater/ledge based on the test pit data.
- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils, which was verified by the test pit data which documented a substantial thickness of sand. As such a "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.
- Drawdown Time: The highest possible ponded water depth in this system is 2.0' based on the lowest outlet invert. Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 24/8.27 = 2.9 hours thereby meeting the DEP drawdown requirement of <72 hours.

Basin CC-2: This BMP is a surficial infiltration basin. An overflow weir has been provided at an elevation to maximize the amount of infiltration that this system will provide (note that the system is equipped with an underdrain/valve so it can be drained for maintenance purposes should the need arise). The following considerations were factored into the design of this BMP:

- Groundwater: Test pits CDG-CC-9 (10/02/20), ST-18 (01/10/19), and ST-19 (01/10/19) were used to evaluate high groundwater and ledge for this BMP. Test pit CDG-CC-9 showed seasonal high groundwater at elevation 172.0± and ledge at elevation 165.5±. Test pit ST-18 showed water seeping at elevation 171.0± and did not encounter ledge down through elevation 158.00±. Test pit ST-19 showed water seeping at elevation 170.0± and did not encounter ledge down through elevation 161.00±. The bottom of the system is designed to be at elevation 176.00 and is

therefore 4.0'± above seasonal high groundwater, which is the more limiting factor between groundwater/ledge based on the test pit data.
- Infiltration Rate: NRCS soil maps indicate that this BMP is located predominantly within HSG-A soils, which was verified by the test pit data which documented a substantial thickness of sand. As such a "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.
- Drawdown Time: The highest possible ponded water depth in this system is 1.85' based on the lowest outlet invert. Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 22.2/8.27 = 2.7 hours thereby meeting the DEP drawdown requirement of <72 hours.

Basin CC-3: This BMP is a surficial infiltration basin. An overflow weir has been provided at an elevation to maximize the amount of infiltration that this system will provide (note that the system is equipped with an underdrain/valve so it can be drained for maintenance purposes should the need arise). The following considerations were factored into the design of this BMP:

- Groundwater: Test pits CDG-CC-1 (10/02/20), CDG-CC-22 (10/02/20), and CDG-CC-23 (10/02/20) were used to evaluate high groundwater and ledge for this BMP. Test pit CDG-CC-1 showed seasonal high groundwater at elevation 170.5± and ledge at elevation 169.5±. CDG-CC-22 showed seasonal high groundwater at elevation 172.5± and ledge at elevation 170.5±. CDG-CC-23 showed seasonal high groundwater at elevation 171.0± and ledge at elevation 163.05±. Since these test pits are located at varying ground elevations in gently sloped area, it can be extrapolated that seasonal high groundwater is generally 3'-4' below existing grade in this portion of the site. Therefore, to be conservative, the bottom of the basin was held generally 1' above existing grade to provide 4' of separation to seasonal high groundwater, conservatively assuming that seasonal high groundwater is consistently 3' below existing grade.
- Infiltration Rate: Although the NRCS soil maps indicate that this BMP is located within HSG-A soils, the test pit data consistently documented loamy sand soils in this part of the site. As such a "Rawls" infiltration rate of 2.41 inches/hour was used in the modeling of this system.
- Drawdown Time: The highest possible ponded water depth in this system is 2.75' based on the lowest outlet invert. Utilizing the "Rawls" infiltration rate of 2.41 inches/hour, the drawdown time is 33/2.41 = 13.7 hours thereby meeting the DEP drawdown requirement of <72 hours.

4.7 Peak Flow Comparison Table

In accordance with the state stormwater standards, the stormwater management system is designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates for the 2-year, 10-year, and 100-year, 24-hour storm events. The peak flow has been mitigated through the use of the BMPs described in the section above. Rainfall values used for each design storm were obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14. Peak flow rates for the pre-development and post-development conditions are illustrated in the following table:

POINT OF ANALYSIS	**2-YEAR STORM EVENT (3.34"/24-HR)**		**10-YEAR STORM EVENT (5.23"/24-HR)**		**100-YEAR STORM EVENT (8.23"/24-HR)**	
	PRE (CFS)	**POST (CFS)**	**PRE (CFS)**	**POST (CFS)**	**PRE (CFS)**	**POST (CFS)**
POA-2	*1.74*	**1.72**	*4.25*	**2.81**	*12.20*	**12.10**
POA-3	*0.29*	**0.17**	*0.48*	**0.26**	*2.41*	**1.77**
POA-4	*4.68*	**4.68**	*16.26*	**14.93**	*41.93*	**41.69**
POA-7	*0.12*	**0.10**	*1.15*	**0.44**	*5.42*	**2.71**

Pre- and post-development Hydrocad output for these storm events is included in Attachments 4 and 5 of this report.

5.0 STORMWATER RECHARGE (STANDARD 3)

The DEP Stormwater Management Policy requires that the site's impervious area be used to calculate the required infiltration in order to approximate the annual recharge from pre-development conditions. On this site, the total proposed impervious area is 3.60± acres as compared with the existing impervious area of 0.14± acres, for a new increase in impervious area of 3.46± acres. The required recharge equals a depth of runoff corresponding to the underlying soil type multiplied by the in impervious area for each soil type in the post development condition. The following values were used for this project:

HSG	RUNOFF DEPTH TO INFILTRATE (in)	EXISTING IMPERVIOUS AREA (ac)	PROPOSED IMPERVIOUS AREA (ac)	NET CHANGE IMPERVIOUS AREA (ac)
A	0.60	0.10	3.11	3.01
B	0.35	0.00	0.00	0.00
C	0.25	0.00	0.33	0.33
D	0.10	0.04	0.16	0.12

Recharge Volume (Rv) = (required runoff depth) x (newly created impervious area) =

$$
\begin{aligned}
&0.60 \text{ inch} \times 3.01 \text{ acres} \times (43{,}560 \text{ ft}^2/\text{acre}) \times (1 \text{ ft}/12 \text{ inches}) \\
+\ &0.35 \text{ inch} \times 0.00 \text{ acres} \times (43{,}560 \text{ ft}^2/\text{acre}) \times (1 \text{ ft}/12 \text{ inches}) \\
+\ &0.25 \text{ inch} \times 0.33 \text{ acres} \times (43{,}560 \text{ ft}^2/\text{acre}) \times (1 \text{ ft}/12 \text{ inches}) \\
+\ &0.10 \text{ inch} \times 0.12 \text{ acres} \times (43{,}560 \text{ ft}^2/\text{acre}) \times (1 \text{ ft}/12 \text{ inches}) \\
&\textbf{6,899} \\
&\textbf{(cubic feet)}
\end{aligned}
$$

The static recharge volume provided in the BMPs far exceeds DEP's recharge requirement as follows:

BMP	STATIC RECHARGE VOLUME (cubic feet)
Basin CC-1	5,197
Basin CC-2	6,026
Basin CC-3	7,324
SIS CC-1	6,681
SIS CC-2	1,901
SIS CC-3	4,549
SIS CC-4	1,477
TOTAL STATIC RECHARGE VOLUME	**33,155** (cubic feet)

6.0 WATER QUALITY (STANDARD 4)

By utilizing the BMPs outlined below, the Project achieves the required water quality treatment level of 80% total suspended solids (TSS) removal. Treatment trains documenting the provided TSS removal are provided below.

Deep Sump Hooded Catch Basins: Stormwater runoff from proposed pavement areas will be directed via curbing and site grading to catch basins with deep sumps and hooded outlets. The catch basins will trap and remove sediment and larger particles from the stormwater and will improve the performance of subsequent BMPs. The sumps will be a minimum of 4' in depth and a regular inspection and cleaning schedule has been proposed to ensure optimal effectiveness.

Proprietary Water Quality Units: The proposed proprietary water quality units (WQUs) are designed to remove heavy particles, floating debris and hydrocarbons from stormwater. Stormwater enters the system where floatables and oils are separated prior to the clarified stormwater runoff discharging to an outlet pipe. Water quality unit sizing and selection data is included in Attachment 6 of this report.

Infiltration: Stormwater from paved areas will be discharged to the proposed infiltration BMPs after undergoing pre-treatment from the BMPs listed above. The infiltration BMPs will provide further treatment of the stormwater.

TREATMENT TRAIN: INFILTRATION WITH PRETREATMENT

BMP (A)	TSS Removal Rate (B)	Starting TSS Load (C)	Amount Removed (BxC) (D)	Remaining Load (C-D) (E)
Infiltration with pretreatment (deep sump catch basins and/or WQUs)	0.80	1.0	0.80	0.20
Total TSS Removal = Summation of (D) =			**80%**	

TREATMENT TRAIN THROUGH DMH-1

BMP (A)	TSS Removal Rate (B)	Starting TSS Load (C)	Amount Removed (BxC) (D)	Remaining Load (C-D) (E)
Deep Sump CBs	0.25	1.0	0.25	0.75
WQU Unit	0.89[1]	0.75	0.67	0.08
Total TSS Removal = Summation of (D) =			**92%**	

TREATMENT TRAIN THROUGH DMH-7

BMP (A)	TSS Removal Rate (B)	Starting TSS Load (C)	Amount Removed (BxC) (D)	Remaining Load (C-D) (E)
WQU Unit	0.90[2]	1.0	0.90	0.10
Total TSS Removal = Summation of (D) =			**90%**	

[1] See attached water quality unit sizing documentation, Attachment 6

[2] See attached water quality unit sizing documentation, Attachment 6

7.0 LUHPPL (STANDARD 5)

Not applicable to the Project.

8.0 CRITICAL AREAS (STANDARD 6)

Not applicable to the Project.

9.0 REDEVELOPMENT (STANDARD 7)

Not applicable to the Project.

10.0 EROSION & SEDIMENT CONTROL PLAN (STANDARD 8)

The project is subject to the National Pollutant Discharge Elimination System (NPDES) program of the United States Environmental Protection Agency, which will require construction operations to comply with the NPDES General Permit For Stormwater Discharges From Construction Activities and will require the implementation of a site-specific a Stormwater Pollution Prevention Plan (SWPPP) addressing erosion and sedimentation control practices to be used throughout the construction period. The SWPPP will be prepared prior to construction as required by the NPDES permit.

Proposed erosion and sedimentation control measures will include compost filter socks, silt fence, crushed stone, riprap, hydroseeding, mulching, erosion control matting, diversion berms, and sedimentation basins. Compost filter sock and siltation fence will be used for the perimeter erosion control barrier and elsewhere as conditions warrant. Sedimentation basins will be used throughout the site to treat runoff and diversion berms will be utilized as needed to divert untreated stormwater to the sedimentation basins. Sedimentation basins and diversion berms will be added, removed, and adjusted as the site evolves throughout the construction process. Hydroseeding or sod will be used as a permanent stabilization measure for all revegetated areas of the site. Slopes 3:1 and steeper will be stabilized with an erosion control matting. Mulching may be used to reinforce seeded areas where erosion control matting is not required or warranted, but where some protection is warranted. Mulching may also be used to stabilize areas where construction activities will temporarily cease for more than 14 days. Silt sacks will be used to protect catch basins prior to binder and elsewhere as conditions warrant. The contractor will be required to keep a reasonable stock of erosion controls on site to be able to supplement or make repairs as necessary.

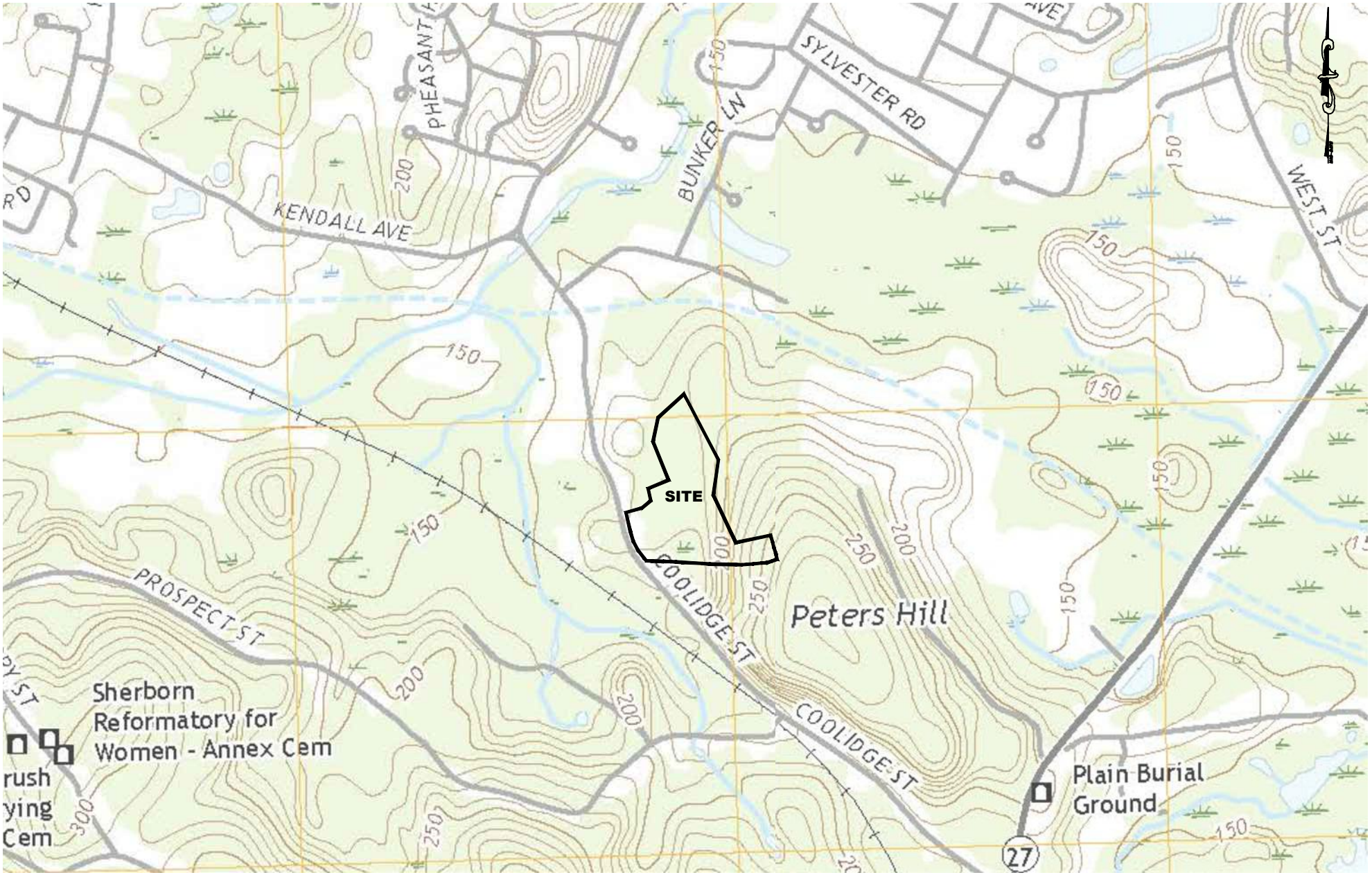
11.0 OPERATION & MAINTENANCE PLAN (STANDARD 9)

A post-construction Operation and Maintenance (O&M) Plan for the Project is included as Attachment 7.

12.0 ILLICIT DISCHARGES (STANDARD 10)

The proposed stormwater management system does not include any illicit discharges. An illicit discharge statement is included as Attachment 8.

Figures



1000 0 500 1000 2000

GRAPHIC SCALE IN FEET

SOURCE: USGS TOPO 2018
QUADS: FRAMINGHAM, HOLLISTON, MEDWAY, & NATICK

CLIENT:

BAYSTONE DEVELOPMENT

PARCELS 5-54, 5-55
84, 86 COOLIDGE STREET
SHERBORN, MA 01770

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www.cdgengineering.com
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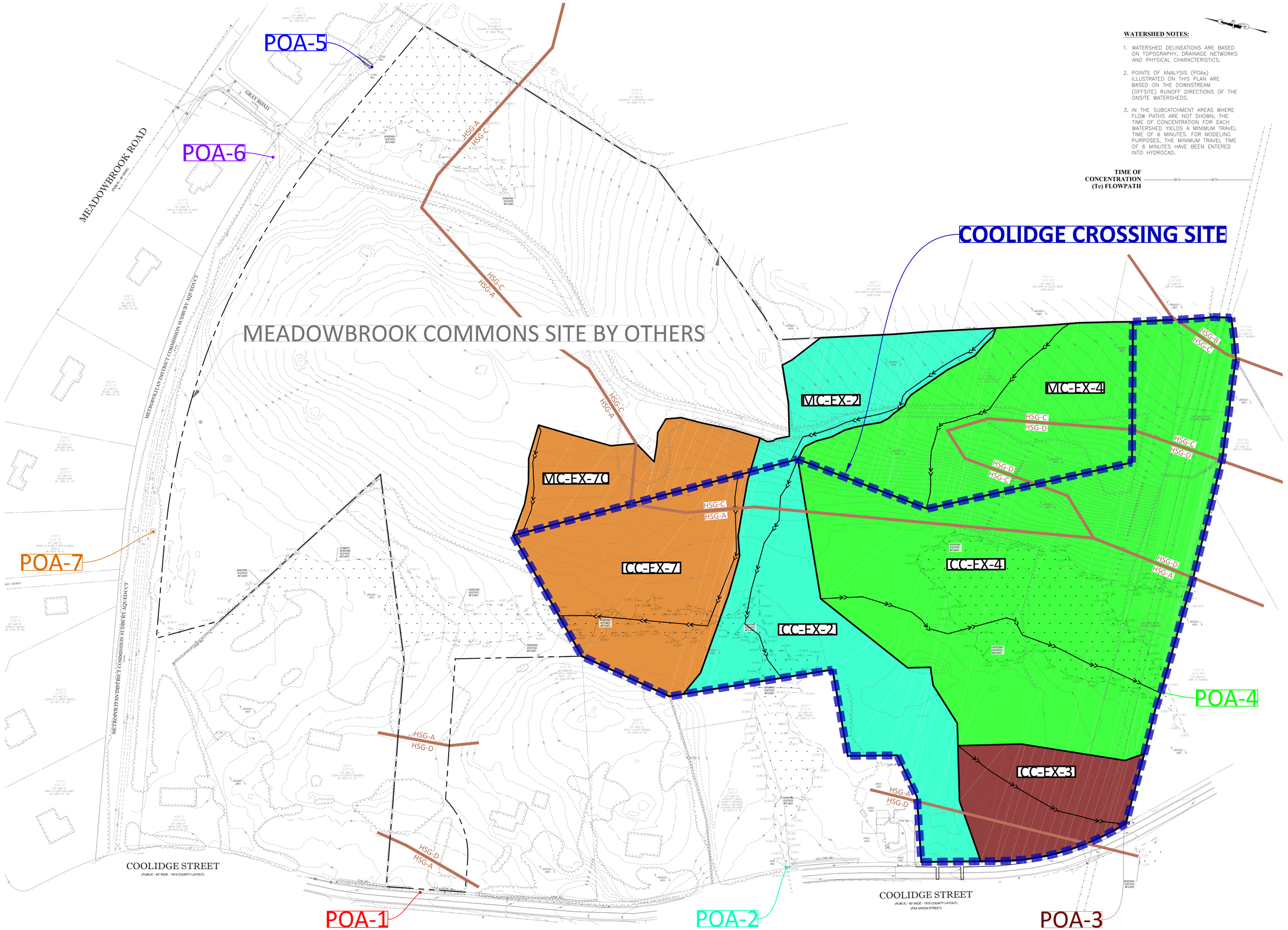
LOCATION MAP

01/22/2021



WATERSHED NOTES:

1. WATERSHED DELINEATIONS ARE BASED ON TOPOGRAPHY, DRAINAGE NETWORKS AND PHYSICAL CHARACTERISTICS.
2. POINTS OF ANALYSIS (POAs) ILLUSTRATED ON THIS PLAN ARE BASED ON THE DOWNSTREAM (OFFSITE) RUNOFF DIRECTIONS OF THE ONSITE WATERSHEDS.
3. IN THE SUBCATCHMENT AREAS WHERE FLOW PATHS ARE NOT SHOWN, THE TIME OF CONCENTRATION FOR EACH WATERSHED YIELDS A MINIMUM TRAVEL TIME OF 6 MINUTES. FOR MODELING PURPOSES, THE MINIMUM TRAVEL TIME OF 6 MINUTES HAVE BEEN ENTERED INTO HYDROCAD.

TIME OF CONCENTRATION (Tc) FLOWPATH

NOT FOR CONSTRUCTION

CDG PROJECT #: 20012

REVISIONS:

REV	DATE	COMMENT
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

ZONING BOARD OF APPEALS:

SEAL:

MATTHEW A. LEIDNER, P.E.

PREPARED BY:
CIVIL DESIGN GROUP, LLC
21 HIGH STREET, SUITE 207
NORTH ANDOVER, MA 01845
www.cdgengineering.com
p: 978-794-5400 f: 978-965-3971

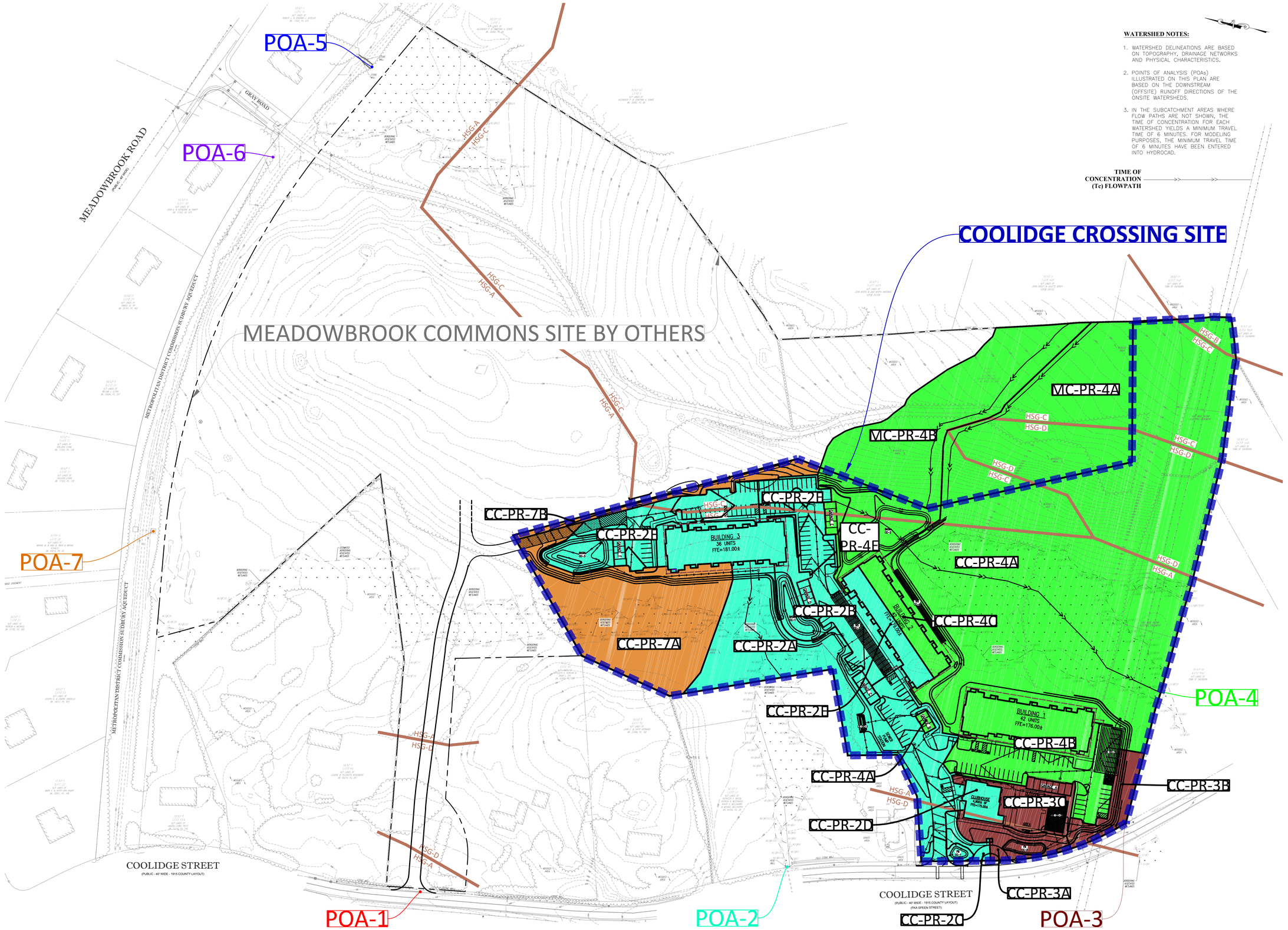
PREPARED FOR:
BAYSTONE DEVELOPMENT
21 CENTER STREET
WESTON, MA 02493
www.baystonedevelopment.com

PROJECT:
COOLIDGE CROSSING
84 & 86 COOLIDGE STREET
SHERBORN, MASSACHUSETTS

SCALE:
80 0 40 80 160
GRAPHIC SCALE IN FEET

SHEET:
PRE-DEVELOPMENT WATERSHEDS
FIGURE 3

DATE: 01/22/2021



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TIME OF CONCENTRATION (Tc) FLOWPATH

NOT FOR CONSTRUCTION

CDG PROJECT #: 20012

REVISIONS:

REV	DATE	COMMENT
1		
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SHERBORN, MASSACHUSETTS

SCALE:

80 0 40 80 160

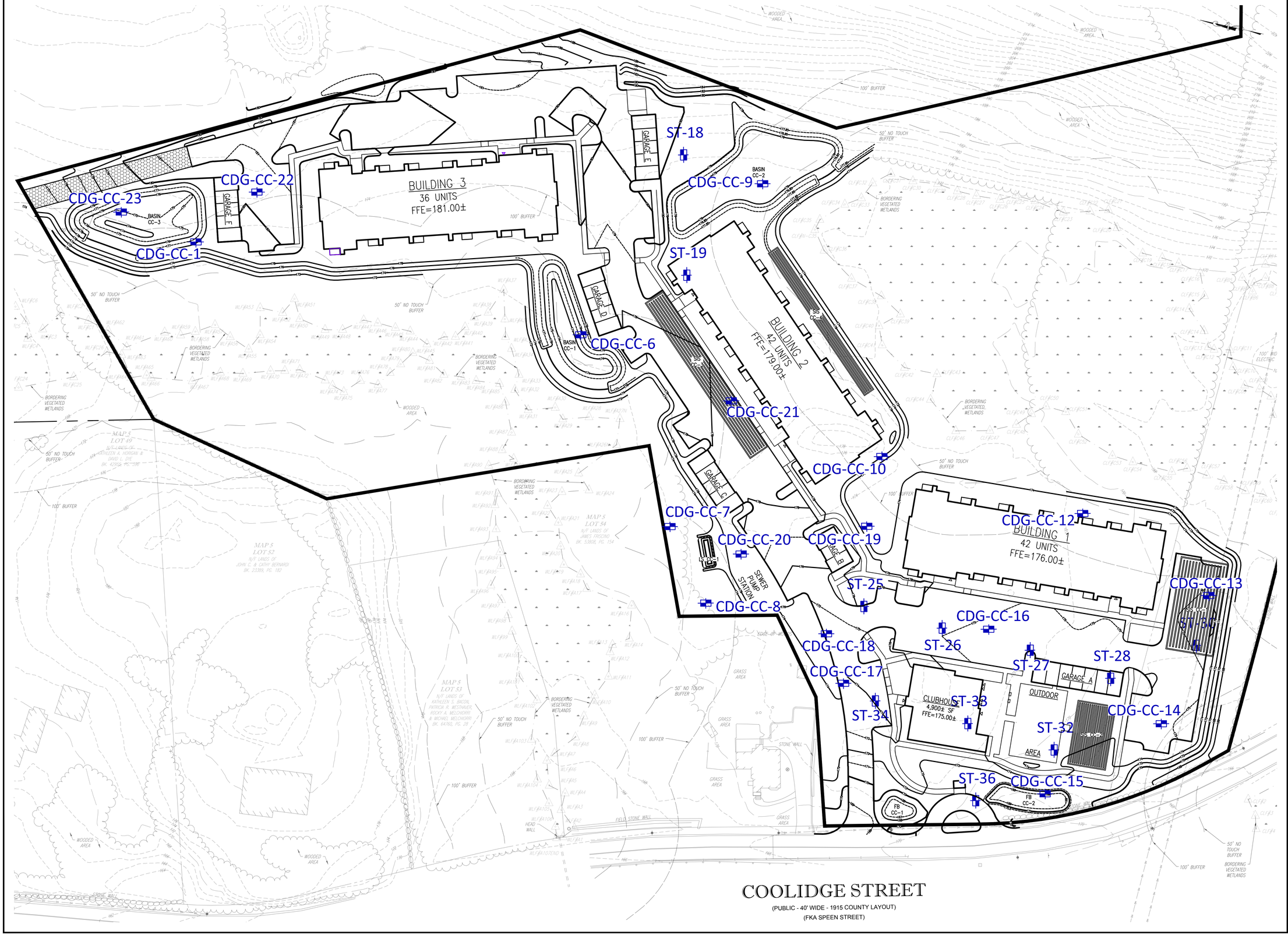
GRAPHIC SCALE IN FEET

SHEET:

POST-DEVELOPMENT WATERSHEDS

FIGURE 4

DATE: 01/22/2021



NOT FOR CONSTRUCTION

CDG PROJECT #: 20012

REVISIONS:

REV	DATE	COMMENT
1		
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84 & 86 COOLIDGE STREET
SHERBORN, MASSACHUSETTS

SCALE:

40 0 20 40 80

GRAPHIC SCALE IN FEET

SHEET:

TEST PIT LOCATIONS

FIGURE 5

DATE: 01/22/2021

Attachment 1 –

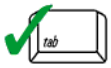
DEP Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

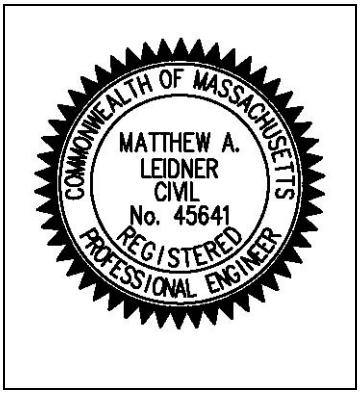
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



01/22/2021

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☒ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☒ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☐ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Attachment 2 – Test Pit Logs:

Civil Design Group

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-1 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Woodland w/stone walls (e.g., woodland, agricultural field, vacant lot, etc.) | Mature Trees (Vegetation) | Limited (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 10+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A	-	-	-	-	-	-	-	-	-	Forest mat
4-21	B	LS	10YR 5/4	-	-	-	10	0	GRANULAR	FRIABLE	-
21-48	C	SL	10YR 5/2	36	2.5YR 4/8	10	25	5	PLATY	FRIABLE	-
48	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-6 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Woodland w/stone walls (e.g., woodland, agricultural field, vacant lot, etc.) | Mature Trees (Vegetation) | Limited (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 5+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	-	-	-	-	-	-	-	-	-	-
6-20	B	S	10YR 5/8	-	-	-	0	0	GRANULAR	LOOSE	Beach sand
20-54	C1	S	10YR 5/4	30	2.5YR 4/8	25	0	0	GRANULAR	LOOSE	Beach sand
54-120	C2	S	10YR 5/2	-	-	-	0	0	GRANULAR	LOOSE	Beach sand
120	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-7 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Ap	-	-	-	-	-	-	-	-	-	-
8-18	B	LS	10YR 5/6	-	-	-	0	0	GRANULAR	FRIABLE	-
18-36	C1	LS	10YR 5/4	24	2.5YR 4/8	10	10	0	GRANULAR	FRIABLE	-
36-48	C2	LS	10YR 5/2	-	-	-	50	0	GRANULAR	FRIABLE	Dense in place
48	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Ce Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-8 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Ap	-	-	-	-	-	-	-	-	-	-
6-18	B/C	LS	10YR 5/4	-	-	-	<10	0	GRANULAR	FRIABLE	See below
18	LEDGE										-

Additional Notes:
Cannot differentiate B and C horizons; no redox observed.

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-9 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☒ Yes ☐ No | If yes: 90 Depth Weeping from Pit | - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	Ap	-	-	-	-	-	-	-	-	-	-
10-16	B	S	10YR 5/8	-	-	-	0	0	GRANULAR	LOOSE	Beach sand
16-60	C1	S	10YR 5/4	18	2.5YR 4/8	25	0	0	GRANULAR	LOOSE	Beach sand
60-96	C2	S	10YR 5/2	-	-	-	0	0	GRANULAR	LOOSE	Beach sand
96	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-10 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Ap	-	-	-	-	-	-	-	-	-	-
8-24	B	FS	10YR 5/4	-	-	-	0	0	GRANULAR	LOOSE	-
24-54	C1	FS	10YR 5/3	36	2.5YR 4/8	25	0	0	GRANULAR	LOOSE	-
54-114	C2	SL	10YR 5/2	-	-	-	25	25	PLATY	FRIABLE	-
114	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-12 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	-	-	-	-	-	-	-	-	-	-
6-18	B	LS	10YR 5/6	-	-	-	0	0	GRANULAR	FRIABLE	-
18-42	C1	LS	10YR 5/4	30	2.5YR 4/8	25	10	0	GRANULAR	FRIABLE	-
42-102	C2	SL	10YR 6/2	-	-	-	25	25	PLATY	FRIABLE	-
102	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-13 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Power Line Easement (e.g., woodland, agricultural field, vacant lot, etc.) | Brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Ap	-	-	-	-	-	-	-	-	-	-
8-12	B	S	10YR 5/8	-	-	-	0	0	GRANULAR	LOOSE	-
12-42	C1	S	10YR 5/4	30	2.5YR 4/8	25	0	0	GRANULAR	LOOSE	-
42-108	C2	LS	10YR 5/2	-	-	-	25	10	GRANULAR	FRIABLE	-
108	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-14 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Power Line Easement (e.g., woodland, agricultural field, vacant lot, etc.) | Brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	Ap	-	-	-	-	-	-	-	-	-	-
10-24	B	LS	10YR 5/8	-	-	-	0	0	GRANULAR	FRIABLE	-
24-36	C	LS	10YR 5/4	-	-	-	5	0	GRANULAR	FRIABLE	-
36	LEDGE			-	-	-					-

Additional Notes:
Ledge depth varies from just beneath the Ap layer to 36"; no redox observed.

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-15 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	Ap	-	-	-	-	-	-	-	-	-	-
10-18	B	S	10YR 5/4	-	-	-	0	0	GRANULAR	LOOSE	-
18-72	C1	S	10YR 5/3	24	2.5YR 4/8	10	0	0	GRANULAR	LOOSE	-
72-96	C2	SL	10YR 5/2	-	-	-	25	25	PLATY	FRIABLE	-
96	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-16 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Ap	-	-	-	-	-	-	-	-	-	-
8-18	B	LS	10YR 5/6	-	-	-	0	0	GRANULAR	FRIABLE	-
18-42	C1	LS	10YR 5/4	36	2.5YR 4/8	10	0	0	GRANULAR	FRIABLE	-
42-72	C2	LS	10YR 5/2	-	-	-	25	25	GRANULAR	FRIABLE	-
72	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-17 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	-	-	-	-	-	-	-	-	-	-
6-18	B	LS	10YR 5/6	-	-	-	0	0	GRANULAR	FRIABLE	-
18-48	C1	LS	10YR 5/4	30	2.5YR 4/8	10	0	0	GRANULAR	FRIABLE	-
48-66	C2	LS	10YR 5/2	-	-	-	25	25	GRANULAR	FRIABLE	-
66	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-18 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	-	-	-	-	-	-	-	-	-	-
6-18	B	LS	10YR 5/6	-	-	-	0	0	GRANULAR	FRIABLE	-
18-36	C1	LS	10YR 5/4	30	2.5YR 4/8	10	0	0	GRANULAR	FRIABLE	-
36-60	C2	LS	10YR 5/2	-	-	-	25	25	GRANULAR	FRIABLE	-
60	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-19 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	-	-	-	-	-	-	-	-	-	-
6-18	B	LS	10YR 5/6	-	-	-	0	0	GRANULAR	FRIABLE	-
18-36	C1	LS	10YR 5/4	30	2.5YR 4/8	25	10	0	GRANULAR	FRIABLE	-
36-114	C2	SL	10YR 6/2	-	-	-	25	25	PLATY	FRIABLE	-
114	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-20 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	-	-	-	-	-	-	-	-	-	-
6-18	B	LS	10YR 5/6	-	-	-	5	0	GRANULAR	FRIABLE	Borderline sand
18-42	C1	LS	10YR 5/4	36	2.5YR 4/8	2-	5	0	GRANULAR	FRIABLE	Borderline sand
36-108	C2	SL	10YR 5/2	-	-	-	25	10	PLATY	FRIABLE	-
108	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-21 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass/brush (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	Ap	-	-	-	-	-	-	-	-	-	-
10-18	B	S	10YR 5/8	-	-	-	0	0	GRANULAR	LOOSE	Beach sand
18-48	C1	S	10YR 5/4	30	2.5YR 4/8	25	0	0	GRANULAR	LOOSE	Beach sand
48-78	C2	S	10YR 5/2	-	-	-	0	0	GRANULAR	LOOSE	Beach sand
78	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-22 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Woodland w/stone walls (e.g., woodland, agricultural field, vacant lot, etc.) | Mature Trees (Vegetation) | Limited (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 10+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A	-	-	-	-	-	-	-	-	-	Forest mat
4-24	B	LS	10YR 5/4	-	-	-	10	0	GRANULAR	FRIABLE	-
24-72	C	SL	10YR 5/2	48	10YR 4/6	5	25	5	PLATY	FRIABLE	-
72	LEDGE										

Additional Notes:

TEST PIT LOG

Site: 84 & 86 Coolidge Street, Sherborn, Massachusetts
Logged By: Matthew Leidner, P.E., Civil Design Group, LLC (MA SE13676)
Excavator: Ryan, WW Contracting

Test Pit Number: CDG-CC-23 (Hole #) | 10-02-2020 (Date) | 0700 (Time) | Cloudy, 60 deg. F (Weather) | - (Latitude) | - (Longitude:)

Land Use: Woodland w/stone walls (e.g., woodland, agricultural field, vacant lot, etc.) | Mature Trees (Vegetation) | Limited (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 10+/- (Slope (%))

Groundwater Observed: ☐ Yes ☒ No If yes: - Depth Weeping from Pit - Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	-	-	-	-	-	-	-	-	-	Forest mat
6-24	B	LS	10YR 5/4	-	-	-	5	0	GRANULAR	FRIABLE	-
24-132	C	SL	10YR 5/2	36	10YR 4/6	5	25	5	PLATY	FRIABLE	-
132	LEDGE										

Additional Notes:

Attachment 3 – Test Pit Logs:

Ransom Environmental

RANSOM Consulting, Inc.

Consulting Engineers and Scientists

TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: ST-18	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England LLC	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected __Yes _X_No
Capacity/Reach: ≈18 ft	Time Started: 14:30 Time Completed: 14:50
Weather: Partly cloudy, 30°F	
Logged by: JPJ	Date: 1/10/19
Checked by:	Date:

TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
0 – 0.75			Dark Brown, fine SAND and SILT, some roots, trace gravel, organic odor (TOPSOIL).
0.75 – 4.5			Orange/brown fine SAND and SILT, little gravel, boulder at 3.5'.
4.5 – 16			Gray fine SAND and SILT, some gravel, some cobbles.
			End of test pit 16'.
			Water seeping at 3'.

Pit Dimensions (Feet)
Length 12
Width 8
Depth 16

Remarks:
1. Test pit excavated in field area.
2. Test pit backfilled with native soils.
3. Strong organic odor noted.

RANSOM Consulting, Inc.

Consulting Engineers and Scientists

TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: ST-19	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England LLC	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected _X_Yes __No
Capacity/Reach: ≈18 ft	Time Started: 14:55 Time Completed: 15:00
Weather: Sun, 30°F	
Logged by: JPJ	Date: 1/10/19
Checked by:	Date:

TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
0 – 0.5			Dark Brown, fine SAND and SILT, some roots, trace gravel, organic odor (TOPSOIL).
0.5 – 12	S1	4 - 5	Brown fine SAND, trace silt.
			End of test pit 12'.
			Water seeping at 3'.

Pit Dimensions (Feet)
Length 14
Width 8
Depth 12

Remarks:
1. Test pit excavated in field area.
2. Test pit backfilled with native soils.
3. Soil sample S1 submitted for laboratory grain size analyses (sieve & hydrometer).
4. 2" diameter PVC monitoring well labeled "MW-1" located approximately 10' west of ST-19 static water level measured at 1.2' below grade.

RANSOM Consulting, Inc.

Consulting Engineers and Scientists

TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: ST-25	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England LLC	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected __Yes _X_No
Capacity/Reach: ≈18 ft	Time Started: 8:20 Time Completed: 8:30
Weather: Sun, 20°F	
Logged by: JPJ	Date: 1/11/19
Checked by:	Date:

TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
0 – 1.5			Dark Brown, fine SAND and SILT, some roots, trace gravel, organic odor (TOPSOIL).
1.5 – 2.67			Brown fine to medium SAND, trace silt.
			Bedrock surface encountered at 2.67', end of test pit.
			Water observed at 2.67'.

Pit Dimensions (Feet)
Length 10
Width 6
Depth 2.67

Remarks:
1. Test pit excavated in garden area.
2. Test pit backfilled with native soils.

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TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: ST-26	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England LLC	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected _X_Yes __No
Capacity/Reach: ≈18 ft	Time Started: 8:40 Time Completed: 9:00
Weather: Sun, 20°F	
Logged by: JPJ	Date: 1/11/19
Checked by:	Date:

TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
0 – 0.8			Dark Brown, fine SAND and SILT, some roots, trace gravel, organic odor (TOPSOIL).
0.8 – 3			Orange/brown fine to medium SAND, trace silt.
3 – 9	S1	5 – 6	Brown fine SAND and SILT, some gravel, little cobbles (TILL). Gravel sub-rounded to sub-angular.
			Bedrock surface encountered at 9', end of test pit.
			Water seeping at 3'.

Pit Dimensions (Feet)
Length 12
Width 6
Depth 9

Remarks:
1. Test pit excavated in field area.
2. Test pit backfilled with native soils.
3. Soil sample S1 submitted for laboratory grain size analyses (sieve & hydrometer).
4. 4" diameter perforated PVC observation well installed in excavation prior to backfilling.

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Consulting Engineers and Scientists

TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: ST-27	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England LLC	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected __Yes _X_No
Capacity/Reach: ≈18 ft	Time Started: 9:05 Time Completed:
Weather: Sun, 18°F	
Logged by: JPJ	Date: 1/11/19
Checked by:	Date:

TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
			Bedrock exposed at ground surface.

Pit Dimensions (Feet) Length NA Width NA Depth NA	Remarks:

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Consulting Engineers and Scientists

TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: ST-28	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England LLC	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected __Yes _X_No
Capacity/Reach: ≈18 ft	Time Started: 9:10 Time Completed: 9:20
Weather: Sun, 18°F	
Logged by: JPJ	Date: 1/11/19
Checked by:	Date:

TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
0 – 0.75			Dark Brown, fine SAND and SILT, some roots, trace gravel, organic odor (TOPSOIL).
0.75 – 3.5			Orange/brown fine SAND and SILT, some gravel. Gravel sub-rounded to sub-angular.
3.5 – 10			Brown fine SAND and SILT, some gravel (TILL). Gravel sub-rounded to sub-angular.
			Bedrock surface encountered at 10'.
			Water seeping at 3.5'.

Pit Dimensions (Feet) Length 12 Width 6 Depth 10	Remarks: 1. Test pit excavated in field area. 2. Test pit backfilled with native soils.

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TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: ST-30	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England, LLC.	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected __Yes _X_No
Capacity/Reach: ≈18 ft	Time Started: 9:25 Time Completed: 9:30
Weather: Sun, 18°F	
Logged by: JPJ	Date: 1/11/19
Checked by:	Date:

TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
0 – 1.25			Dark Brown, fine SAND and SILT, some roots, trace gravel, organic odor (TOPSOIL).
1.25 – 3			Orange/brown fine SAND and SILT, some gravel. Gravel sub-rounded to sub-angular .
3 – 4.5			Brown fine SAND and SILT, some gravel, little coarse sand (TILL). Gravel sub-rounded to sub-angular.
			Bedrock surface encountered at 4.5'.
			Water seeping at 3'.

Pit Dimensions (Feet) Length 11 Width 6 Depth 4.5	Remarks: 1. Test pit excavated in field area. 2. Test pit backfilled with native soils.

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TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: ST-32	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England LLC	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected __Yes _X_No
Capacity/Reach: ≈18 ft	Time Started: 9:36 Time Completed: 9:40
Weather: Sun, 18°F	
Logged by: JPJ	Date: 1/11/19
Checked by:	Date:

TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
0 – 1.5			Dark Brown, fine SAND and SILT, some roots, trace gravel, organic odor (TOPSOIL).
1.5 – 4			Brown fine SAND, trace silt.
			Bedrock surface encountered at 4'.
			Water seeping at 3'.

Pit Dimensions (Feet) Length 9 Width 6 Depth 4	Remarks: 1. Test pit excavated in field area. 2. Test pit backfilled with native soils.

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TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: **ST-33**	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England LLC	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected __Yes _X_No
Capacity/Reach: ≈18 ft	Time Started: 9:40 Time Completed:
Weather: Sun, 18°F	
Logged by: JPJ	Date: 1/11/19
Checked by:	Date:

TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
			Bedrock exposed at ground surface.

Pit Dimensions (Feet) Length NA Width NA Depth NA	Remarks:

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TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: ST-34	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England LLC	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected __Yes _X_No
Capacity/Reach: ≈18 ft	Time Started: 10:40 Time Completed: 10:47
Weather: Sun, 20°F	
Logged by: JPJ	Date: 1/11/19
Checked by:	Date:

TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
0 – 0.8			Dark Brown, fine SAND and SILT, some roots, trace gravel, organic odor (TOPSOIL).
0.8 – 3			Orange/brown fine SAND and SILT.
3 - 9			Gray/brown, fine SAND and SILT, some gravel, some cobbles, some boulders (TILL).
			Bedrock surface encountered at 9’.
			Water seeping at 5’.

Pit Dimensions (Feet)
Length 13
Width 8
Depth 9

Remarks:
1. Test pit excavated in grass area.
2. Test pit backfilled with native soils.
3. 4” diameter perforated PVC observation well installed in excavation prior to backfilling.

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TEST PIT LOG

Project: Coolidge Street	Project #: 181.01030.002
TEST PIT IDENTIFICATION: ST-36	
Location: Sherborn, MA	Ground Elevation:
Client: Pulte Homes of New England LLC	Datum: NA
Contractor: Speroni Excavation	Operator: Rob
Equipment: CAT 320C	Samples Collected __Yes _X_No
Capacity/Reach: ≈18 ft	Time Started: 9:43 Time Completed: 9:52
Weather: Sun, 18°F	
Logged by: JPJ	Date: 1/11/19
Checked by:	Date:

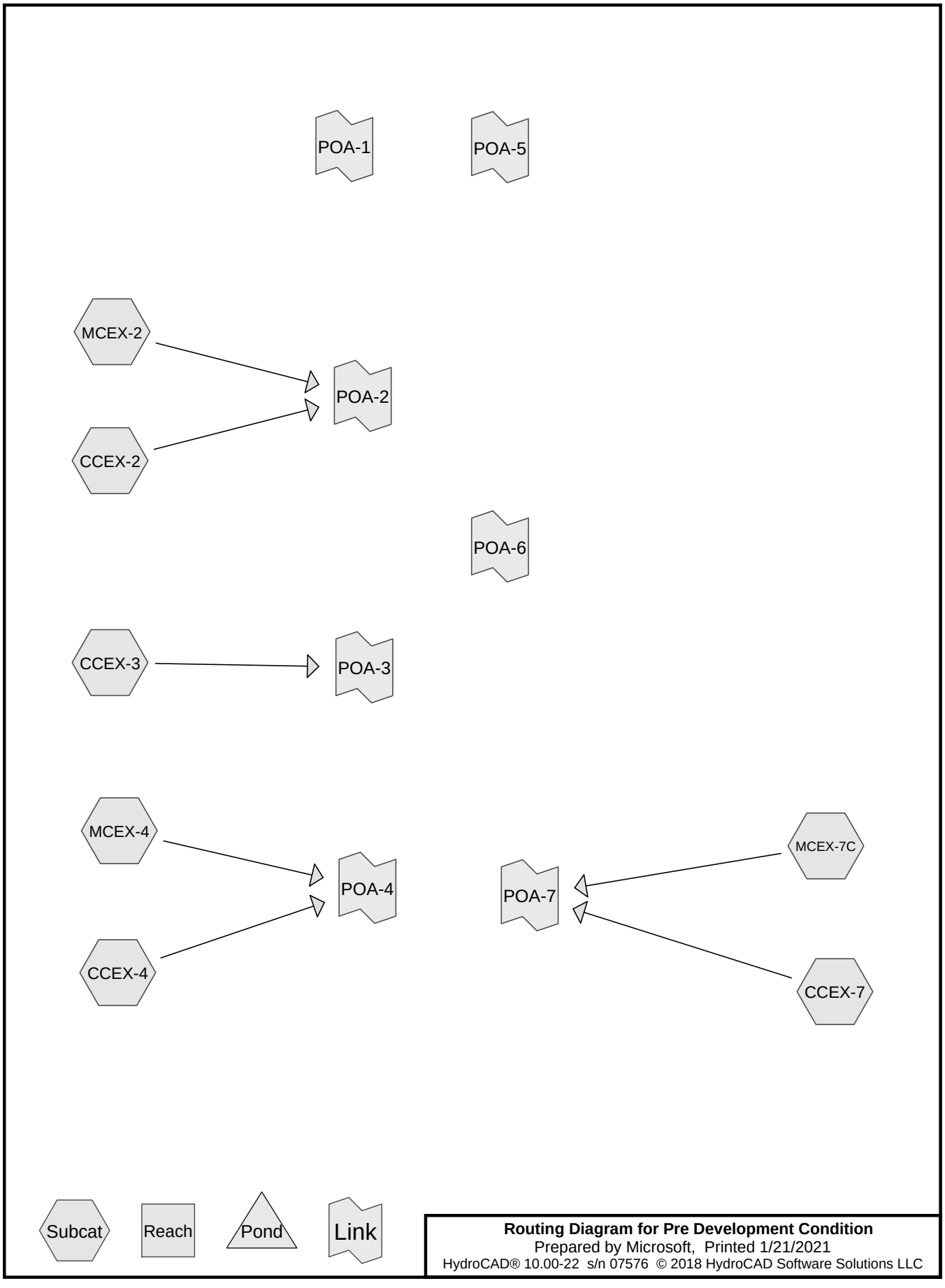
TEST PIT INFORMATION

Depth of Stratum Change Feet	Sample No. and Type	Sample Depth Feet	Soil Description
0 – 1.5			Dark Brown, fine SAND and SILT, some roots, trace gravel, organic odor (TOPSOIL).
1.5 – 2.1			Orange/brown fine SAND, some silt.
2.1 - 5			Brown, fine SAND, trace silt.
5 - 9			Gray/brown fine SAND and SILT, some gravel, little cobbles.
			Bedrock surface encountered at 9’.
			Water seeping at 3.5’.

Pit Dimensions (Feet) Length 11 Width 5 Depth 9	Remarks: 1. Test pit excavated adjacent to driveway. 2. Test pit backfilled with native soils.

Attachment 4 – HydroCad Output:

Pre-Development Conditions



Routing Diagram for Pre Development Condition
Prepared by Microsoft, Printed 1/21/2021

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.660	30	Brush, Good, HSG A (CCEX-4)
0.070	48	Brush, Good, HSG B (CCEX-4)
0.360	65	Brush, Good, HSG C (CCEX-4)
0.550	73	Brush, Good, HSG D (CCEX-4)
0.050	96	Gravel surface, HSG A (MCEX-7C)
0.160	96	Gravel surface, HSG C (MCEX-2, MCEX-4, MCEX-7C)
0.010	96	Gravel surface, HSG D (MCEX-4)
3.910	30	Meadow, non-grazed, HSG A (CCEX-2, CCEX-3, CCEX-4)
0.260	71	Meadow, non-grazed, HSG C (MCEX-2, MCEX-4, MCEX-7C)
0.670	78	Meadow, non-grazed, HSG D (CCEX-2, CCEX-3, MCEX-4)
0.090	98	Paved parking, HSG A (CCEX-2, CCEX-3)
0.010	98	Roofs, HSG A (CCEX-2)
0.040	98	Roofs, HSG D (CCEX-2, CCEX-3)
2.330	77	Wetlands, HSG A (CCEX-2, CCEX-4, CCEX-7)
5.010	30	Woods, Good, HSG A (CCEX-2, CCEX-4, CCEX-7, MCEX-7C)
0.030	55	Woods, Good, HSG B (CCEX-4)
5.610	70	Woods, Good, HSG C (CCEX-2, CCEX-4, CCEX-7, MCEX-2, MCEX-4, MCEX-7C)
1.080	77	Woods, Good, HSG D (CCEX-3, CCEX-4, MCEX-4)
20.900	**53**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
12.060	HSG A	CCEX-2, CCEX-3, CCEX-4, CCEX-7, MCEX-7C
0.100	HSG B	CCEX-4
6.390	HSG C	CCEX-2, CCEX-4, CCEX-7, MCEX-2, MCEX-4, MCEX-7C
2.350	HSG D	CCEX-2, CCEX-3, CCEX-4, MCEX-4
0.000	Other	
20.900		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment CCEX-2: Runoff Area=2.990 ac 2.01% Impervious Runoff Depth>0.07"
Flow Length=449' Tc=13.0 min CN=40/98 Runoff=0.21 cfs 0.017 af

Subcatchment CCEX-3: Runoff Area=1.400 ac 5.71% Impervious Runoff Depth>0.18"
Flow Length=357' Tc=11.1 min CN=39/98 Runoff=0.29 cfs 0.021 af

Subcatchment CCEX-4: Runoff Area=8.190 ac 0.00% Impervious Runoff Depth>0.29"
Flow Length=710' Tc=19.5 min CN=55/0 Runoff=1.34 cfs 0.199 af

Subcatchment CCEX-7: Runoff Area=2.610 ac 0.00% Impervious Runoff Depth>0.00"
Flow Length=579' Tc=21.0 min CN=38/0 Runoff=0.00 cfs 0.000 af

Subcatchment MCEX-2: Runoff Area=1.260 ac 0.00% Impervious Runoff Depth>0.96"
Flow Length=460' Tc=12.0 min CN=71/0 Runoff=1.53 cfs 0.101 af

Subcatchment MCEX-4: Runoff Area=3.170 ac 0.00% Impervious Runoff Depth>1.02"
Flow Length=485' Tc=11.1 min CN=72/0 Runoff=4.22 cfs 0.268 af

Subcatchment MCEX-7C: Runoff Area=1.280 ac 0.00% Impervious Runoff Depth>0.21"
Flow Length=207' Tc=12.7 min CN=52/0 Runoff=0.12 cfs 0.022 af

Link POA-1:
Primary=0.00 cfs 0.000 af

Link POA-2: Inflow=1.74 cfs 0.118 af
Primary=1.74 cfs 0.118 af

Link POA-3: Inflow=0.29 cfs 0.021 af
Primary=0.29 cfs 0.021 af

Link POA-4: Inflow=4.68 cfs 0.467 af
Primary=4.68 cfs 0.467 af

Link POA-5:
Primary=0.00 cfs 0.000 af

Link POA-6:
Primary=0.00 cfs 0.000 af

Link POA-7: Inflow=0.12 cfs 0.022 af
Primary=0.12 cfs 0.022 af

Total Runoff Area = 20.900 ac Runoff Volume = 0.629 af Average Runoff Depth = 0.36"
99.33% Pervious = 20.760 ac 0.67% Impervious = 0.140 ac

Summary for Subcatchment CCEX-2:

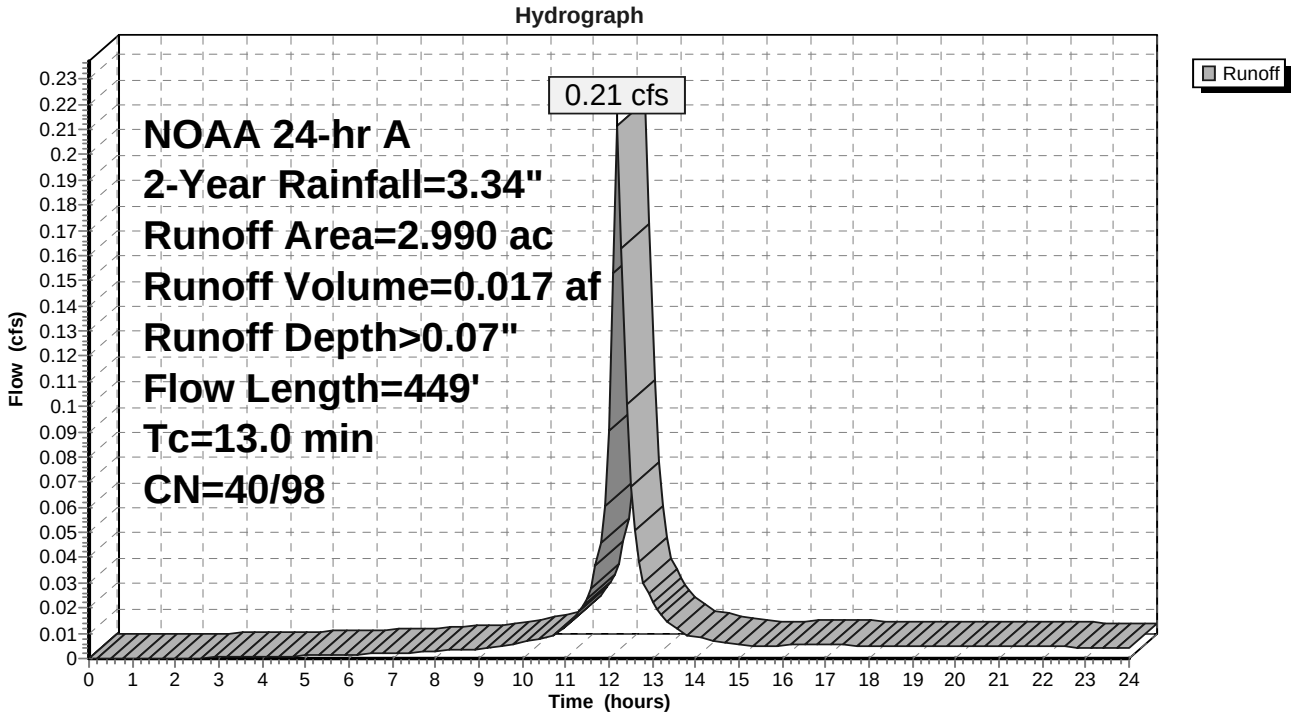
Runoff = 0.21 cfs @ 12.20 hrs, Volume= 0.017 af, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
	1.340	30	Woods, Good, HSG A
*	0.220	77	Wetlands, HSG A
	0.010	98	Roofs, HSG A
	0.970	30	Meadow, non-grazed, HSG A
	0.200	70	Woods, Good, HSG C
	0.030	98	Roofs, HSG D
	0.200	78	Meadow, non-grazed, HSG D
	0.020	98	Paved parking, HSG A
	2.990	41	Weighted Average
	2.930	40	97.99% Pervious Area
	0.060	98	2.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.2000	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
8.1	399	0.0270	0.82		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.0	449	Total			

Subcatchment CCEX-2:



Summary for Subcatchment CCEX-3:

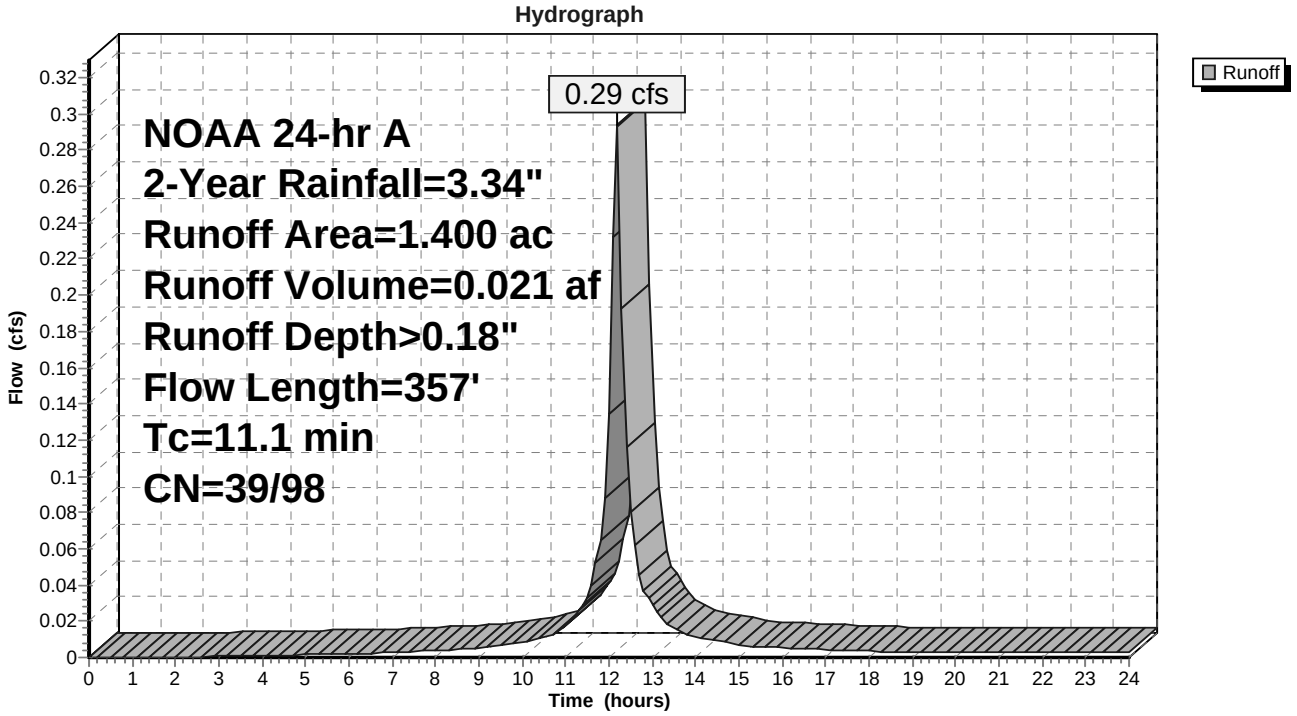
Runoff = 0.29 cfs @ 12.19 hrs, Volume= 0.021 af, Depth> 0.18"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
1.080	30	Meadow, non-grazed, HSG A
0.010	98	Roofs, HSG D
0.060	77	Woods, Good, HSG D
0.180	78	Meadow, non-grazed, HSG D
0.070	98	Paved parking, HSG A
1.400	42	Weighted Average
1.320	39	94.29% Pervious Area
0.080	98	5.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0100	0.13		**Sheet Flow,** Range n= 0.130 P2= 3.16"
4.4	307	0.0270	1.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.1	357	Total			

Subcatchment CCEX-3:



Summary for Subcatchment CCEX-4:

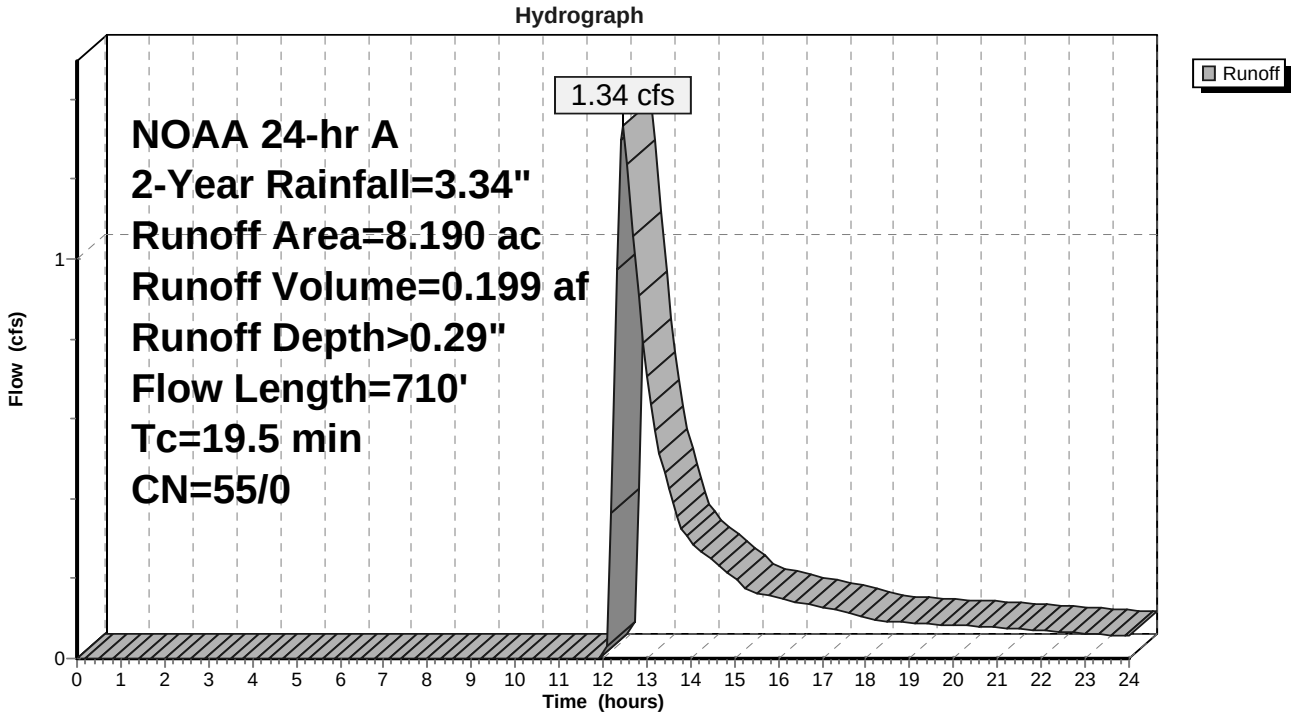
Runoff = 1.34 cfs @ 12.45 hrs, Volume= 0.199 af, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
	0.660	30	Brush, Good, HSG A
*	1.810	77	Wetlands, HSG A
	1.860	30	Meadow, non-grazed, HSG A
	0.900	30	Woods, Good, HSG A
	0.030	55	Woods, Good, HSG B
	0.070	48	Brush, Good, HSG B
	0.360	65	Brush, Good, HSG C
	1.340	70	Woods, Good, HSG C
	0.610	77	Woods, Good, HSG D
	0.550	73	Brush, Good, HSG D
	8.190	55	Weighted Average
	8.190	55	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0100	0.13		**Sheet Flow,** Range n= 0.130 P2= 3.16"
12.8	660	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
19.5	710	Total			

Subcatchment CCEX-4:



Summary for Subcatchment CCEX-7:

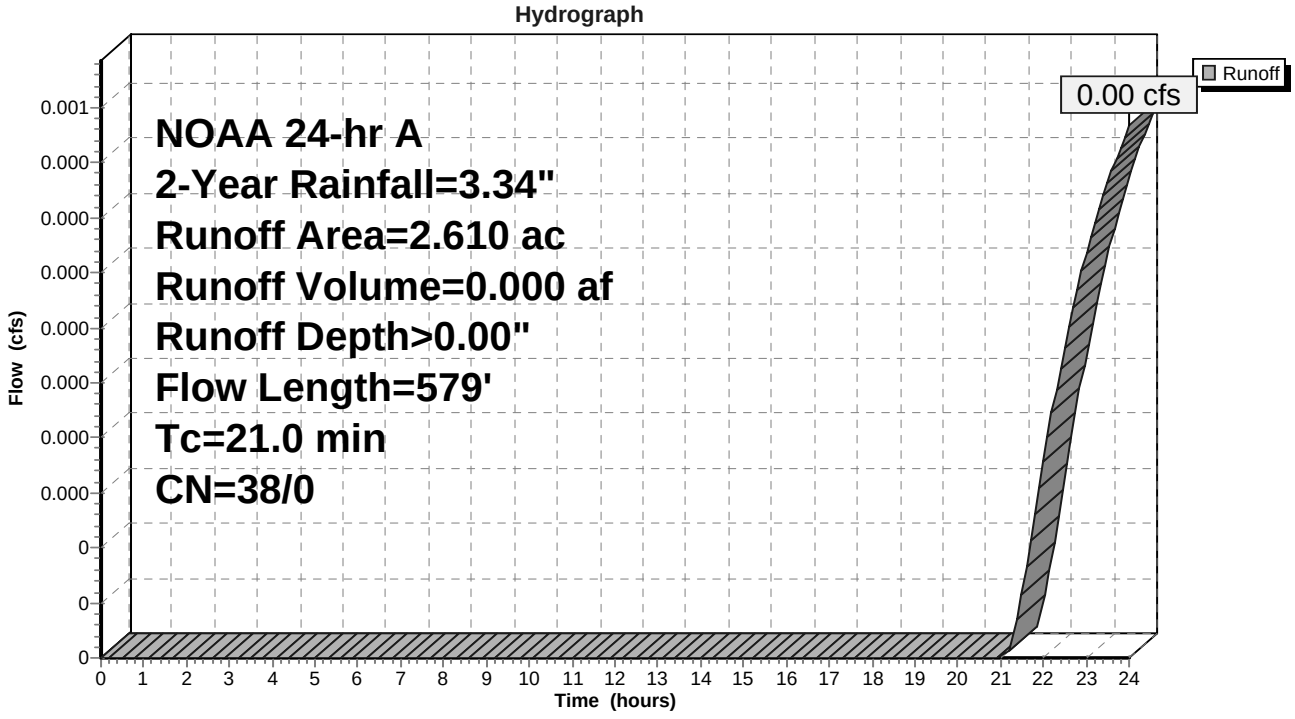
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
	2.110	30	Woods, Good, HSG A
*	0.300	77	Wetlands, HSG A
	0.200	70	Woods, Good, HSG C
	2.610	38	Weighted Average
	2.610	38	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
13.9	529	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.0	579	Total			

Subcatchment CCEX-7:



Summary for Subcatchment MCEX-2:

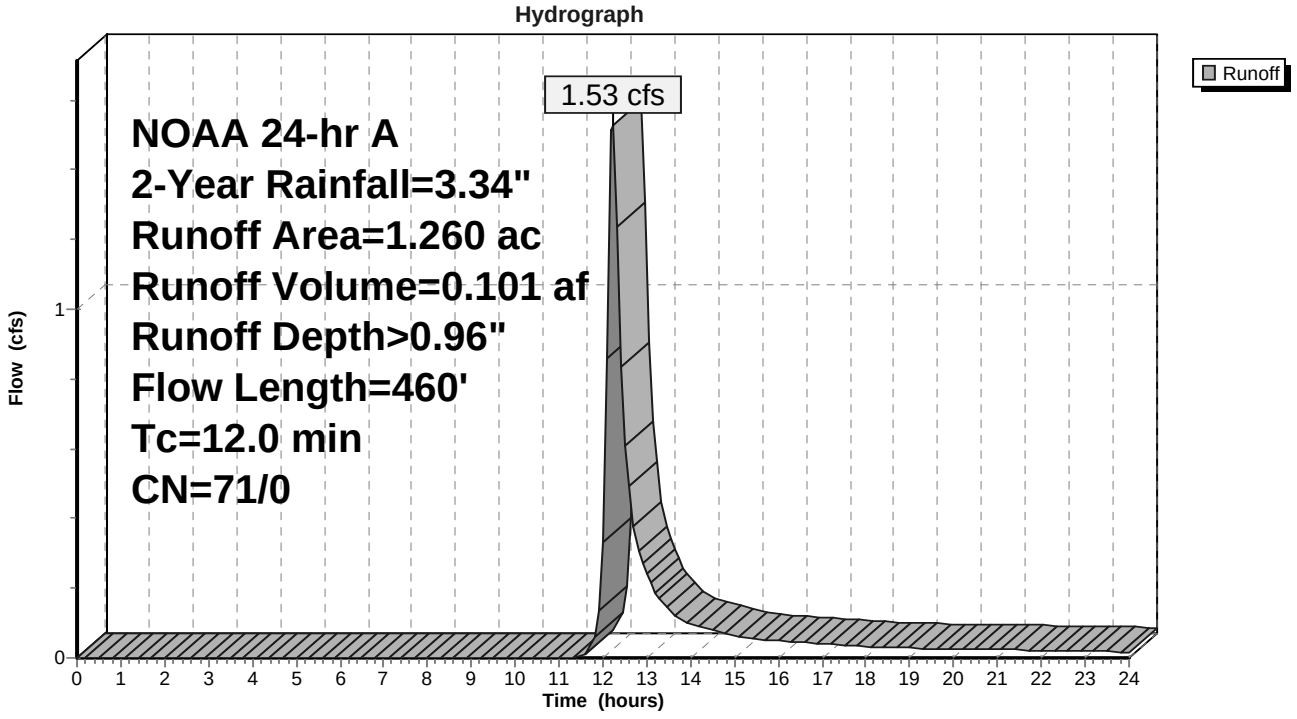
Runoff = 1.53 cfs @ 12.22 hrs, Volume= 0.101 af, Depth> 0.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
1.160	70	Woods, Good, HSG C
0.040	96	Gravel surface, HSG C
0.060	71	Meadow, non-grazed, HSG C
1.260	71	Weighted Average
1.260	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
5.5	410	0.0320	1.25		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.0	460	Total			

Subcatchment MCEX-2:



Summary for Subcatchment MCEX-4:

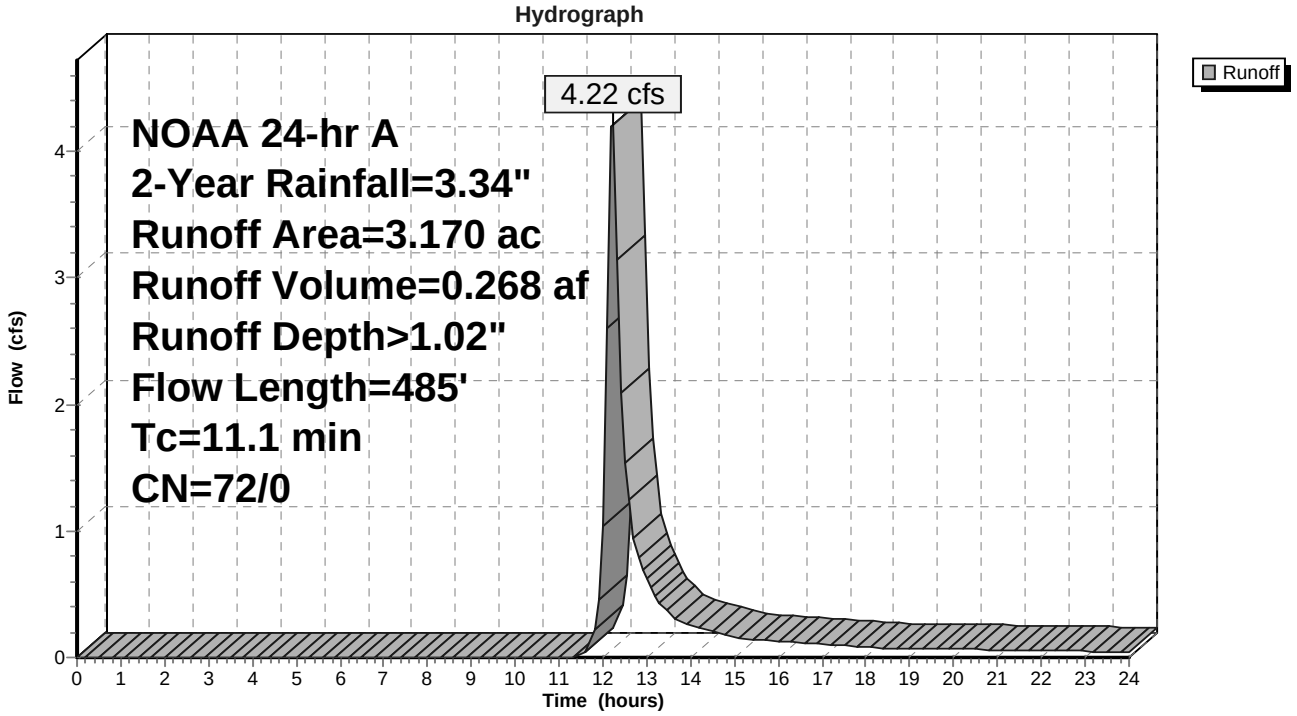
Runoff = 4.22 cfs @ 12.21 hrs, Volume= 0.268 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
2.280	70	Woods, Good, HSG C
0.060	96	Gravel surface, HSG C
0.120	71	Meadow, non-grazed, HSG C
0.410	77	Woods, Good, HSG D
0.290	78	Meadow, non-grazed, HSG D
0.010	96	Gravel surface, HSG D
3.170	72	Weighted Average
3.170	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.0	435	0.1290	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	485	Total			

Subcatchment MCEX-4:



Summary for Subcatchment MCEX-7C:

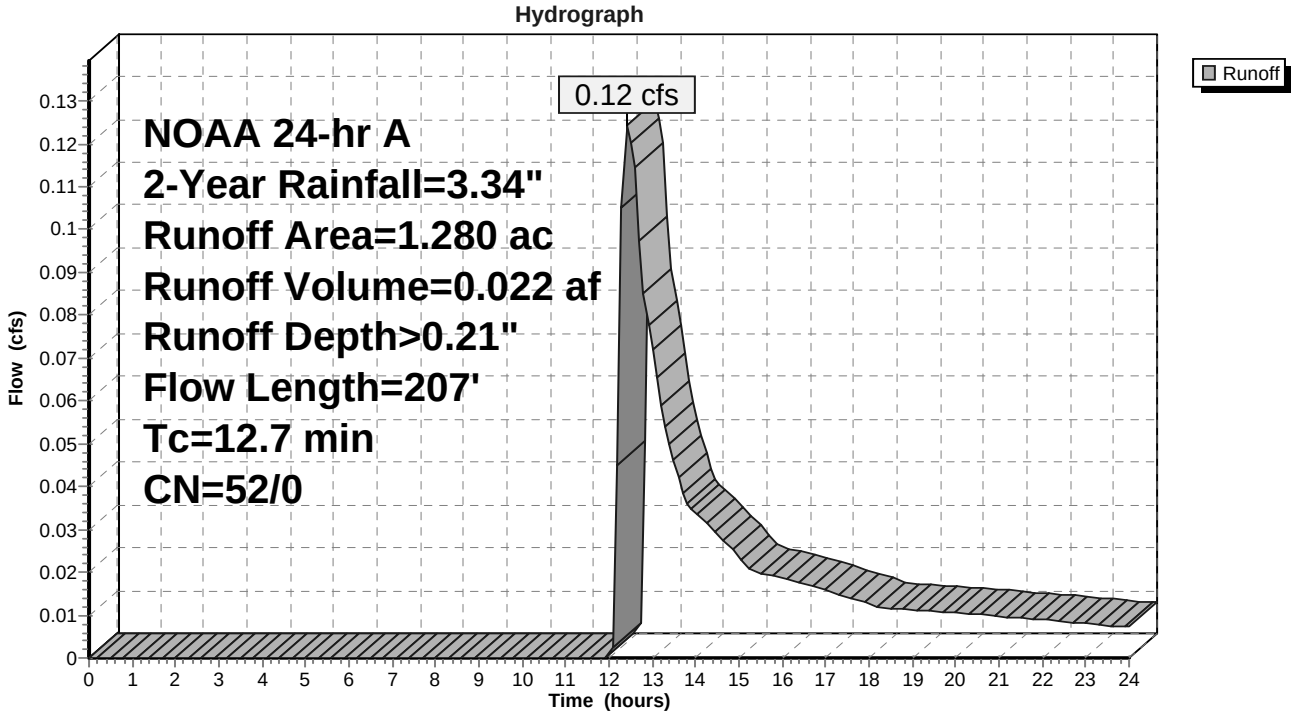
Runoff = 0.12 cfs @ 12.44 hrs, Volume= 0.022 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.660	30	Woods, Good, HSG A
0.050	96	Gravel surface, HSG A
0.060	96	Gravel surface, HSG C
0.430	70	Woods, Good, HSG C
0.080	71	Meadow, non-grazed, HSG C
1.280	52	Weighted Average
1.280	52	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
2.1	157	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	207	Total			

Subcatchment MCEX-7C:

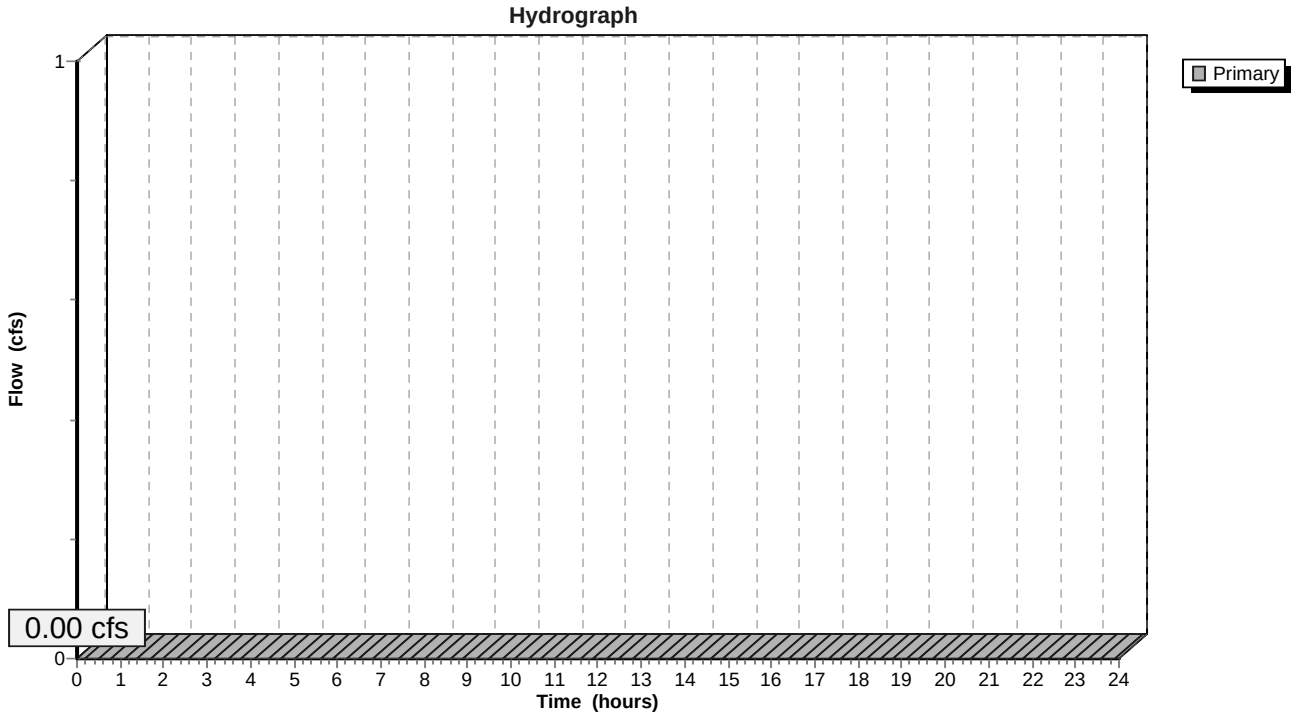


Summary for Link POA-1:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-1:

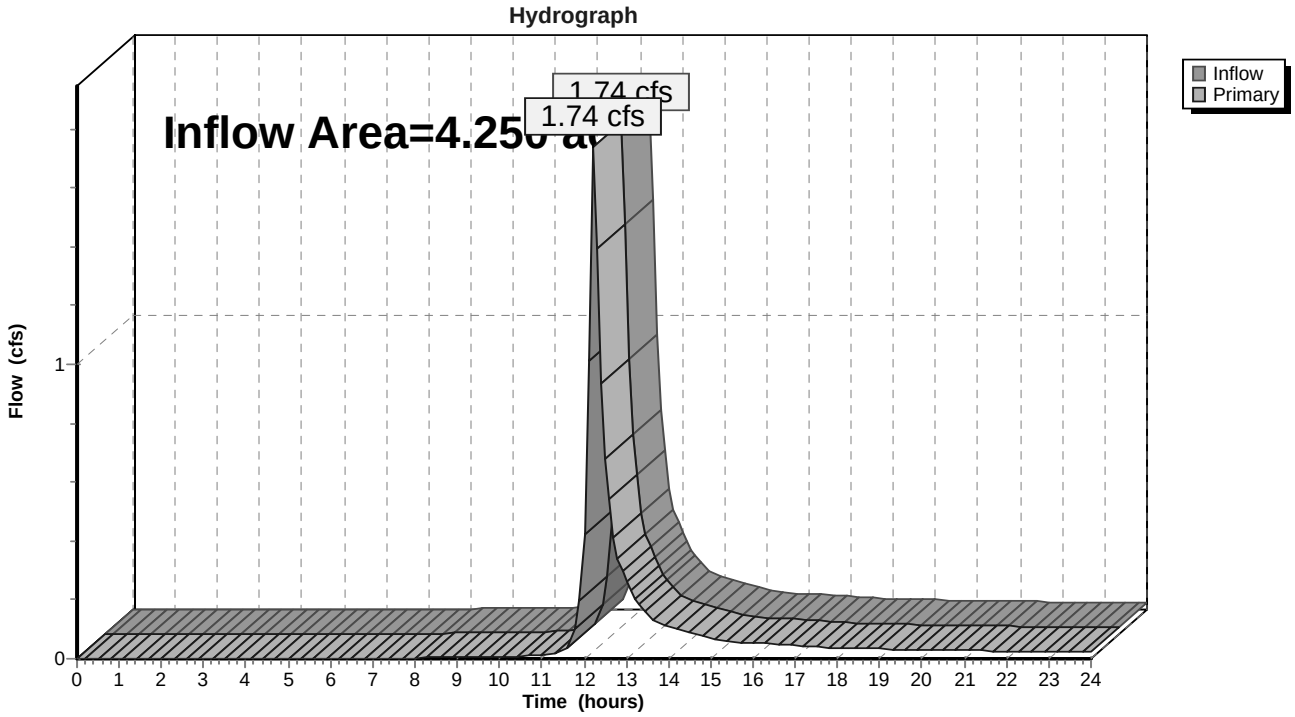


Summary for Link POA-2:

Inflow Area = 4.250 ac, 1.41% Impervious, Inflow Depth > 0.33" for 2-Year event
Inflow = 1.74 cfs @ 12.22 hrs, Volume= 0.118 af
Primary = 1.74 cfs @ 12.22 hrs, Volume= 0.118 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-2:

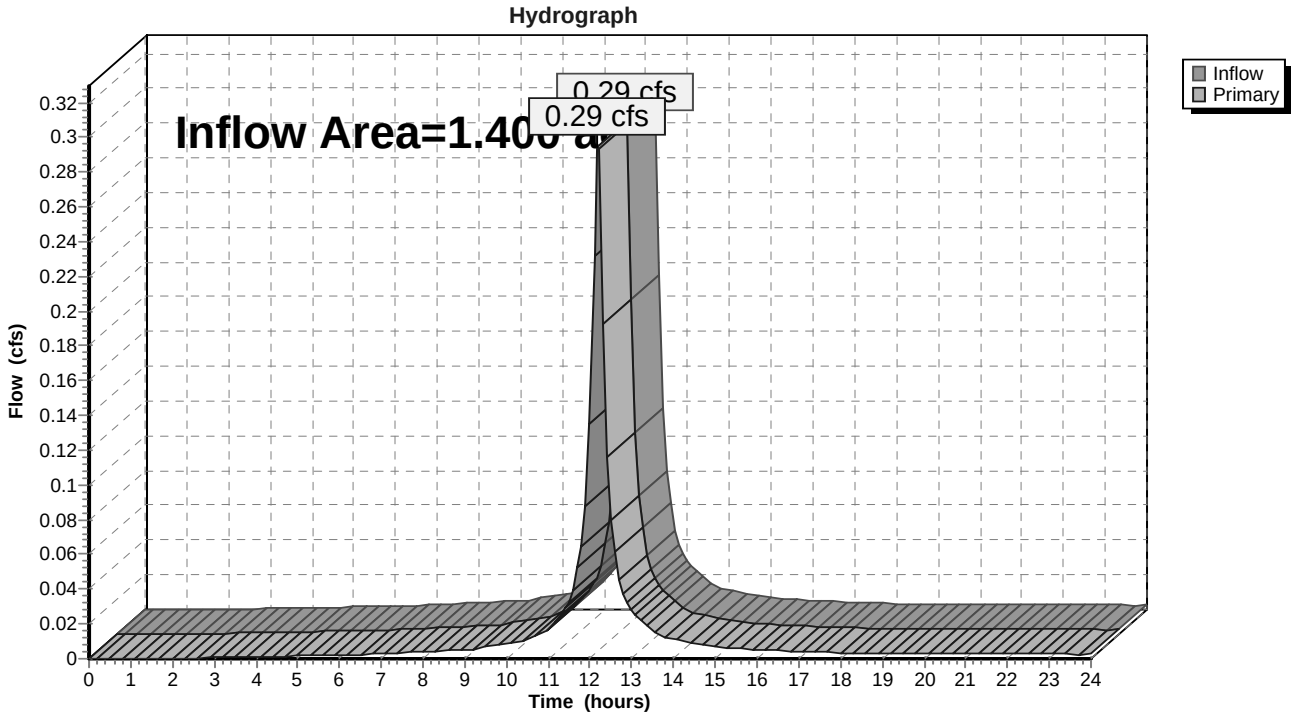


Summary for Link POA-3:

Inflow Area = 1.400 ac, 5.71% Impervious, Inflow Depth > 0.18" for 2-Year event
Inflow = 0.29 cfs @ 12.19 hrs, Volume= 0.021 af
Primary = 0.29 cfs @ 12.19 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-3:

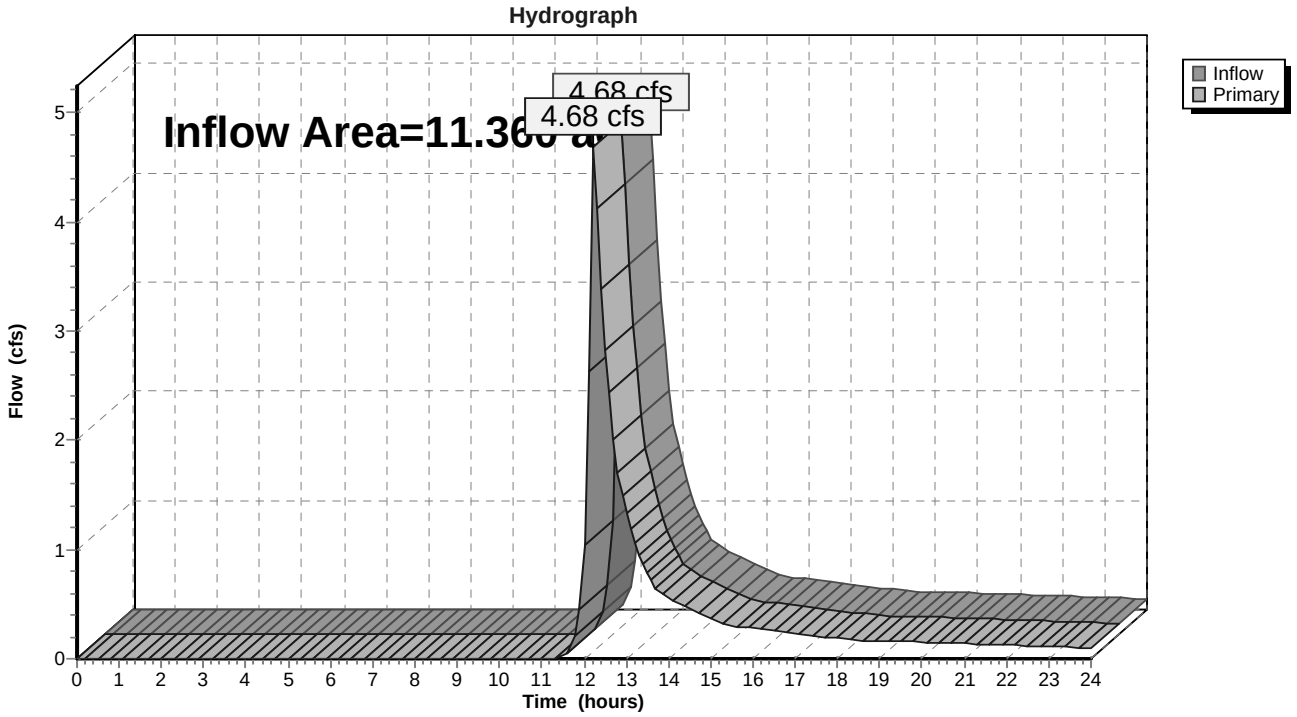


Summary for Link POA-4:

Inflow Area = 11.360 ac, 0.00% Impervious, Inflow Depth > 0.49" for 2-Year event
Inflow = 4.68 cfs @ 12.23 hrs, Volume= 0.467 af
Primary = 4.68 cfs @ 12.23 hrs, Volume= 0.467 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-4:

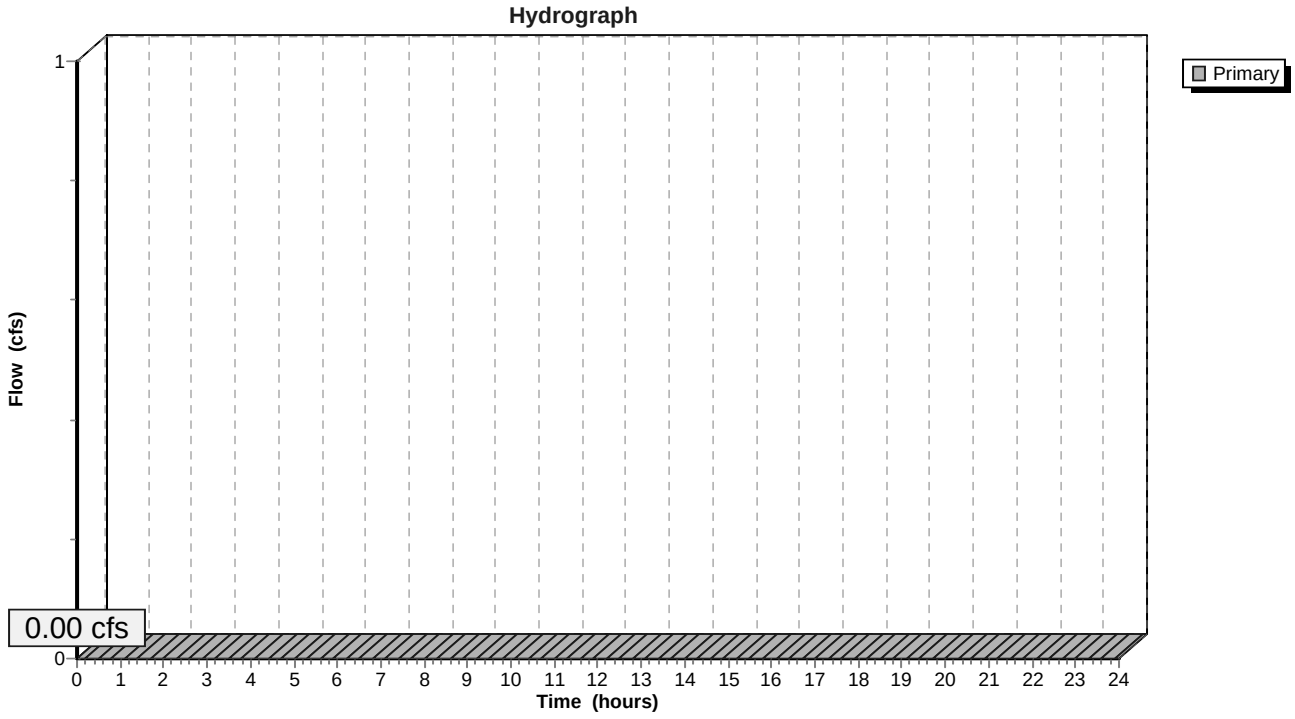


Summary for Link POA-5:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-5:

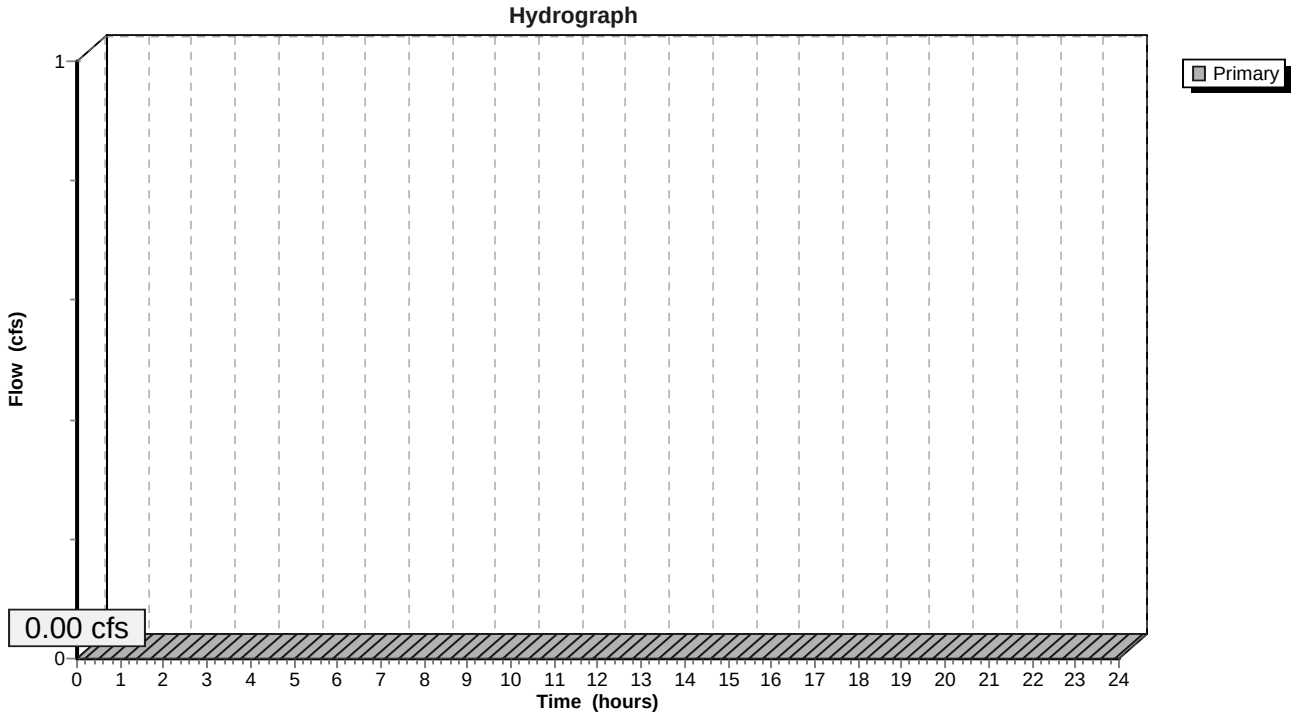


Summary for Link POA-6:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-6:

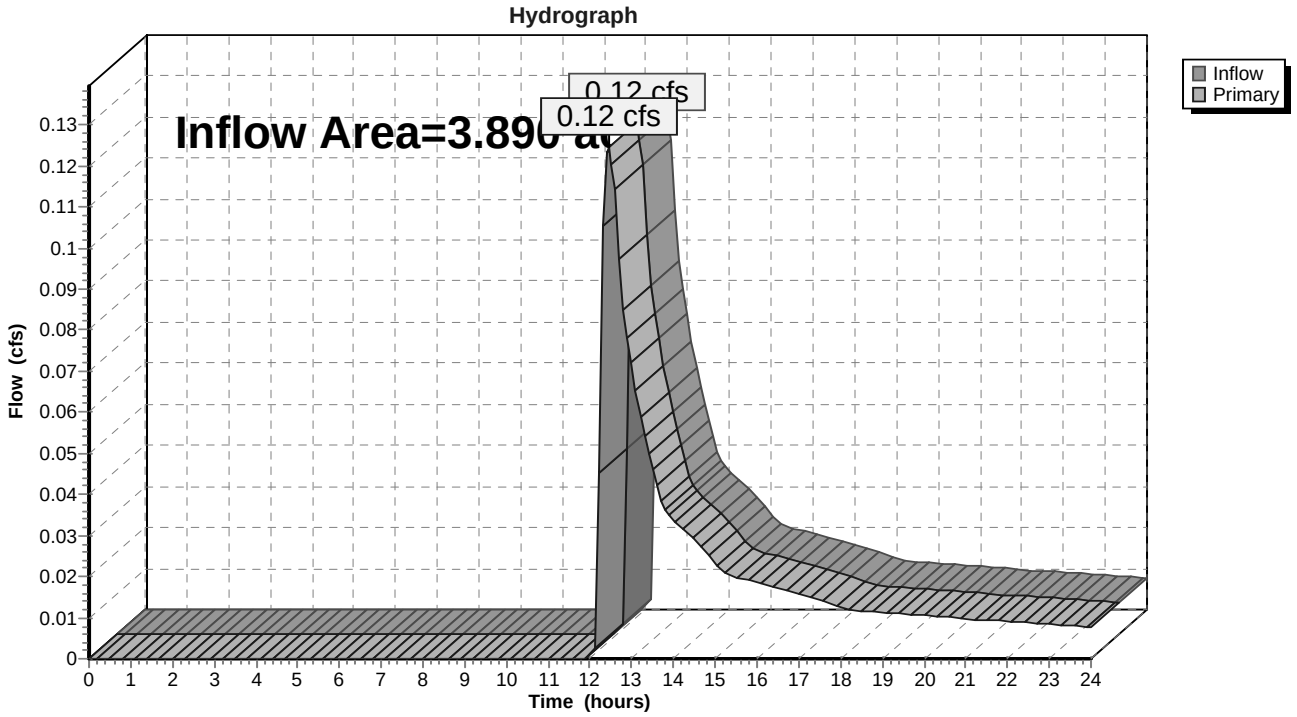


Summary for Link POA-7:

Inflow Area = 3.890 ac, 0.00% Impervious, Inflow Depth > 0.07" for 2-Year event
Inflow = 0.12 cfs @ 12.44 hrs, Volume= 0.022 af
Primary = 0.12 cfs @ 12.44 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-7:



Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment CCEX-2: Runoff Area=2.990 ac 2.01% Impervious Runoff Depth>0.38"
Flow Length=449' Tc=13.0 min CN=40/98 Runoff=0.52 cfs 0.095 af

Subcatchment CCEX-3: Runoff Area=1.400 ac 5.71% Impervious Runoff Depth>0.52"
Flow Length=357' Tc=11.1 min CN=39/98 Runoff=0.48 cfs 0.061 af

Subcatchment CCEX-4: Runoff Area=8.190 ac 0.00% Impervious Runoff Depth>1.09"
Flow Length=710' Tc=19.5 min CN=55/0 Runoff=8.28 cfs 0.745 af

Subcatchment CCEX-7: Runoff Area=2.610 ac 0.00% Impervious Runoff Depth>0.21"
Flow Length=579' Tc=21.0 min CN=38/0 Runoff=0.18 cfs 0.046 af

Subcatchment MCEX-2: Runoff Area=1.260 ac 0.00% Impervious Runoff Depth>2.29"
Flow Length=460' Tc=12.0 min CN=71/0 Runoff=3.82 cfs 0.240 af

Subcatchment MCEX-4: Runoff Area=3.170 ac 0.00% Impervious Runoff Depth>2.37"
Flow Length=485' Tc=11.1 min CN=72/0 Runoff=10.21 cfs 0.627 af

Subcatchment MCEX-7C: Runoff Area=1.280 ac 0.00% Impervious Runoff Depth>0.91"
Flow Length=207' Tc=12.7 min CN=52/0 Runoff=1.20 cfs 0.097 af

Link POA-1:
Primary=0.00 cfs 0.000 af

Link POA-2: Inflow=4.25 cfs 0.335 af
Primary=4.25 cfs 0.335 af

Link POA-3: Inflow=0.48 cfs 0.061 af
Primary=0.48 cfs 0.061 af

Link POA-4: Inflow=16.26 cfs 1.372 af
Primary=16.26 cfs 1.372 af

Link POA-5:
Primary=0.00 cfs 0.000 af

Link POA-6:
Primary=0.00 cfs 0.000 af

Link POA-7: Inflow=1.15 cfs 0.142 af
Primary=1.15 cfs 0.142 af

Total Runoff Area = 20.900 ac Runoff Volume = 1.910 af Average Runoff Depth = 1.10"
99.33% Pervious = 20.760 ac 0.67% Impervious = 0.140 ac

Summary for Subcatchment CCEX-2:

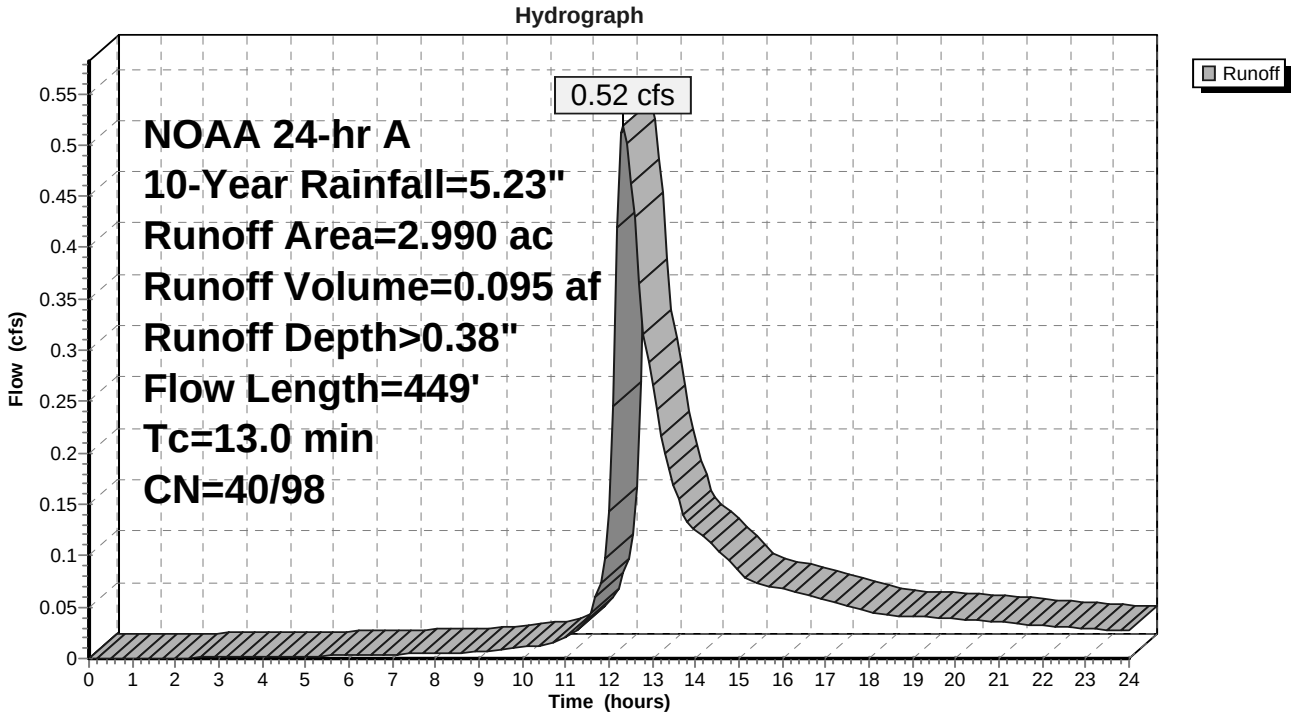
Runoff = 0.52 cfs @ 12.34 hrs, Volume= 0.095 af, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

	Area (ac)	CN	Description
	1.340	30	Woods, Good, HSG A
*	0.220	77	Wetlands, HSG A
	0.010	98	Roofs, HSG A
	0.970	30	Meadow, non-grazed, HSG A
	0.200	70	Woods, Good, HSG C
	0.030	98	Roofs, HSG D
	0.200	78	Meadow, non-grazed, HSG D
	0.020	98	Paved parking, HSG A
	2.990	41	Weighted Average
	2.930	40	97.99% Pervious Area
	0.060	98	2.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.2000	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
8.1	399	0.0270	0.82		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.0	449	Total			

Subcatchment CCEX-2:



Summary for Subcatchment CCEX-3:

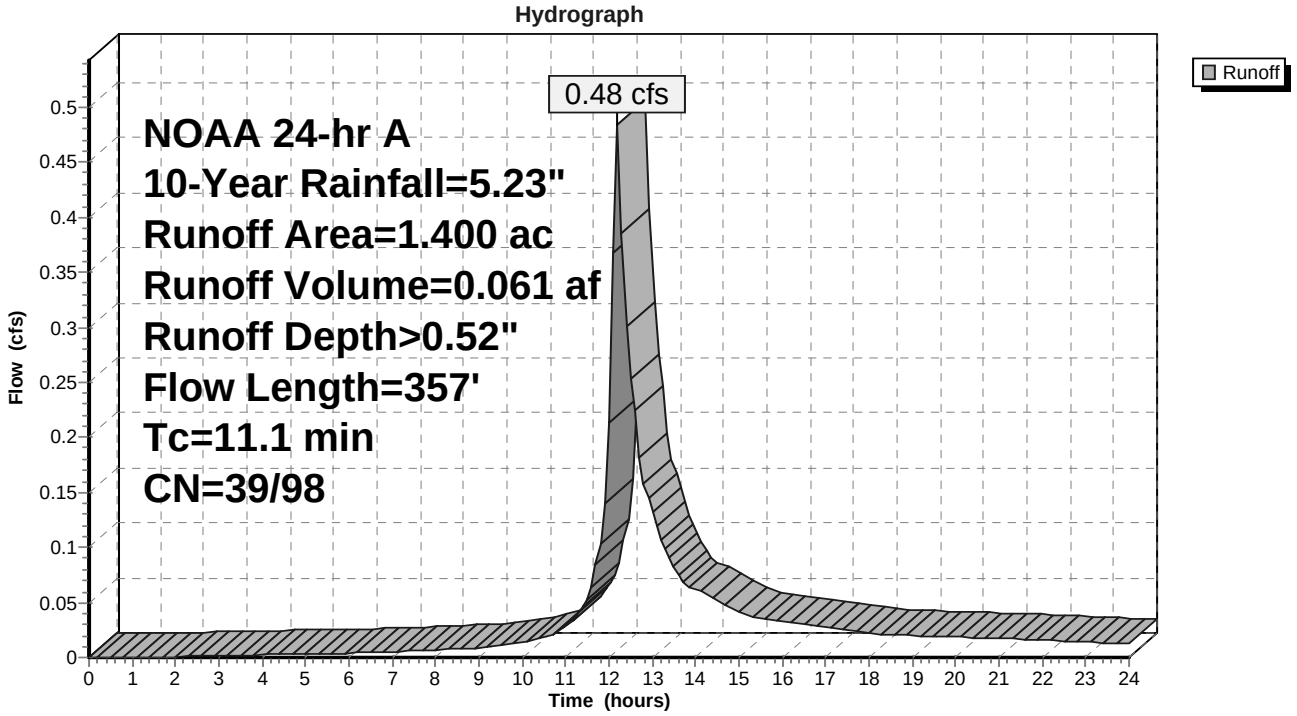
Runoff = 0.48 cfs @ 12.20 hrs, Volume= 0.061 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
1.080	30	Meadow, non-grazed, HSG A
0.010	98	Roofs, HSG D
0.060	77	Woods, Good, HSG D
0.180	78	Meadow, non-grazed, HSG D
0.070	98	Paved parking, HSG A
1.400	42	Weighted Average
1.320	39	94.29% Pervious Area
0.080	98	5.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0100	0.13		**Sheet Flow,** Range n= 0.130 P2= 3.16"
4.4	307	0.0270	1.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.1	357	Total			

Subcatchment CCEX-3:



Summary for Subcatchment CCEX-4:

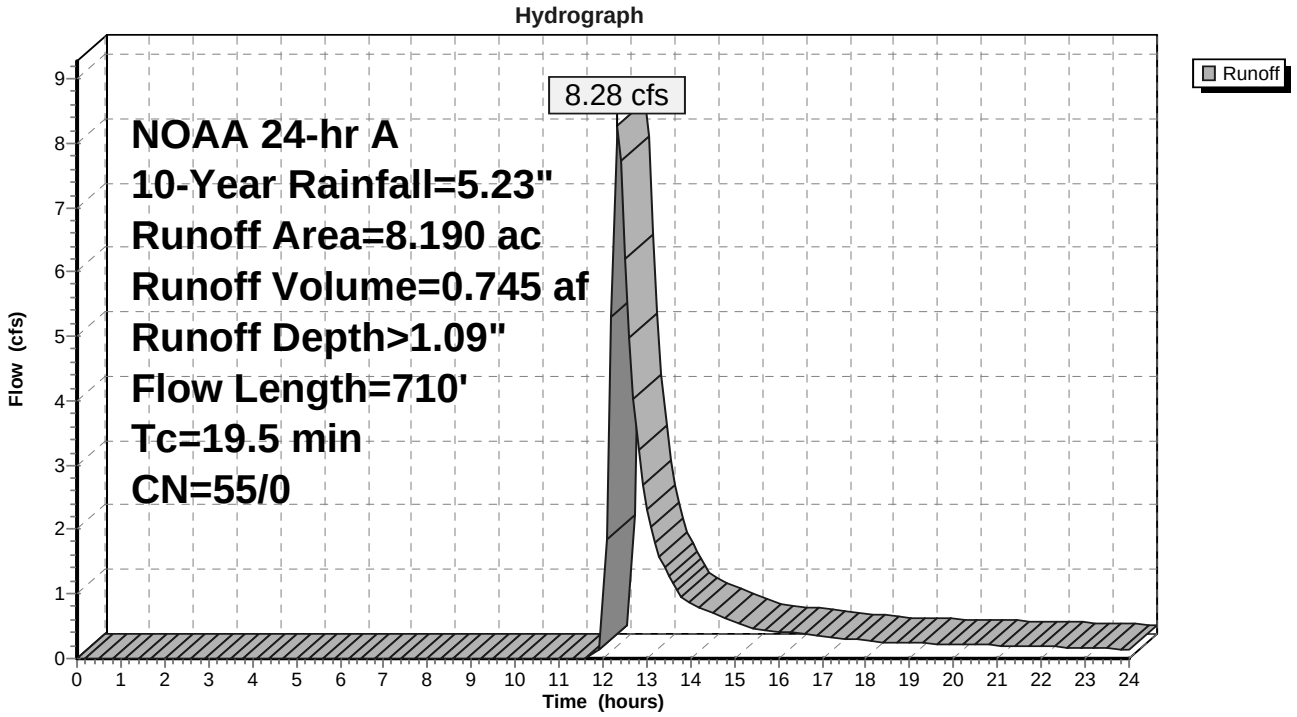
Runoff = 8.28 cfs @ 12.34 hrs, Volume= 0.745 af, Depth> 1.09"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

	Area (ac)	CN	Description
	0.660	30	Brush, Good, HSG A
*	1.810	77	Wetlands, HSG A
	1.860	30	Meadow, non-grazed, HSG A
	0.900	30	Woods, Good, HSG A
	0.030	55	Woods, Good, HSG B
	0.070	48	Brush, Good, HSG B
	0.360	65	Brush, Good, HSG C
	1.340	70	Woods, Good, HSG C
	0.610	77	Woods, Good, HSG D
	0.550	73	Brush, Good, HSG D
	8.190	55	Weighted Average
	8.190	55	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0100	0.13		**Sheet Flow,** Range n= 0.130 P2= 3.16"
12.8	660	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
19.5	710	Total			

Subcatchment CCEX-4:



Summary for Subcatchment CCEX-7:

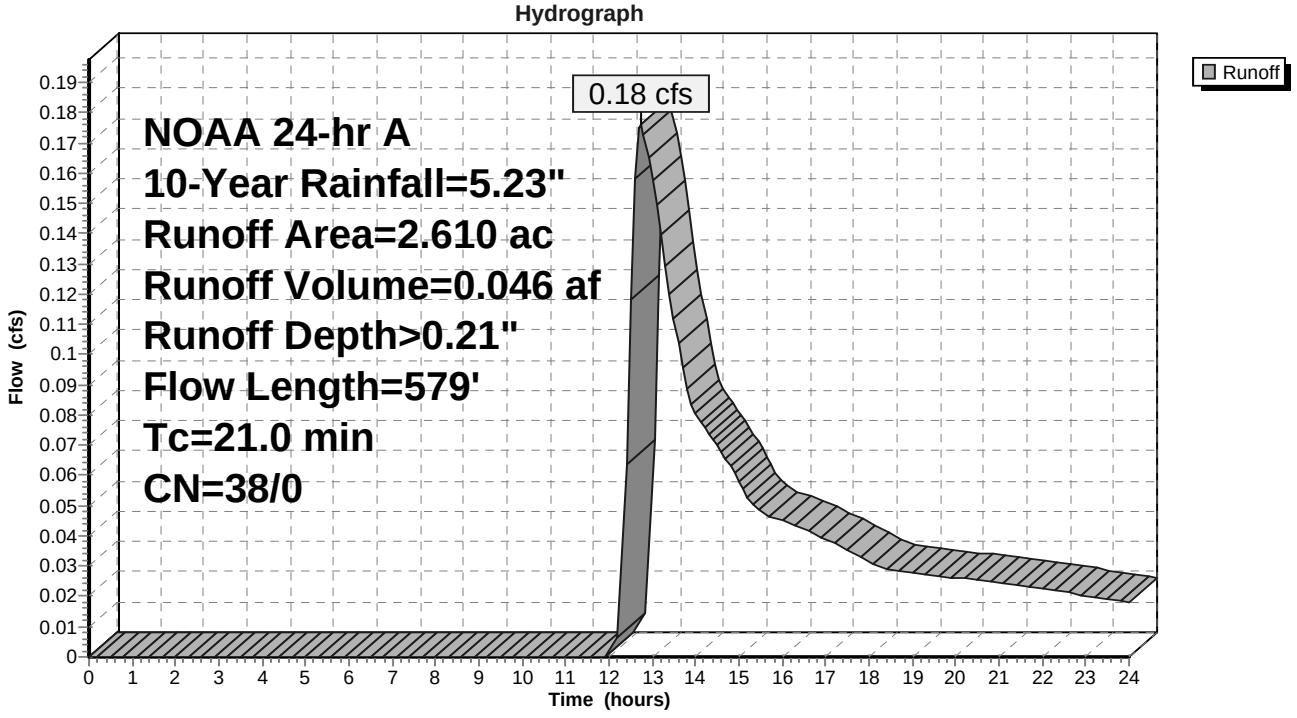
Runoff = 0.18 cfs @ 12.74 hrs, Volume= 0.046 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

	Area (ac)	CN	Description
	2.110	30	Woods, Good, HSG A
*	0.300	77	Wetlands, HSG A
	0.200	70	Woods, Good, HSG C
	2.610	38	Weighted Average
	2.610	38	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
13.9	529	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.0	579	Total			

Subcatchment CCEX-7:



Summary for Subcatchment MCEX-2:

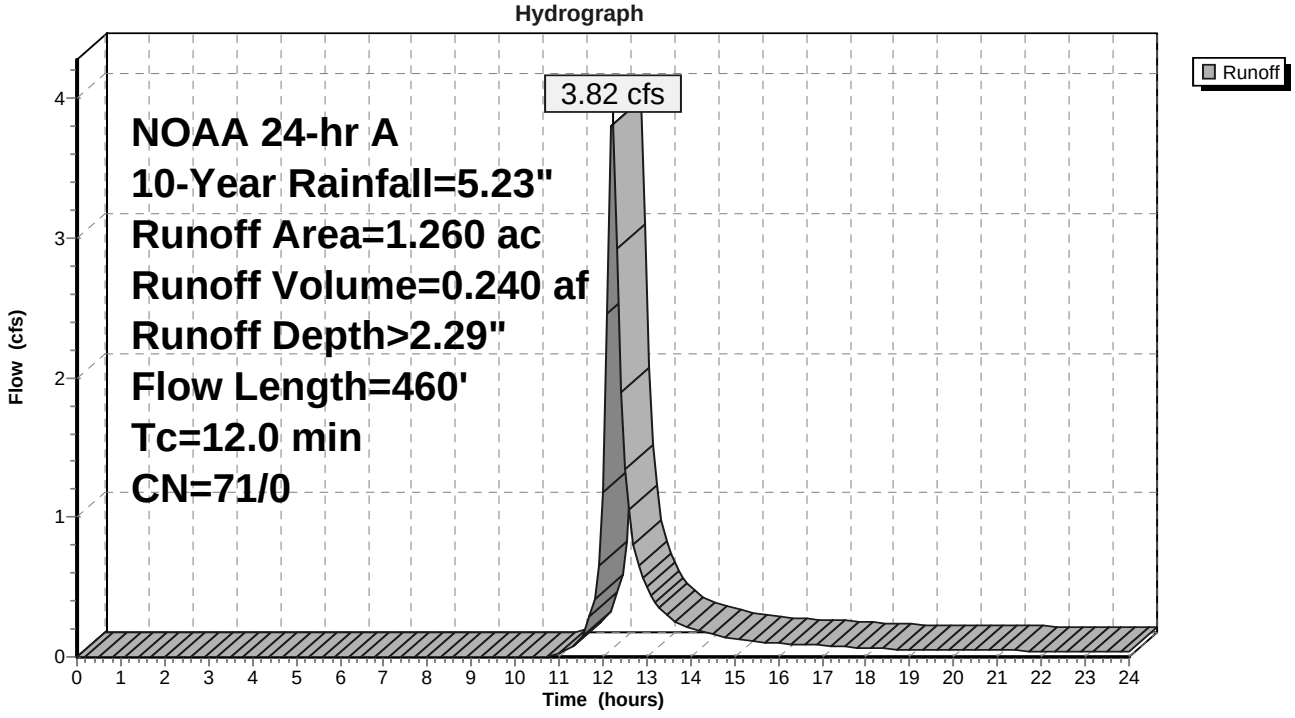
Runoff = 3.82 cfs @ 12.21 hrs, Volume= 0.240 af, Depth> 2.29"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
1.160	70	Woods, Good, HSG C
0.040	96	Gravel surface, HSG C
0.060	71	Meadow, non-grazed, HSG C
1.260	71	Weighted Average
1.260	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
5.5	410	0.0320	1.25		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.0	460	Total			

Subcatchment MCEX-2:



Summary for Subcatchment MCEX-4:

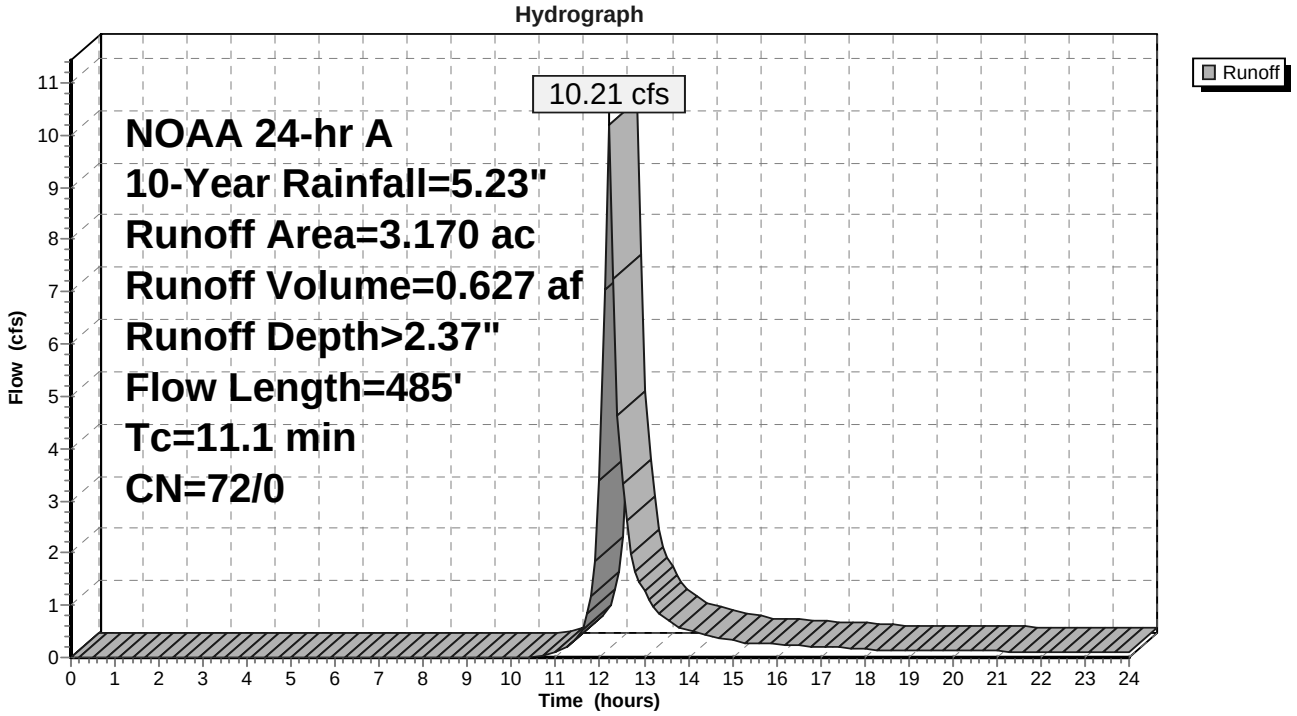
Runoff = 10.21 cfs @ 12.20 hrs, Volume= 0.627 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
2.280	70	Woods, Good, HSG C
0.060	96	Gravel surface, HSG C
0.120	71	Meadow, non-grazed, HSG C
0.410	77	Woods, Good, HSG D
0.290	78	Meadow, non-grazed, HSG D
0.010	96	Gravel surface, HSG D
3.170	72	Weighted Average
3.170	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.0	435	0.1290	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	485	Total			

Subcatchment MCEX-4:



Summary for Subcatchment MCEX-7C:

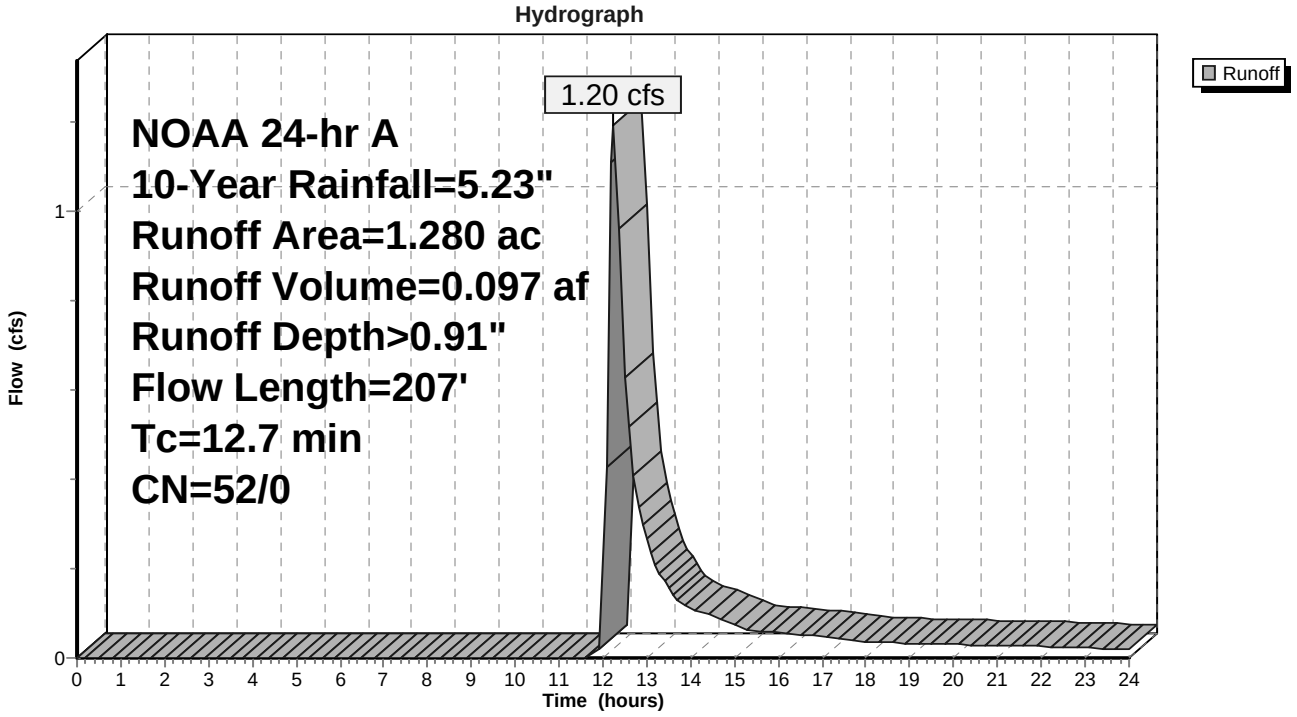
Runoff = 1.20 cfs @ 12.25 hrs, Volume= 0.097 af, Depth> 0.91"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.660	30	Woods, Good, HSG A
0.050	96	Gravel surface, HSG A
0.060	96	Gravel surface, HSG C
0.430	70	Woods, Good, HSG C
0.080	71	Meadow, non-grazed, HSG C
1.280	52	Weighted Average
1.280	52	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
2.1	157	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	207	Total			

Subcatchment MCEX-7C:

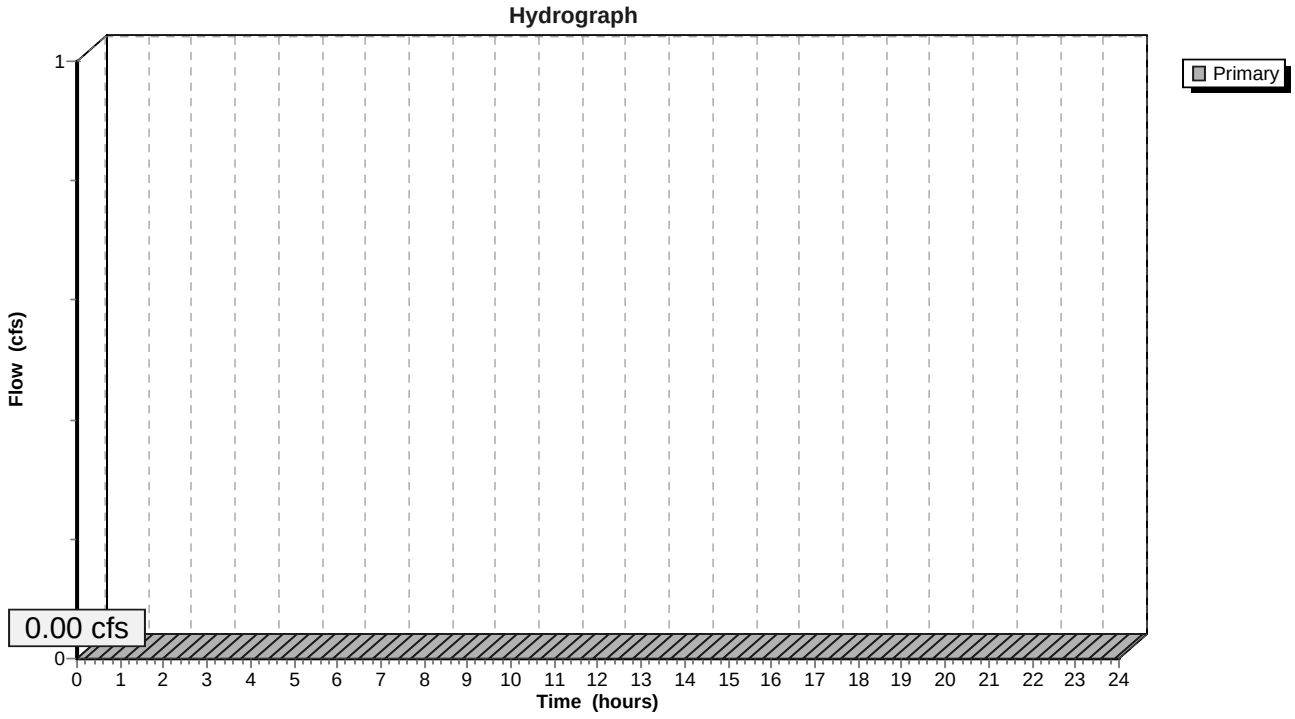


Summary for Link POA-1:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-1:

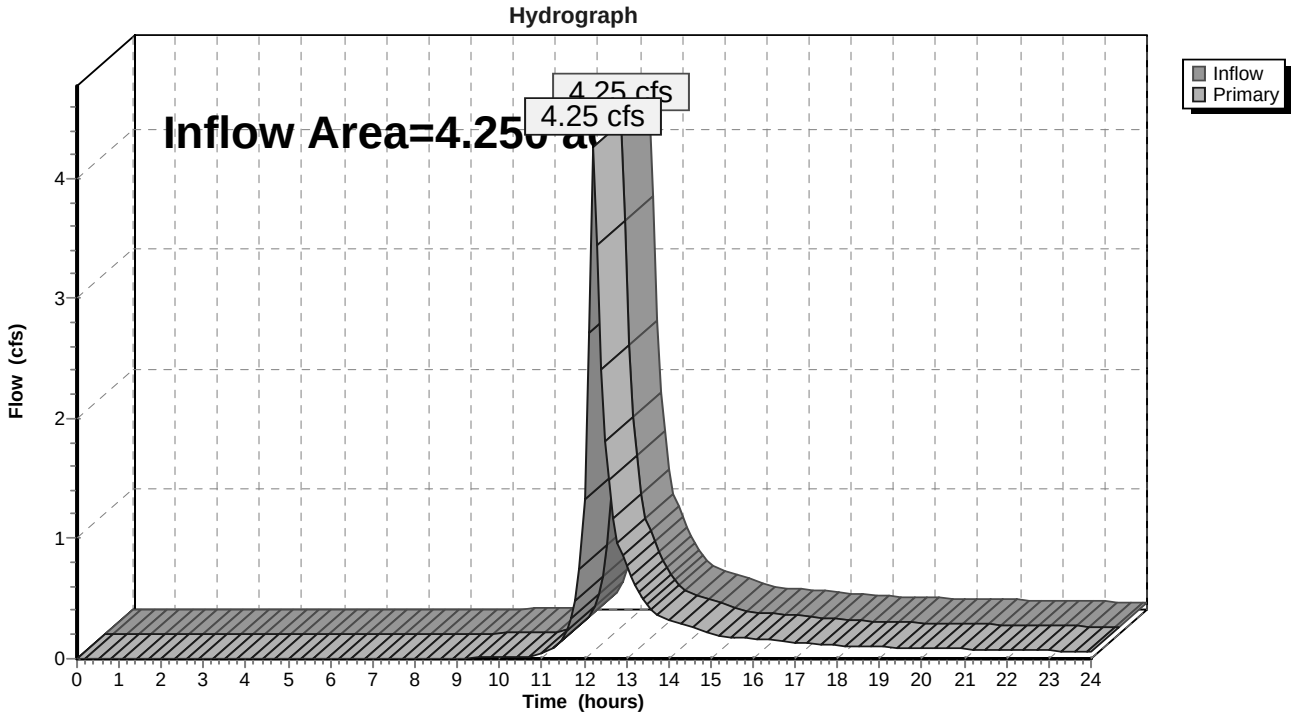


Summary for Link POA-2:

Inflow Area = 4.250 ac, 1.41% Impervious, Inflow Depth > 0.95" for 10-Year event
Inflow = 4.25 cfs @ 12.22 hrs, Volume= 0.335 af
Primary = 4.25 cfs @ 12.22 hrs, Volume= 0.335 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-2:

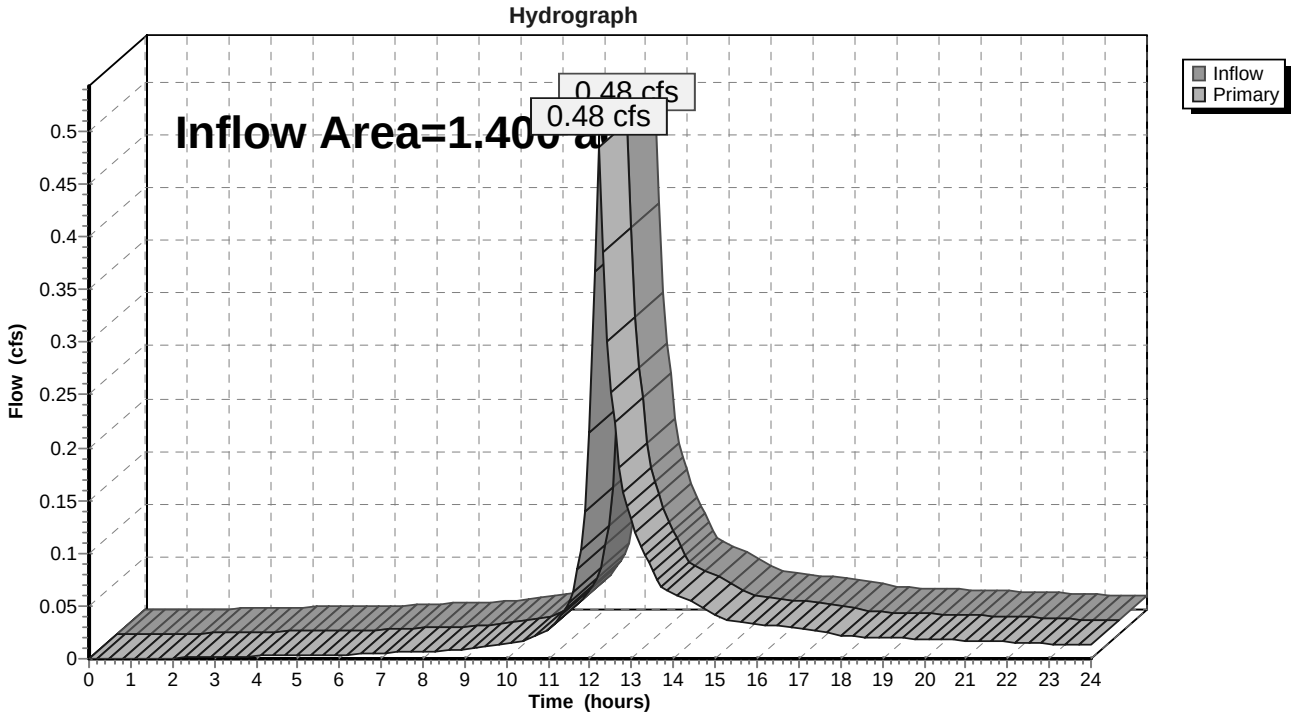


Summary for Link POA-3:

Inflow Area = 1.400 ac, 5.71% Impervious, Inflow Depth > 0.52" for 10-Year event
Inflow = 0.48 cfs @ 12.20 hrs, Volume= 0.061 af
Primary = 0.48 cfs @ 12.20 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-3:

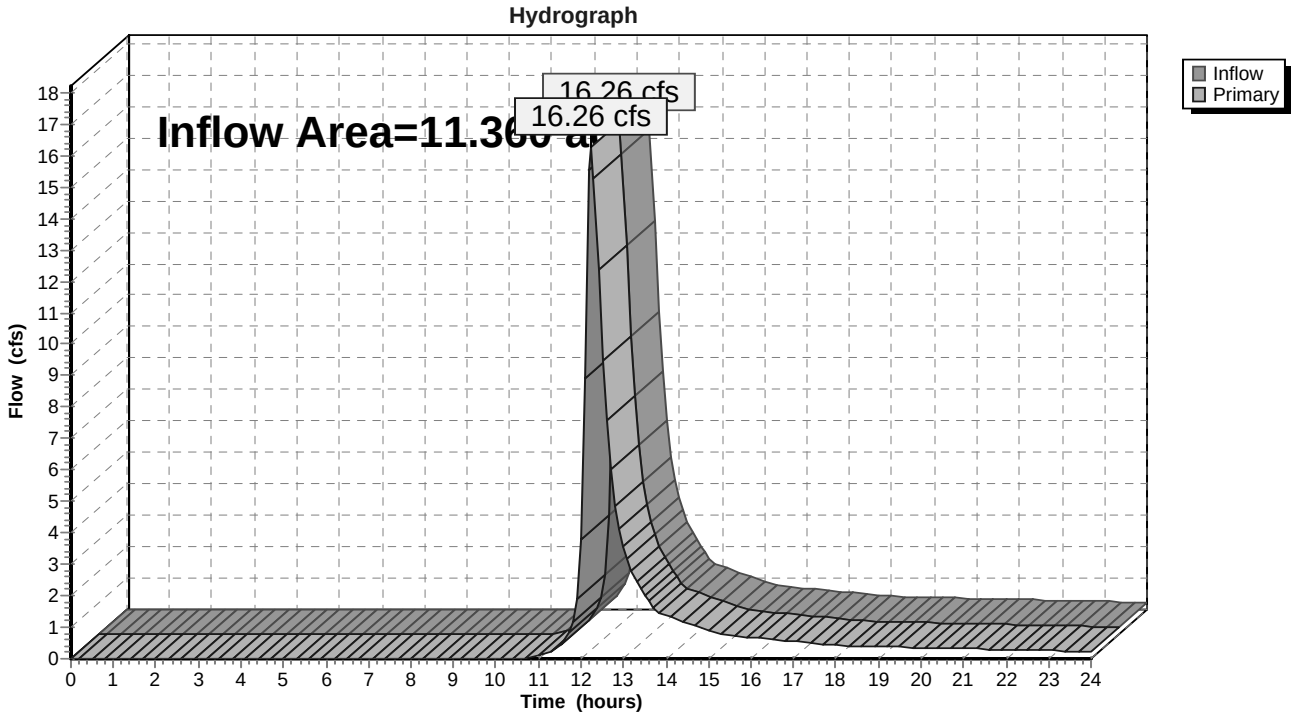


Summary for Link POA-4:

Inflow Area = 11.360 ac, 0.00% Impervious, Inflow Depth > 1.45" for 10-Year event
Inflow = 16.26 cfs @ 12.25 hrs, Volume= 1.372 af
Primary = 16.26 cfs @ 12.25 hrs, Volume= 1.372 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-4:

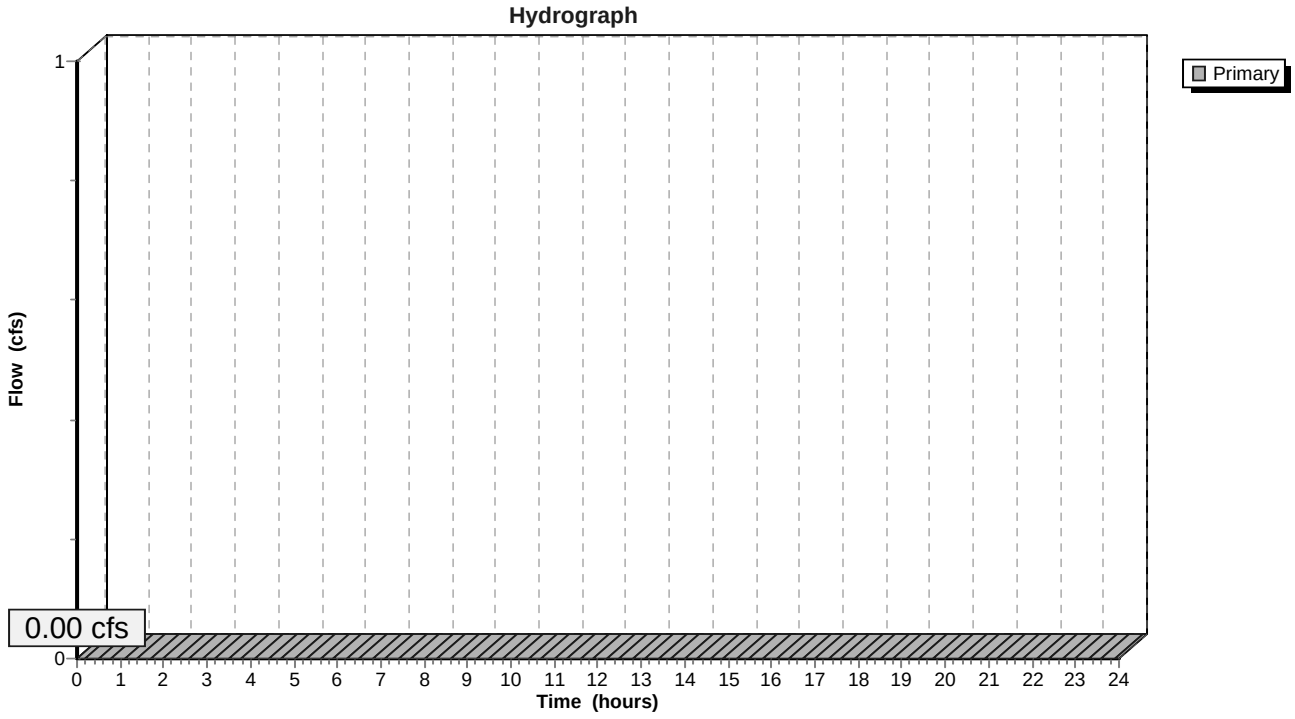


Summary for Link POA-5:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-5:

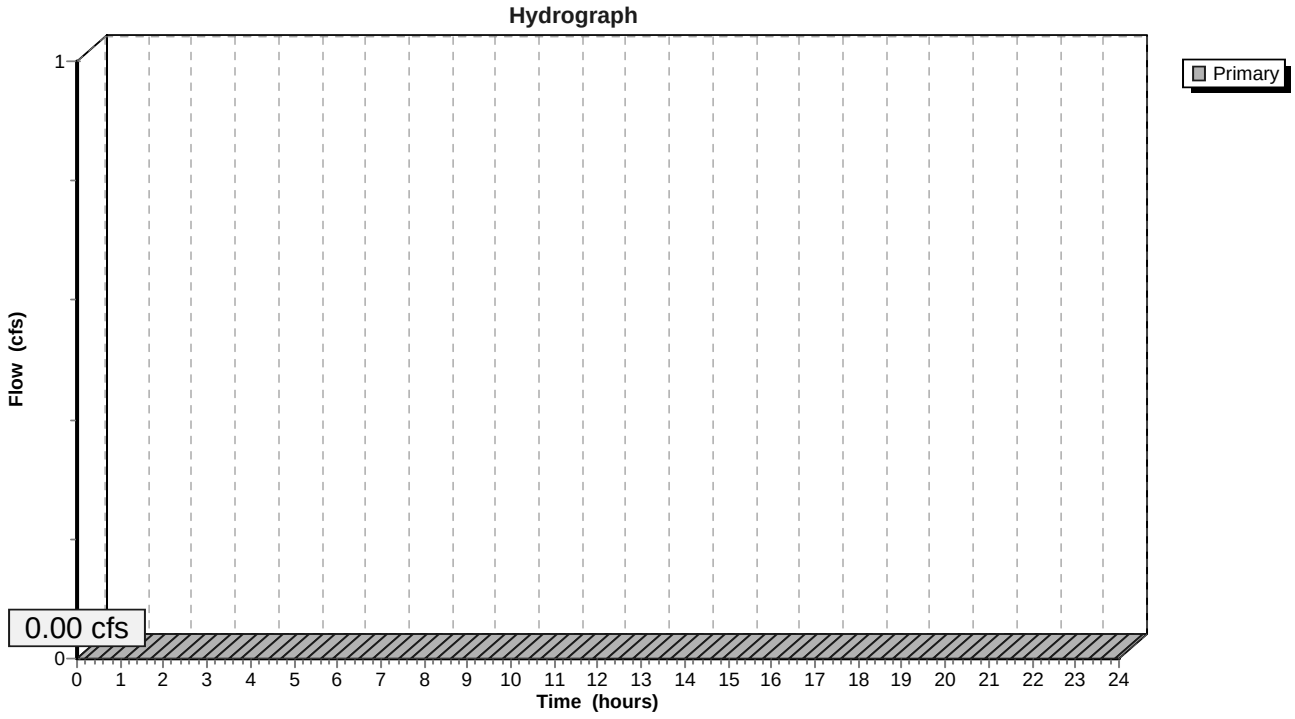


Summary for Link POA-6:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-6:

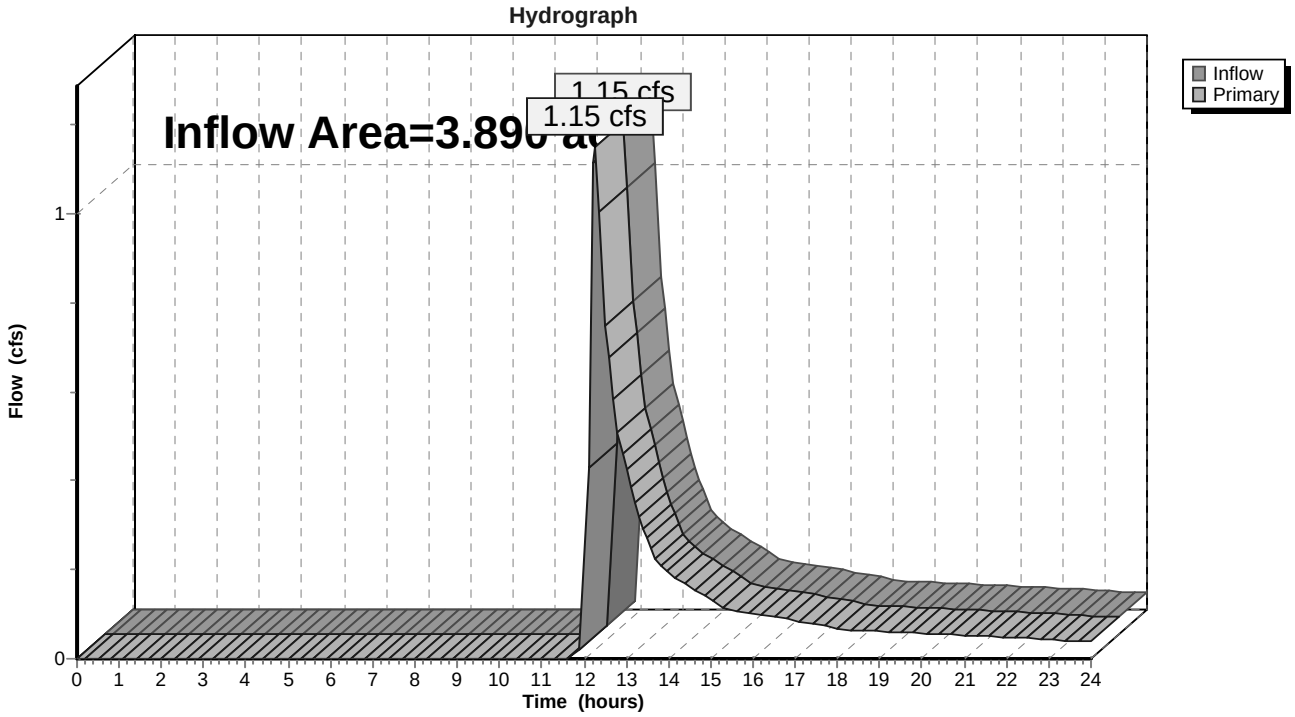


Summary for Link POA-7:

Inflow Area = 3.890 ac, 0.00% Impervious, Inflow Depth > 0.44" for 10-Year event
Inflow = 1.15 cfs @ 12.25 hrs, Volume= 0.142 af
Primary = 1.15 cfs @ 12.25 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-7:



Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment CCEX-2: Runoff Area=2.990 ac 2.01% Impervious Runoff Depth>1.48"
Flow Length=449' Tc=13.0 min CN=40/98 Runoff=4.23 cfs 0.369 af

Subcatchment CCEX-3: Runoff Area=1.400 ac 5.71% Impervious Runoff Depth>1.64"
Flow Length=357' Tc=11.1 min CN=39/98 Runoff=2.41 cfs 0.191 af

Subcatchment CCEX-4: Runoff Area=8.190 ac 0.00% Impervious Runoff Depth>2.93"
Flow Length=710' Tc=19.5 min CN=55/0 Runoff=25.26 cfs 2.001 af

Subcatchment CCEX-7: Runoff Area=2.610 ac 0.00% Impervious Runoff Depth>1.15"
Flow Length=579' Tc=21.0 min CN=38/0 Runoff=2.22 cfs 0.251 af

Subcatchment MCEX-2: Runoff Area=1.260 ac 0.00% Impervious Runoff Depth>4.77"
Flow Length=460' Tc=12.0 min CN=71/0 Runoff=7.96 cfs 0.501 af

Subcatchment MCEX-4: Runoff Area=3.170 ac 0.00% Impervious Runoff Depth>4.89"
Flow Length=485' Tc=11.1 min CN=72/0 Runoff=20.91 cfs 1.292 af

Subcatchment MCEX-7C: Runoff Area=1.280 ac 0.00% Impervious Runoff Depth>2.60"
Flow Length=207' Tc=12.7 min CN=52/0 Runoff=4.16 cfs 0.278 af

Link POA-1:
Primary=0.00 cfs 0.000 af

Link POA-2: Inflow=12.20 cfs 0.870 af
Primary=12.20 cfs 0.870 af

Link POA-3: Inflow=2.41 cfs 0.191 af
Primary=2.41 cfs 0.191 af

Link POA-4: Inflow=41.93 cfs 3.293 af
Primary=41.93 cfs 3.293 af

Link POA-5:
Primary=0.00 cfs 0.000 af

Link POA-6:
Primary=0.00 cfs 0.000 af

Link POA-7: Inflow=5.42 cfs 0.529 af
Primary=5.42 cfs 0.529 af

Total Runoff Area = 20.900 ac Runoff Volume = 4.883 af Average Runoff Depth = 2.80"
99.33% Pervious = 20.760 ac 0.67% Impervious = 0.140 ac

Summary for Subcatchment CCEX-2:

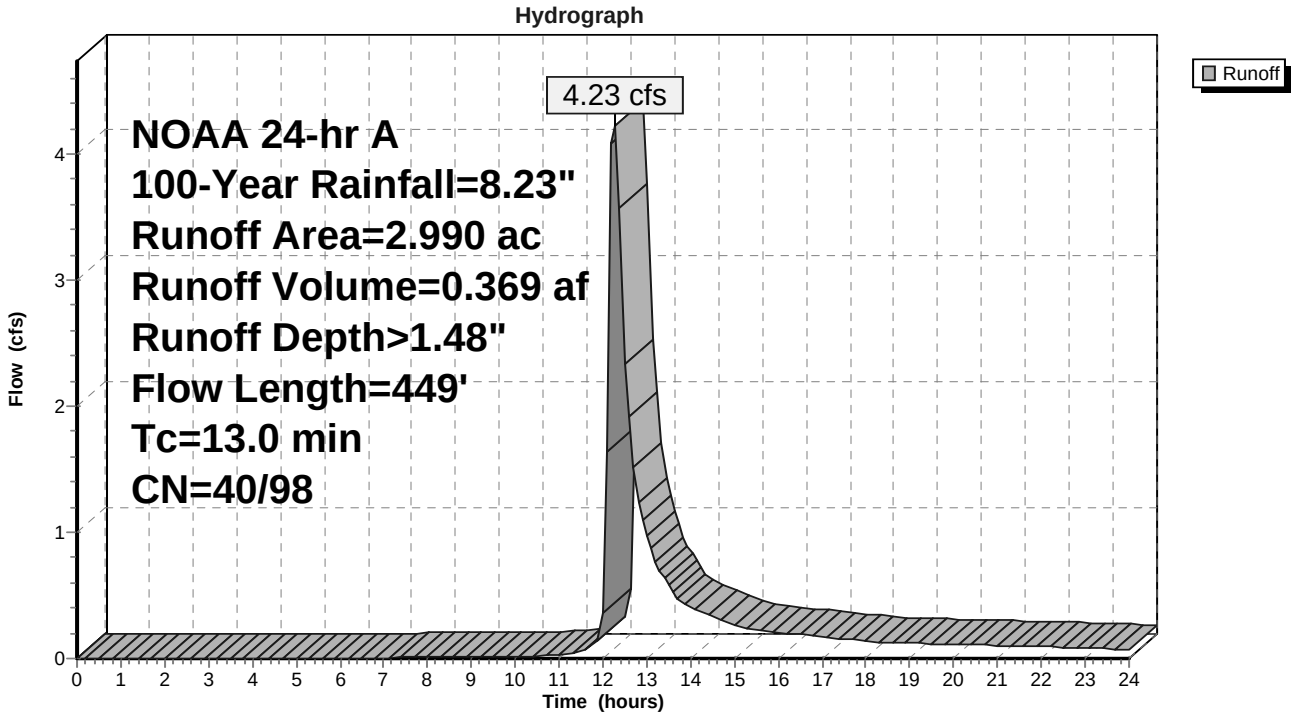
Runoff = 4.23 cfs @ 12.25 hrs, Volume= 0.369 af, Depth> 1.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

	Area (ac)	CN	Description
	1.340	30	Woods, Good, HSG A
*	0.220	77	Wetlands, HSG A
	0.010	98	Roofs, HSG A
	0.970	30	Meadow, non-grazed, HSG A
	0.200	70	Woods, Good, HSG C
	0.030	98	Roofs, HSG D
	0.200	78	Meadow, non-grazed, HSG D
	0.020	98	Paved parking, HSG A
	2.990	41	Weighted Average
	2.930	40	97.99% Pervious Area
	0.060	98	2.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.2000	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
8.1	399	0.0270	0.82		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.0	449	Total			

Subcatchment CCEX-2:



Summary for Subcatchment CCEX-3:

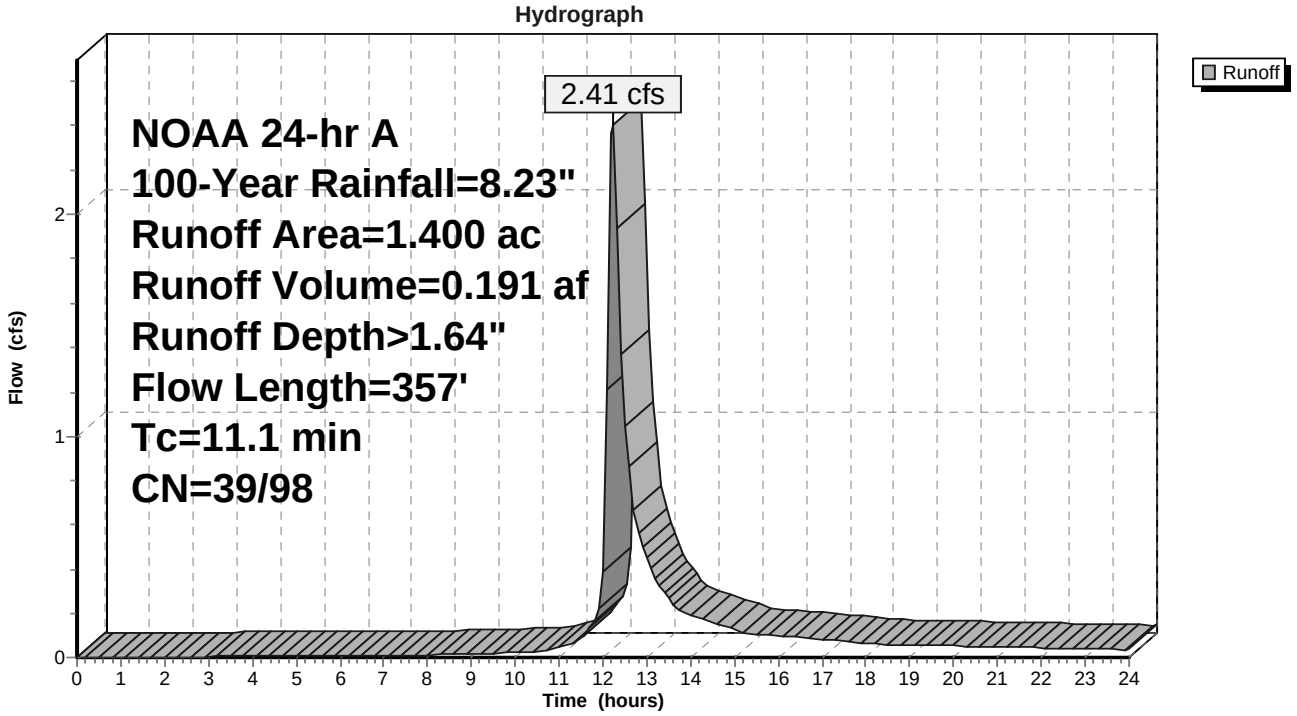
Runoff = 2.41 cfs @ 12.22 hrs, Volume= 0.191 af, Depth> 1.64"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
1.080	30	Meadow, non-grazed, HSG A
0.010	98	Roofs, HSG D
0.060	77	Woods, Good, HSG D
0.180	78	Meadow, non-grazed, HSG D
0.070	98	Paved parking, HSG A
1.400	42	Weighted Average
1.320	39	94.29% Pervious Area
0.080	98	5.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0100	0.13		**Sheet Flow,** Range n= 0.130 P2= 3.16"
4.4	307	0.0270	1.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.1	357	Total			

Subcatchment CCEX-3:



Summary for Subcatchment CCEX-4:

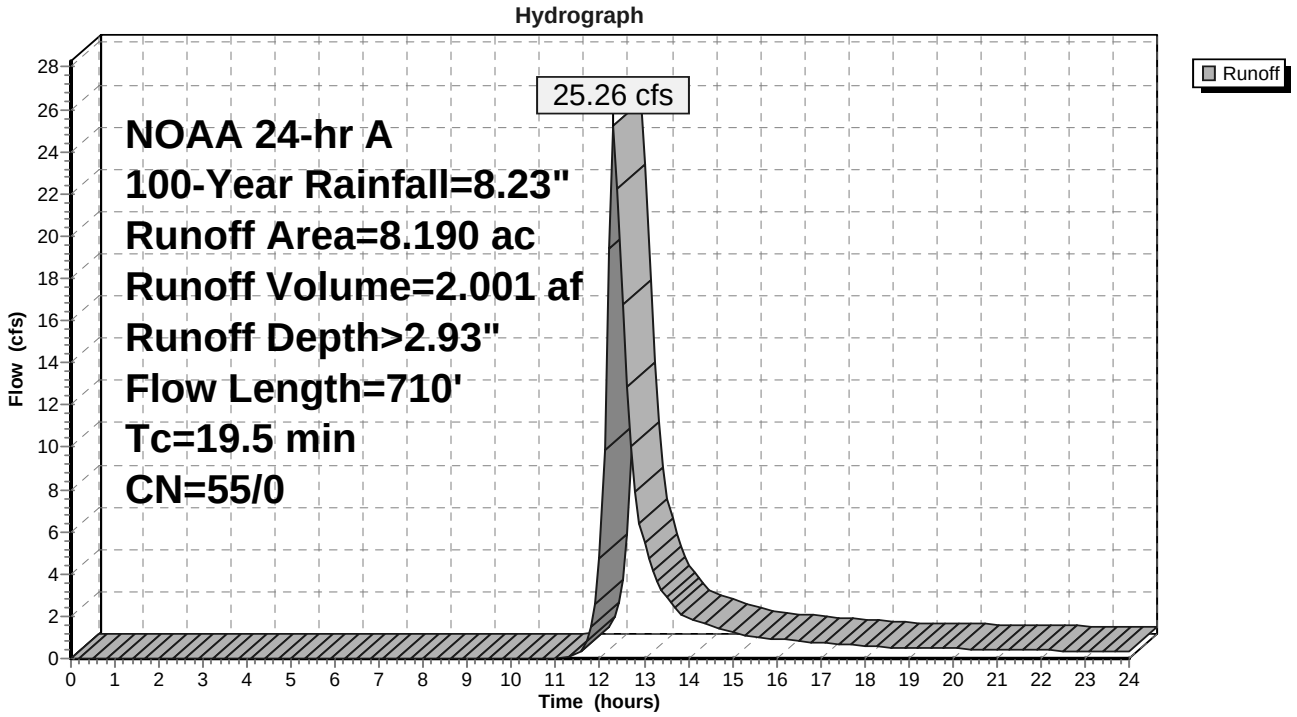
Runoff = 25.26 cfs @ 12.32 hrs, Volume= 2.001 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

	Area (ac)	CN	Description
	0.660	30	Brush, Good, HSG A
*	1.810	77	Wetlands, HSG A
	1.860	30	Meadow, non-grazed, HSG A
	0.900	30	Woods, Good, HSG A
	0.030	55	Woods, Good, HSG B
	0.070	48	Brush, Good, HSG B
	0.360	65	Brush, Good, HSG C
	1.340	70	Woods, Good, HSG C
	0.610	77	Woods, Good, HSG D
	0.550	73	Brush, Good, HSG D
	8.190	55	Weighted Average
	8.190	55	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0100	0.13		**Sheet Flow,** Range n= 0.130 P2= 3.16"
12.8	660	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
19.5	710	Total			

Subcatchment CCEX-4:



Summary for Subcatchment CCEX-7:

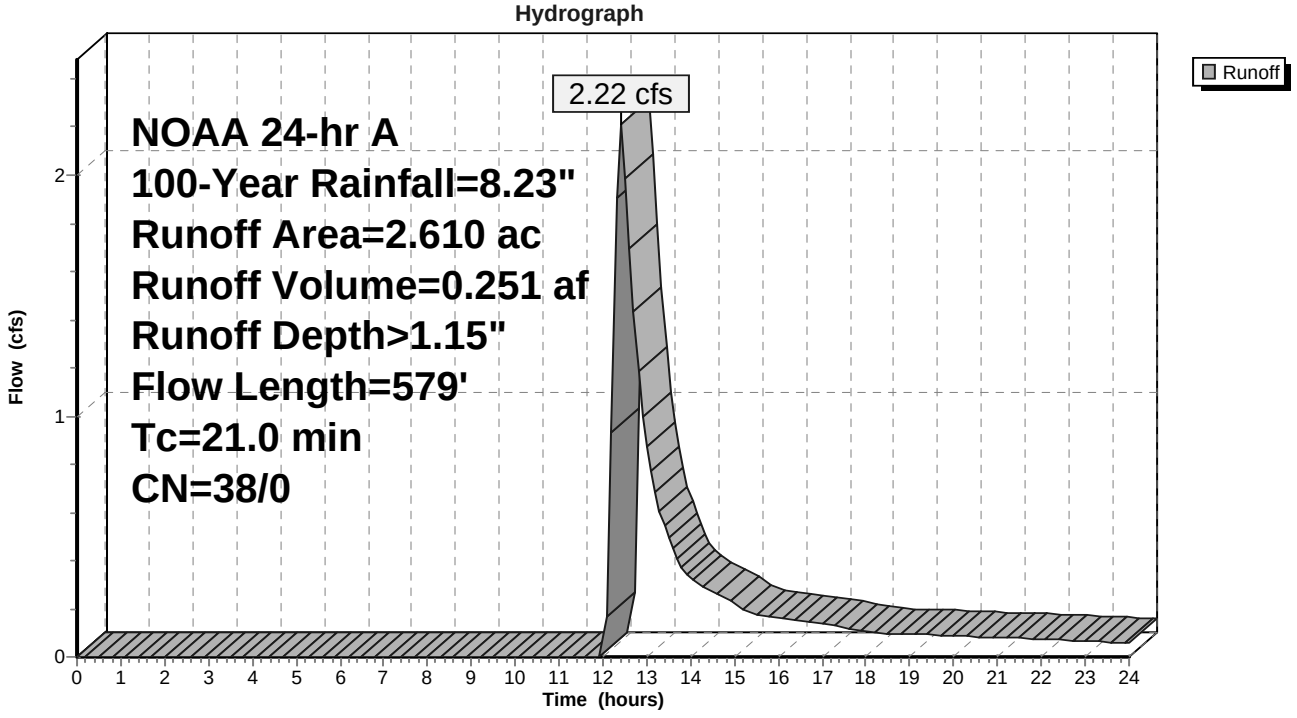
Runoff = 2.22 cfs @ 12.41 hrs, Volume= 0.251 af, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

	Area (ac)	CN	Description
	2.110	30	Woods, Good, HSG A
*	0.300	77	Wetlands, HSG A
	0.200	70	Woods, Good, HSG C
	2.610	38	Weighted Average
	2.610	38	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
13.9	529	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.0	579	Total			

Subcatchment CCEX-7:



Summary for Subcatchment MCEX-2:

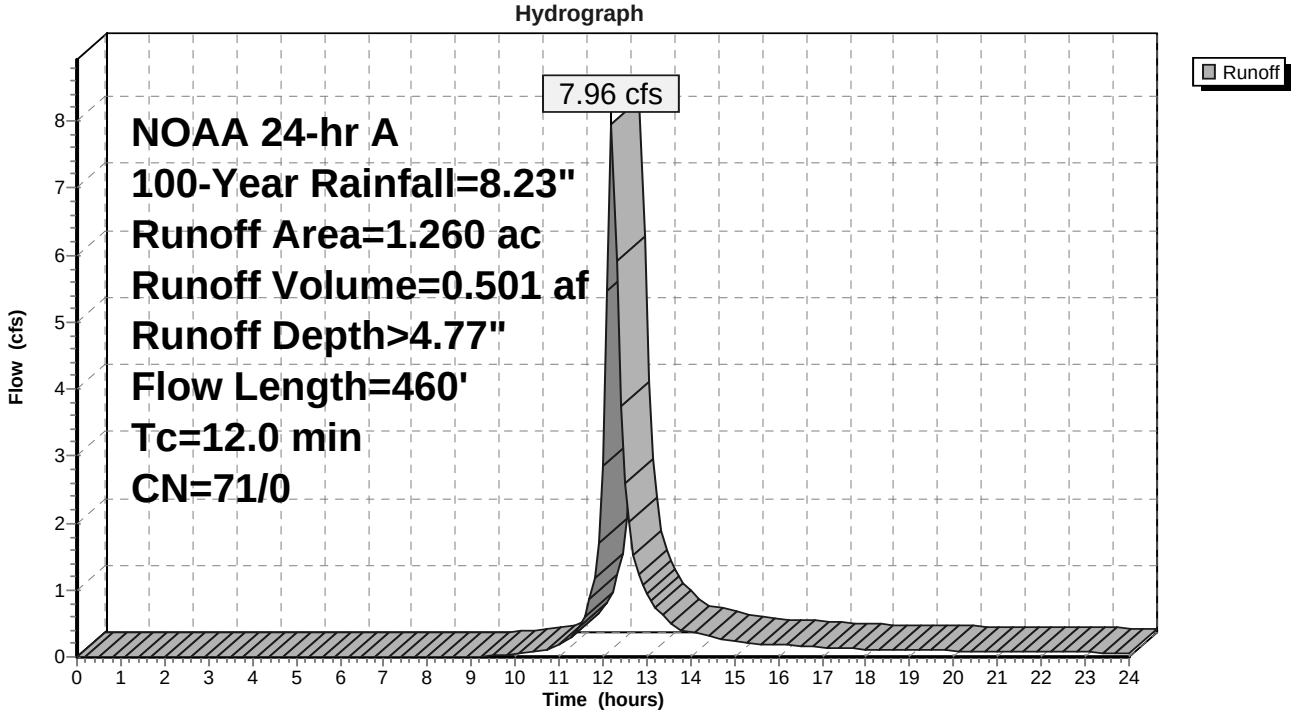
Runoff = 7.96 cfs @ 12.20 hrs, Volume= 0.501 af, Depth> 4.77"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
1.160	70	Woods, Good, HSG C
0.040	96	Gravel surface, HSG C
0.060	71	Meadow, non-grazed, HSG C
1.260	71	Weighted Average
1.260	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
5.5	410	0.0320	1.25		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.0	460	Total			

Subcatchment MCEX-2:



Summary for Subcatchment MCEX-4:

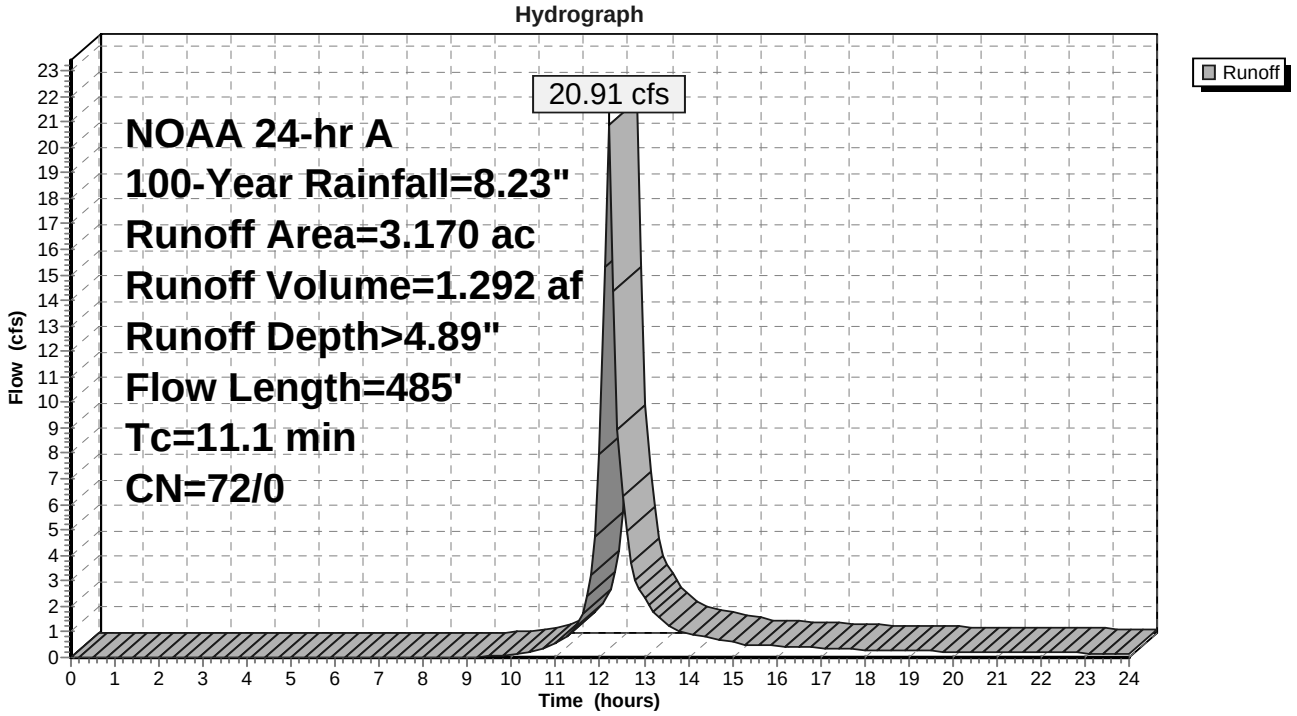
Runoff = 20.91 cfs @ 12.20 hrs, Volume= 1.292 af, Depth> 4.89"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
2.280	70	Woods, Good, HSG C
0.060	96	Gravel surface, HSG C
0.120	71	Meadow, non-grazed, HSG C
0.410	77	Woods, Good, HSG D
0.290	78	Meadow, non-grazed, HSG D
0.010	96	Gravel surface, HSG D
3.170	72	Weighted Average
3.170	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.0	435	0.1290	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	485	Total			

Subcatchment MCEX-4:



Summary for Subcatchment MCEX-7C:

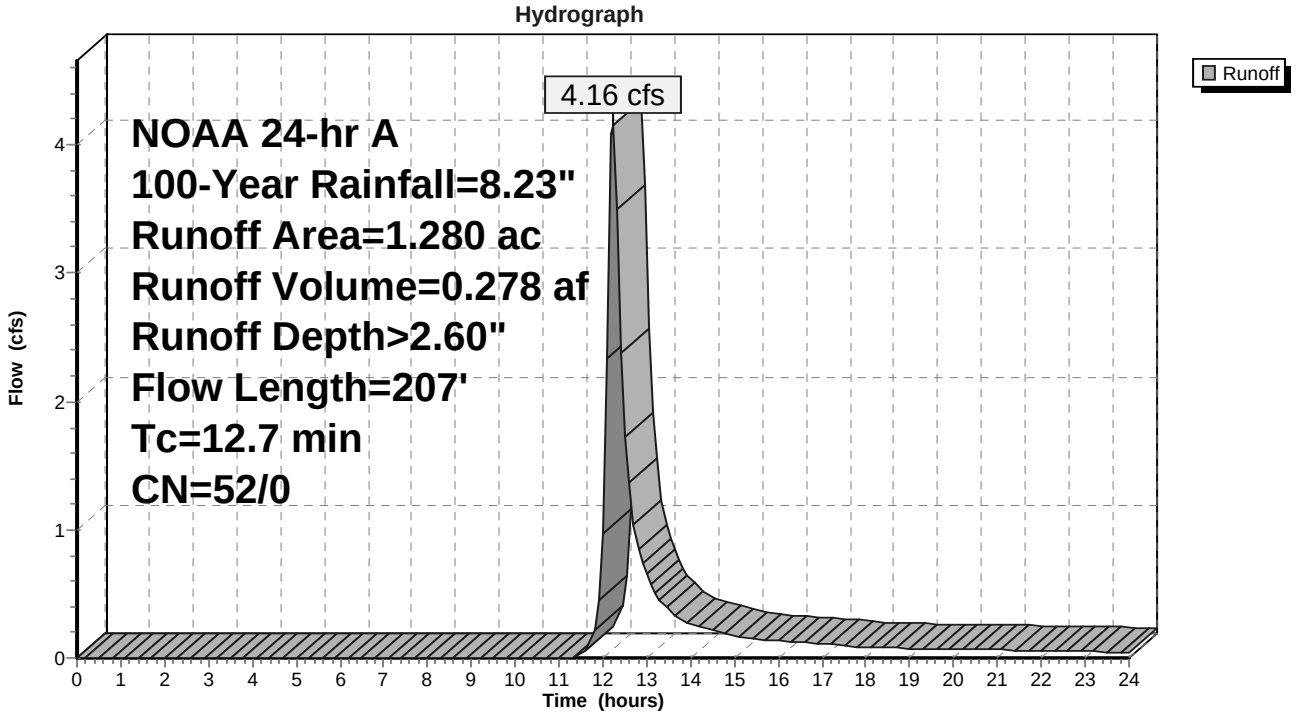
Runoff = 4.16 cfs @ 12.22 hrs, Volume= 0.278 af, Depth> 2.60"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.660	30	Woods, Good, HSG A
0.050	96	Gravel surface, HSG A
0.060	96	Gravel surface, HSG C
0.430	70	Woods, Good, HSG C
0.080	71	Meadow, non-grazed, HSG C
1.280	52	Weighted Average
1.280	52	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
2.1	157	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	207	Total			

Subcatchment MCEX-7C:

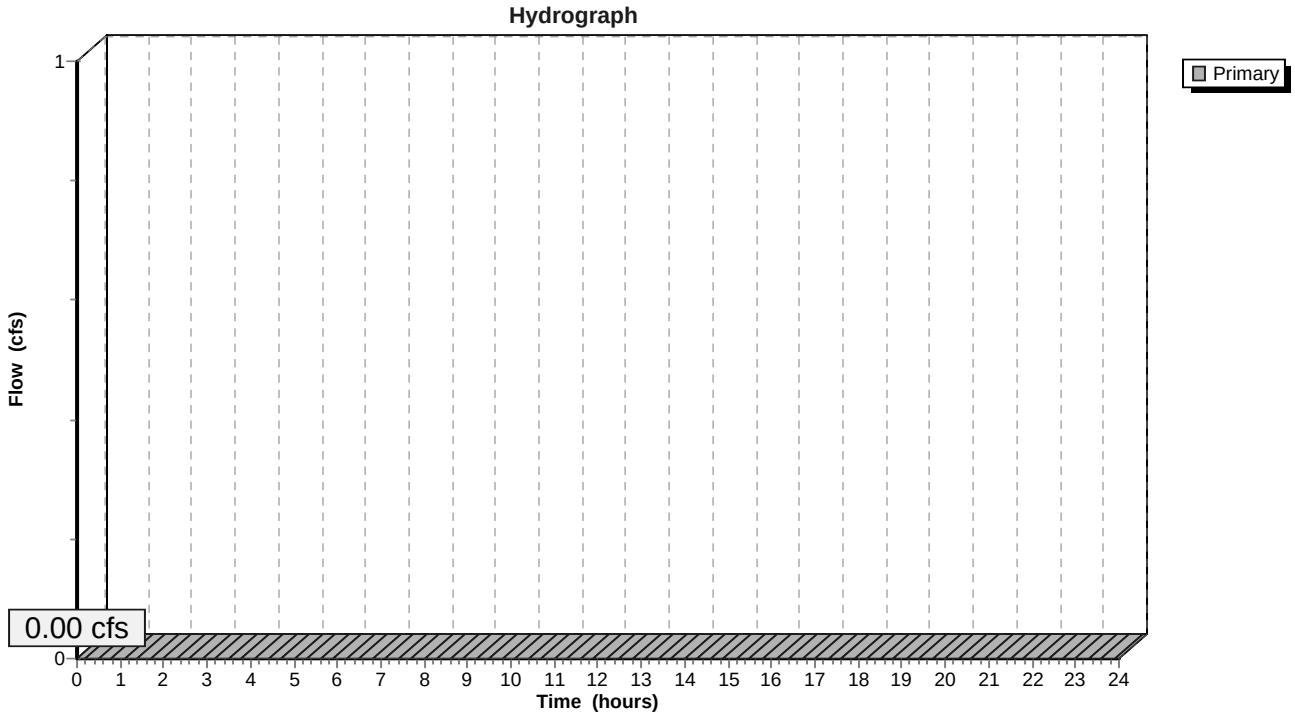


Summary for Link POA-1:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-1:

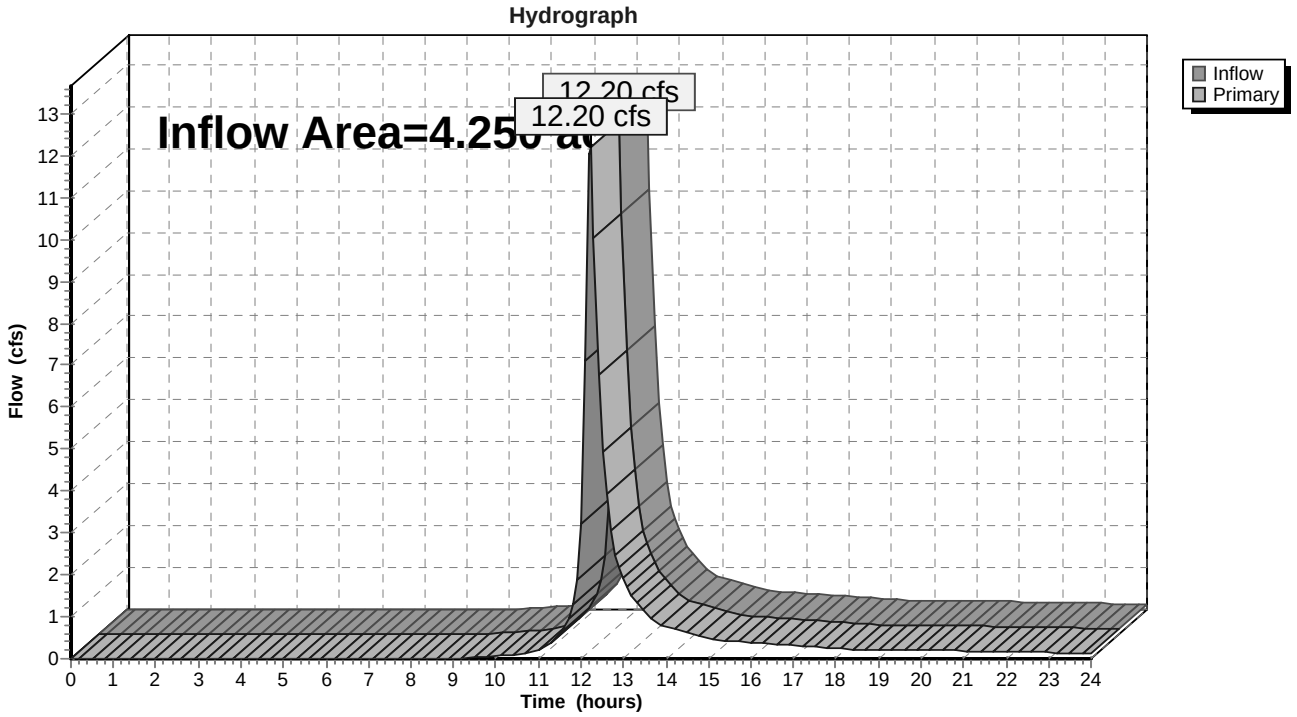


Summary for Link POA-2:

Inflow Area = 4.250 ac, 1.41% Impervious, Inflow Depth > 2.46" for 100-Year event
Inflow = 12.20 cfs @ 12.22 hrs, Volume= 0.870 af
Primary = 12.20 cfs @ 12.22 hrs, Volume= 0.870 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-2:

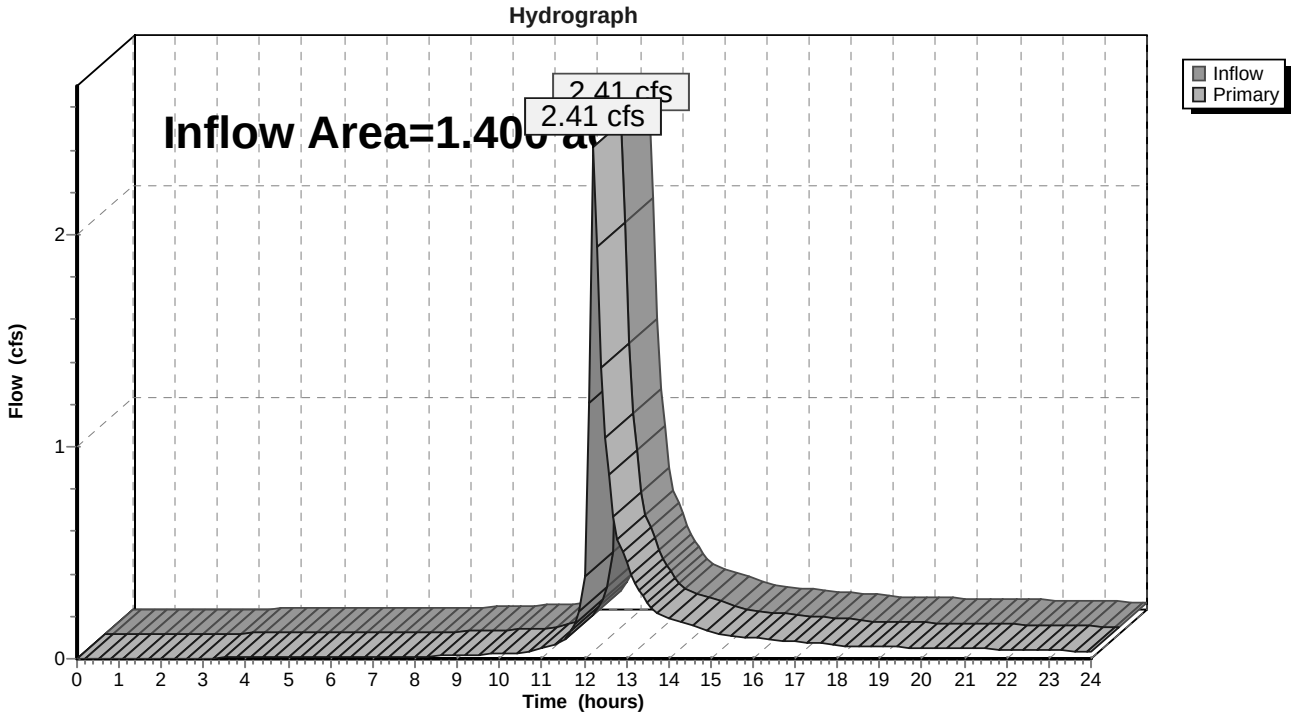


Summary for Link POA-3:

Inflow Area = 1.400 ac, 5.71% Impervious, Inflow Depth > 1.64" for 100-Year event
Inflow = 2.41 cfs @ 12.22 hrs, Volume= 0.191 af
Primary = 2.41 cfs @ 12.22 hrs, Volume= 0.191 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-3:

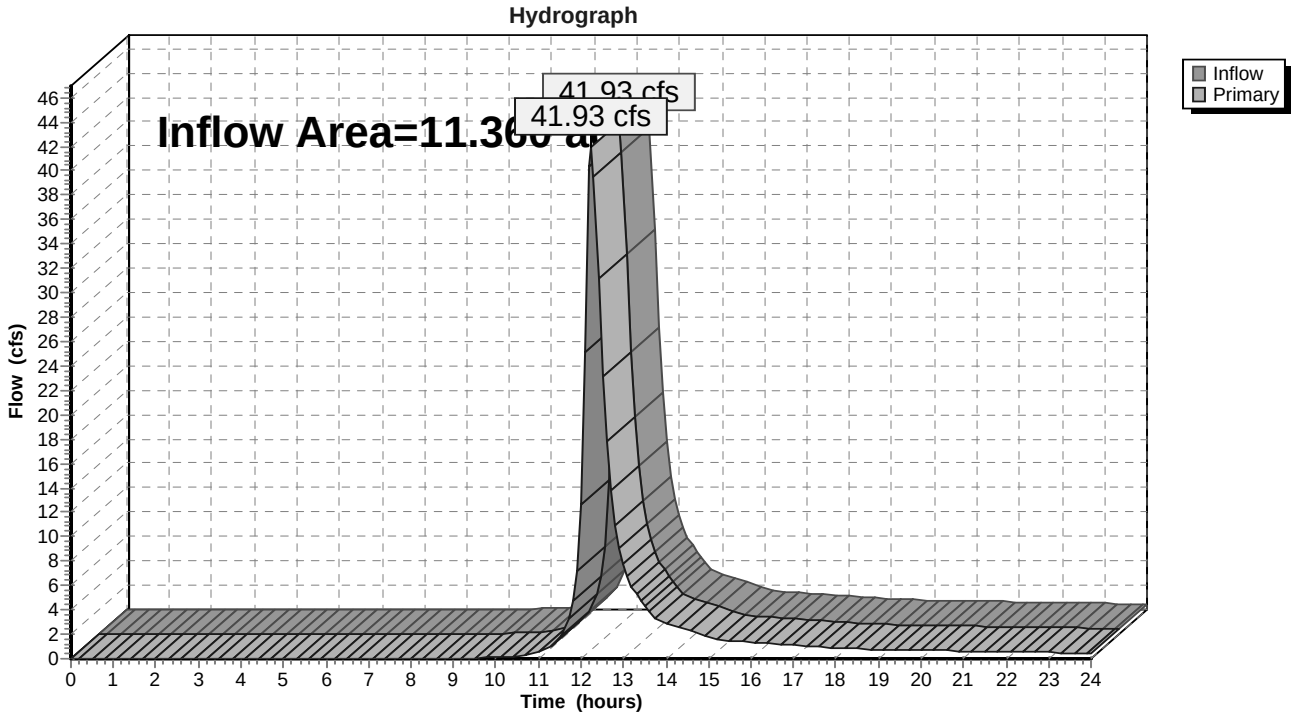


Summary for Link POA-4:

Inflow Area = 11.360 ac, 0.00% Impervious, Inflow Depth > 3.48" for 100-Year event
Inflow = 41.93 cfs @ 12.24 hrs, Volume= 3.293 af
Primary = 41.93 cfs @ 12.24 hrs, Volume= 3.293 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-4:

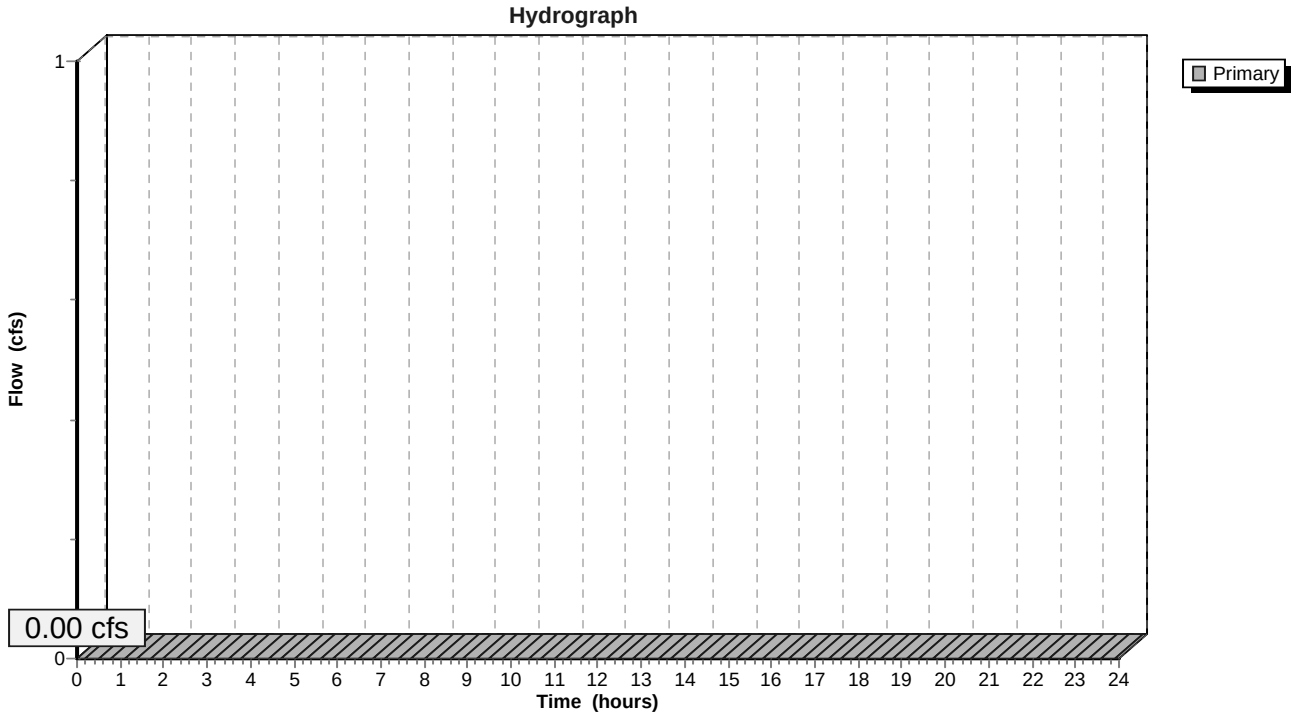


Summary for Link POA-5:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-5:

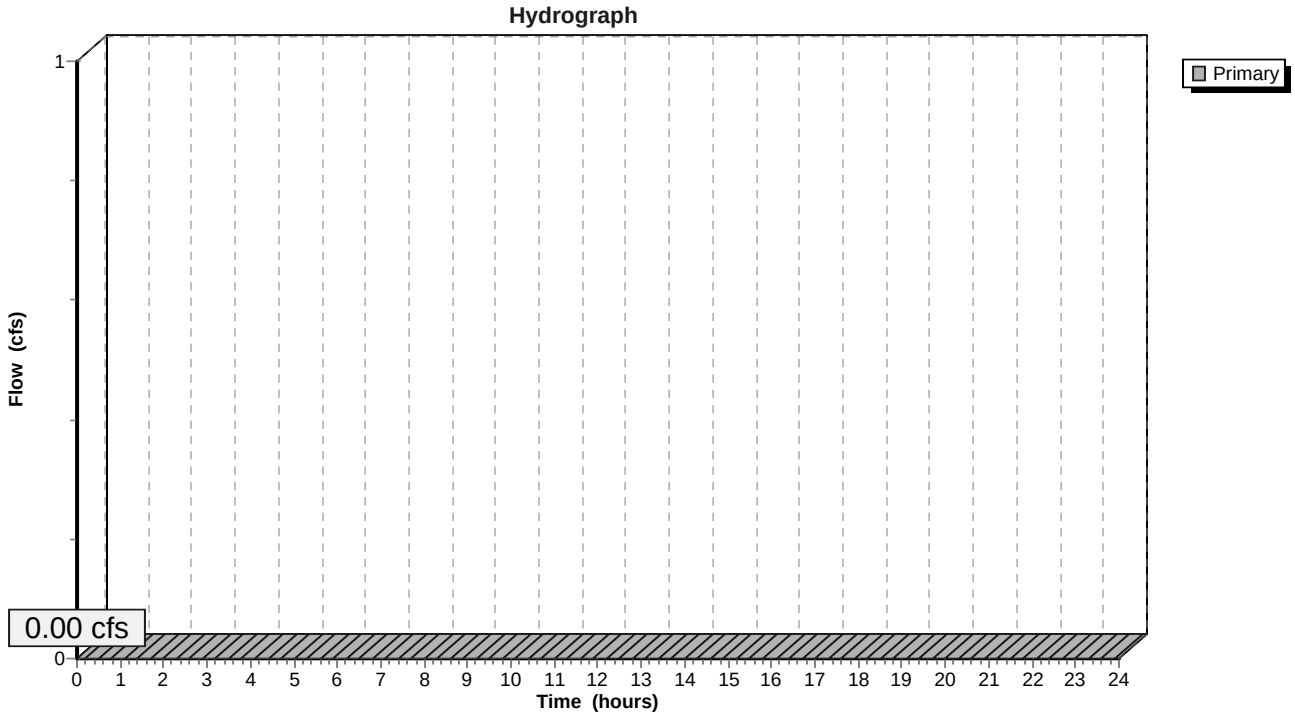


Summary for Link POA-6:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-6:

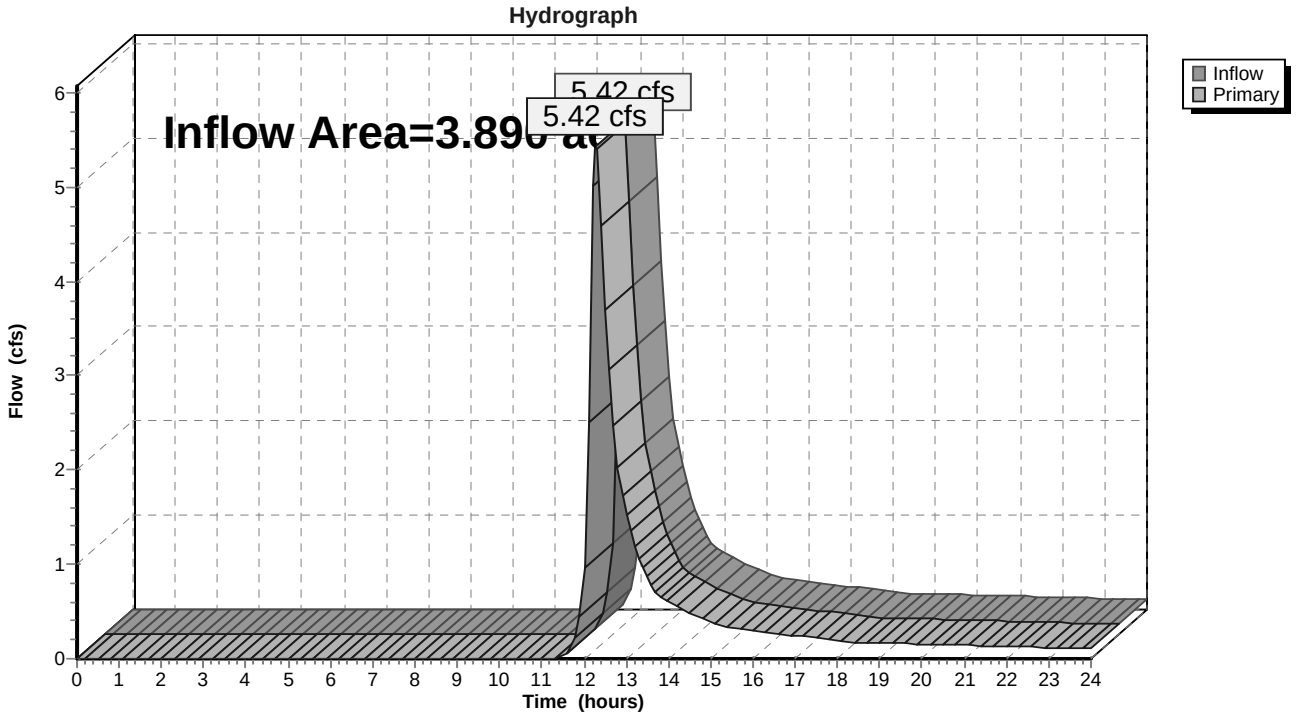


Summary for Link POA-7:

Inflow Area = 3.890 ac, 0.00% Impervious, Inflow Depth > 1.63" for 100-Year event
Inflow = 5.42 cfs @ 12.28 hrs, Volume= 0.529 af
Primary = 5.42 cfs @ 12.28 hrs, Volume= 0.529 af, Atten= 0%, Lag= 0.0 min

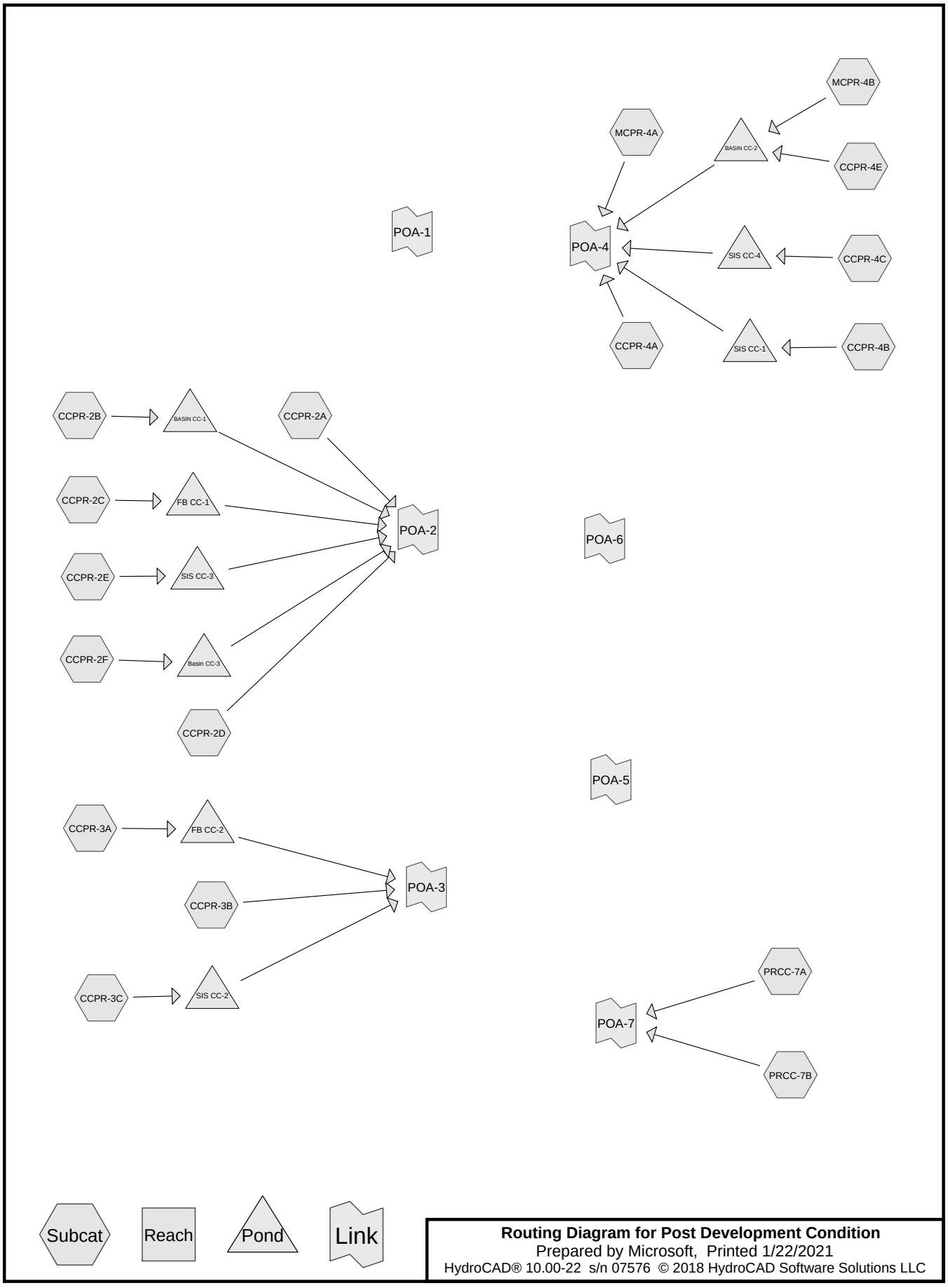
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-7:



Attachment 5 – HydroCad Output:

Post-Development Conditions



Routing Diagram for Post Development Condition
Prepared by Microsoft, Printed 1/22/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.150	39	>75% Grass cover, Good, HSG A (CCPR-2A, CCPR-2B, CCPR-2E, CCPR-2F, CCPR-3B, CCPR-3C, CCPR-4A, CCPR-4B, CCPR-4E, PRCC-7A)
0.350	74	>75% Grass cover, Good, HSG C (CCPR-2E, CCPR-2F, CCPR-4E, PRCC-7B)
0.330	80	>75% Grass cover, Good, HSG D (CCPR-2A, CCPR-2C, CCPR-3A, CCPR-3B, CCPR-3C)
0.550	30	Brush, Good, HSG A (CCPR-3B, CCPR-4A)
0.070	48	Brush, Good, HSG B (CCPR-4A)
0.360	65	Brush, Good, HSG C (CCPR-4A)
0.550	73	Brush, Good, HSG D (CCPR-4A)
0.070	96	Gravel surface, HSG A (CCPR-2F, PRCC-7A)
0.060	96	Gravel surface, HSG C (MCPR-4A, MCPR-4B)
0.010	96	Gravel surface, HSG D (MCPR-4A)
0.750	30	Meadow, non-grazed, HSG A (CCPR-2A, CCPR-2F, CCPR-4A, PRCC-7A, PRCC-7B)
0.190	71	Meadow, non-grazed, HSG C (MCPR-4A, MCPR-4B, PRCC-7B)
0.290	78	Meadow, non-grazed, HSG D (MCPR-4A)
1.610	98	Paved parking, HSG A (CCPR-2A, CCPR-2B, CCPR-2E, CCPR-2F, CCPR-3B, CCPR-3C, CCPR-4B)
0.320	98	Paved parking, HSG C (CCPR-2E, CCPR-2F)
0.150	98	Paved parking, HSG D (CCPR-2A, CCPR-2C, CCPR-3A)
1.500	98	Roofs, HSG A (CCPR-2B, CCPR-2D, CCPR-2E, CCPR-2F, CCPR-3C, CCPR-4A, CCPR-4B, CCPR-4C, CCPR-4E)
0.010	98	Roofs, HSG C (CCPR-4E)
0.010	98	Roofs, HSG D (CCPR-2D)
0.510	98	Water Surface, HSG A (CCPR-2B, CCPR-2F, CCPR-3B, CCPR-3C, CCPR-4A, CCPR-4E)
0.010	98	Water Surface, HSG C (CCPR-4E)
2.330	77	Wetlands, HSG A (CCPR-2A, CCPR-4A, PRCC-7A)
1.880	30	Woods, Good, HSG A (CCPR-2A, CCPR-4A, PRCC-7A)
0.030	55	Woods, Good, HSG B (CCPR-4A)
3.210	70	Woods, Good, HSG C (CCPR-4A, MCPR-4A, MCPR-4B)
1.010	77	Woods, Good, HSG D (CCPR-4A, MCPR-4A)
18.310	**67**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
11.350	HSG A	CCPR-2A, CCPR-2B, CCPR-2D, CCPR-2E, CCPR-2F, CCPR-3B, CCPR-3C, CCPR-4A, CCPR-4B, CCPR-4C, CCPR-4E, PRCC-7A, PRCC-7B
0.100	HSG B	CCPR-4A
4.510	HSG C	CCPR-2E, CCPR-2F, CCPR-4A, CCPR-4E, MCPR-4A, MCPR-4B, PRCC-7B
2.350	HSG D	CCPR-2A, CCPR-2C, CCPR-2D, CCPR-3A, CCPR-3B, CCPR-3C, CCPR-4A, MCPR-4A
0.000	Other	
18.310		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment CCPR-2A: Runoff Area=1.730 ac 20.81% Impervious Runoff Depth>0.66"
Flow Length=232' Tc=9.9 min CN=42/98 Runoff=1.35 cfs 0.096 af

Subcatchment CCPR-2B: Runoff Area=1.080 ac 73.15% Impervious Runoff Depth>2.27"
Tc=6.0 min CN=39/98 Runoff=3.29 cfs 0.205 af

Subcatchment CCPR-2C: Runoff Area=0.100 ac 30.00% Impervious Runoff Depth>1.99"
Tc=6.0 min CN=80/98 Runoff=0.28 cfs 0.017 af

Subcatchment CCPR-2D: Runoff Area=0.110 ac 100.00% Impervious Runoff Depth>3.11"
Tc=6.0 min CN=0/98 Runoff=0.46 cfs 0.028 af

Subcatchment CCPR-2E: Runoff Area=0.580 ac 96.55% Impervious Runoff Depth>3.01"
Tc=6.0 min CN=57/98 Runoff=2.34 cfs 0.146 af

Subcatchment CCPR-2F: Runoff Area=0.780 ac 66.67% Impervious Runoff Depth>2.08"
Tc=6.0 min CN=41/98 Runoff=2.17 cfs 0.135 af

Subcatchment CCPR-3A: Runoff Area=0.230 ac 21.74% Impervious Runoff Depth>1.86"
Tc=6.0 min CN=80/98 Runoff=0.62 cfs 0.036 af

Subcatchment CCPR-3B: Runoff Area=0.210 ac 19.05% Impervious Runoff Depth>0.59"
Tc=6.0 min CN=38/98 Runoff=0.17 cfs 0.010 af

Subcatchment CCPR-3C: Runoff Area=0.320 ac 62.50% Impervious Runoff Depth>1.95"
Tc=6.0 min CN=42/98 Runoff=0.83 cfs 0.052 af

Subcatchment CCPR-4A: Runoff Area=6.430 ac 0.78% Impervious Runoff Depth>0.52"
Flow Length=740' Tc=17.6 min CN=61/98 Runoff=2.83 cfs 0.279 af

Subcatchment CCPR-4B: Runoff Area=1.110 ac 91.89% Impervious Runoff Depth>2.85"
Tc=6.0 min CN=39/98 Runoff=4.25 cfs 0.264 af

Subcatchment CCPR-4C: Runoff Area=0.210 ac 100.00% Impervious Runoff Depth>3.11"
Tc=6.0 min CN=0/98 Runoff=0.88 cfs 0.054 af

Subcatchment CCPR-4E: Runoff Area=0.570 ac 31.58% Impervious Runoff Depth>1.32"
Tc=6.0 min CN=61/98 Runoff=0.95 cfs 0.063 af

Subcatchment MCPR-4A: Runoff Area=1.720 ac 0.00% Impervious Runoff Depth>1.13"
Flow Length=485' Tc=11.1 min CN=74/0 Runoff=2.58 cfs 0.162 af

Subcatchment MCPR-4B: Runoff Area=1.400 ac 0.00% Impervious Runoff Depth>0.91"
Flow Length=485' Tc=11.1 min CN=70/0 Runoff=1.63 cfs 0.106 af

Subcatchment PRCC-7A: Runoff Area=1.520 ac 0.00% Impervious Runoff Depth>0.02"
Flow Length=410' Tc=16.8 min CN=42/0 Runoff=0.00 cfs 0.003 af

Subcatchment PRCC-7B: Runoff Area=0.210 ac 0.00% Impervious Runoff Depth>0.46"
Tc=6.0 min CN=60/0 Runoff=0.10 cfs 0.008 af

Pond BASIN CC-1: Peak Elev=175.40' Storage=3,166 cf Inflow=3.29 cfs 0.205 af
Discarded=0.58 cfs 0.205 af Primary=0.00 cfs 0.000 af Outflow=0.58 cfs 0.205 af

Pond BASIN CC-2: Peak Elev=176.13' Storage=845 cf Inflow=2.38 cfs 0.169 af
Discarded=1.26 cfs 0.169 af Primary=0.00 cfs 0.000 af Outflow=1.26 cfs 0.169 af

Pond Basin CC-3: Peak Elev=175.89' Storage=3,167 cf Inflow=2.17 cfs 0.135 af
Discarded=0.20 cfs 0.132 af Primary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.132 af

Pond FB CC-1: Peak Elev=167.79' Storage=328 cf Inflow=0.28 cfs 0.017 af
Discarded=0.03 cfs 0.017 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.017 af

Pond FB CC-2: Peak Elev=169.60' Storage=658 cf Inflow=0.62 cfs 0.036 af
Discarded=0.07 cfs 0.036 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.036 af

Pond SIS CC-1: Peak Elev=171.37' Storage=3,330 cf Inflow=4.25 cfs 0.264 af
Discarded=0.79 cfs 0.263 af Primary=0.00 cfs 0.000 af Outflow=0.79 cfs 0.263 af

Pond SIS CC-2: Peak Elev=171.23' Storage=211 cf Inflow=0.83 cfs 0.052 af
Discarded=0.44 cfs 0.053 af Primary=0.00 cfs 0.000 af Outflow=0.44 cfs 0.053 af

Pond SIS CC-3: Peak Elev=175.23' Storage=1,260 cf Inflow=2.34 cfs 0.146 af
Discarded=0.72 cfs 0.145 af Primary=0.00 cfs 0.000 af Outflow=0.72 cfs 0.145 af

Pond SIS CC-4: Peak Elev=175.48' Storage=352 cf Inflow=0.88 cfs 0.054 af
Discarded=0.35 cfs 0.055 af Primary=0.00 cfs 0.000 af Outflow=0.35 cfs 0.055 af

Link POA-1:
Primary=0.00 cfs 0.000 af

Link POA-2: Inflow=1.72 cfs 0.124 af
Primary=1.72 cfs 0.124 af

Link POA-3: Inflow=0.17 cfs 0.010 af
Primary=0.17 cfs 0.010 af

Link POA-4: Inflow=4.68 cfs 0.441 af
Primary=4.68 cfs 0.441 af

Link POA-5:
Primary=0.00 cfs 0.000 af

Link POA-6:
Primary=0.00 cfs 0.000 af

Link POA-7: Inflow=0.10 cfs 0.011 af
Primary=0.10 cfs 0.011 af

Total Runoff Area = 18.310 ac Runoff Volume = 1.663 af Average Runoff Depth = 1.09"
77.50% Pervious = 14.190 ac 22.50% Impervious = 4.120 ac

Summary for Subcatchment CCPR-2A:

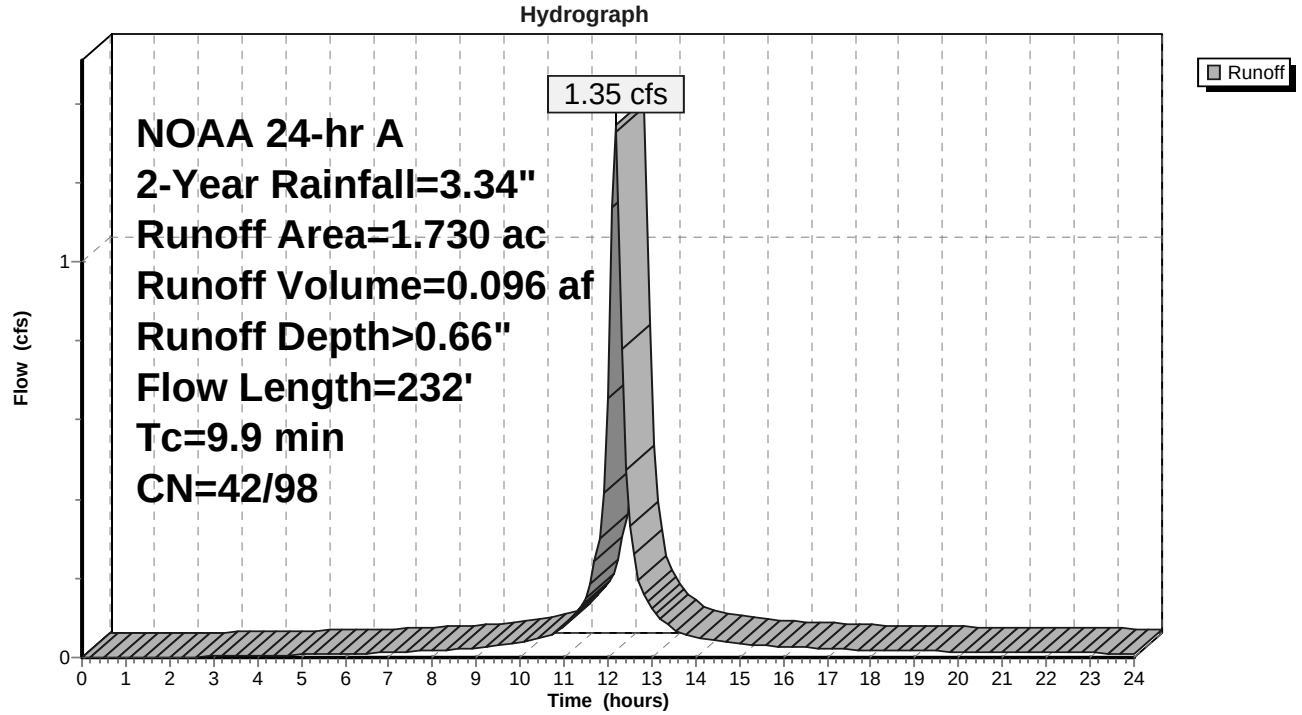
Runoff = 1.35 cfs @ 12.18 hrs, Volume= 0.096 af, Depth> 0.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
	0.600	30	Woods, Good, HSG A
*	0.220	77	Wetlands, HSG A
	0.170	30	Meadow, non-grazed, HSG A
	0.290	98	Paved parking, HSG A
	0.070	98	Paved parking, HSG D
	0.320	39	>75% Grass cover, Good, HSG A
	0.060	80	>75% Grass cover, Good, HSG D
	1.730	54	Weighted Average
	1.370	42	79.19% Pervious Area
	0.360	98	20.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	25	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
6.6	207	0.0110	0.52		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.9	232	Total			

Subcatchment CCPR-2A:



Summary for Subcatchment CCPR-2B:

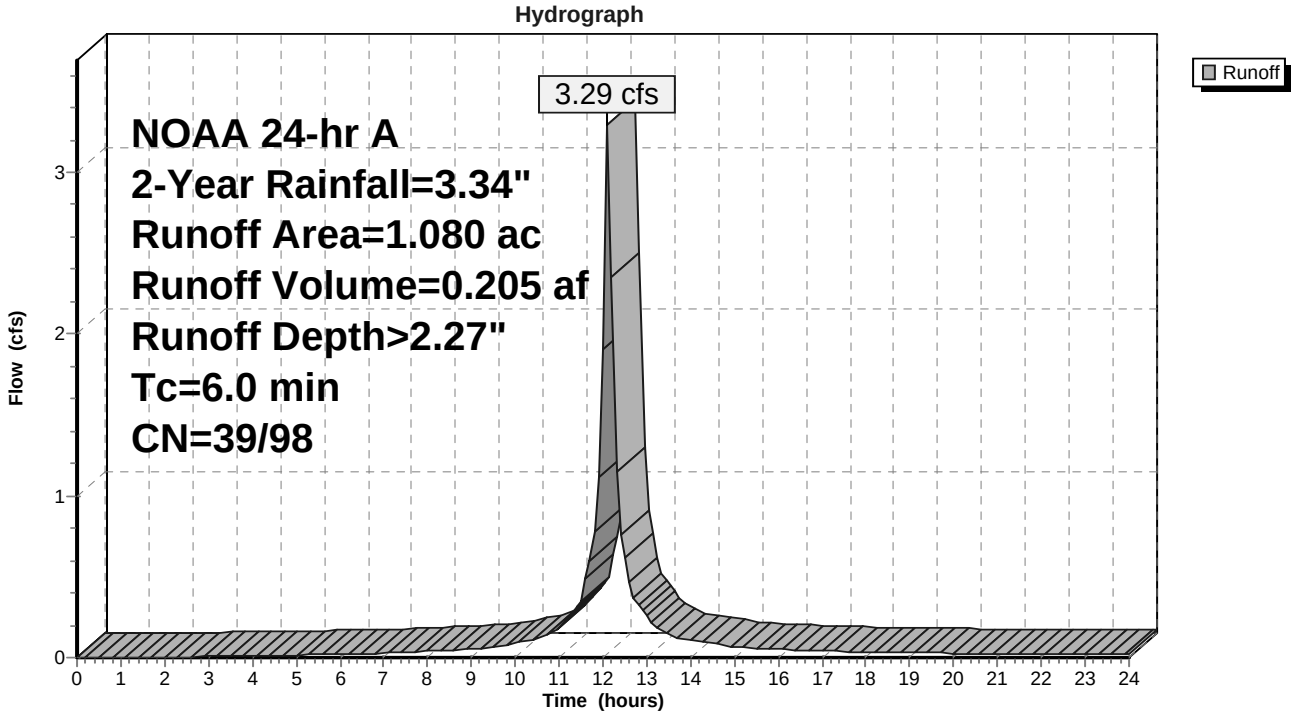
Runoff = 3.29 cfs @ 12.11 hrs, Volume= 0.205 af, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.450	98	Roofs, HSG A
0.290	39	>75% Grass cover, Good, HSG A
0.090	98	Water Surface, HSG A
0.250	98	Paved parking, HSG A
1.080	82	Weighted Average
0.290	39	26.85% Pervious Area
0.790	98	73.15% Impervious Area

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

Subcatchment CCPR-2B:



Summary for Subcatchment CCPR-2C:

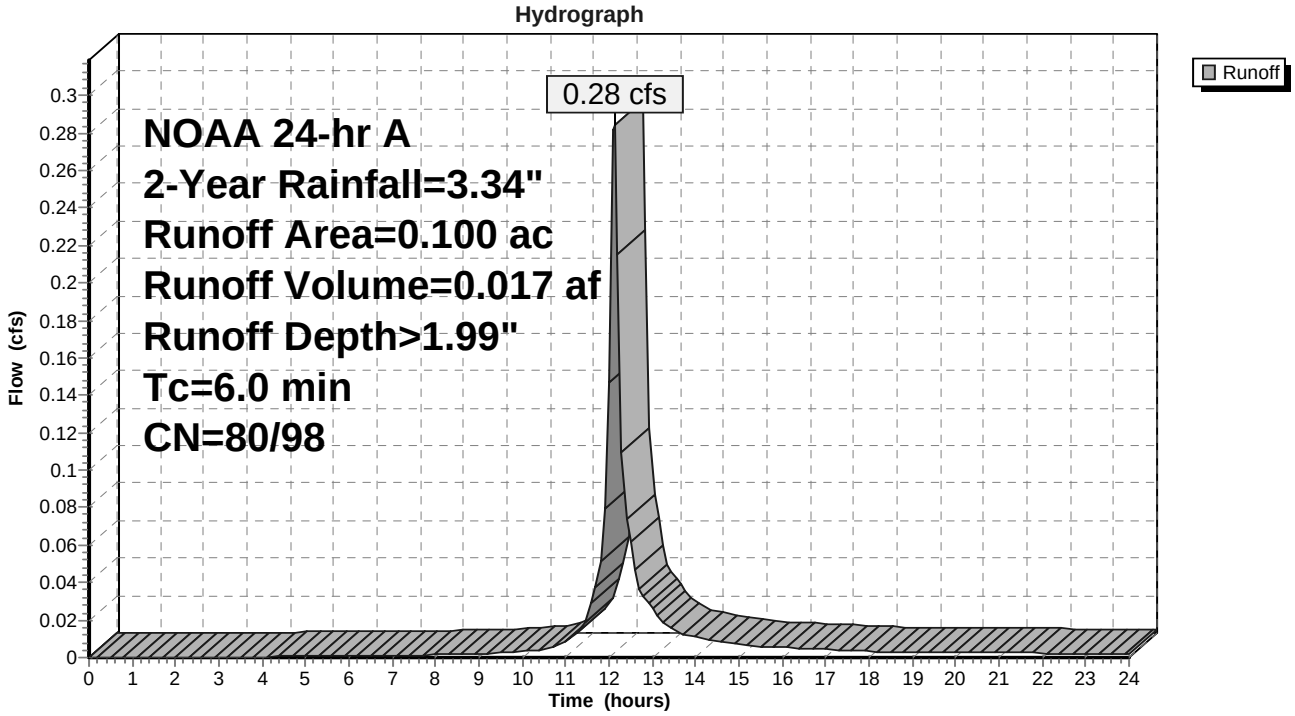
Runoff = 0.28 cfs @ 12.12 hrs, Volume= 0.017 af, Depth> 1.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.030	98	Paved parking, HSG D
0.070	80	>75% Grass cover, Good, HSG D
0.100	85	Weighted Average
0.070	80	70.00% Pervious Area
0.030	98	30.00% Impervious Area

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

Subcatchment CCPR-2C:



Summary for Subcatchment CCPR-2D:

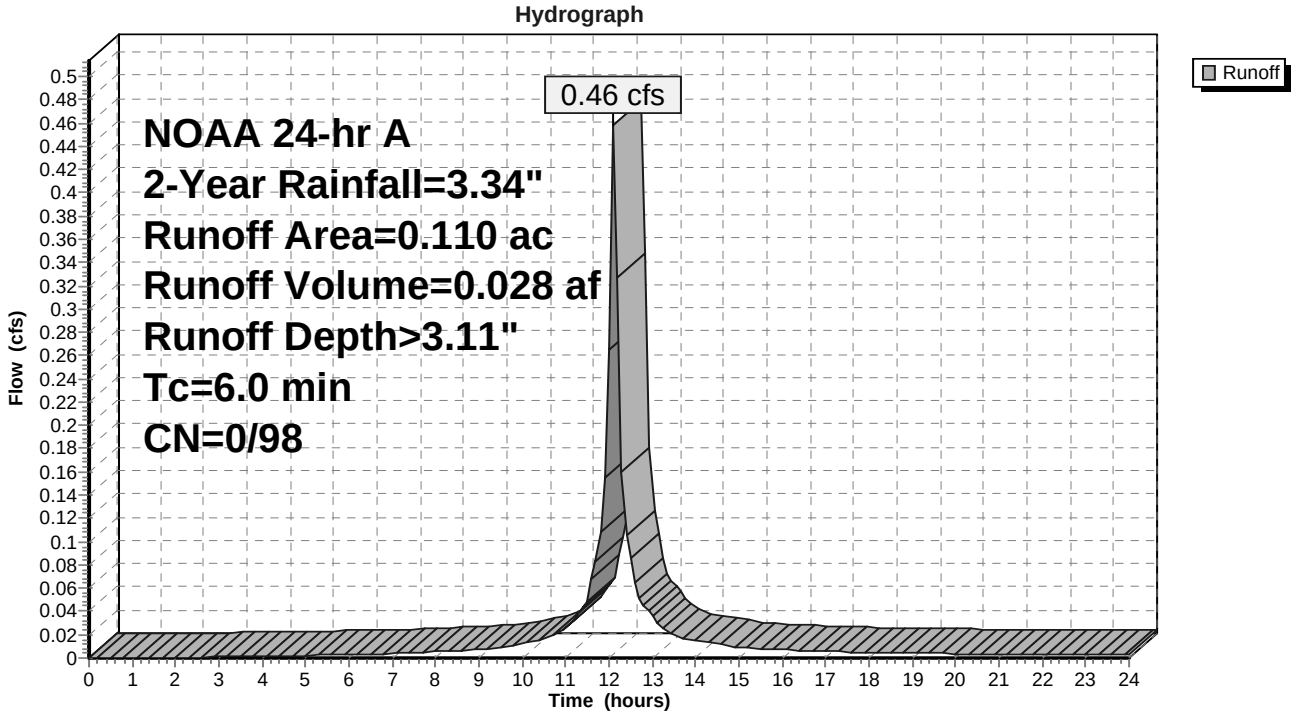
Runoff = 0.46 cfs @ 12.11 hrs, Volume= 0.028 af, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.100	98	Roofs, HSG A
0.010	98	Roofs, HSG D
0.110	98	Weighted Average
0.110	98	100.00% Impervious Area

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

Subcatchment CCPR-2D:



Summary for Subcatchment CCPR-2E:

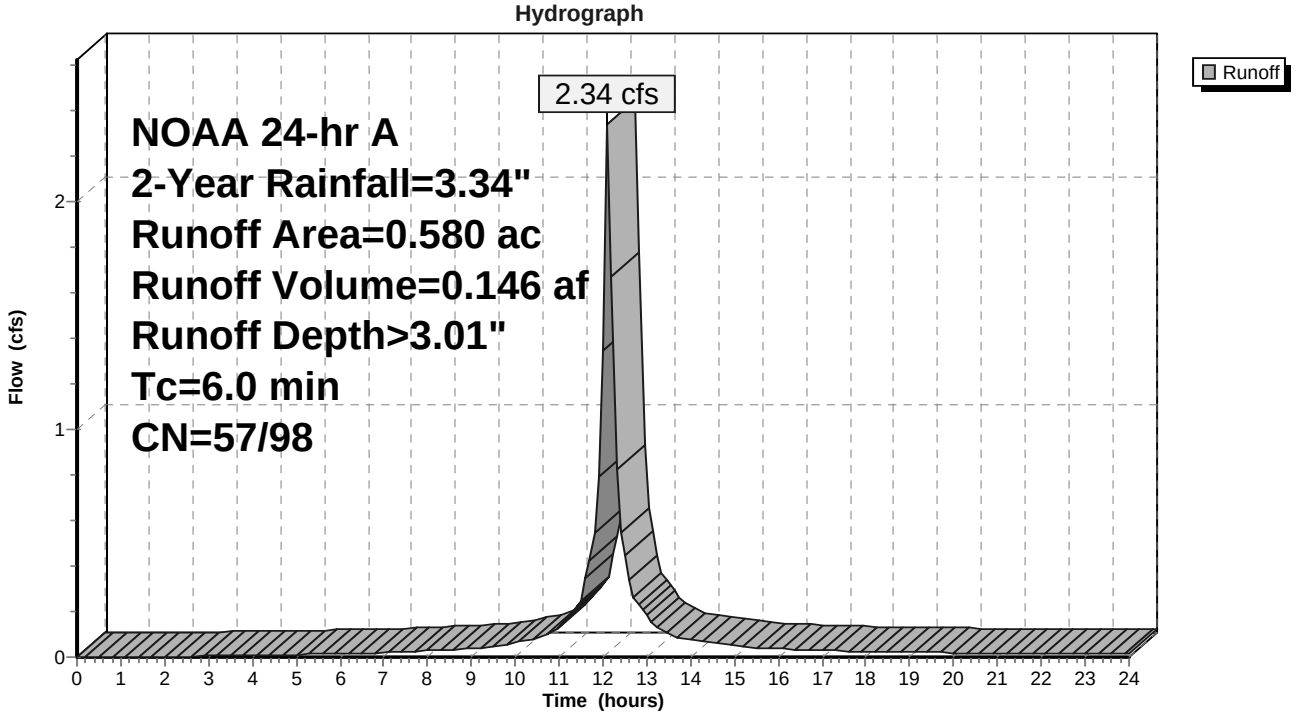
Runoff = 2.34 cfs @ 12.11 hrs, Volume= 0.146 af, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG A
0.170	98	Paved parking, HSG C
0.010	39	>75% Grass cover, Good, HSG A
0.010	74	>75% Grass cover, Good, HSG C
0.220	98	Roofs, HSG A
0.580	97	Weighted Average
0.020	57	3.45% Pervious Area
0.560	98	96.55% Impervious Area

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

Subcatchment CCPR-2E:



Summary for Subcatchment CCPR-2F:

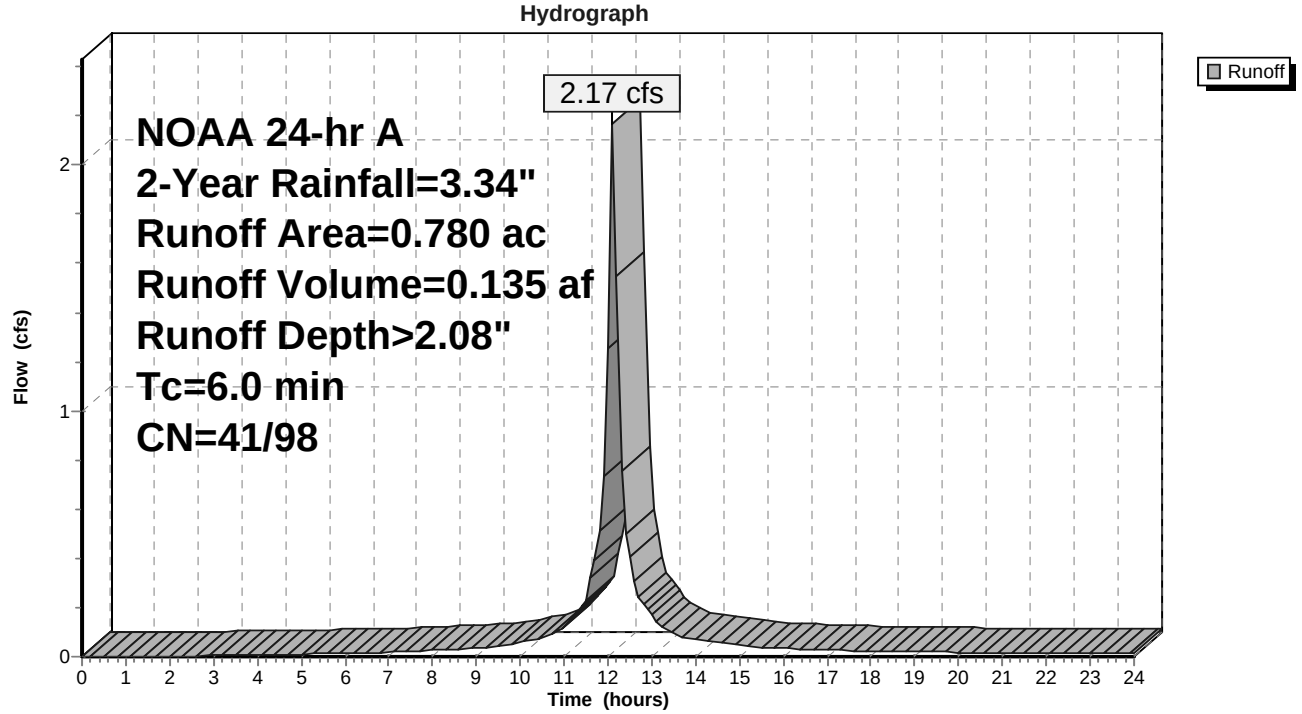
Runoff = 2.17 cfs @ 12.11 hrs, Volume= 0.135 af, Depth> 2.08"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.250	98	Paved parking, HSG A
0.150	98	Paved parking, HSG C
0.030	98	Roofs, HSG A
0.090	98	Water Surface, HSG A
0.130	39	>75% Grass cover, Good, HSG A
0.010	74	>75% Grass cover, Good, HSG C
0.100	30	Meadow, non-grazed, HSG A
0.020	96	Gravel surface, HSG A
0.780	79	Weighted Average
0.260	41	33.33% Pervious Area
0.520	98	66.67% Impervious Area

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

Subcatchment CCPR-2F:



Summary for Subcatchment CCPR-3A:

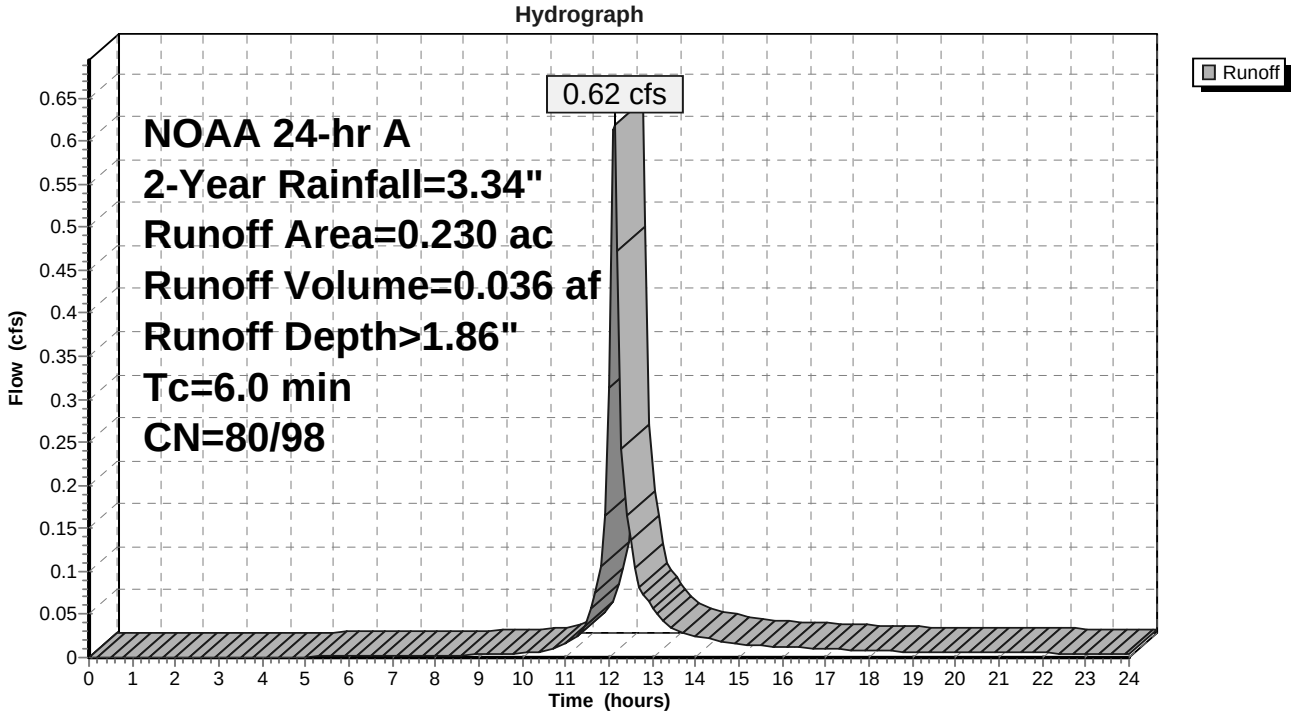
Runoff = 0.62 cfs @ 12.12 hrs, Volume= 0.036 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.180	80	>75% Grass cover, Good, HSG D
0.050	98	Paved parking, HSG D
0.230	84	Weighted Average
0.180	80	78.26% Pervious Area
0.050	98	21.74% Impervious Area

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

Subcatchment CCPR-3A:



Summary for Subcatchment CCPR-3B:

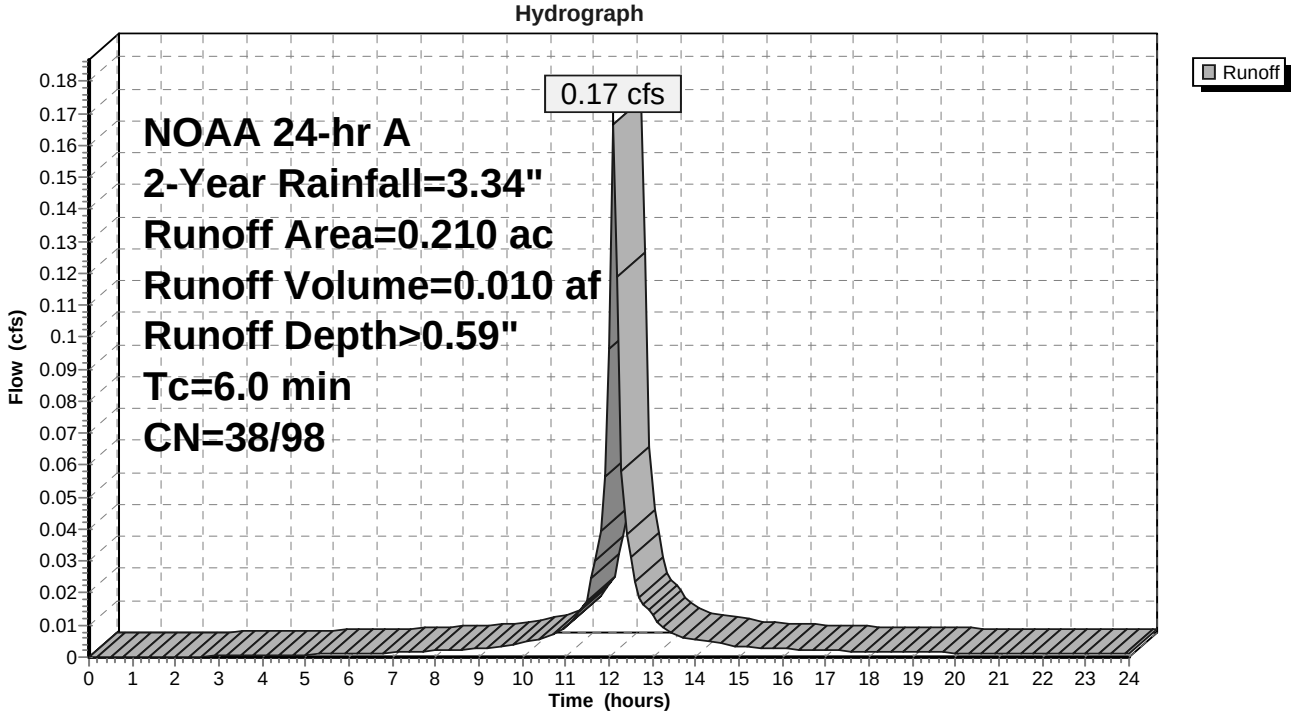
Runoff = 0.17 cfs @ 12.11 hrs, Volume= 0.010 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.100	39	>75% Grass cover, Good, HSG A
0.010	80	>75% Grass cover, Good, HSG D
0.060	30	Brush, Good, HSG A
0.030	98	Water Surface, HSG A
0.010	98	Paved parking, HSG A
0.210	50	Weighted Average
0.170	38	80.95% Pervious Area
0.040	98	19.05% Impervious Area

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

Subcatchment CCPR-3B:



Summary for Subcatchment CCPR-3C:

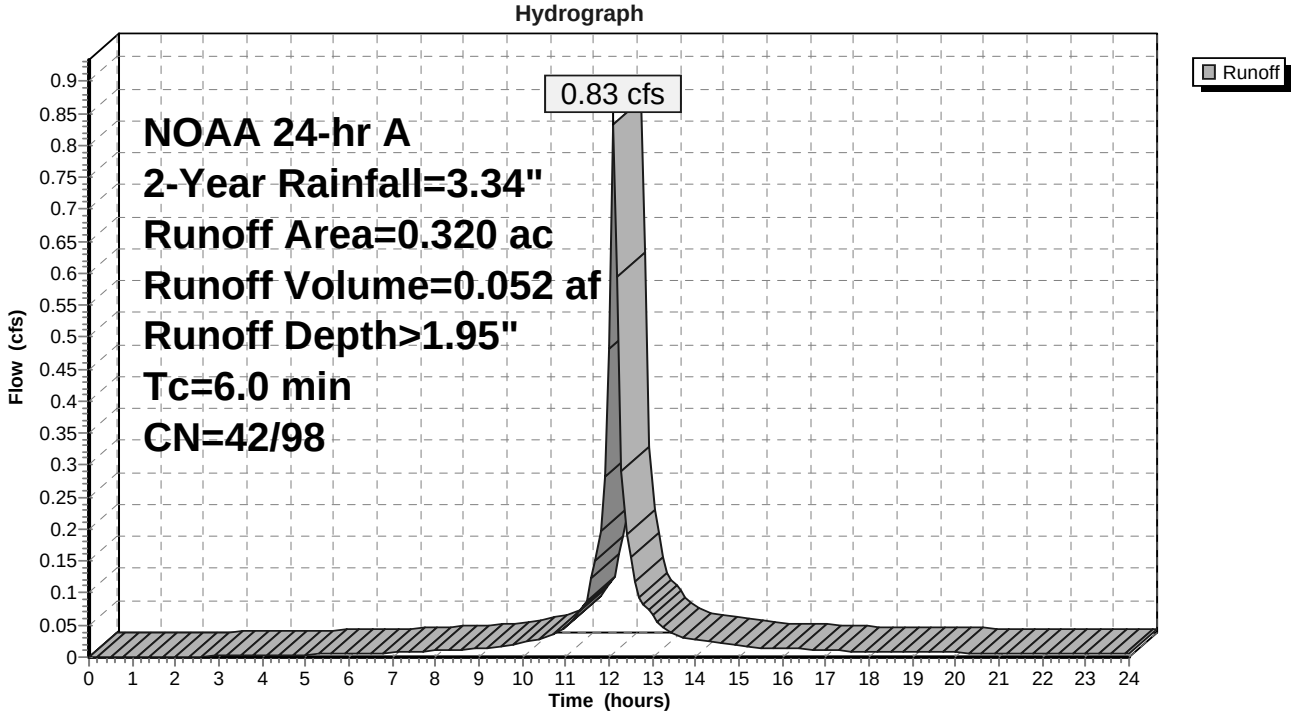
Runoff = 0.83 cfs @ 12.11 hrs, Volume= 0.052 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.030	98	Paved parking, HSG A
0.040	98	Roofs, HSG A
0.110	39	>75% Grass cover, Good, HSG A
0.010	80	>75% Grass cover, Good, HSG D
0.130	98	Water Surface, HSG A
0.320	77	Weighted Average
0.120	42	37.50% Pervious Area
0.200	98	62.50% Impervious Area

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

Subcatchment CCPR-3C:



Summary for Subcatchment CCPR-4A:

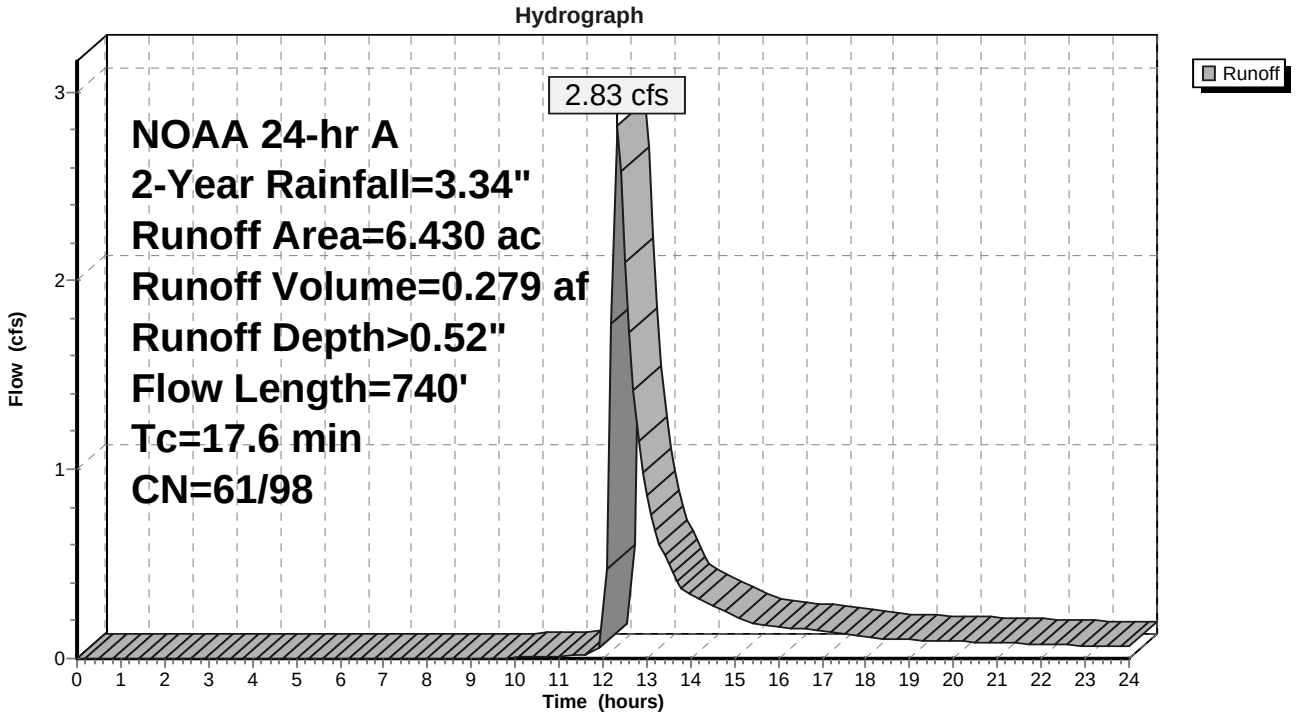
Runoff = 2.83 cfs @ 12.33 hrs, Volume= 0.279 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
	0.490	30	Brush, Good, HSG A
*	1.810	77	Wetlands, HSG A
	0.310	30	Meadow, non-grazed, HSG A
	0.330	30	Woods, Good, HSG A
	0.030	55	Woods, Good, HSG B
	0.070	48	Brush, Good, HSG B
	0.360	65	Brush, Good, HSG C
	0.980	70	Woods, Good, HSG C
	0.600	77	Woods, Good, HSG D
	0.550	73	Brush, Good, HSG D
	0.850	39	>75% Grass cover, Good, HSG A
	0.030	98	Water Surface, HSG A
	0.020	98	Roofs, HSG A
	6.430	61	Weighted Average
	6.380	61	99.22% Pervious Area
	0.050	98	0.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
11.9	690	0.0190	0.96		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.6	740	Total			

Subcatchment CCPR-4A:



Summary for Subcatchment CCPR-4B:

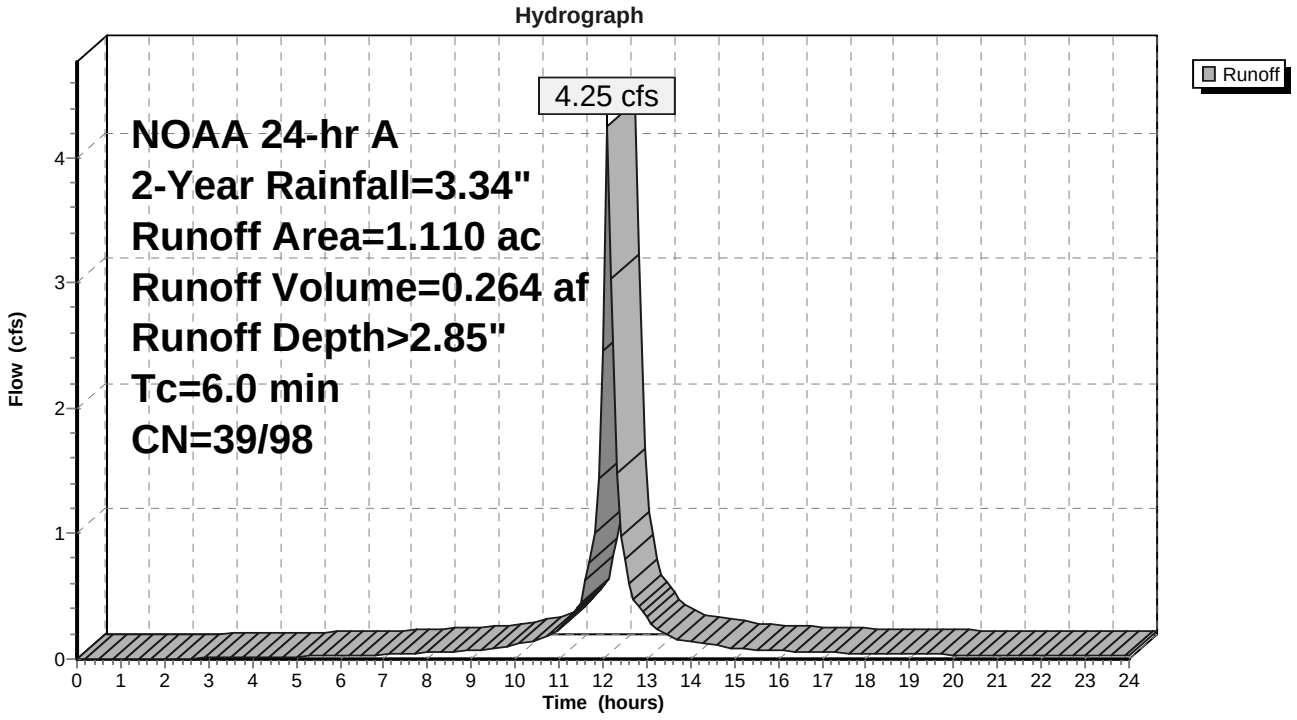
Runoff = 4.25 cfs @ 12.11 hrs, Volume= 0.264 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.610	98	Paved parking, HSG A
0.410	98	Roofs, HSG A
0.090	39	>75% Grass cover, Good, HSG A
1.110	93	Weighted Average
0.090	39	8.11% Pervious Area
1.020	98	91.89% Impervious Area

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

Subcatchment CCPR-4B:



Summary for Subcatchment CCPR-4C:

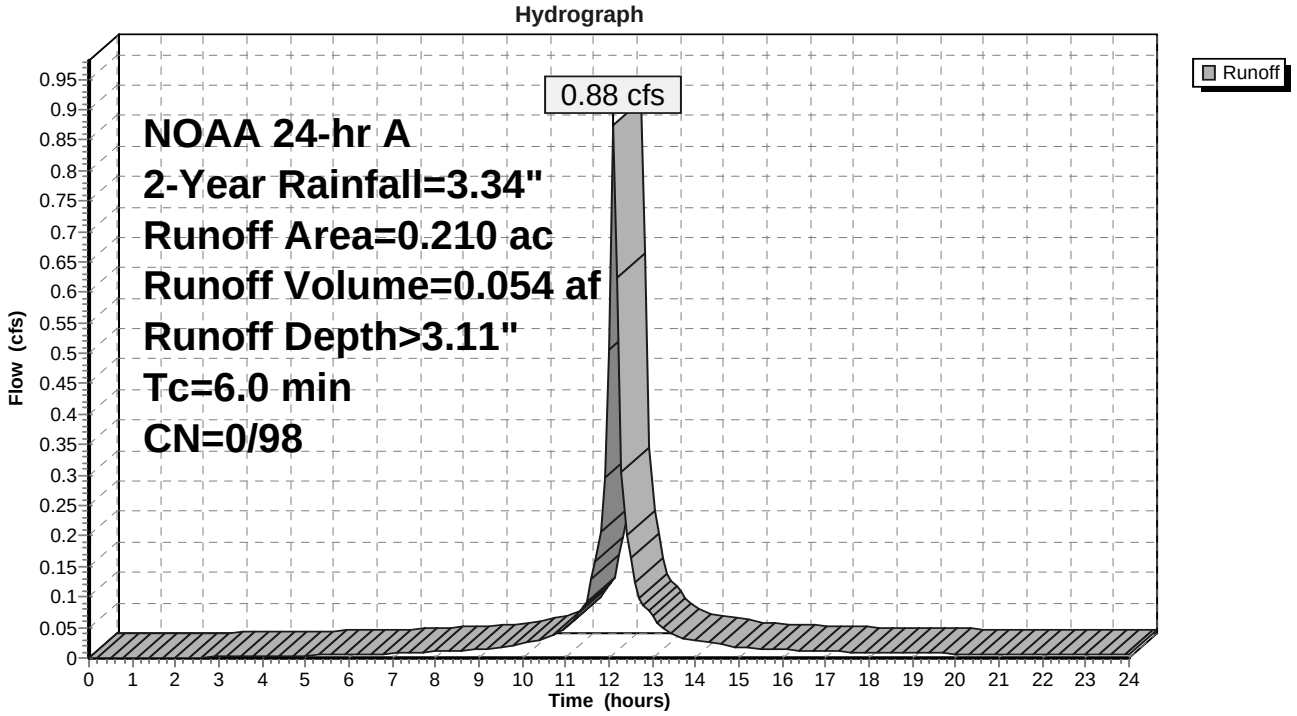
Runoff = 0.88 cfs @ 12.11 hrs, Volume= 0.054 af, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.210	98	Roofs, HSG A
0.210	98	100.00% Impervious Area

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

Subcatchment CCPR-4C:



Summary for Subcatchment CCPR-4E:

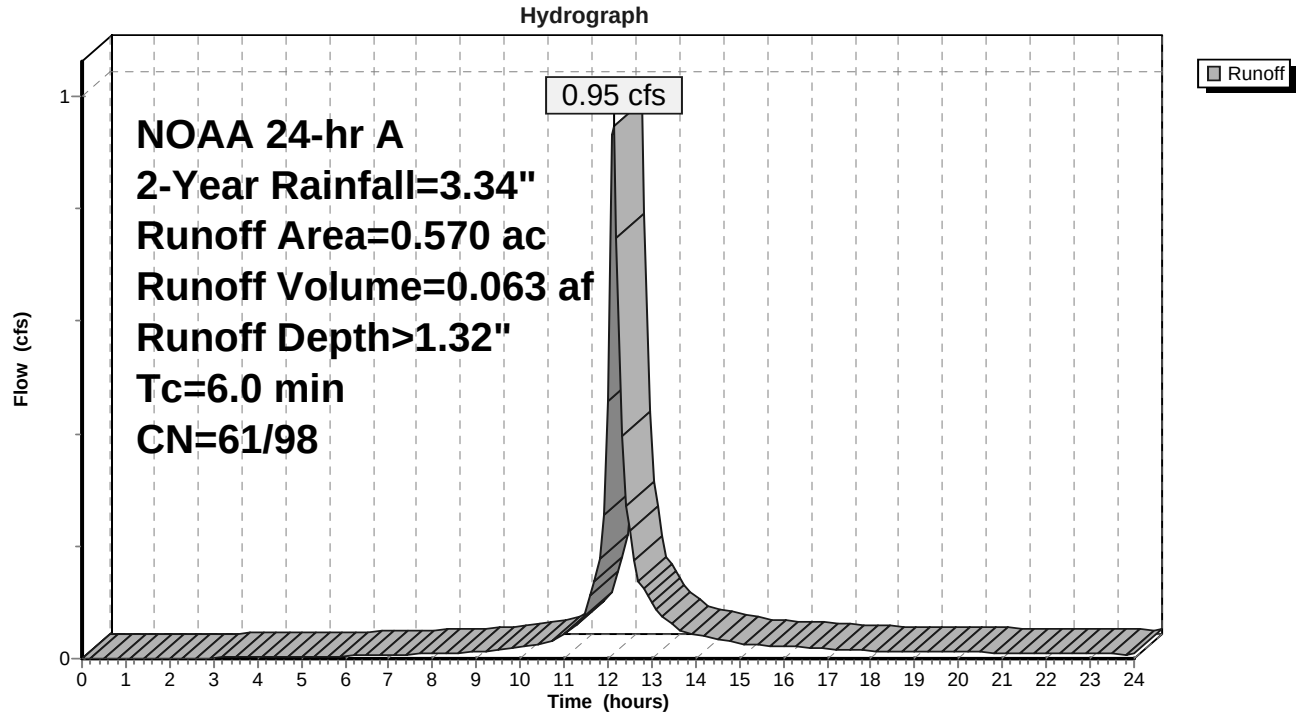
Runoff = 0.95 cfs @ 12.12 hrs, Volume= 0.063 af, Depth> 1.32"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.020	98	Roofs, HSG A
0.010	98	Roofs, HSG C
0.140	39	>75% Grass cover, Good, HSG A
0.250	74	>75% Grass cover, Good, HSG C
0.140	98	Water Surface, HSG A
0.010	98	Water Surface, HSG C
0.570	73	Weighted Average
0.390	61	68.42% Pervious Area
0.180	98	31.58% Impervious Area

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

Subcatchment CCPR-4E:



Summary for Subcatchment MCPR-4A:

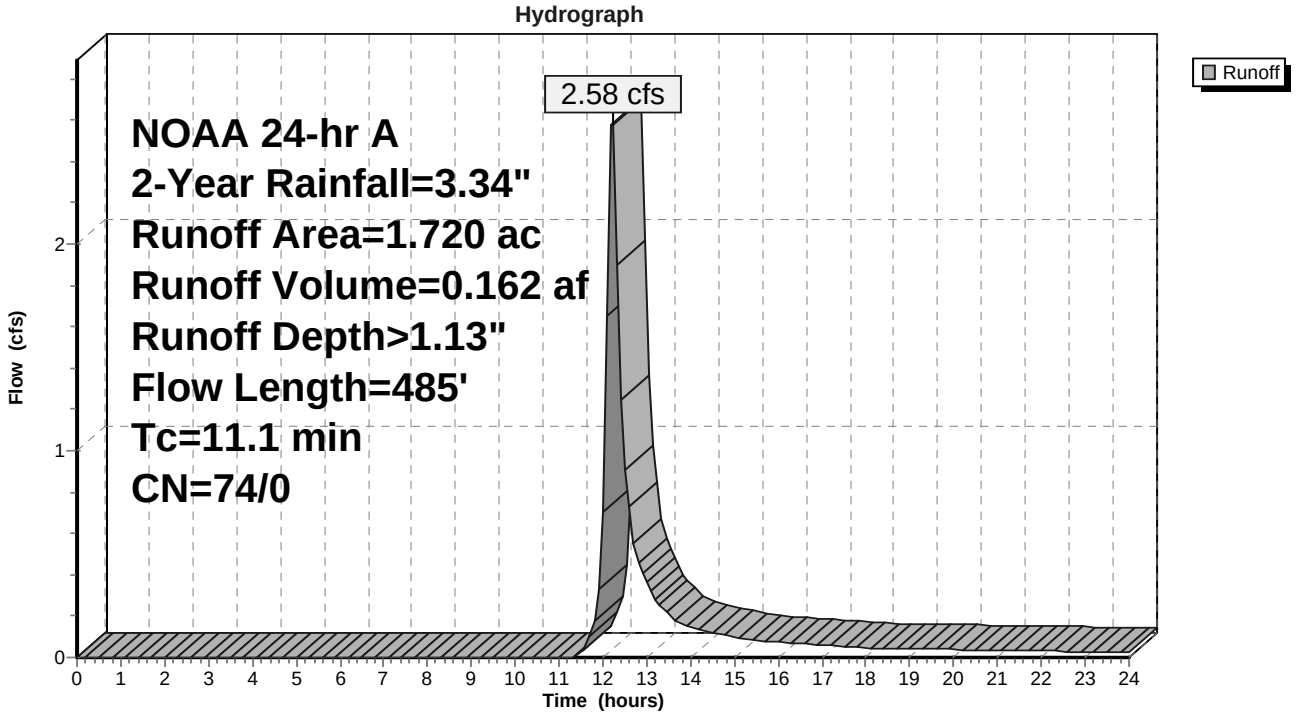
Runoff = 2.58 cfs @ 12.21 hrs, Volume= 0.162 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.870	70	Woods, Good, HSG C
0.040	96	Gravel surface, HSG C
0.100	71	Meadow, non-grazed, HSG C
0.410	77	Woods, Good, HSG D
0.290	78	Meadow, non-grazed, HSG D
0.010	96	Gravel surface, HSG D
1.720	74	Weighted Average
1.720	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.0	435	0.1290	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	485	Total			

Subcatchment MCPR-4A:



Summary for Subcatchment MCPR-4B:

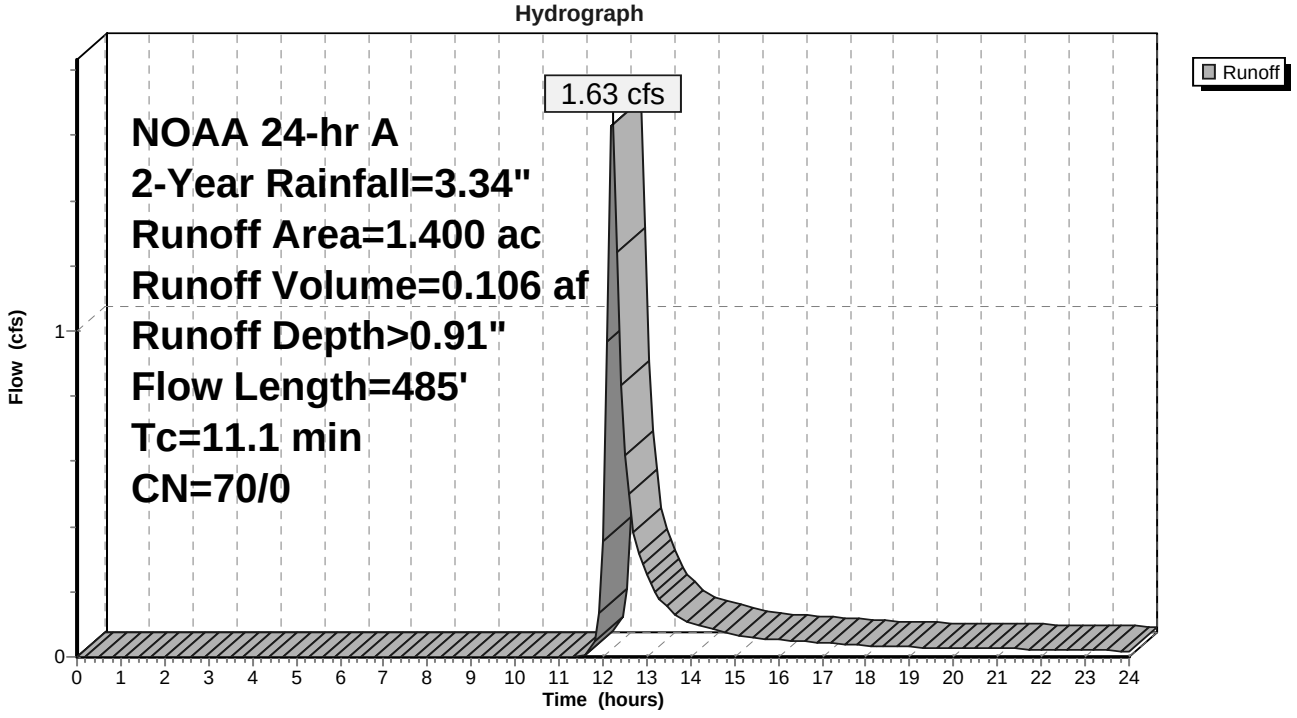
Runoff = 1.63 cfs @ 12.21 hrs, Volume= 0.106 af, Depth> 0.91"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
1.360	70	Woods, Good, HSG C
0.020	96	Gravel surface, HSG C
0.020	71	Meadow, non-grazed, HSG C
1.400	70	Weighted Average
1.400	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.0	435	0.1290	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	485	Total			

Subcatchment MCPR-4B:



Summary for Subcatchment PRCC-7A:

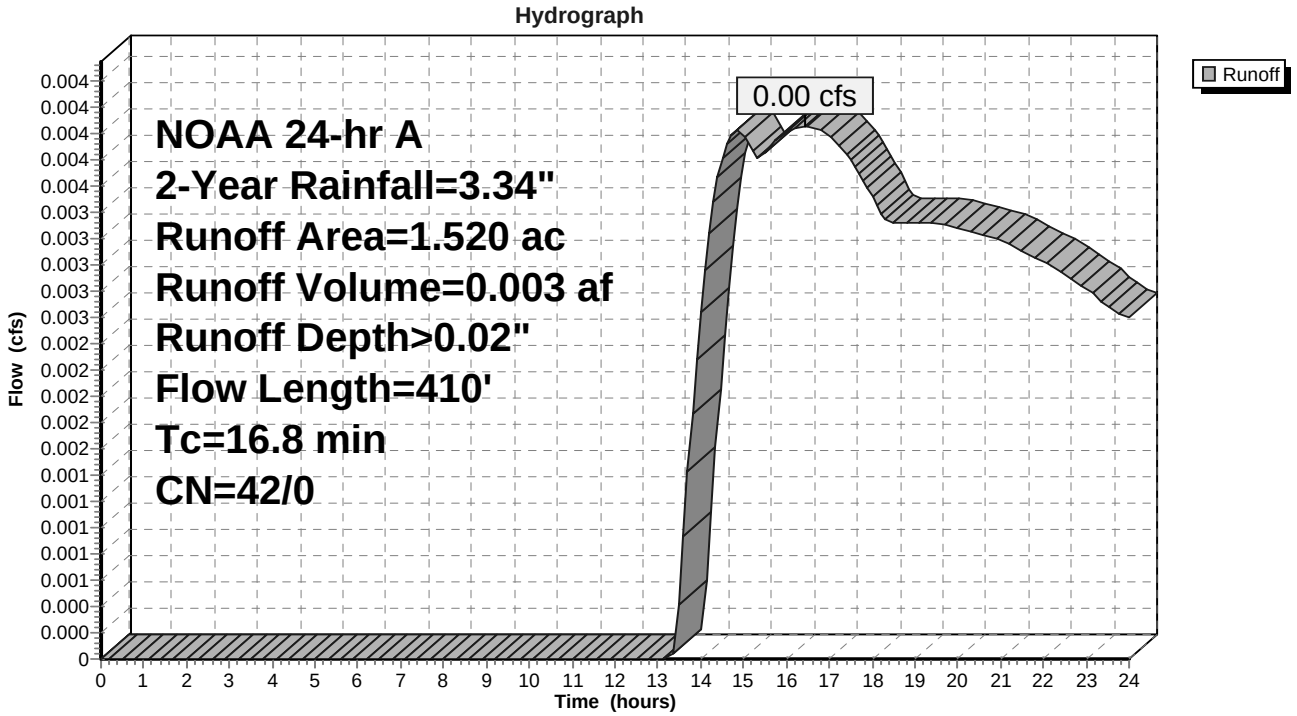
Runoff = 0.00 cfs @ 16.43 hrs, Volume= 0.003 af, Depth> 0.02"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
	0.050	96	Gravel surface, HSG A
	0.110	39	>75% Grass cover, Good, HSG A
	0.110	30	Meadow, non-grazed, HSG A
	0.950	30	Woods, Good, HSG A
*	0.300	77	Wetlands, HSG A
	1.520	42	Weighted Average
	1.520	42	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	25	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.16"
0.6	10	0.5000	0.27		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.16"
9.9	375	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.8	410	Total			

Subcatchment PRCC-7A:



Summary for Subcatchment PRCC-7B:

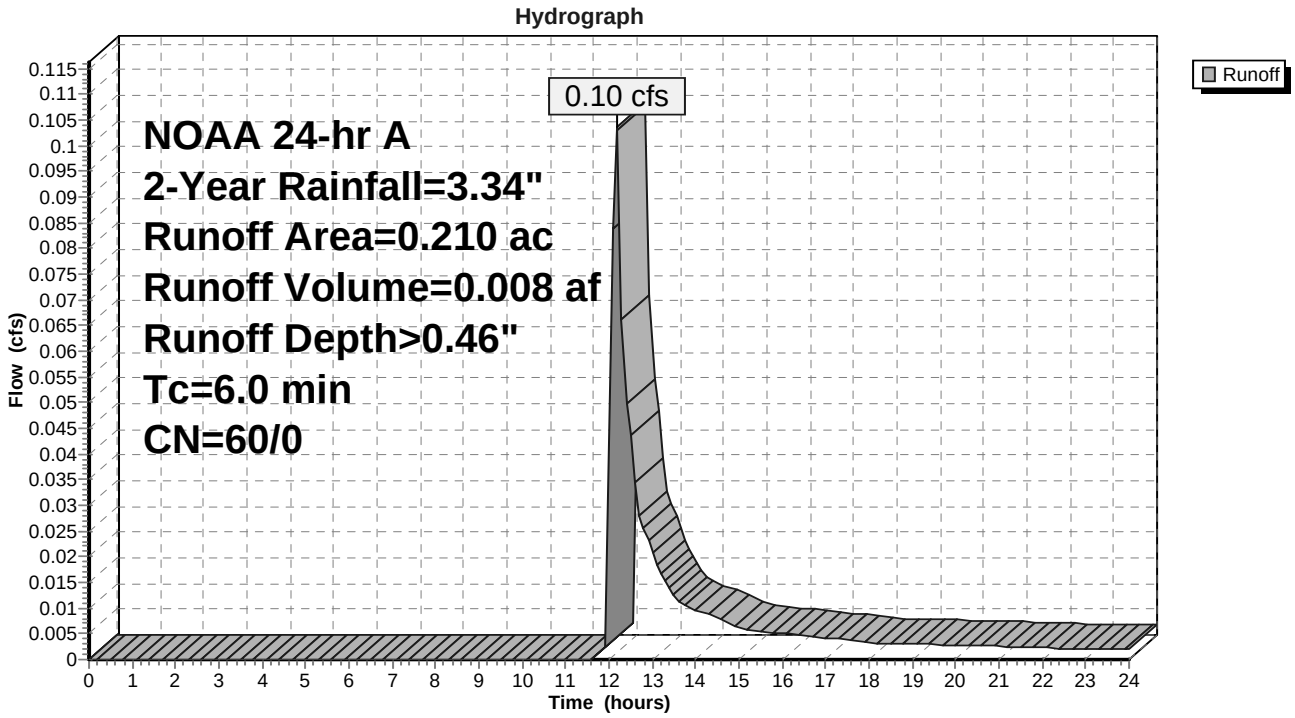
Runoff = 0.10 cfs @ 12.18 hrs, Volume= 0.008 af, Depth> 0.46"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.080	74	>75% Grass cover, Good, HSG C
0.060	30	Meadow, non-grazed, HSG A
0.070	71	Meadow, non-grazed, HSG C
0.210	60	Weighted Average
0.210	60	100.00% Pervious Area

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

Subcatchment PRCC-7B:



Summary for Pond BASIN CC-1:

Inflow Area = 1.080 ac, 73.15% Impervious, Inflow Depth > 2.27" for 2-Year event
Inflow = 3.29 cfs @ 12.11 hrs, Volume= 0.205 af
Outflow = 0.58 cfs @ 12.52 hrs, Volume= 0.205 af, Atten= 82%, Lag= 24.8 min
Discarded = 0.58 cfs @ 12.52 hrs, Volume= 0.205 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 175.40' @ 12.52 hrs Surf.Area= 3,054 sf Storage= 3,166 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 42.1 min (794.6 - 752.4)

Volume	Invert	Avail.Storage	Storage Description
#1	174.00'	9,568 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

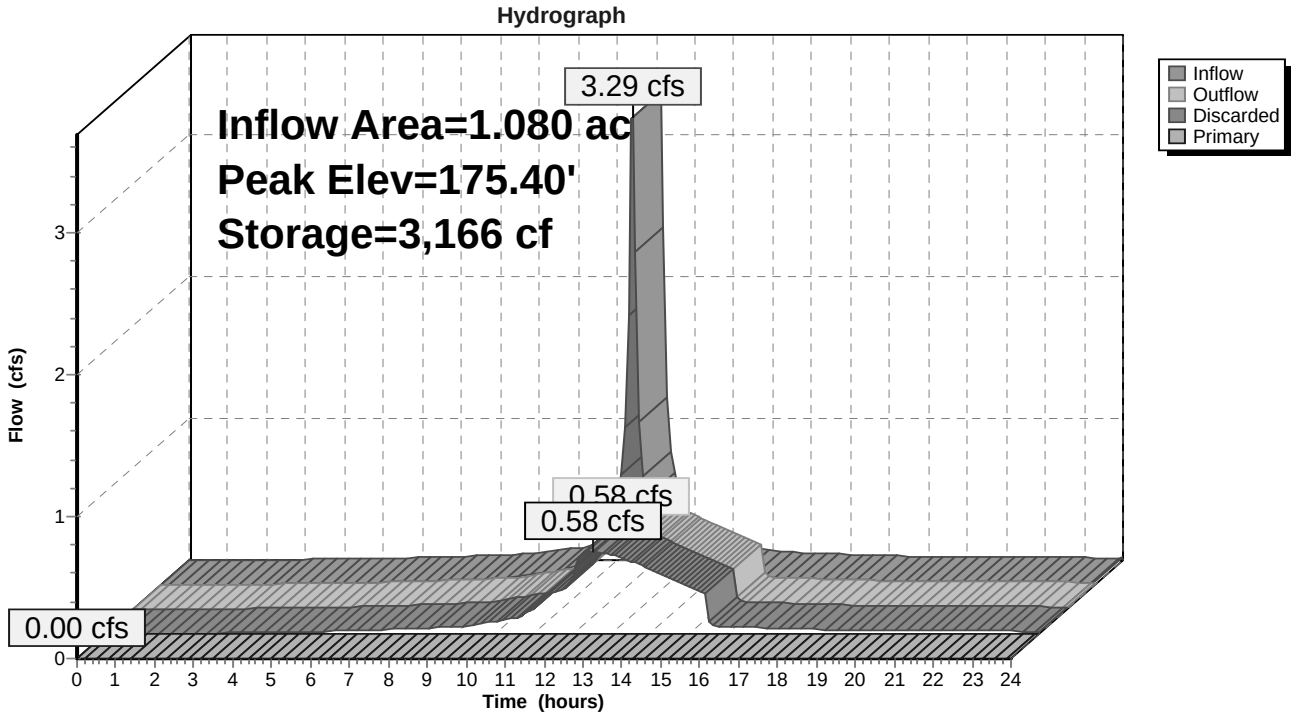
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.00	1,464	0	0
176.00	3,733	5,197	5,197
177.00	5,008	4,371	9,568

Device	Routing	Invert	Outlet Devices
#1	Primary	176.00'	**75.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	174.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.58 cfs @ 12.52 hrs HW=175.40' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.58 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BASIN CC-1:



Summary for Pond BASIN CC-2:

Inflow Area = 1.970 ac, 9.14% Impervious, Inflow Depth > 1.03" for 2-Year event
Inflow = 2.38 cfs @ 12.19 hrs, Volume= 0.169 af
Outflow = 1.26 cfs @ 12.38 hrs, Volume= 0.169 af, Atten= 47%, Lag= 11.3 min
Discarded = 1.26 cfs @ 12.38 hrs, Volume= 0.169 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 176.13' @ 12.38 hrs Surf.Area= 6,591 sf Storage= 845 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.0 min (825.2 - 821.2)

Volume	Invert	Avail.Storage	Storage Description
#1	176.00'	14,678 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

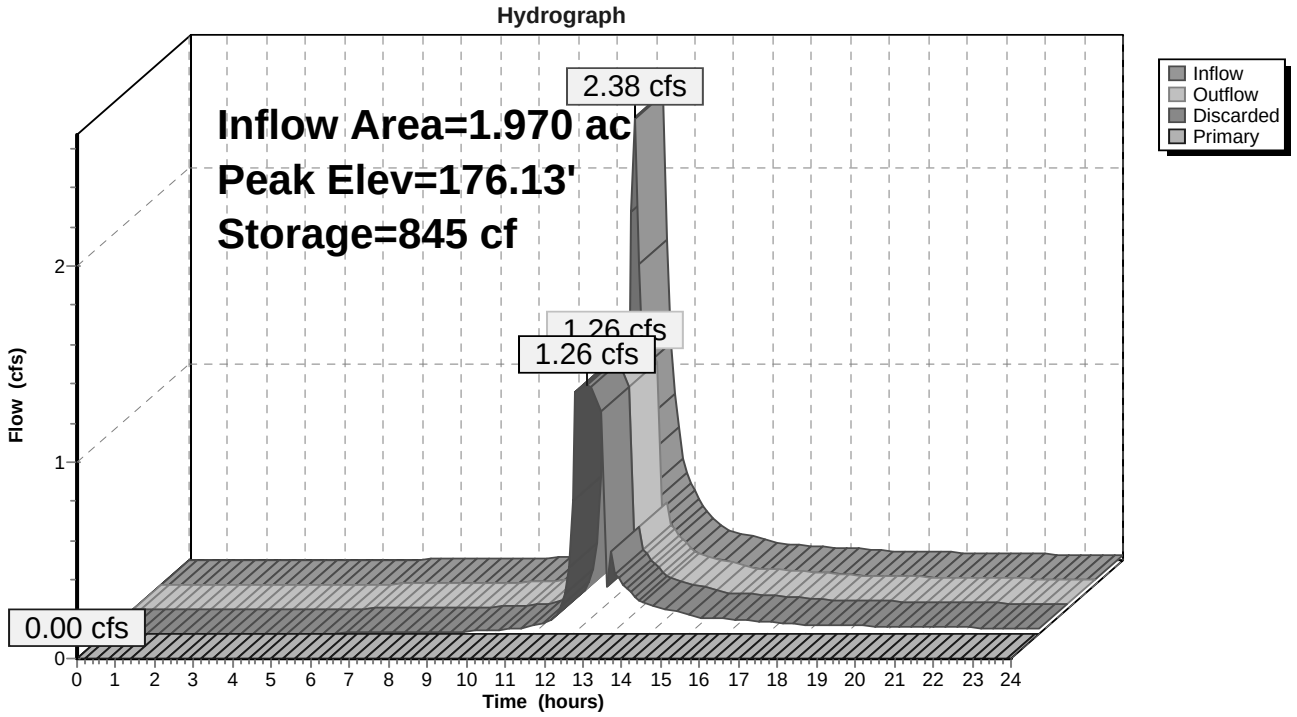
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
176.00	6,371	0	0
177.85	9,497	14,678	14,678

Device	Routing	Invert	Outlet Devices
#1	Primary	176.85'	**20.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	176.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.26 cfs @ 12.38 hrs HW=176.13' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 1.26 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=176.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BASIN CC-2:



Summary for Pond Basin CC-3:

Inflow Area = 0.780 ac, 66.67% Impervious, Inflow Depth > 2.08" for 2-Year event
Inflow = 2.17 cfs @ 12.11 hrs, Volume= 0.135 af
Outflow = 0.20 cfs @ 12.84 hrs, Volume= 0.132 af, Atten= 91%, Lag= 44.0 min
Discarded = 0.20 cfs @ 12.84 hrs, Volume= 0.132 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 175.89' @ 12.84 hrs Surf.Area= 3,656 sf Storage= 3,167 cf

Plug-Flow detention time= 184.7 min calculated for 0.131 af (97% of inflow)
Center-of-Mass det. time= 171.5 min (924.7 - 753.2)

Volume	Invert	Avail.Storage	Storage Description
#1	174.00'	13,726 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

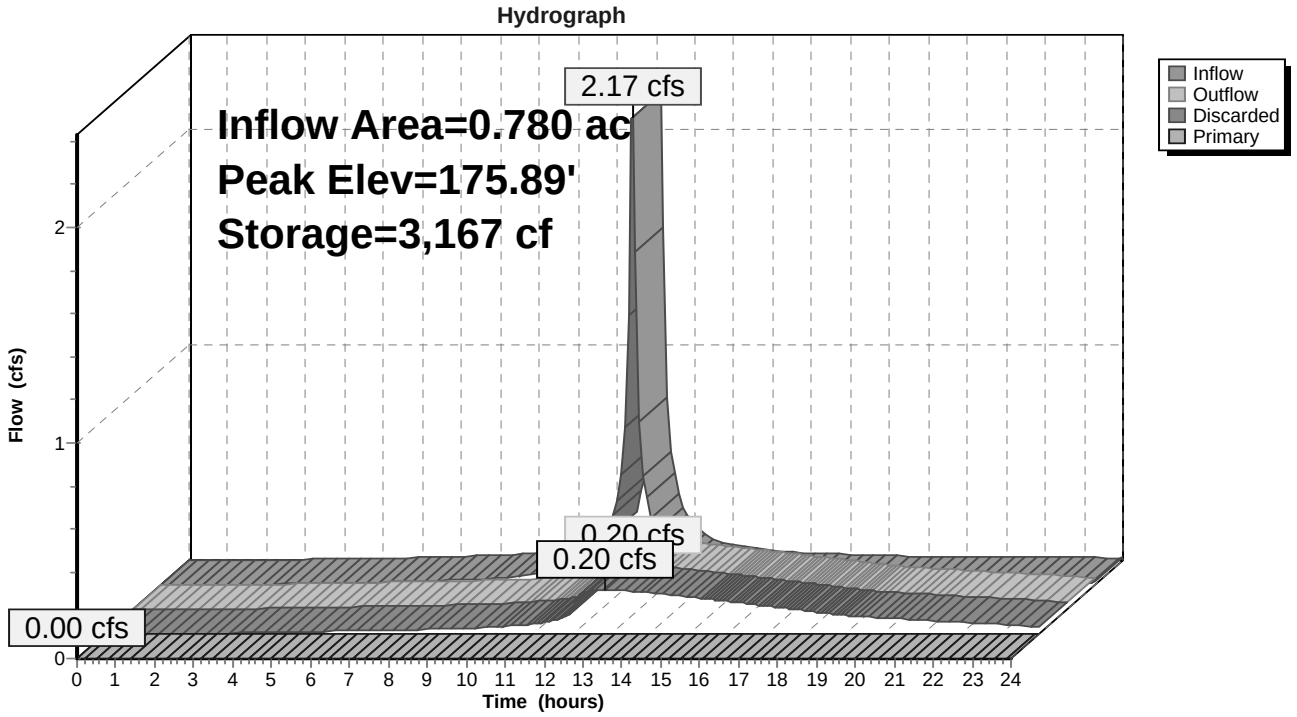
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.00	265	0	0
175.00	1,483	874	874
176.00	3,918	2,701	3,575
178.00	6,233	10,151	13,726

Device	Routing	Invert	Outlet Devices
#1	Primary	177.00'	**50.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	175.00'	**12.0" Round Culvert** L= 247.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 175.00' / 173.50' S= 0.0061 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	176.75'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Discarded	174.00'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.20 cfs @ 12.84 hrs HW=175.89' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Culvert** (Controls 0.00 cfs)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Basin CC-3:



Summary for Pond FB CC-1:

Inflow Area = 0.100 ac, 30.00% Impervious, Inflow Depth > 1.99" for 2-Year event
Inflow = 0.28 cfs @ 12.12 hrs, Volume= 0.017 af
Outflow = 0.03 cfs @ 12.92 hrs, Volume= 0.017 af, Atten= 90%, Lag= 48.4 min
Discarded = 0.03 cfs @ 12.92 hrs, Volume= 0.017 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 167.79' @ 12.92 hrs Surf.Area= 511 sf Storage= 328 cf

Plug-Flow detention time= 104.2 min calculated for 0.016 af (99% of inflow)
Center-of-Mass det. time= 103.0 min (889.0 - 786.0)

Volume	Invert	Avail.Storage	Storage Description
#1	167.00'	1,798 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

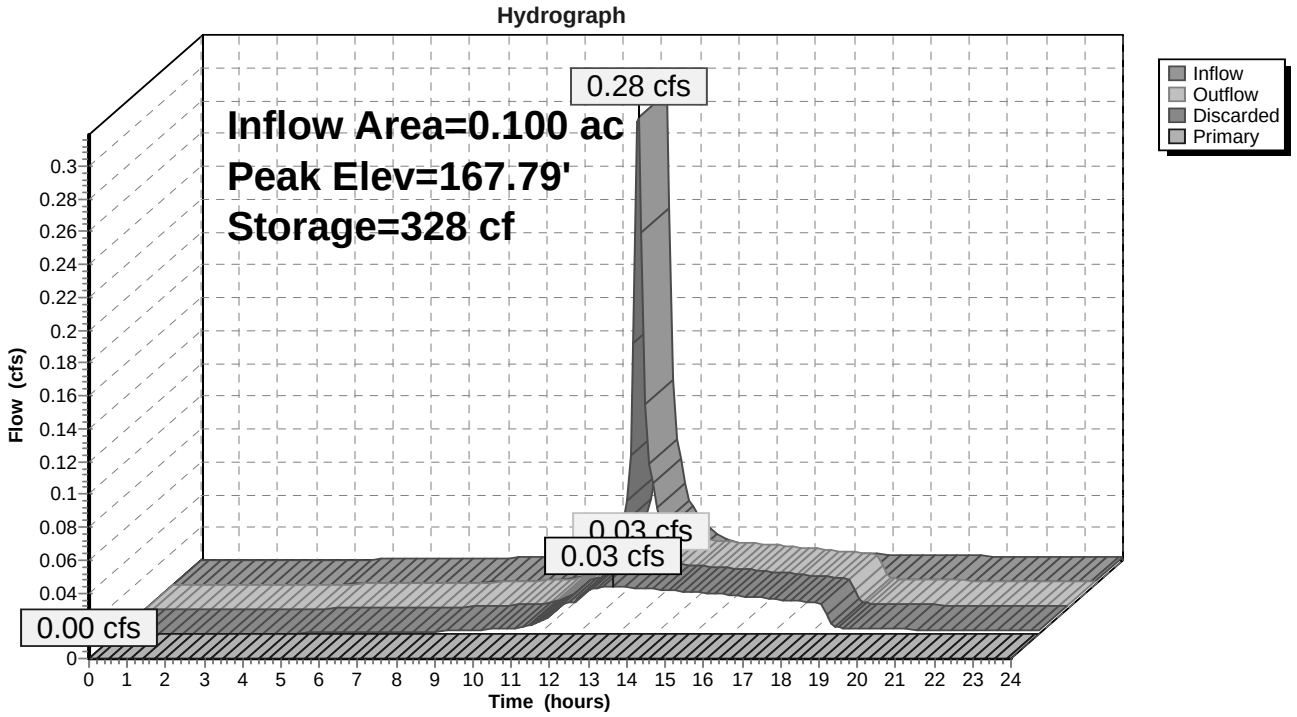
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
167.00	323	0	0
168.00	562	443	443
169.65	1,081	1,355	1,798

Device	Routing	Invert	Outlet Devices
#1	Primary	167.00'	**8.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 167.00' / 166.70' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	169.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	167.00'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.03 cfs @ 12.92 hrs HW=167.79' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=167.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond FB CC-1:


Hydrograph
Inflow
Outflow
Discarded
Primary
0.28 cfs
Inflow Area=0.100 ac
Peak Elev=167.79'
Storage=328 cf
0.03 cfs
0.03 cfs
0.00 cfs
Flow (cfs)
0 0.04 0.06 0.08 0.1 0.12 0.14 0.16 0.18 0.2 0.22 0.24 0.26 0.28 0.3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond FB CC-2:

Inflow Area = 0.230 ac, 21.74% Impervious, Inflow Depth > 1.86" for 2-Year event
Inflow = 0.62 cfs @ 12.12 hrs, Volume= 0.036 af
Outflow = 0.07 cfs @ 12.84 hrs, Volume= 0.036 af, Atten= 89%, Lag= 43.5 min
Discarded = 0.07 cfs @ 12.84 hrs, Volume= 0.036 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 169.60' @ 12.84 hrs Surf.Area= 1,251 sf Storage= 658 cf

Plug-Flow detention time= 80.5 min calculated for 0.035 af (100% of inflow)
Center-of-Mass det. time= 79.7 min (872.3 - 792.7)

Volume	Invert	Avail.Storage	Storage Description
#1	169.00'	1,997 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

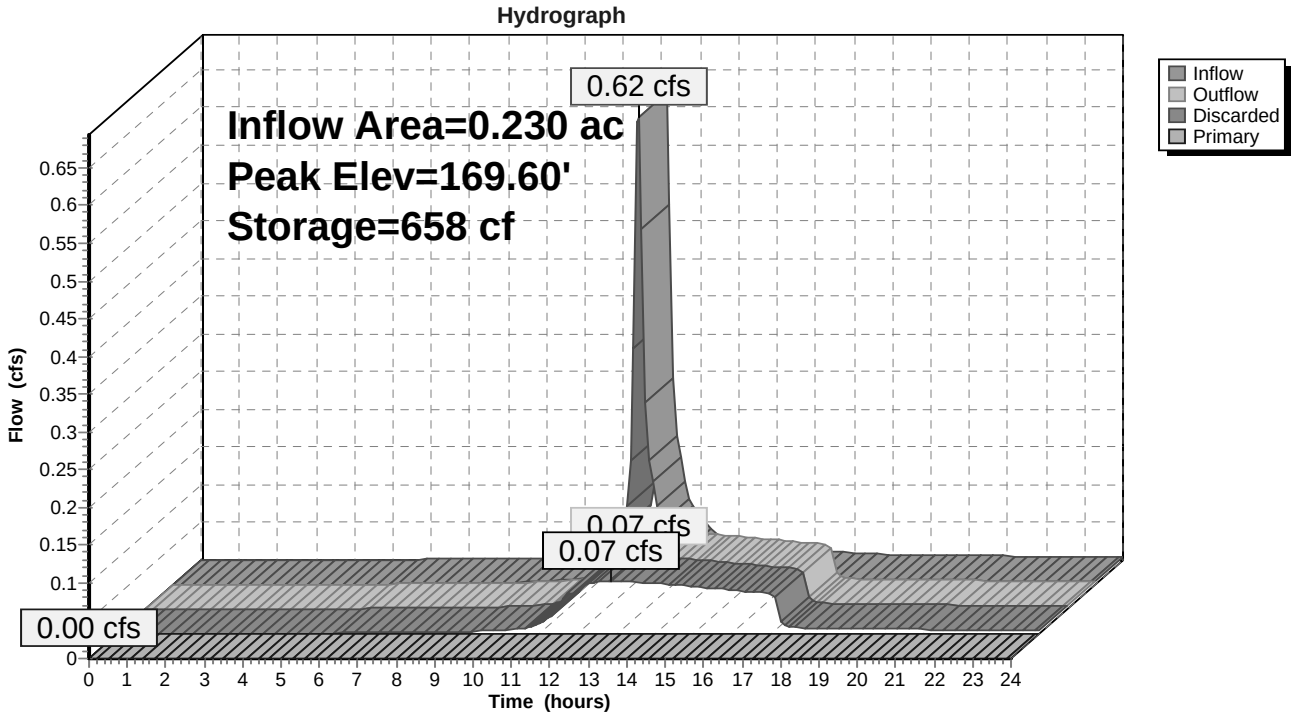
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.00	941	0	0
170.00	1,457	1,199	1,199
170.50	1,736	798	1,997

Device	Routing	Invert	Outlet Devices
#1	Primary	168.25'	**8.0" Round Culvert** L= 83.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 168.25' / 167.80' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	170.25'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	169.00'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.07 cfs @ 12.84 hrs HW=169.60' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=169.00' (Free Discharge)
└**1=Culvert** (Passes 0.00 cfs of 0.86 cfs potential flow)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond FB CC-2:


Hydrograph
Inflow
Outflow
Discarded
Primary
0.62 cfs
Inflow Area=0.230 ac
Peak Elev=169.60'
Storage=658 cf
0.07 cfs
0.07 cfs
0.00 cfs
Flow (cfs)
0 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond SIS CC-1:

Inflow Area = 1.110 ac, 91.89% Impervious, Inflow Depth > 2.85" for 2-Year event
Inflow = 4.25 cfs @ 12.11 hrs, Volume= 0.264 af
Outflow = 0.79 cfs @ 11.80 hrs, Volume= 0.263 af, Atten= 81%, Lag= 0.0 min
Discarded = 0.79 cfs @ 11.80 hrs, Volume= 0.263 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 171.37' @ 12.50 hrs Surf.Area= 4,140 sf Storage= 3,330 cf

Plug-Flow detention time= 28.1 min calculated for 0.262 af (99% of inflow)
Center-of-Mass det. time= 24.8 min (777.1 - 752.3)

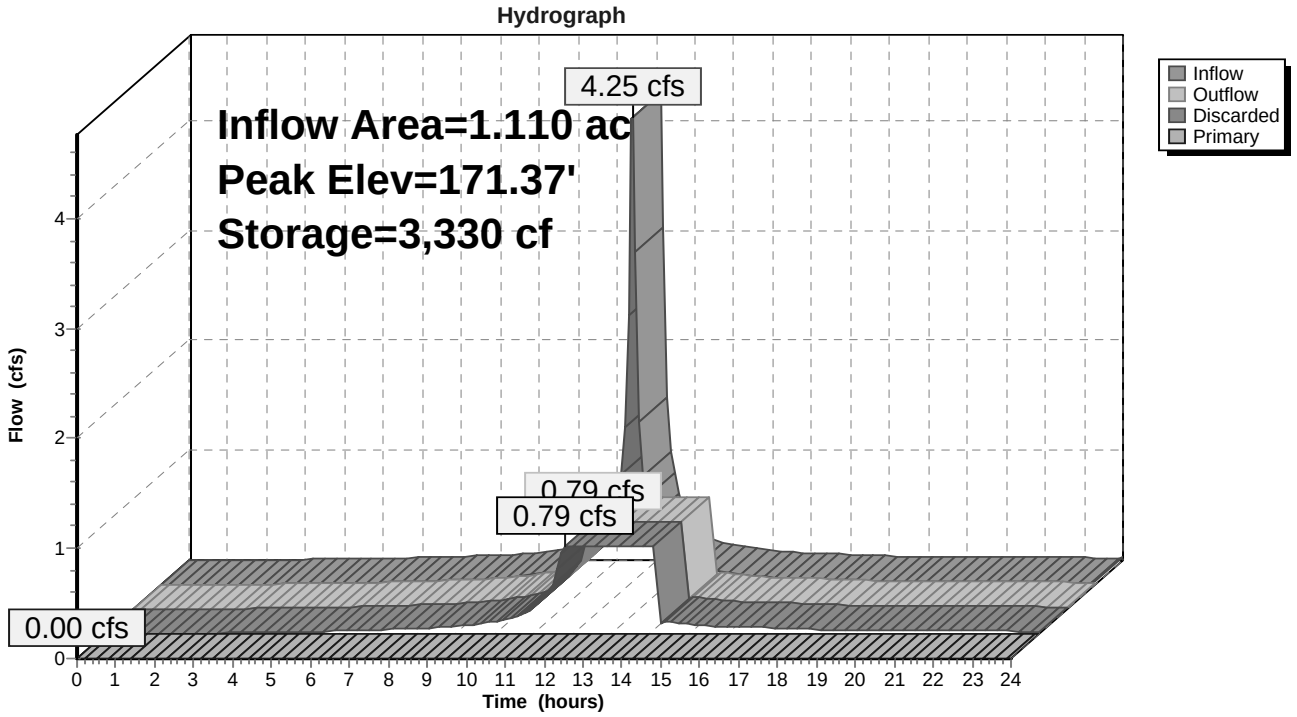
Volume	Invert	Avail.Storage	Storage Description
#1	170.00'	2,446 cf	**46.00'W x 90.00'L x 2.50'H Prismatoid** 10,350 cf Overall - 4,235 cf Embedded = 6,115 cf x 40.0% Voids
#2	170.50'	3,958 cf	**24.0" Round Pipe Storage** x 15 Inside #1 L= 84.0'
#3	170.50'	276 cf	**24.0" Round Pipe Storage** x 2 Inside #1 L= 44.0'
#4	172.50'	6 cf	**2.00'W x 2.00'L x 1.50'H Prismatoid**-Impervious
		6,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	172.50'	**12.0" Round Culvert** L= 14.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 172.50' / 169.00' S= 0.2465 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	170.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.79 cfs @ 11.80 hrs HW=170.06' (Free Discharge)
↑└**2=Exfiltration** (Exfiltration Controls 0.79 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=170.00' (Free Discharge)
↑└**1=Culvert** (Controls 0.00 cfs)

Pond SIS CC-1:


Hydrograph
Inflow Area=1.110 ac
Peak Elev=171.37'
Storage=3,330 cf
4.25 cfs
0.79 cfs
0.79 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 1 2 3 4

Summary for Pond SIS CC-2:

Inflow Area = 0.320 ac, 62.50% Impervious, Inflow Depth > 1.95" for 2-Year event
Inflow = 0.83 cfs @ 12.11 hrs, Volume= 0.052 af
Outflow = 0.44 cfs @ 12.00 hrs, Volume= 0.053 af, Atten= 47%, Lag= 0.0 min
Discarded = 0.44 cfs @ 12.00 hrs, Volume= 0.053 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 171.23' @ 12.25 hrs Surf.Area= 2,294 sf Storage= 211 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.2 min (756.1 - 753.9)

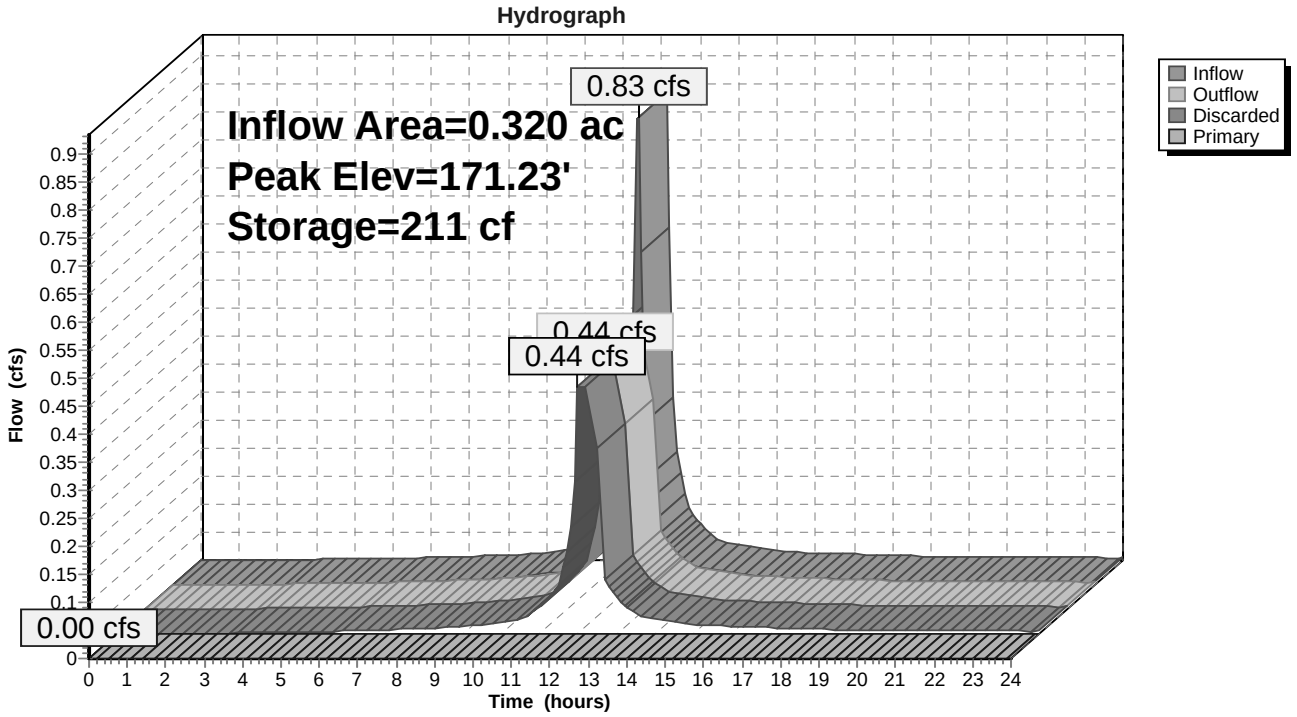
Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	1,026 cf	**37.00'W x 62.00'L x 1.50'H Prismatoid** 3,441 cf Overall - 875 cf Embedded = 2,566 cf x 40.0% Voids
#2	171.50'	820 cf	**12.0" Round Pipe Storage** x 18 Inside #1 L= 58.0'
#3	171.50'	55 cf	**12.0" Round Pipe Storage** x 2 Inside #1 L= 35.0'
		1,901 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	172.50'	**12.0" Round Culvert** L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 172.50' / 171.50' S= 0.0526 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	171.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.44 cfs @ 12.00 hrs HW=171.03' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=171.00' (Free Discharge)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond SIS CC-2:


Hydrograph
Inflow
Outflow
Discarded
Primary
0.83 cfs
Inflow Area=0.320 ac
Peak Elev=171.23'
Storage=211 cf
0.44 cfs
0.44 cfs
0.00 cfs
Flow (cfs)
Time (hours)

Summary for Pond SIS CC-3:

Inflow Area = 0.580 ac, 96.55% Impervious, Inflow Depth > 3.01" for 2-Year event
Inflow = 2.34 cfs @ 12.11 hrs, Volume= 0.146 af
Outflow = 0.72 cfs @ 11.90 hrs, Volume= 0.145 af, Atten= 69%, Lag= 0.0 min
Discarded = 0.72 cfs @ 11.90 hrs, Volume= 0.145 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 175.23' @ 12.34 hrs Surf.Area= 3,780 sf Storage= 1,260 cf

Plug-Flow detention time= 9.3 min calculated for 0.145 af (100% of inflow)
Center-of-Mass det. time= 9.1 min (761.9 - 752.8)

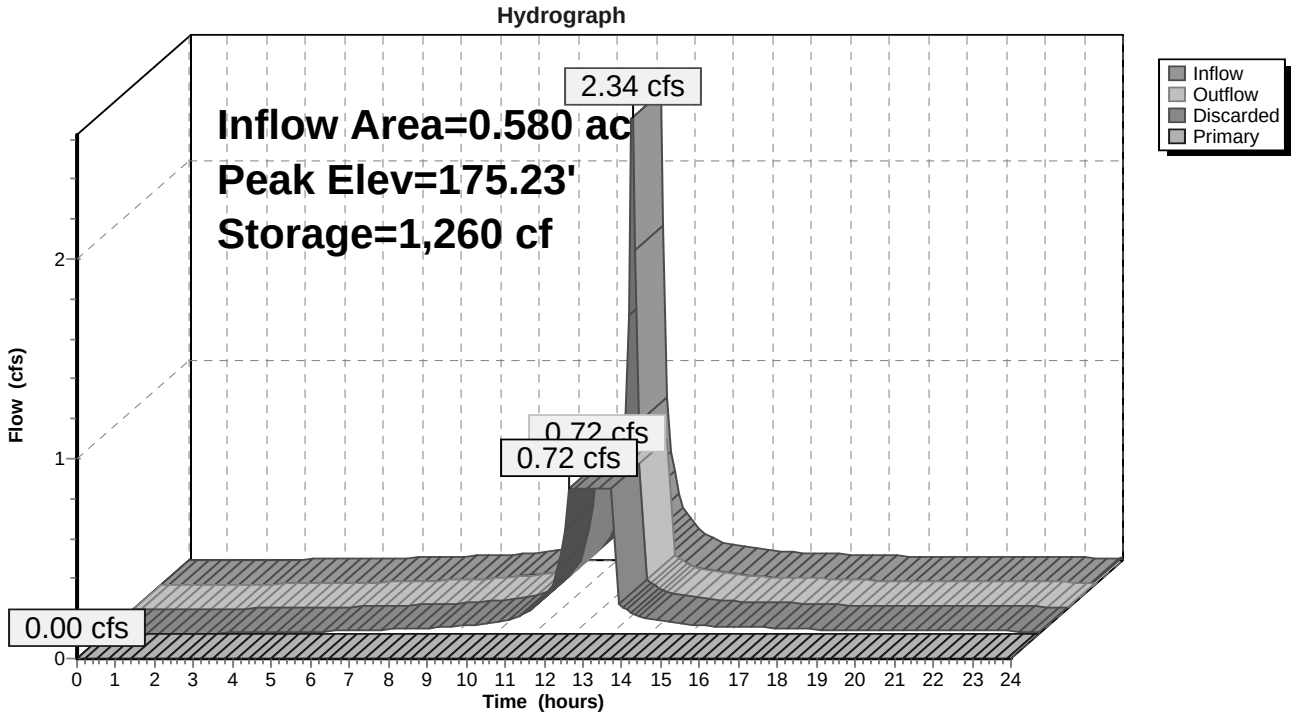
Volume	Invert	Avail.Storage	Storage Description
#1	174.50'	2,008 cf	**21.00'W x 180.00'L x 2.00'H Prismatoid** 7,560 cf Overall - 2,541 cf Embedded = 5,019 cf x 40.0% Voids
#2	175.00'	2,474 cf	**18.0" Round Pipe Storage** x 8 Inside #1 L= 175.0'
#3	175.00'	67 cf	**18.0" Round Pipe Storage** x 2 Inside #1 L= 19.0'
#4	176.50'	10 cf	**2.00'W x 2.00'L x 2.50'H Prismatoid**
		4,559 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	176.50'	**12.0" Round Culvert** L= 36.3' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 176.50' / 174.00' S= 0.0689 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	174.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.72 cfs @ 11.90 hrs HW=174.55' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=174.50' (Free Discharge)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond SIS CC-3:


Hydrograph
Inflow
Outflow
Discarded
Primary
2.34 cfs
Inflow Area=0.580 ac
Peak Elev=175.23'
Storage=1,260 cf
0.72 cfs
0.72 cfs
0.00 cfs
Flow (cfs)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond SIS CC-4:

Inflow Area = 0.210 ac,100.00% Impervious, Inflow Depth > 3.11" for 2-Year event
Inflow = 0.88 cfs @ 12.11 hrs, Volume= 0.054 af
Outflow = 0.35 cfs @ 12.00 hrs, Volume= 0.055 af, Atten= 60%, Lag= 0.0 min
Discarded = 0.35 cfs @ 12.00 hrs, Volume= 0.055 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 175.48' @ 12.31 hrs Surf.Area= 1,815 sf Storage= 352 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 5.1 min (757.3 - 752.3)

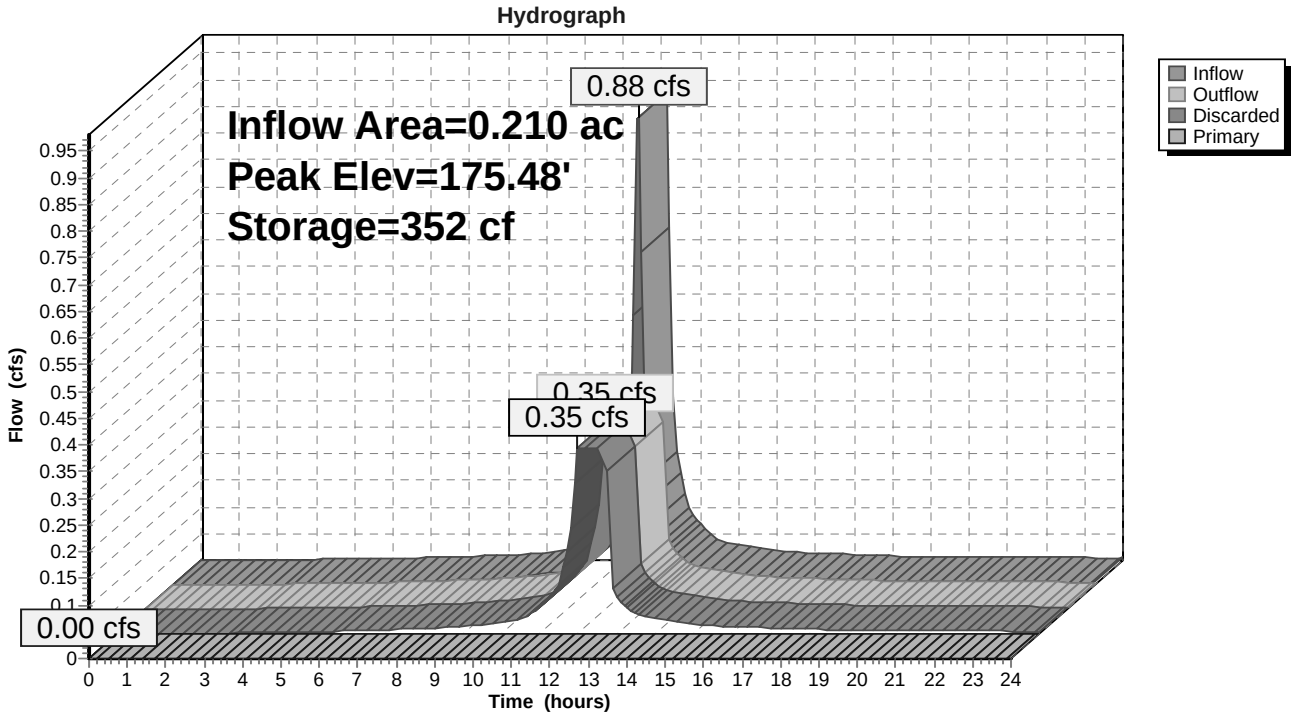
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	830 cf	**11.00'W x 165.00'L x 1.50'H Prismatoid** 2,723 cf Overall - 646 cf Embedded = 2,076 cf x 40.0% Voids
#2	175.50'	632 cf	**12.0" Round Pipe Storage** x 5 Inside #1 L= 161.0'
#3	175.50'	14 cf	**12.0" Round Pipe Storage** x 2 Inside #1 L= 9.0'
#4	176.50'	6 cf	**2.00'W x 2.00'L x 1.50'H Prismatoid**
		1,483 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	176.50'	**12.0" Round Culvert** L= 6.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 176.50' / 176.00' S= 0.0806 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	175.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.35 cfs @ 12.00 hrs HW=175.06' (Free Discharge)
↑└**2=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
↑└**1=Culvert** (Controls 0.00 cfs)

Pond SIS CC-4:

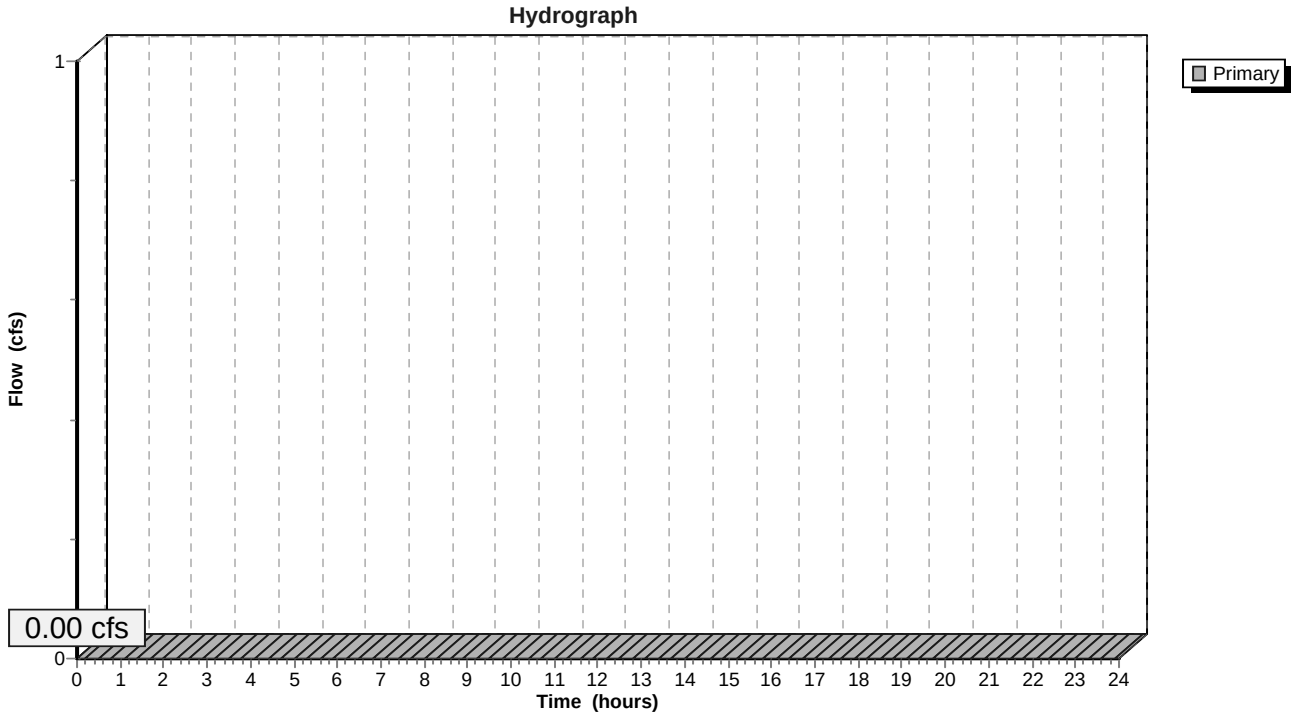

Hydrograph
Inflow
Outflow
Discarded
Primary
0.88 cfs
Inflow Area=0.210 ac
Peak Elev=175.48'
Storage=352 cf
0.35 cfs
0.35 cfs
0.00 cfs
Flow (cfs)
Time (hours)

Summary for Link POA-1:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-1:

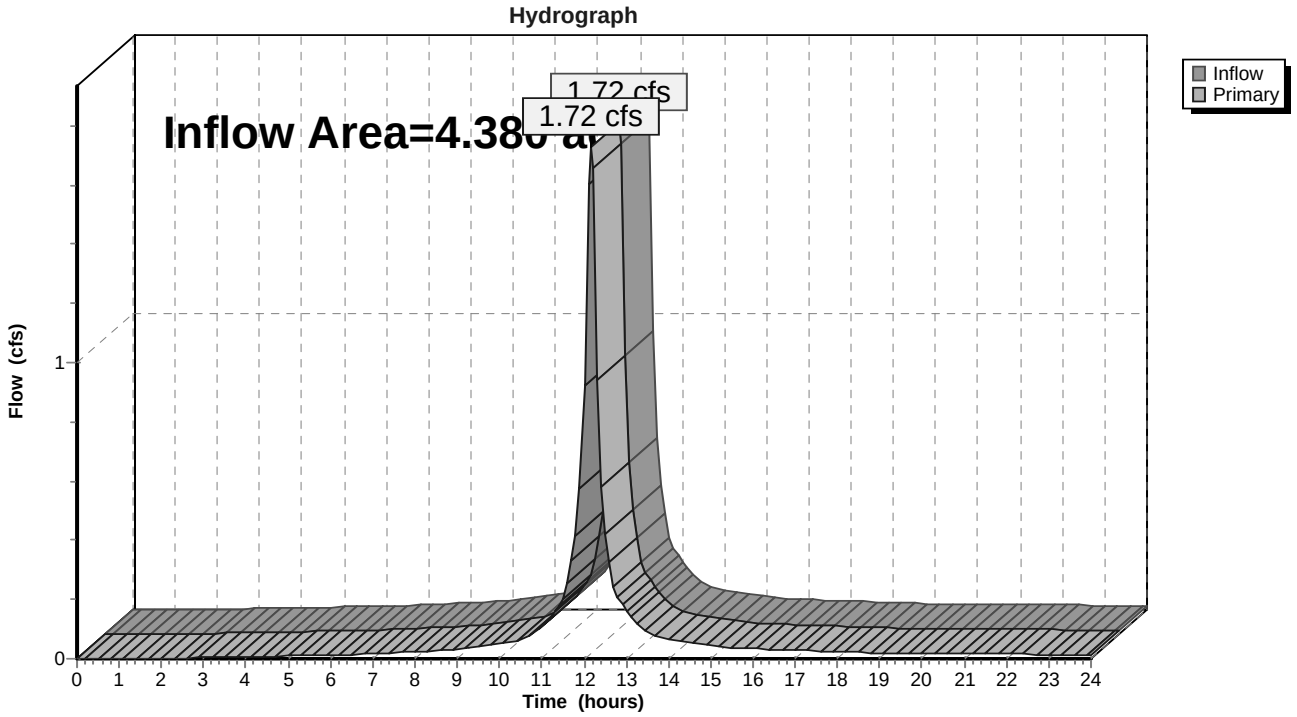


Summary for Link POA-2:

Inflow Area = 4.380 ac, 54.11% Impervious, Inflow Depth > 0.34" for 2-Year event
Inflow = 1.72 cfs @ 12.16 hrs, Volume= 0.124 af
Primary = 1.72 cfs @ 12.16 hrs, Volume= 0.124 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-2:

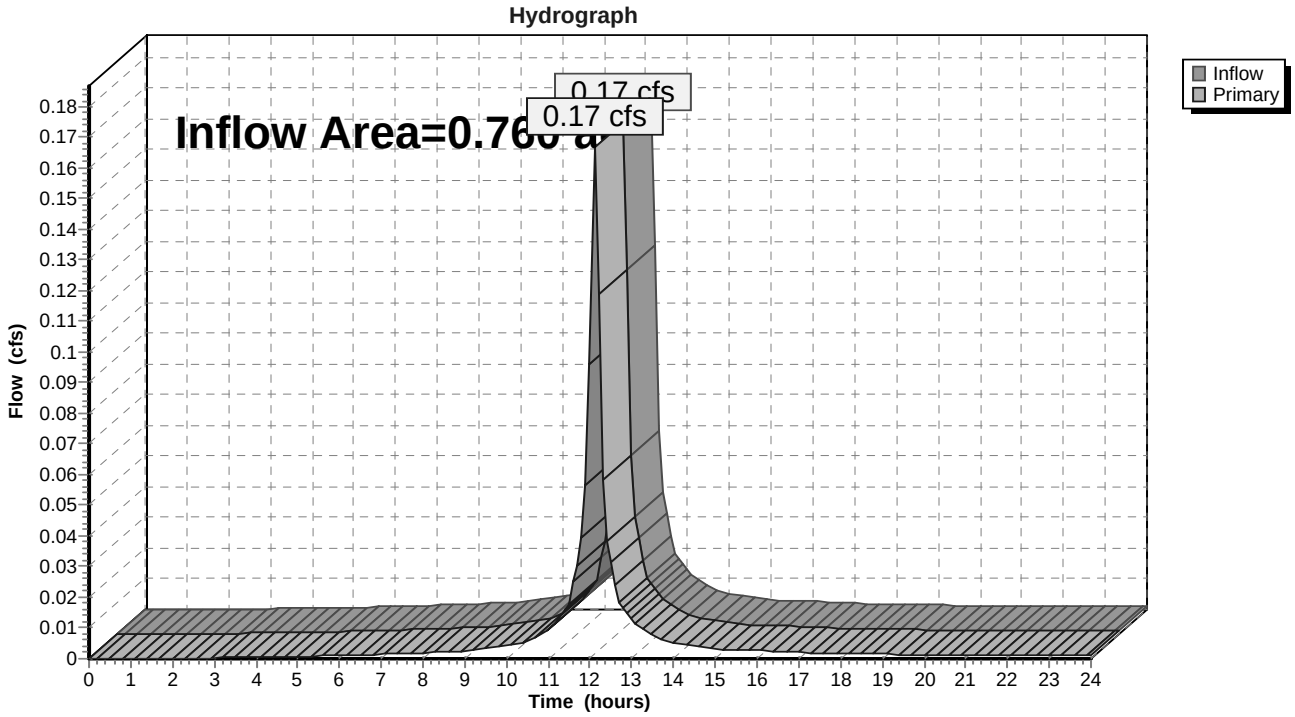


Summary for Link POA-3:

Inflow Area = 0.760 ac, 38.16% Impervious, Inflow Depth > 0.16" for 2-Year event
Inflow = 0.17 cfs @ 12.11 hrs, Volume= 0.010 af
Primary = 0.17 cfs @ 12.11 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-3:

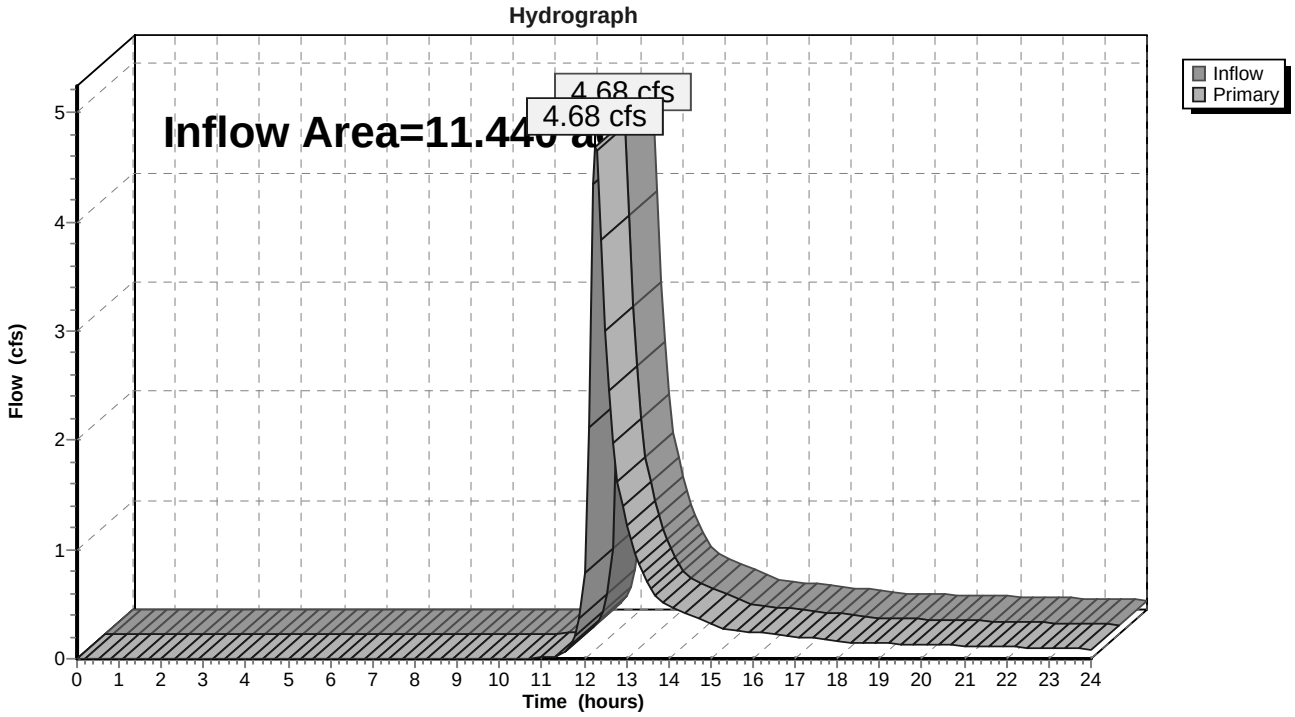


Summary for Link POA-4:

Inflow Area = 11.440 ac, 12.76% Impervious, Inflow Depth > 0.46" for 2-Year event
Inflow = 4.68 cfs @ 12.28 hrs, Volume= 0.441 af
Primary = 4.68 cfs @ 12.28 hrs, Volume= 0.441 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-4:

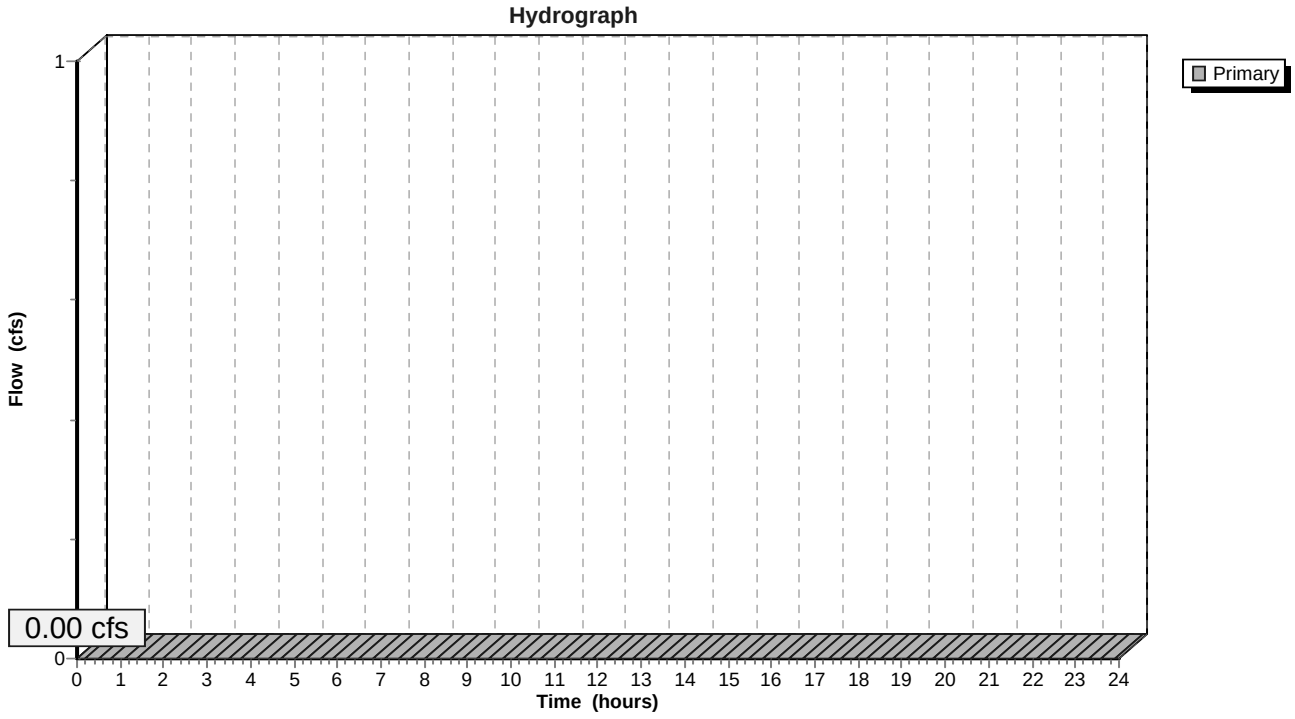


Summary for Link POA-5:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-5:

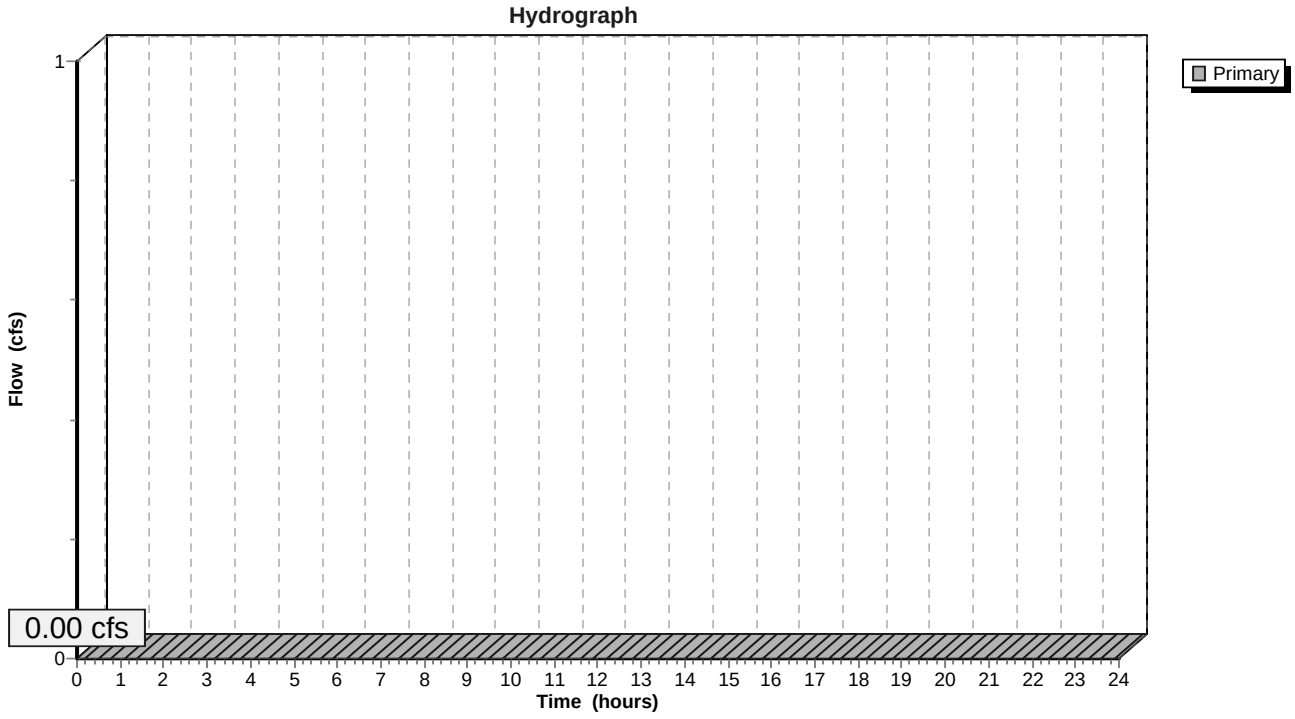


Summary for Link POA-6:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-6:

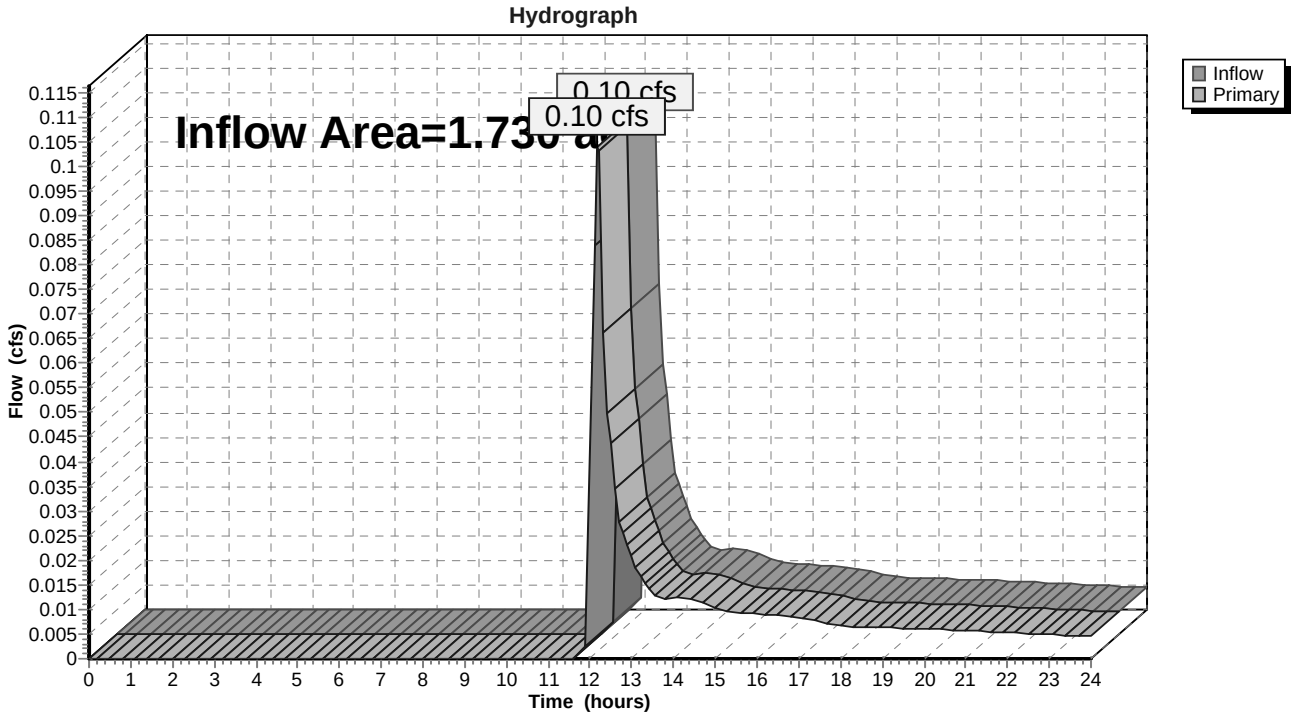


Summary for Link POA-7:

Inflow Area = 1.730 ac, 0.00% Impervious, Inflow Depth > 0.08" for 2-Year event
Inflow = 0.10 cfs @ 12.18 hrs, Volume= 0.011 af
Primary = 0.10 cfs @ 12.18 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-7:



Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment CCPR-2A: Runoff Area=1.730 ac 20.81% Impervious Runoff Depth>1.33"
Flow Length=232' Tc=9.9 min CN=42/98 Runoff=2.31 cfs 0.192 af

Subcatchment CCPR-2B: Runoff Area=1.080 ac 73.15% Impervious Runoff Depth>3.72"
Tc=6.0 min CN=39/98 Runoff=5.19 cfs 0.335 af

Subcatchment CCPR-2C: Runoff Area=0.100 ac 30.00% Impervious Runoff Depth>3.66"
Tc=6.0 min CN=80/98 Runoff=0.53 cfs 0.031 af

Subcatchment CCPR-2D: Runoff Area=0.110 ac 100.00% Impervious Runoff Depth>4.99"
Tc=6.0 min CN=0/98 Runoff=0.72 cfs 0.046 af

Subcatchment CCPR-2E: Runoff Area=0.580 ac 96.55% Impervious Runoff Depth>4.86"
Tc=6.0 min CN=57/98 Runoff=3.71 cfs 0.235 af

Subcatchment CCPR-2F: Runoff Area=0.780 ac 66.67% Impervious Runoff Depth>3.44"
Tc=6.0 min CN=41/98 Runoff=3.43 cfs 0.223 af

Subcatchment CCPR-3A: Runoff Area=0.230 ac 21.74% Impervious Runoff Depth>3.51"
Tc=6.0 min CN=80/98 Runoff=1.17 cfs 0.067 af

Subcatchment CCPR-3B: Runoff Area=0.210 ac 19.05% Impervious Runoff Depth>1.12"
Tc=6.0 min CN=38/98 Runoff=0.26 cfs 0.020 af

Subcatchment CCPR-3C: Runoff Area=0.320 ac 62.50% Impervious Runoff Depth>3.26"
Tc=6.0 min CN=42/98 Runoff=1.32 cfs 0.087 af

Subcatchment CCPR-4A: Runoff Area=6.430 ac 0.78% Impervious Runoff Depth>1.53"
Flow Length=740' Tc=17.6 min CN=61/98 Runoff=10.40 cfs 0.821 af

Subcatchment CCPR-4B: Runoff Area=1.110 ac 91.89% Impervious Runoff Depth>4.61"
Tc=6.0 min CN=39/98 Runoff=6.70 cfs 0.426 af

Subcatchment CCPR-4C: Runoff Area=0.210 ac 100.00% Impervious Runoff Depth>4.99"
Tc=6.0 min CN=0/98 Runoff=1.38 cfs 0.087 af

Subcatchment CCPR-4E: Runoff Area=0.570 ac 31.58% Impervious Runoff Depth>2.61"
Tc=6.0 min CN=61/98 Runoff=2.02 cfs 0.124 af

Subcatchment MCPR-4A: Runoff Area=1.720 ac 0.00% Impervious Runoff Depth>2.55"
Flow Length=485' Tc=11.1 min CN=74/0 Runoff=5.95 cfs 0.365 af

Subcatchment MCPR-4B: Runoff Area=1.400 ac 0.00% Impervious Runoff Depth>2.20"
Flow Length=485' Tc=11.1 min CN=70/0 Runoff=4.18 cfs 0.257 af

Subcatchment PRCC-7A: Runoff Area=1.520 ac 0.00% Impervious Runoff Depth>0.37"
Flow Length=410' Tc=16.8 min CN=42/0 Runoff=0.28 cfs 0.047 af

Subcatchment PRCC-7B: Runoff Area=0.210 ac 0.00% Impervious Runoff Depth>1.44"
Tc=6.0 min CN=60/0 Runoff=0.43 cfs 0.025 af

Pond BASIN CC-1: Peak Elev=176.02' Storage=5,282 cf Inflow=5.19 cfs 0.335 af
Discarded=0.72 cfs 0.320 af Primary=0.69 cfs 0.015 af Outflow=1.41 cfs 0.335 af

Pond BASIN CC-2: Peak Elev=176.69' Storage=4,762 cf Inflow=5.78 cfs 0.381 af
Discarded=1.44 cfs 0.381 af Primary=0.00 cfs 0.000 af Outflow=1.44 cfs 0.381 af

Pond Basin CC-3: Peak Elev=176.46' Storage=5,503 cf Inflow=3.43 cfs 0.223 af
Discarded=0.25 cfs 0.207 af Primary=0.00 cfs 0.000 af Outflow=0.25 cfs 0.207 af

Pond FB CC-1: Peak Elev=168.41' Storage=699 cf Inflow=0.53 cfs 0.031 af
Discarded=0.04 cfs 0.030 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.030 af

Pond FB CC-2: Peak Elev=170.20' Storage=1,498 cf Inflow=1.17 cfs 0.067 af
Discarded=0.09 cfs 0.067 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.067 af

Pond SIS CC-1: Peak Elev=172.75' Storage=6,682 cf Inflow=6.70 cfs 0.426 af
Discarded=0.79 cfs 0.422 af Primary=0.20 cfs 0.002 af Outflow=0.99 cfs 0.423 af

Pond SIS CC-2: Peak Elev=171.66' Storage=662 cf Inflow=1.32 cfs 0.087 af
Discarded=0.44 cfs 0.086 af Primary=0.00 cfs 0.000 af Outflow=0.44 cfs 0.086 af

Pond SIS CC-3: Peak Elev=175.81' Storage=2,832 cf Inflow=3.71 cfs 0.235 af
Discarded=0.72 cfs 0.235 af Primary=0.00 cfs 0.000 af Outflow=0.72 cfs 0.235 af

Pond SIS CC-4: Peak Elev=175.96' Storage=867 cf Inflow=1.38 cfs 0.087 af
Discarded=0.35 cfs 0.088 af Primary=0.00 cfs 0.000 af Outflow=0.35 cfs 0.088 af

Link POA-1:
Primary=0.00 cfs 0.000 af

Link POA-2: Inflow=2.81 cfs 0.253 af
Primary=2.81 cfs 0.253 af

Link POA-3: Inflow=0.26 cfs 0.020 af
Primary=0.26 cfs 0.020 af

Link POA-4: Inflow=14.93 cfs 1.187 af
Primary=14.93 cfs 1.187 af

Link POA-5:
Primary=0.00 cfs 0.000 af

Link POA-6:
Primary=0.00 cfs 0.000 af

Link POA-7: Inflow=0.44 cfs 0.072 af
Primary=0.44 cfs 0.072 af

Total Runoff Area = 18.310 ac Runoff Volume = 3.387 af Average Runoff Depth = 2.22"
77.50% Pervious = 14.190 ac 22.50% Impervious = 4.120 ac

Summary for Subcatchment CCPR-2A:

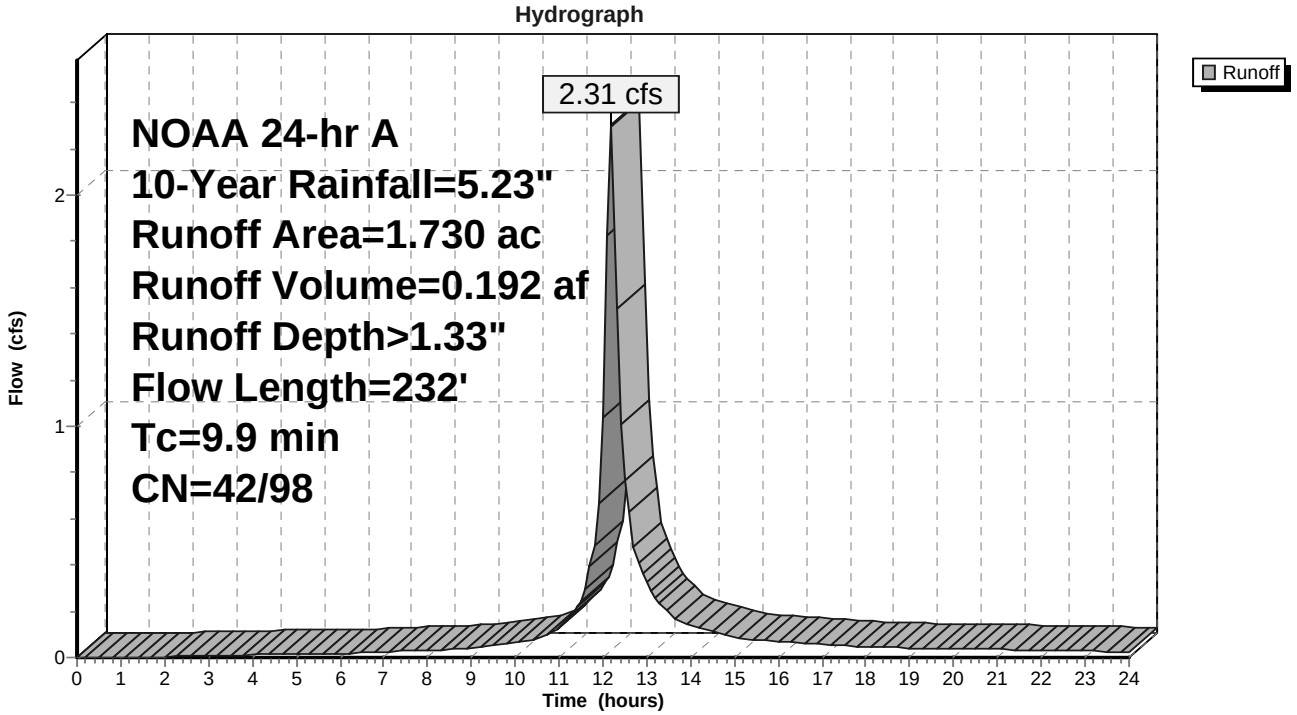
Runoff = 2.31 cfs @ 12.19 hrs, Volume= 0.192 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

	Area (ac)	CN	Description
	0.600	30	Woods, Good, HSG A
*	0.220	77	Wetlands, HSG A
	0.170	30	Meadow, non-grazed, HSG A
	0.290	98	Paved parking, HSG A
	0.070	98	Paved parking, HSG D
	0.320	39	>75% Grass cover, Good, HSG A
	0.060	80	>75% Grass cover, Good, HSG D
	1.730	54	Weighted Average
	1.370	42	79.19% Pervious Area
	0.360	98	20.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	25	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
6.6	207	0.0110	0.52		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.9	232	Total			

Subcatchment CCPR-2A:



Summary for Subcatchment CCPR-2B:

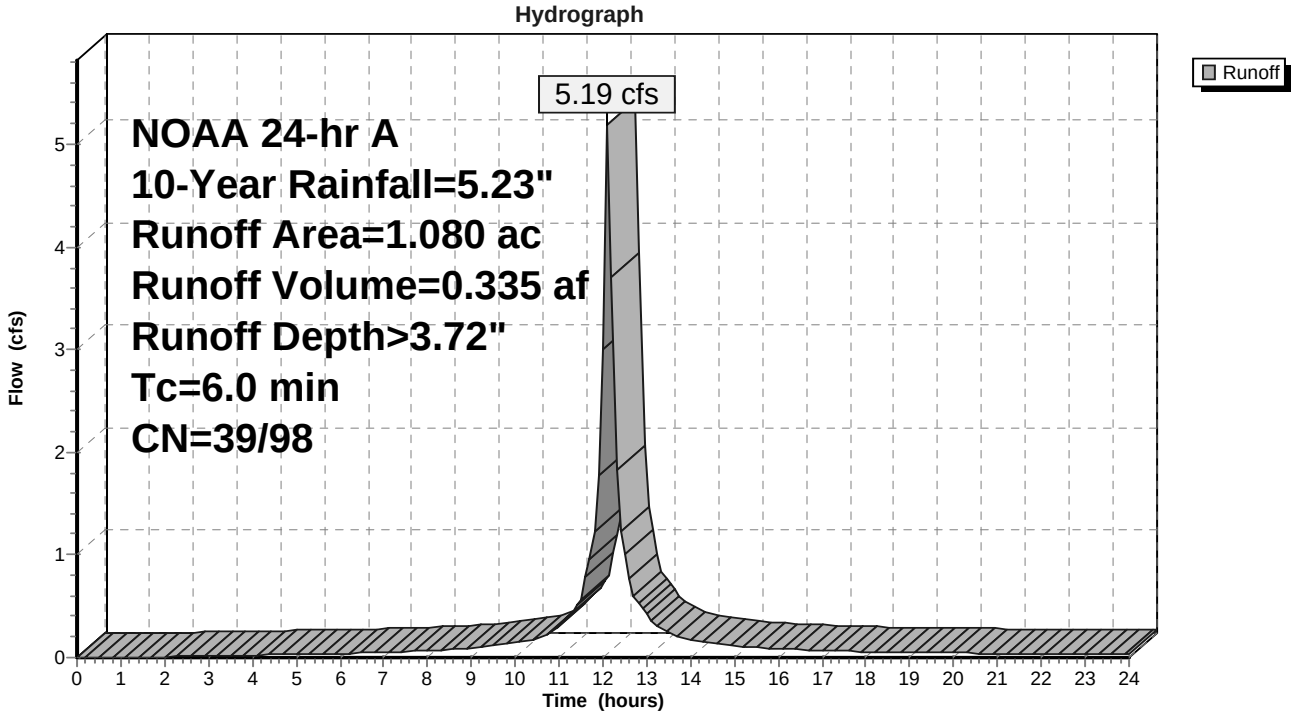
Runoff = 5.19 cfs @ 12.11 hrs, Volume= 0.335 af, Depth> 3.72"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.450	98	Roofs, HSG A
0.290	39	>75% Grass cover, Good, HSG A
0.090	98	Water Surface, HSG A
0.250	98	Paved parking, HSG A
1.080	82	Weighted Average
0.290	39	26.85% Pervious Area
0.790	98	73.15% Impervious Area

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

Subcatchment CCPR-2B:



Summary for Subcatchment CCPR-2C:

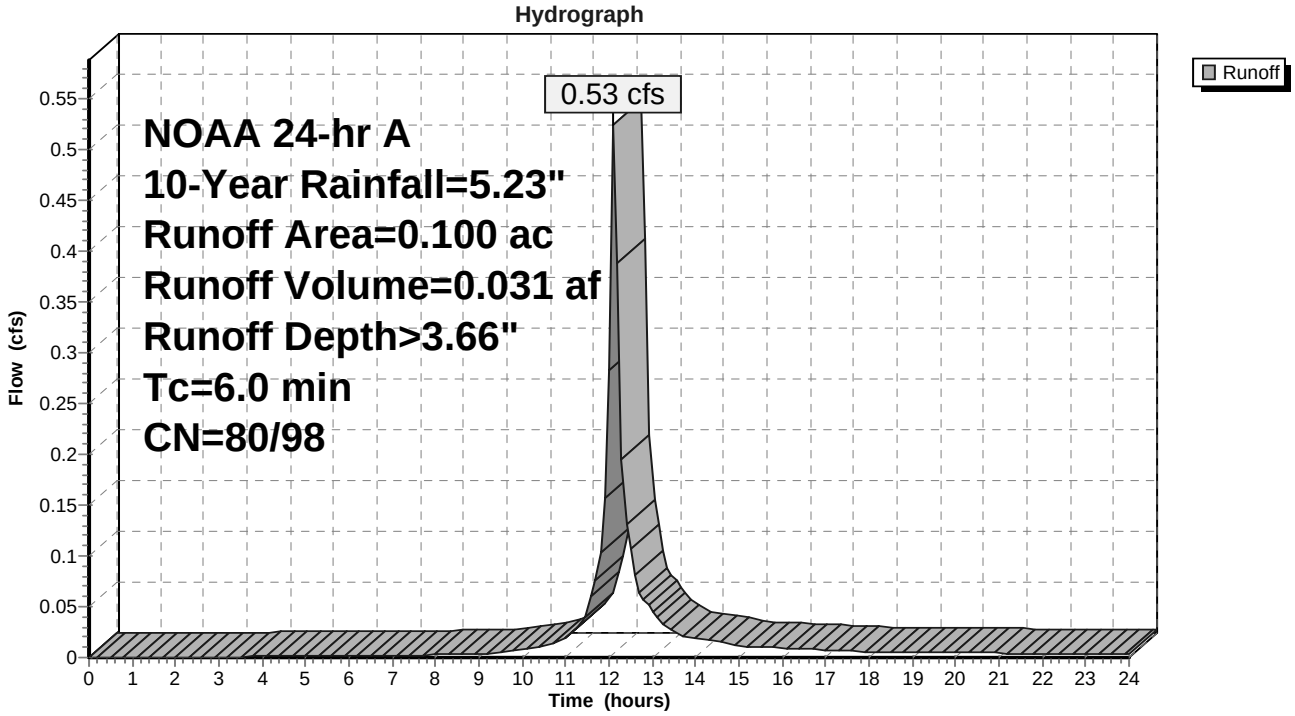
Runoff = 0.53 cfs @ 12.11 hrs, Volume= 0.031 af, Depth> 3.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.030	98	Paved parking, HSG D
0.070	80	>75% Grass cover, Good, HSG D
0.100	85	Weighted Average
0.070	80	70.00% Pervious Area
0.030	98	30.00% Impervious Area

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

Subcatchment CCPR-2C:



Summary for Subcatchment CCPR-2D:

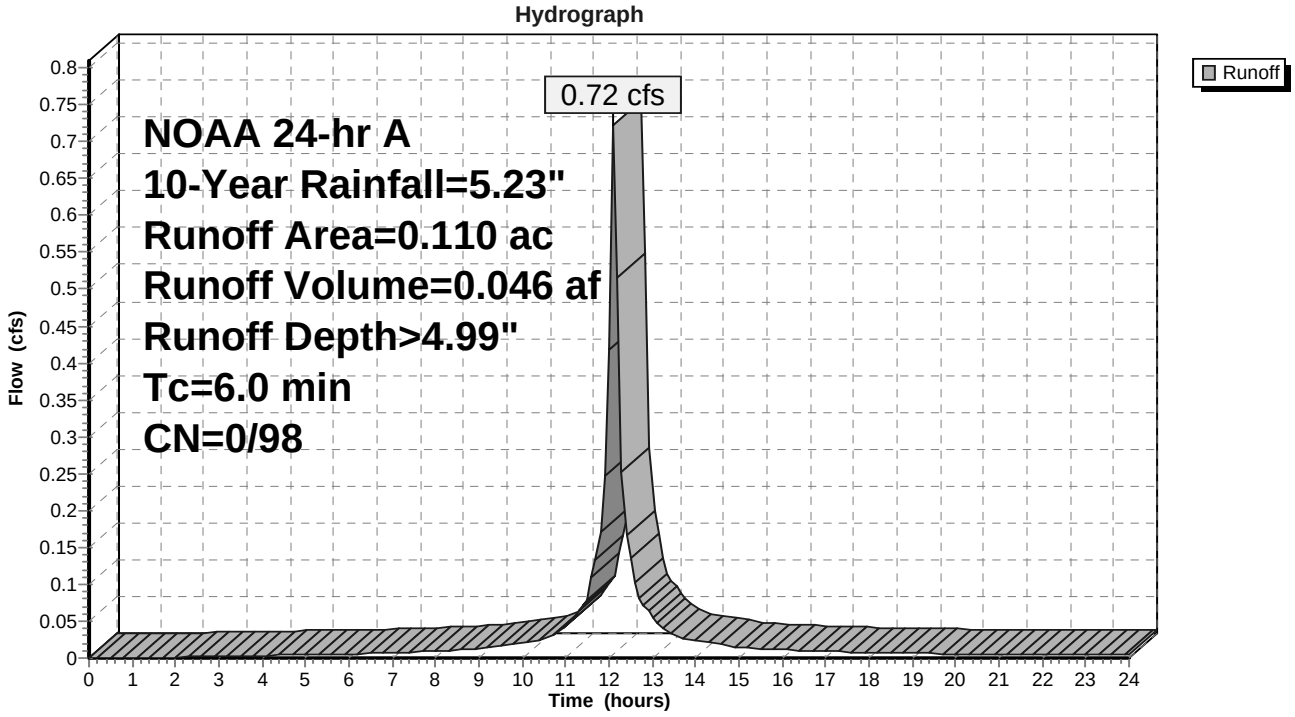
Runoff = 0.72 cfs @ 12.11 hrs, Volume= 0.046 af, Depth> 4.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.100	98	Roofs, HSG A
0.010	98	Roofs, HSG D
0.110	98	Weighted Average
0.110	98	100.00% Impervious Area

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

Subcatchment CCPR-2D:



Summary for Subcatchment CCPR-2E:

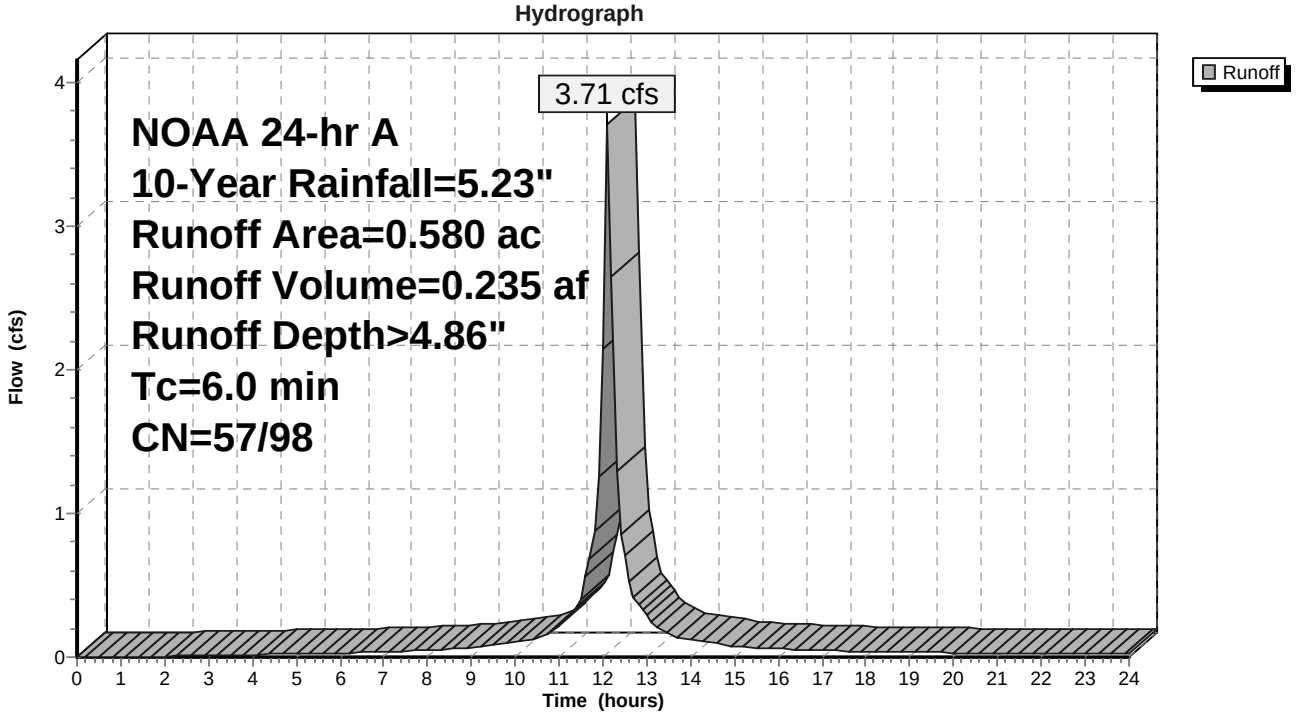
Runoff = 3.71 cfs @ 12.11 hrs, Volume= 0.235 af, Depth> 4.86"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG A
0.170	98	Paved parking, HSG C
0.010	39	>75% Grass cover, Good, HSG A
0.010	74	>75% Grass cover, Good, HSG C
0.220	98	Roofs, HSG A
0.580	97	Weighted Average
0.020	57	3.45% Pervious Area
0.560	98	96.55% Impervious Area

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

Subcatchment CCPR-2E:



Summary for Subcatchment CCPR-2F:

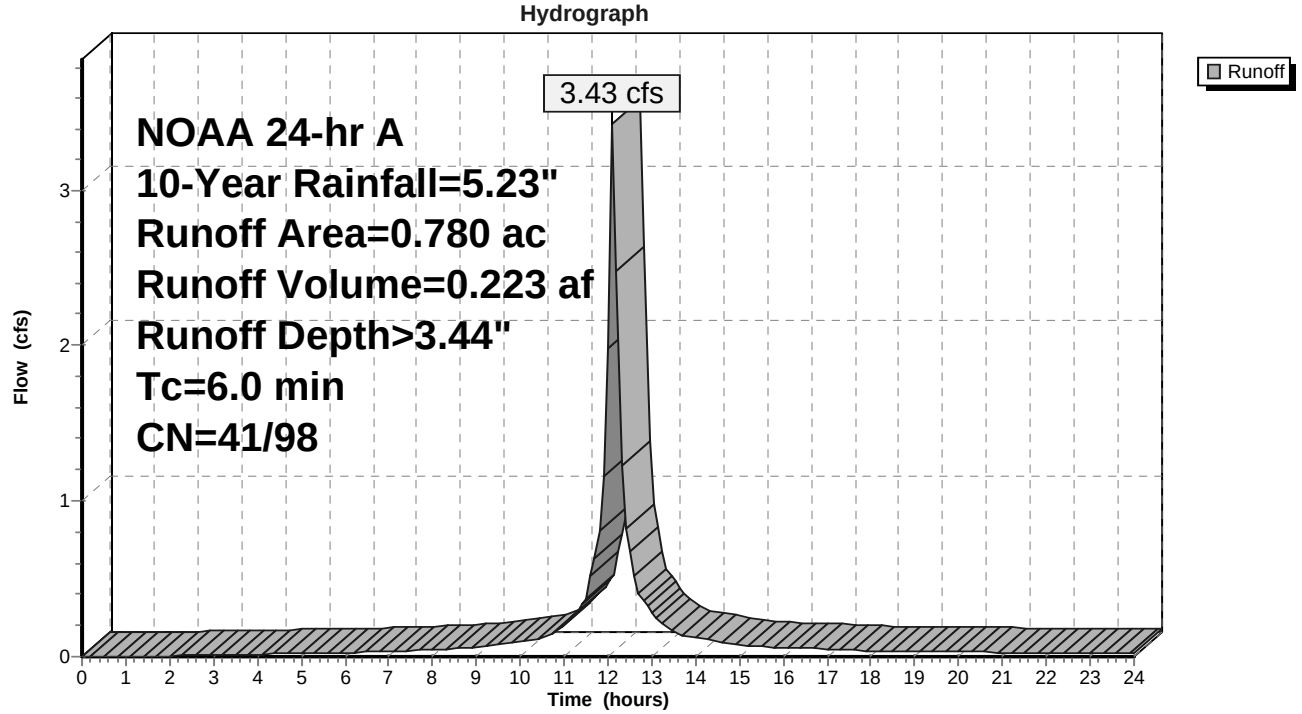
Runoff = 3.43 cfs @ 12.11 hrs, Volume= 0.223 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.250	98	Paved parking, HSG A
0.150	98	Paved parking, HSG C
0.030	98	Roofs, HSG A
0.090	98	Water Surface, HSG A
0.130	39	>75% Grass cover, Good, HSG A
0.010	74	>75% Grass cover, Good, HSG C
0.100	30	Meadow, non-grazed, HSG A
0.020	96	Gravel surface, HSG A
0.780	79	Weighted Average
0.260	41	33.33% Pervious Area
0.520	98	66.67% Impervious Area

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

Subcatchment CCPR-2F:



Summary for Subcatchment CCPR-3A:

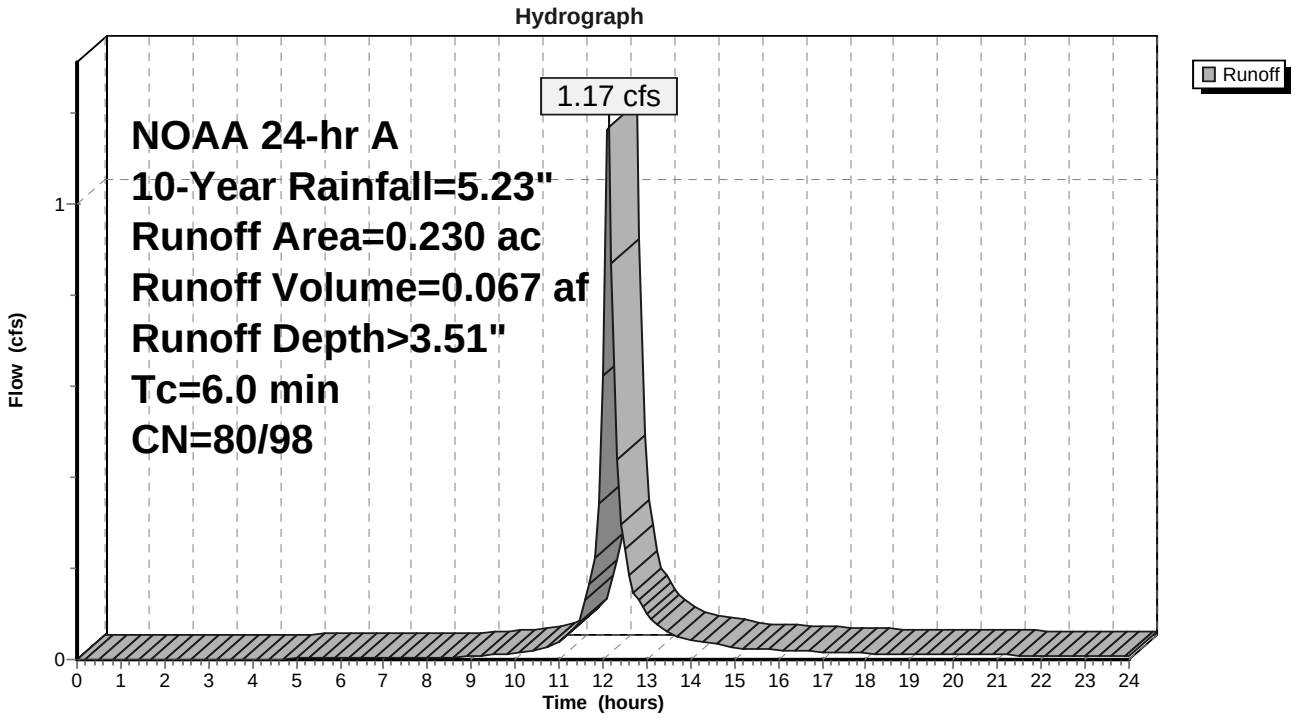
Runoff = 1.17 cfs @ 12.11 hrs, Volume= 0.067 af, Depth> 3.51"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.180	80	>75% Grass cover, Good, HSG D
0.050	98	Paved parking, HSG D
0.230	84	Weighted Average
0.180	80	78.26% Pervious Area
0.050	98	21.74% Impervious Area

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

Subcatchment CCPR-3A:



Summary for Subcatchment CCPR-3B:

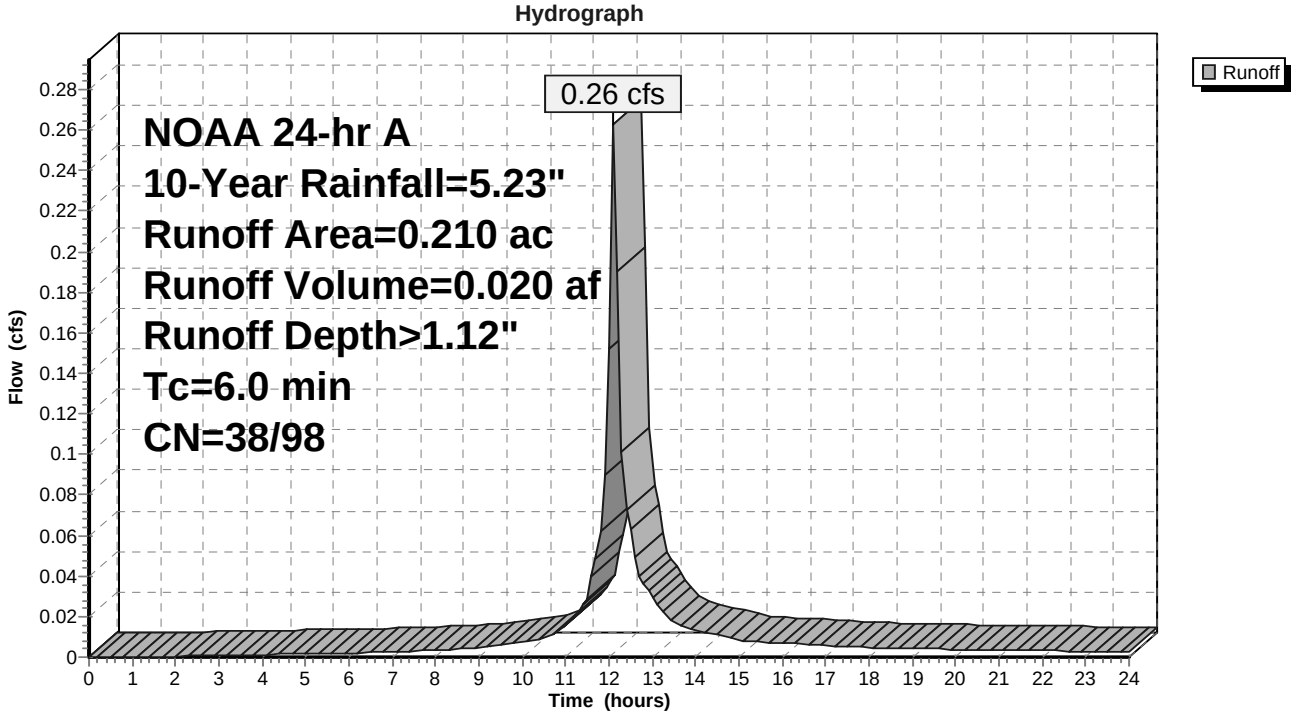
Runoff = 0.26 cfs @ 12.11 hrs, Volume= 0.020 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.100	39	>75% Grass cover, Good, HSG A
0.010	80	>75% Grass cover, Good, HSG D
0.060	30	Brush, Good, HSG A
0.030	98	Water Surface, HSG A
0.010	98	Paved parking, HSG A
0.210	50	Weighted Average
0.170	38	80.95% Pervious Area
0.040	98	19.05% Impervious Area

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

Subcatchment CCPR-3B:



Summary for Subcatchment CCPR-3C:

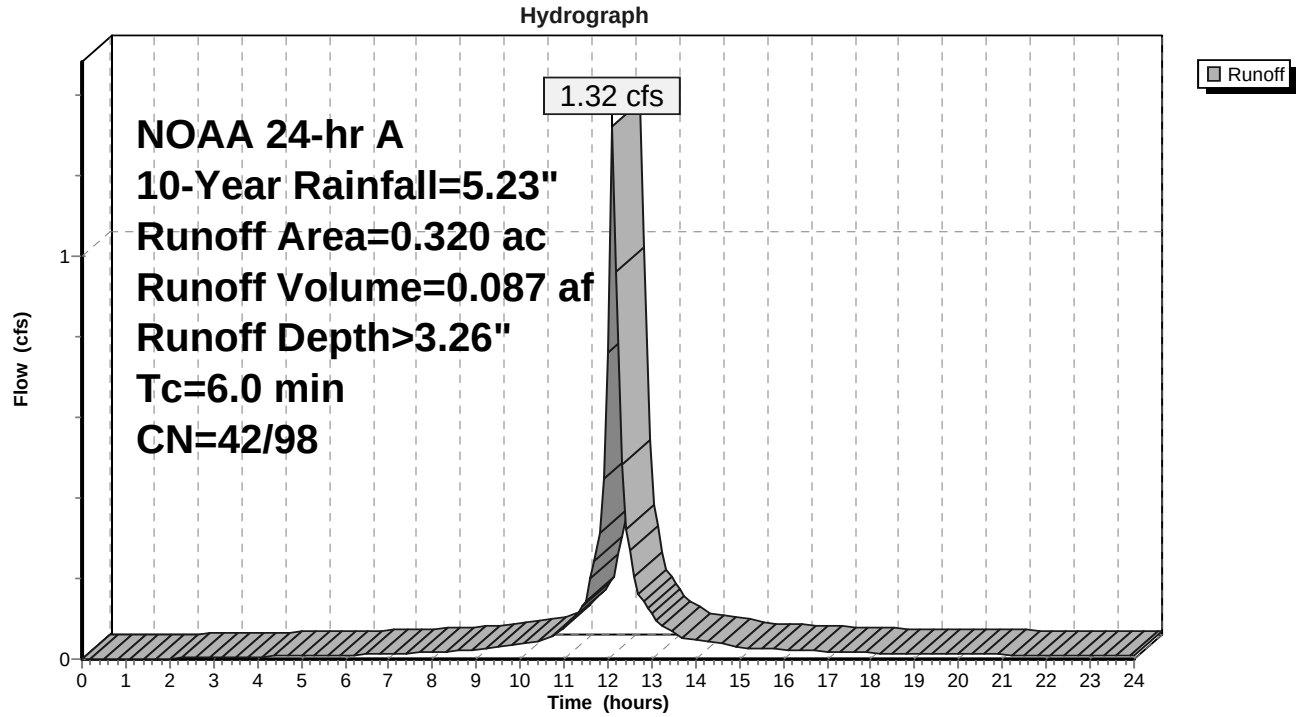
Runoff = 1.32 cfs @ 12.11 hrs, Volume= 0.087 af, Depth> 3.26"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.030	98	Paved parking, HSG A
0.040	98	Roofs, HSG A
0.110	39	>75% Grass cover, Good, HSG A
0.010	80	>75% Grass cover, Good, HSG D
0.130	98	Water Surface, HSG A
0.320	77	Weighted Average
0.120	42	37.50% Pervious Area
0.200	98	62.50% Impervious Area

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

Subcatchment CCPR-3C:



Summary for Subcatchment CCPR-4A:

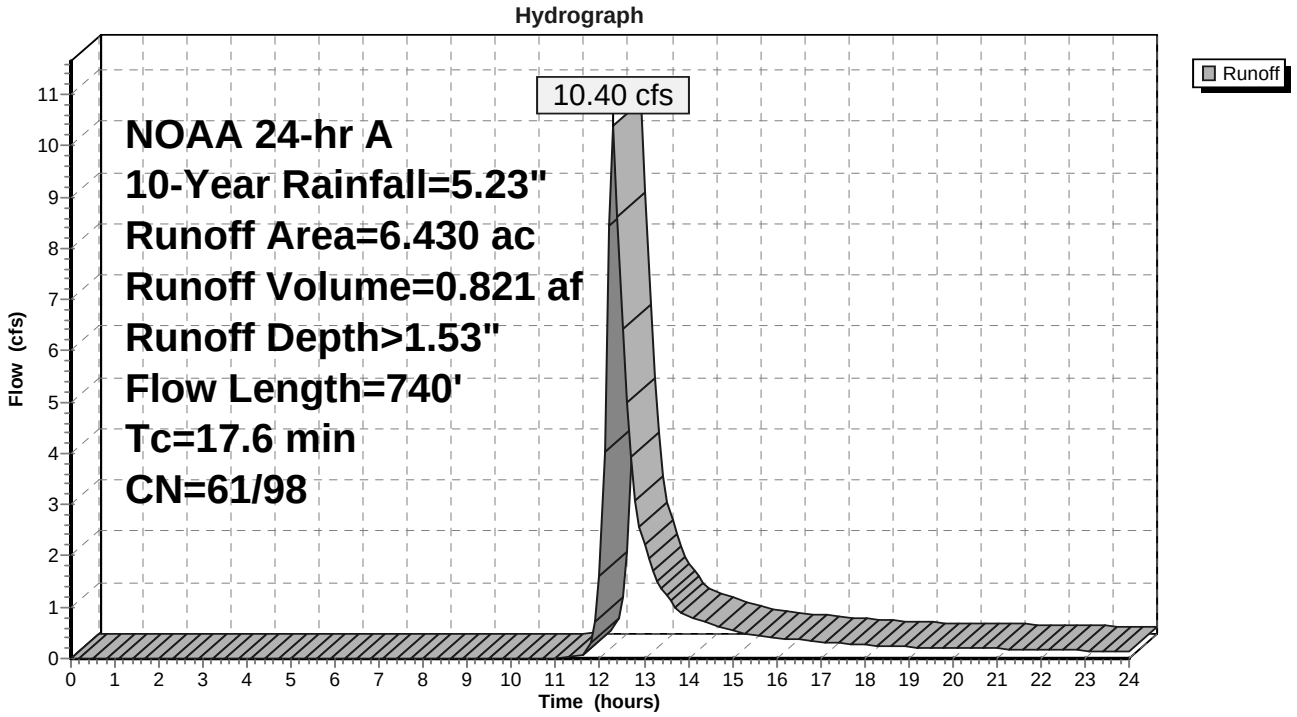
Runoff = 10.40 cfs @ 12.30 hrs, Volume= 0.821 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

	Area (ac)	CN	Description
	0.490	30	Brush, Good, HSG A
*	1.810	77	Wetlands, HSG A
	0.310	30	Meadow, non-grazed, HSG A
	0.330	30	Woods, Good, HSG A
	0.030	55	Woods, Good, HSG B
	0.070	48	Brush, Good, HSG B
	0.360	65	Brush, Good, HSG C
	0.980	70	Woods, Good, HSG C
	0.600	77	Woods, Good, HSG D
	0.550	73	Brush, Good, HSG D
	0.850	39	>75% Grass cover, Good, HSG A
	0.030	98	Water Surface, HSG A
	0.020	98	Roofs, HSG A
	6.430	61	Weighted Average
	6.380	61	99.22% Pervious Area
	0.050	98	0.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
11.9	690	0.0190	0.96		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.6	740	Total			

Subcatchment CCPR-4A:



Summary for Subcatchment CCPR-4B:

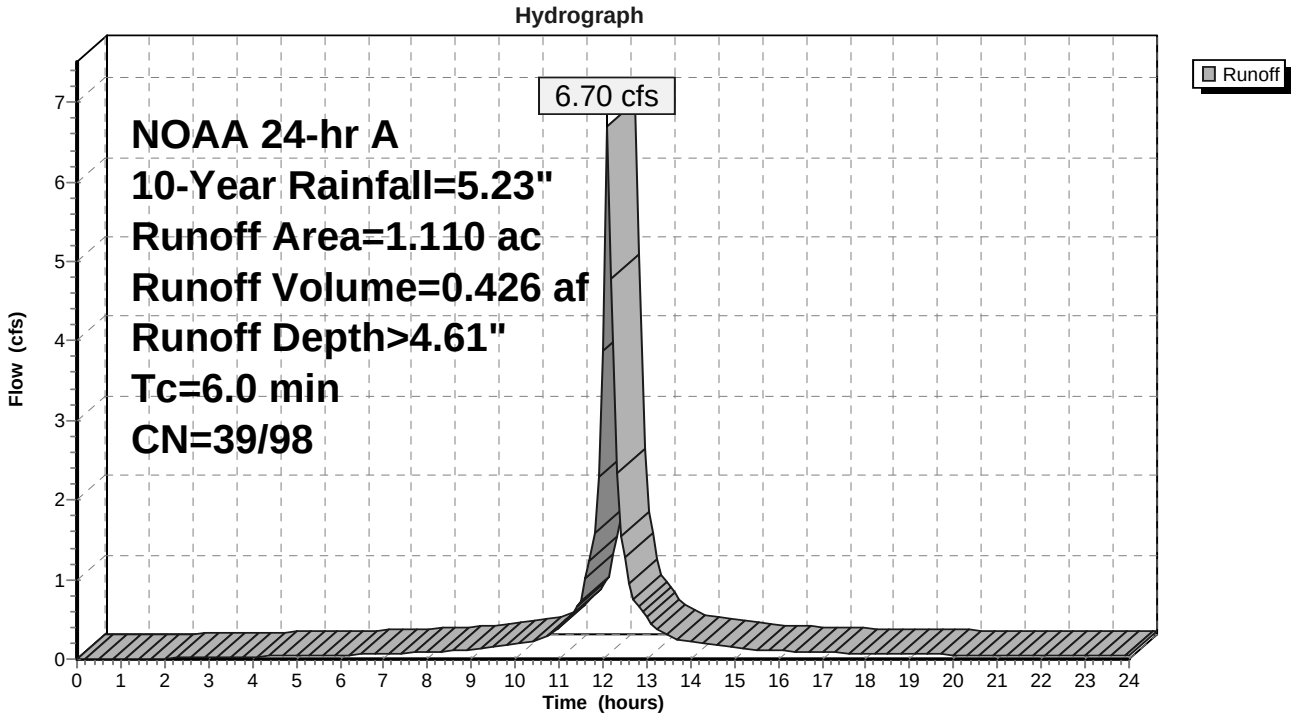
Runoff = 6.70 cfs @ 12.11 hrs, Volume= 0.426 af, Depth> 4.61"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.610	98	Paved parking, HSG A
0.410	98	Roofs, HSG A
0.090	39	>75% Grass cover, Good, HSG A
1.110	93	Weighted Average
0.090	39	8.11% Pervious Area
1.020	98	91.89% Impervious Area

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

Subcatchment CCPR-4B:



Summary for Subcatchment CCPR-4C:

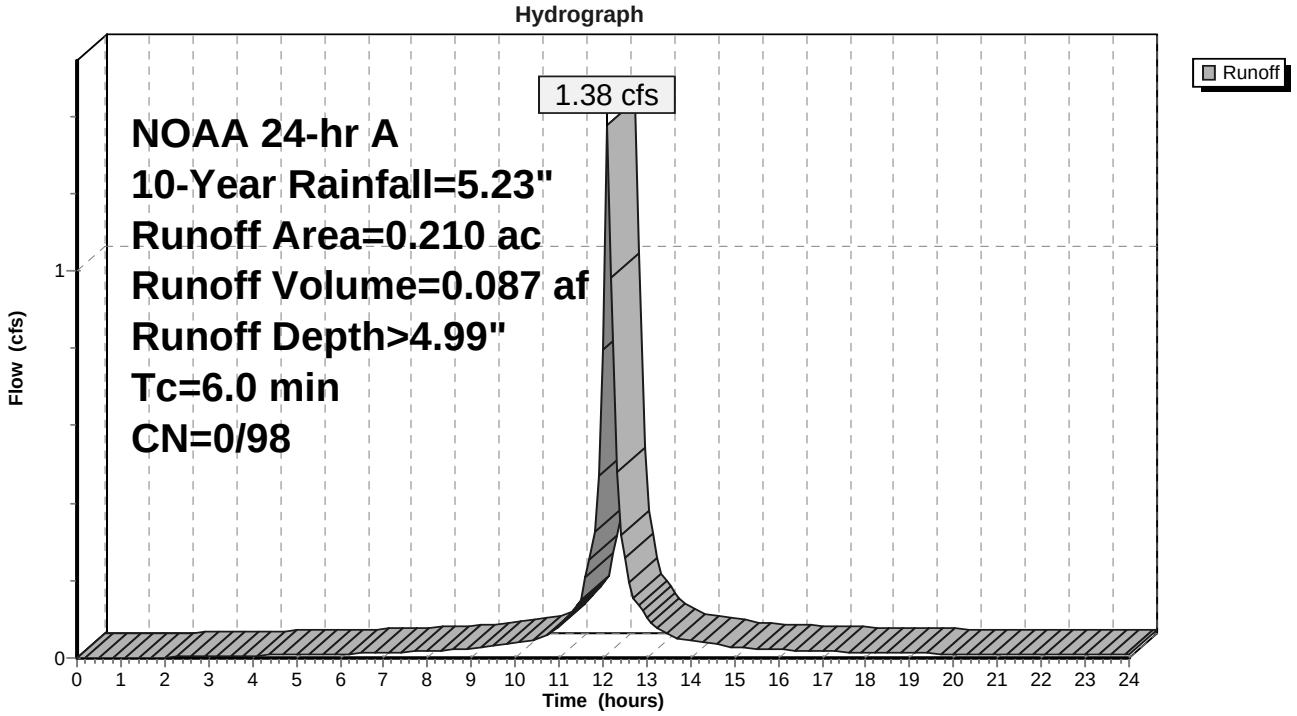
Runoff = 1.38 cfs @ 12.11 hrs, Volume= 0.087 af, Depth> 4.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.210	98	Roofs, HSG A
0.210	98	100.00% Impervious Area

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

Subcatchment CCPR-4C:



Summary for Subcatchment CCPR-4E:

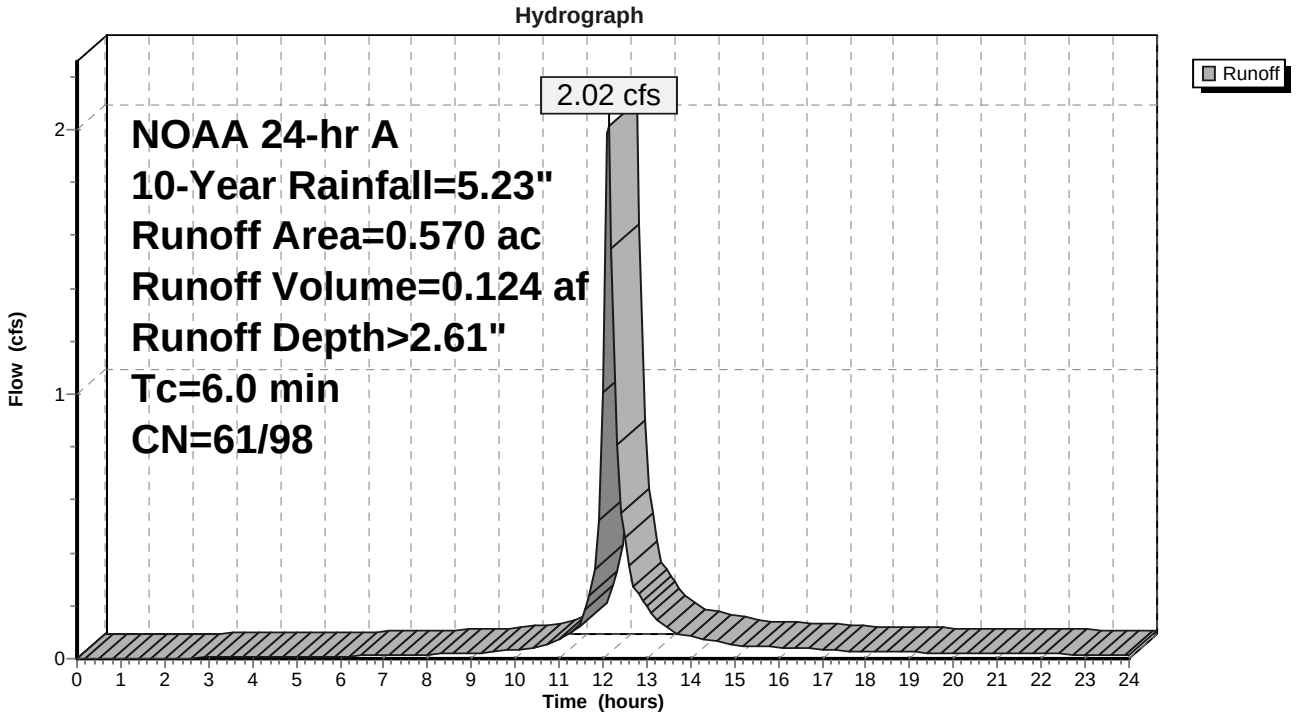
Runoff = 2.02 cfs @ 12.12 hrs, Volume= 0.124 af, Depth> 2.61"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.020	98	Roofs, HSG A
0.010	98	Roofs, HSG C
0.140	39	>75% Grass cover, Good, HSG A
0.250	74	>75% Grass cover, Good, HSG C
0.140	98	Water Surface, HSG A
0.010	98	Water Surface, HSG C
0.570	73	Weighted Average
0.390	61	68.42% Pervious Area
0.180	98	31.58% Impervious Area

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

Subcatchment CCPR-4E:



Summary for Subcatchment MCPR-4A:

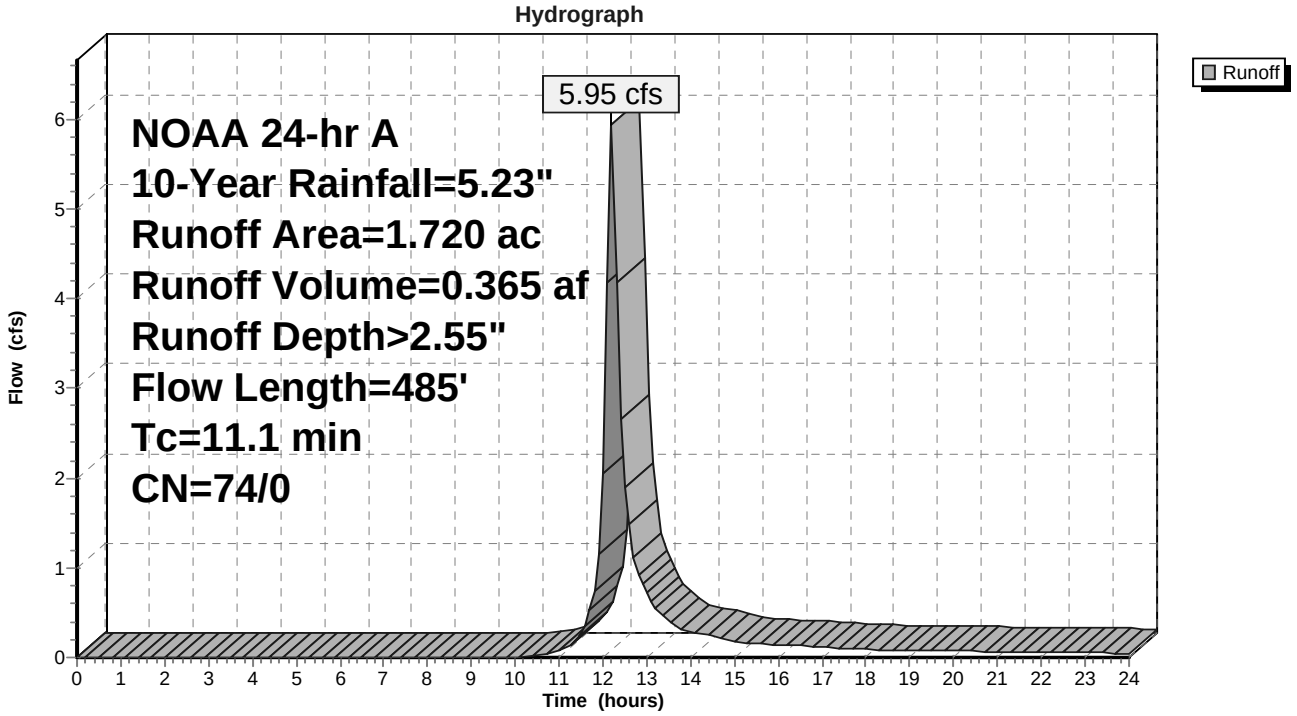
Runoff = 5.95 cfs @ 12.20 hrs, Volume= 0.365 af, Depth> 2.55"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.870	70	Woods, Good, HSG C
0.040	96	Gravel surface, HSG C
0.100	71	Meadow, non-grazed, HSG C
0.410	77	Woods, Good, HSG D
0.290	78	Meadow, non-grazed, HSG D
0.010	96	Gravel surface, HSG D
1.720	74	Weighted Average
1.720	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.0	435	0.1290	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	485	Total			

Subcatchment MCPR-4A:



Summary for Subcatchment MCPR-4B:

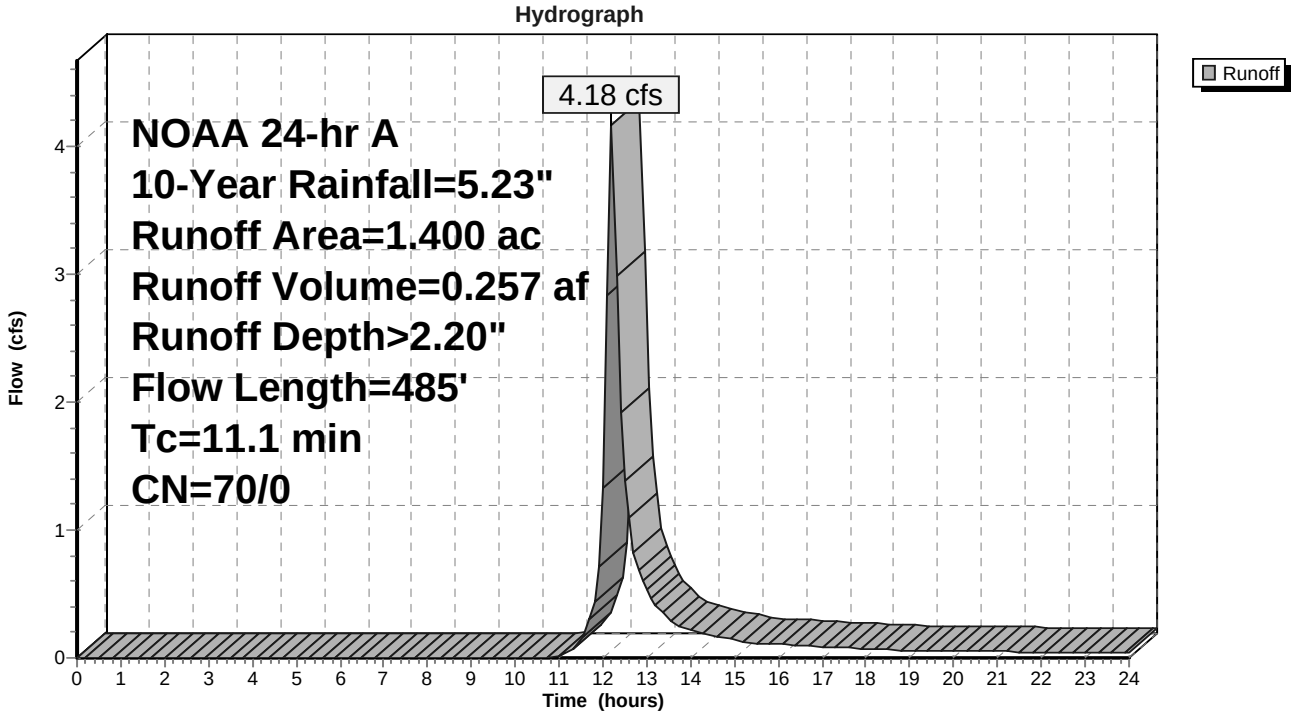
Runoff = 4.18 cfs @ 12.20 hrs, Volume= 0.257 af, Depth> 2.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
1.360	70	Woods, Good, HSG C
0.020	96	Gravel surface, HSG C
0.020	71	Meadow, non-grazed, HSG C
1.400	70	Weighted Average
1.400	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.0	435	0.1290	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	485	Total			

Subcatchment MCPR-4B:



Summary for Subcatchment PRCC-7A:

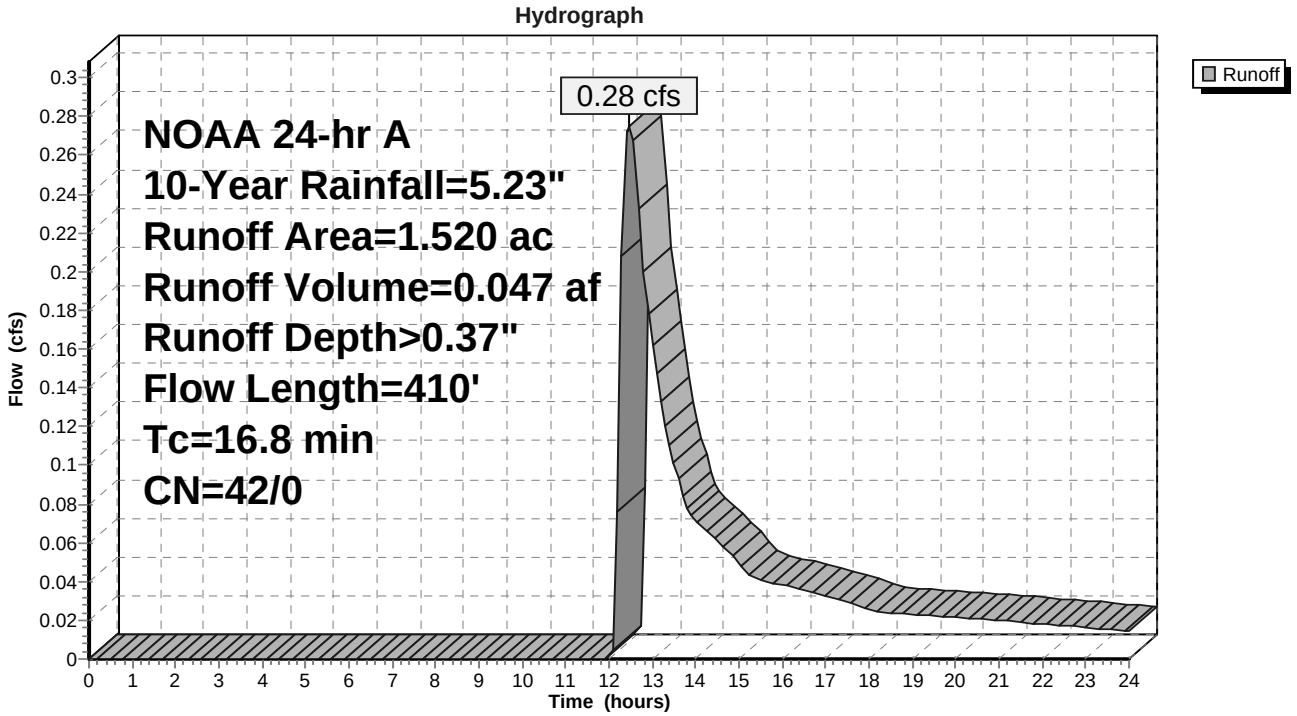
Runoff = 0.28 cfs @ 12.46 hrs, Volume= 0.047 af, Depth> 0.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

	Area (ac)	CN	Description
	0.050	96	Gravel surface, HSG A
	0.110	39	>75% Grass cover, Good, HSG A
	0.110	30	Meadow, non-grazed, HSG A
	0.950	30	Woods, Good, HSG A
*	0.300	77	Wetlands, HSG A
	1.520	42	Weighted Average
	1.520	42	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	25	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.16"
0.6	10	0.5000	0.27		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.16"
9.9	375	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.8	410	Total			

Subcatchment PRCC-7A:



Summary for Subcatchment PRCC-7B:

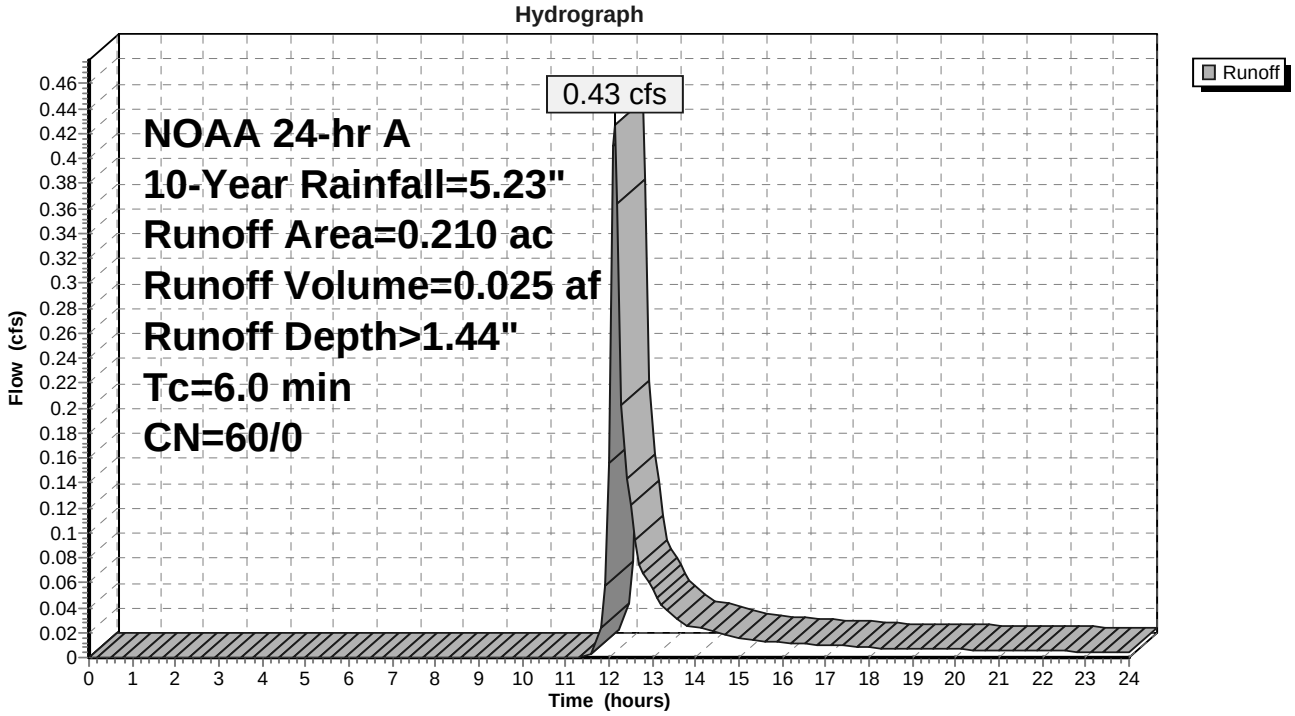
Runoff = 0.43 cfs @ 12.13 hrs, Volume= 0.025 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.080	74	>75% Grass cover, Good, HSG C
0.060	30	Meadow, non-grazed, HSG A
0.070	71	Meadow, non-grazed, HSG C
0.210	60	Weighted Average
0.210	60	100.00% Pervious Area

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

Subcatchment PRCC-7B:



Summary for Pond BASIN CC-1:

Inflow Area = 1.080 ac, 73.15% Impervious, Inflow Depth > 3.72" for 10-Year event
Inflow = 5.19 cfs @ 12.11 hrs, Volume= 0.335 af
Outflow = 1.41 cfs @ 12.35 hrs, Volume= 0.335 af, Atten= 73%, Lag= 14.7 min
Discarded = 0.72 cfs @ 12.35 hrs, Volume= 0.320 af
Primary = 0.69 cfs @ 12.35 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 176.02' @ 12.35 hrs Surf.Area= 3,762 sf Storage= 5,282 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 58.0 min (806.9 - 748.9)

Volume	Invert	Avail.Storage	Storage Description
#1	174.00'	9,568 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

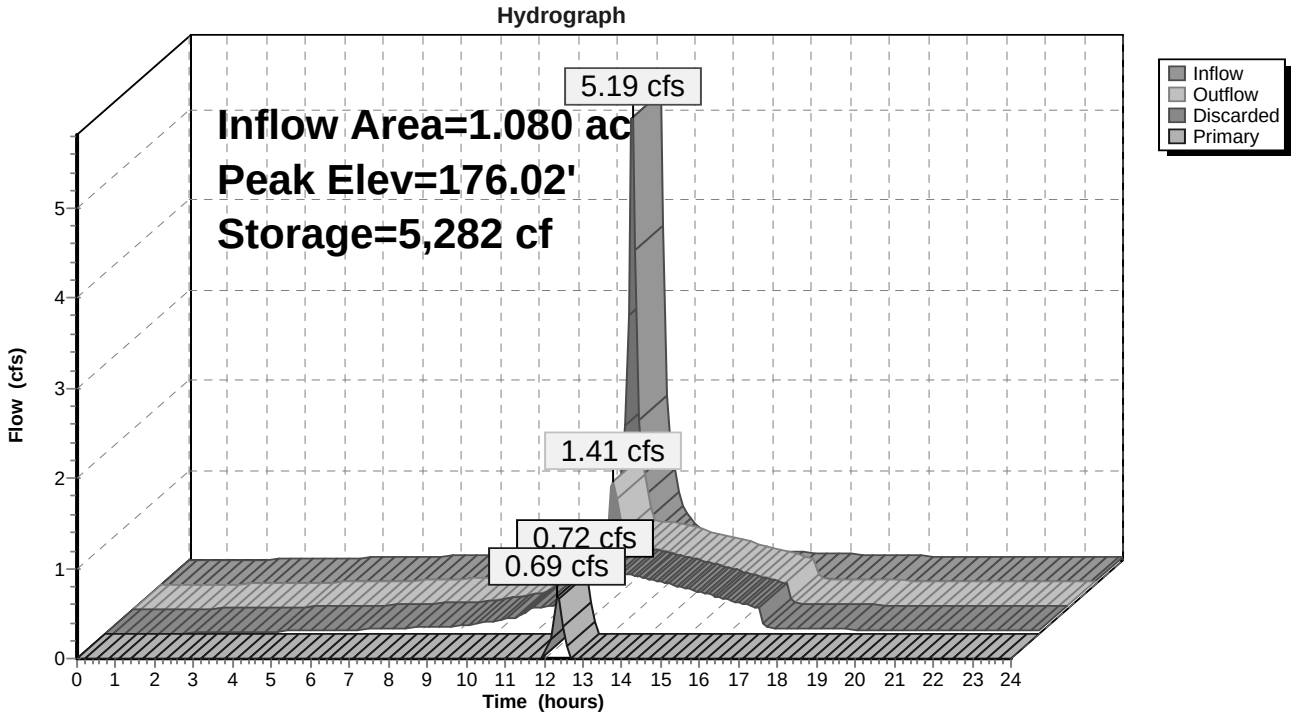
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.00	1,464	0	0
176.00	3,733	5,197	5,197
177.00	5,008	4,371	9,568

Device	Routing	Invert	Outlet Devices
#1	Primary	176.00'	**75.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	174.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.72 cfs @ 12.35 hrs HW=176.02' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=0.56 cfs @ 12.35 hrs HW=176.02' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.56 cfs @ 0.34 fps)

Pond BASIN CC-1:



Summary for Pond BASIN CC-2:

Inflow Area = 1.970 ac, 9.14% Impervious, Inflow Depth > 2.32" for 10-Year event
Inflow = 5.78 cfs @ 12.18 hrs, Volume= 0.381 af
Outflow = 1.44 cfs @ 12.61 hrs, Volume= 0.381 af, Atten= 75%, Lag= 25.4 min
Discarded = 1.44 cfs @ 12.61 hrs, Volume= 0.381 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 176.69' @ 12.61 hrs Surf.Area= 7,529 sf Storage= 4,762 cf

Plug-Flow detention time= 23.9 min calculated for 0.379 af (100% of inflow)
Center-of-Mass det. time= 23.7 min (833.5 - 809.8)

Volume	Invert	Avail.Storage	Storage Description
#1	176.00'	14,678 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

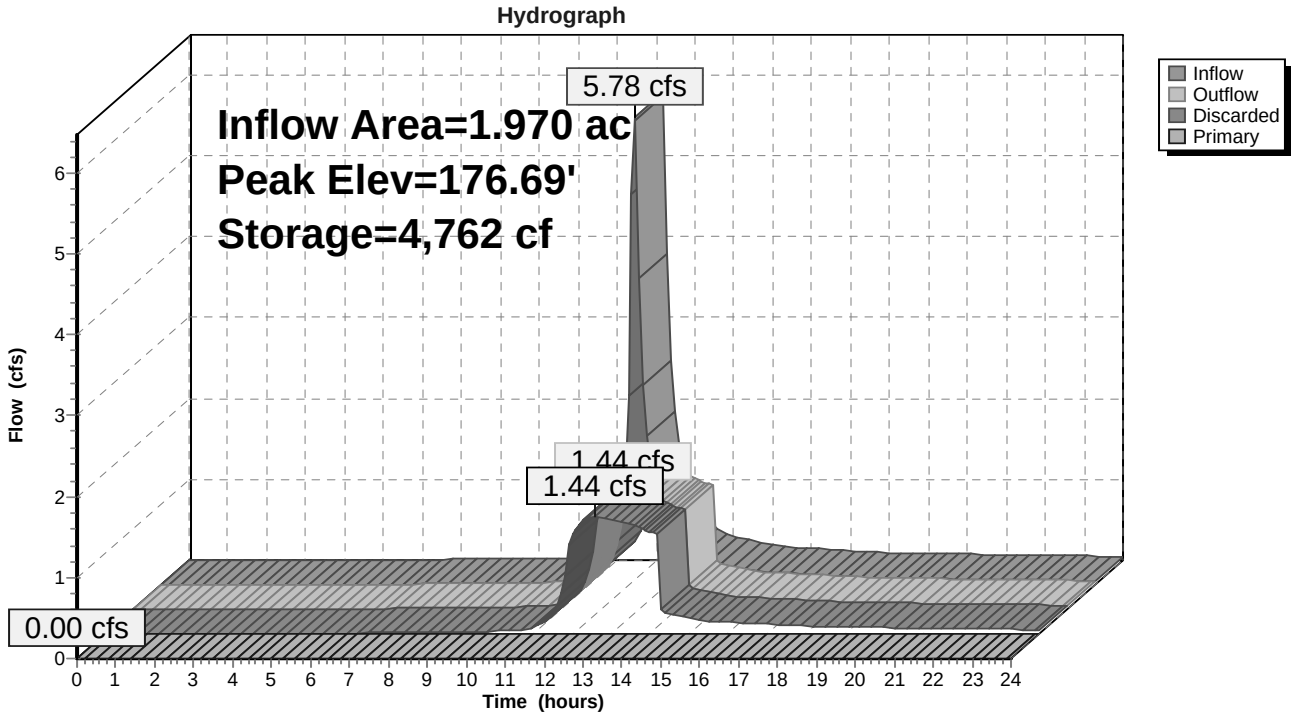
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
176.00	6,371	0	0
177.85	9,497	14,678	14,678

Device	Routing	Invert	Outlet Devices
#1	Primary	176.85'	**20.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	176.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.44 cfs @ 12.61 hrs HW=176.68' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 1.44 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=176.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BASIN CC-2:



Summary for Pond Basin CC-3:

Inflow Area = 0.780 ac, 66.67% Impervious, Inflow Depth > 3.44" for 10-Year event
Inflow = 3.43 cfs @ 12.11 hrs, Volume= 0.223 af
Outflow = 0.25 cfs @ 13.10 hrs, Volume= 0.207 af, Atten= 93%, Lag= 59.6 min
Discarded = 0.25 cfs @ 13.10 hrs, Volume= 0.207 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 176.46' @ 13.10 hrs Surf.Area= 4,451 sf Storage= 5,503 cf

Plug-Flow detention time= 236.7 min calculated for 0.206 af (92% of inflow)
Center-of-Mass det. time= 201.1 min (952.1 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	174.00'	13,726 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

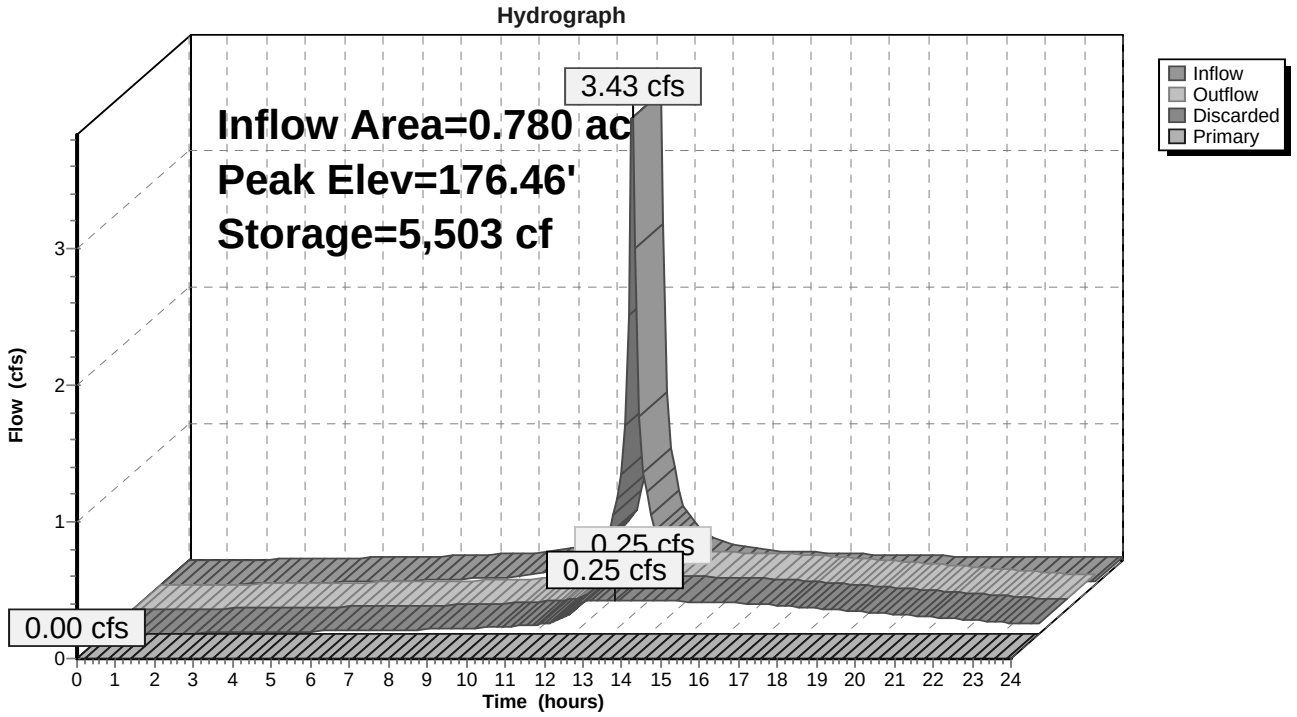
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.00	265	0	0
175.00	1,483	874	874
176.00	3,918	2,701	3,575
178.00	6,233	10,151	13,726

Device	Routing	Invert	Outlet Devices
#1	Primary	177.00'	**50.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	175.00'	**12.0" Round Culvert** L= 247.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 175.00' / 173.50' S= 0.0061 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	176.75'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Discarded	174.00'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.25 cfs @ 13.10 hrs HW=176.46' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.25 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Culvert** (Controls 0.00 cfs)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Basin CC-3:



Summary for Pond FB CC-1:

Inflow Area = 0.100 ac, 30.00% Impervious, Inflow Depth > 3.66" for 10-Year event
Inflow = 0.53 cfs @ 12.11 hrs, Volume= 0.031 af
Outflow = 0.04 cfs @ 13.12 hrs, Volume= 0.030 af, Atten= 93%, Lag= 60.1 min
Discarded = 0.04 cfs @ 13.12 hrs, Volume= 0.030 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 168.41' @ 13.12 hrs Surf.Area= 691 sf Storage= 699 cf

Plug-Flow detention time= 184.7 min calculated for 0.030 af (99% of inflow)
Center-of-Mass det. time= 183.2 min (961.3 - 778.1)

Volume	Invert	Avail.Storage	Storage Description
#1	167.00'	1,798 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

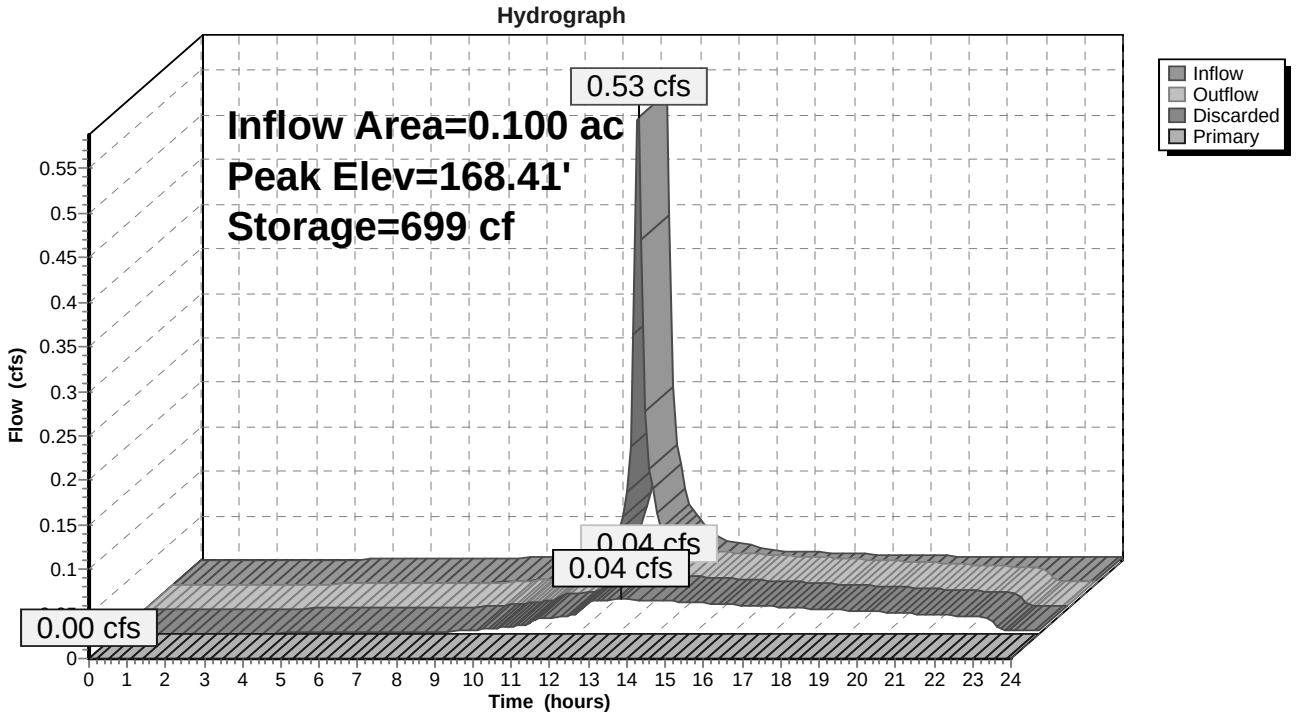
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
167.00	323	0	0
168.00	562	443	443
169.65	1,081	1,355	1,798

Device	Routing	Invert	Outlet Devices
#1	Primary	167.00'	**8.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 167.00' / 166.70' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	169.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	167.00'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.04 cfs @ 13.12 hrs HW=168.41' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=167.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond FB CC-1:


Hydrograph
Inflow
Outflow
Discarded
Primary
0.53 cfs
Inflow Area=0.100 ac
Peak Elev=168.41'
Storage=699 cf
0.04 cfs
0.04 cfs
0.00 cfs
Flow (cfs)
0 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond FB CC-2:

Inflow Area = 0.230 ac, 21.74% Impervious, Inflow Depth > 3.51" for 10-Year event
Inflow = 1.17 cfs @ 12.11 hrs, Volume= 0.067 af
Outflow = 0.09 cfs @ 13.12 hrs, Volume= 0.067 af, Atten= 93%, Lag= 60.0 min
Discarded = 0.09 cfs @ 13.12 hrs, Volume= 0.067 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 170.20' @ 13.12 hrs Surf.Area= 1,567 sf Storage= 1,498 cf

Plug-Flow detention time= 162.9 min calculated for 0.067 af (100% of inflow)
Center-of-Mass det. time= 162.5 min (946.1 - 783.6)

Volume	Invert	Avail.Storage	Storage Description
#1	169.00'	1,997 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

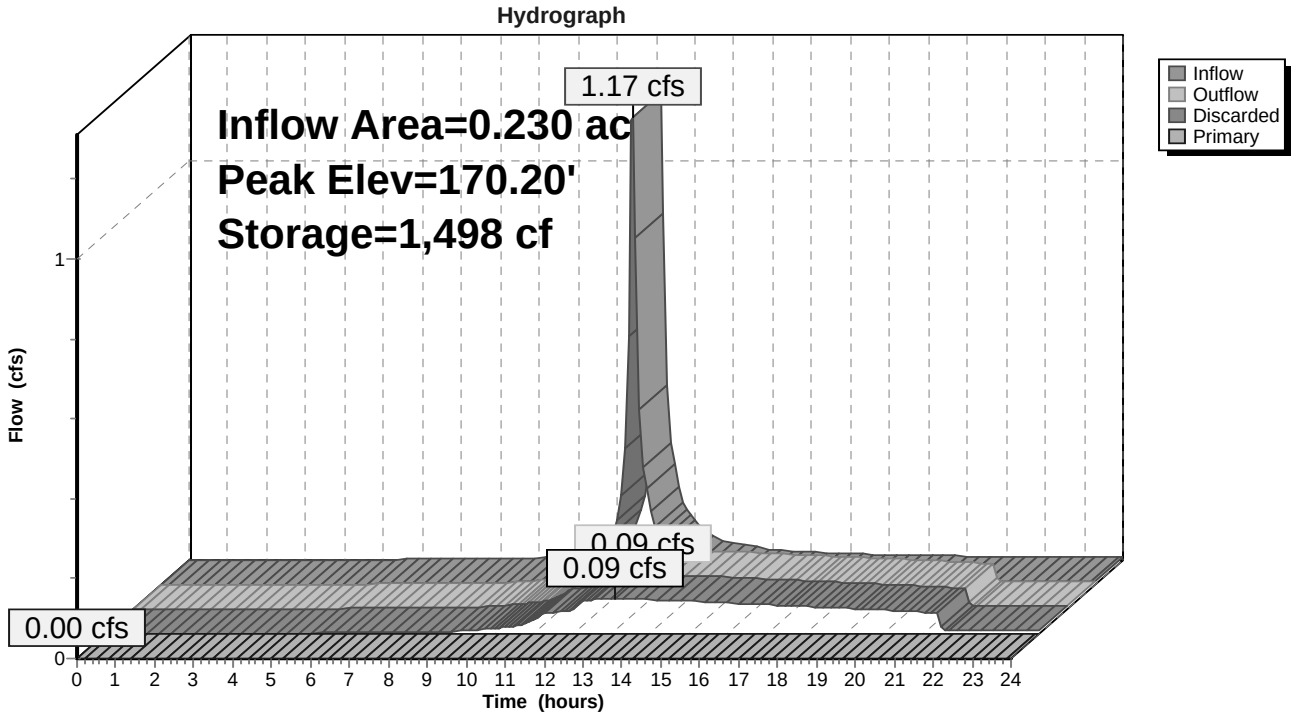
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.00	941	0	0
170.00	1,457	1,199	1,199
170.50	1,736	798	1,997

Device	Routing	Invert	Outlet Devices
#1	Primary	168.25'	**8.0" Round Culvert** L= 83.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 168.25' / 167.80' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	170.25'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	169.00'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.09 cfs @ 13.12 hrs HW=170.20' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=169.00' (Free Discharge)
└**1=Culvert** (Passes 0.00 cfs of 0.86 cfs potential flow)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond FB CC-2:


Hydrograph
Inflow Area=0.230 ac
Peak Elev=170.20'
Storage=1,498 cf
1.17 cfs
0.09 cfs
0.09 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond SIS CC-1:

Inflow Area = 1.110 ac, 91.89% Impervious, Inflow Depth > 4.61" for 10-Year event
Inflow = 6.70 cfs @ 12.11 hrs, Volume= 0.426 af
Outflow = 0.99 cfs @ 12.50 hrs, Volume= 0.423 af, Atten= 85%, Lag= 23.4 min
Discarded = 0.79 cfs @ 11.60 hrs, Volume= 0.422 af
Primary = 0.20 cfs @ 12.50 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 172.75' @ 12.51 hrs Surf.Area= 4,140 sf Storage= 6,682 cf

Plug-Flow detention time= 59.4 min calculated for 0.422 af (99% of inflow)
Center-of-Mass det. time= 55.0 min (801.2 - 746.2)

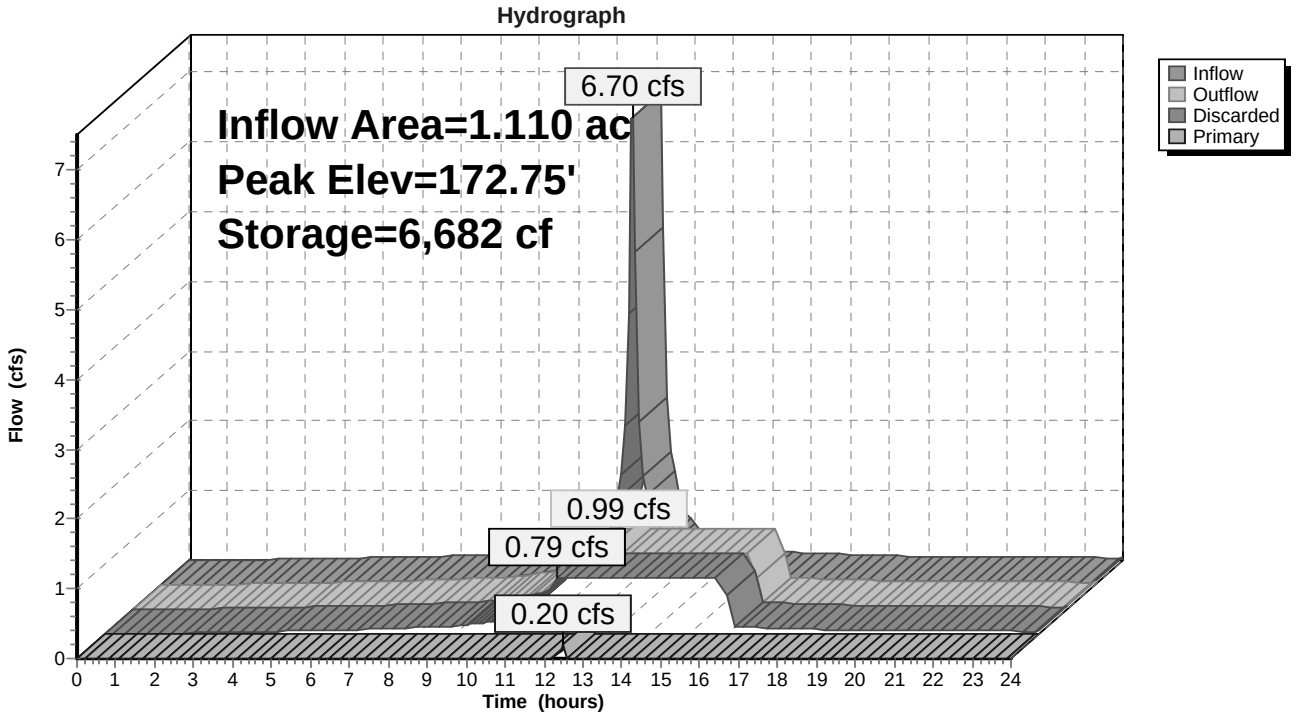
Volume	Invert	Avail.Storage	Storage Description
#1	170.00'	2,446 cf	**46.00'W x 90.00'L x 2.50'H Prismatoid** 10,350 cf Overall - 4,235 cf Embedded = 6,115 cf x 40.0% Voids
#2	170.50'	3,958 cf	**24.0" Round Pipe Storage** x 15 Inside #1 L= 84.0'
#3	170.50'	276 cf	**24.0" Round Pipe Storage** x 2 Inside #1 L= 44.0'
#4	172.50'	6 cf	**2.00'W x 2.00'L x 1.50'H Prismatoid**-Impervious
		6,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	172.50'	**12.0" Round Culvert** L= 14.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 172.50' / 169.00' S= 0.2465 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	170.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.79 cfs @ 11.60 hrs HW=170.06' (Free Discharge)
↑└**2=Exfiltration** (Exfiltration Controls 0.79 cfs)

Primary OutFlow Max=0.20 cfs @ 12.50 hrs HW=172.75' (Free Discharge)
↑└**1=Culvert** (Inlet Controls 0.20 cfs @ 1.33 fps)

Pond SIS CC-1:


Hydrograph
Inflow Area=1.110 ac
Peak Elev=172.75'
Storage=6,682 cf
6.70 cfs
0.99 cfs
0.79 cfs
0.20 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond SIS CC-2:

Inflow Area = 0.320 ac, 62.50% Impervious, Inflow Depth > 3.26" for 10-Year event
Inflow = 1.32 cfs @ 12.11 hrs, Volume= 0.087 af
Outflow = 0.44 cfs @ 12.00 hrs, Volume= 0.086 af, Atten= 67%, Lag= 0.0 min
Discarded = 0.44 cfs @ 12.00 hrs, Volume= 0.086 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 171.66' @ 12.34 hrs Surf.Area= 2,294 sf Storage= 662 cf

Plug-Flow detention time= 12.7 min calculated for 0.086 af (99% of inflow)
Center-of-Mass det. time= 7.1 min (759.6 - 752.6)

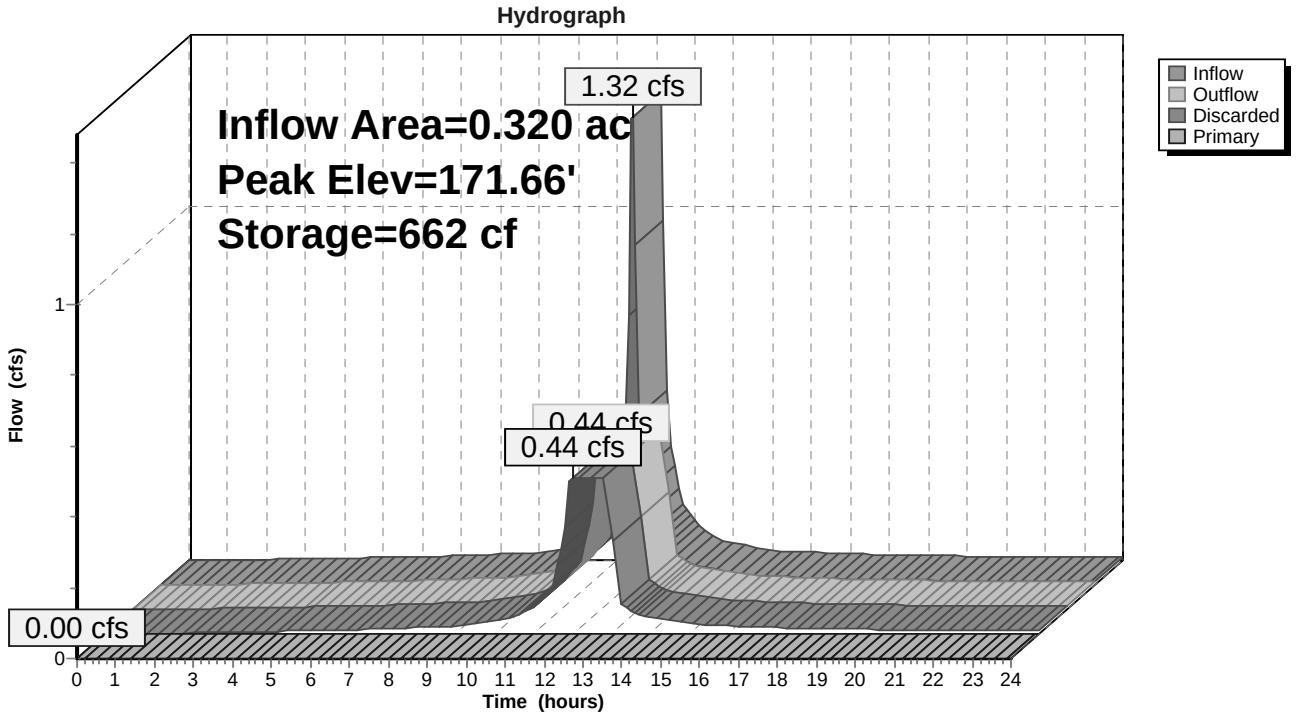
Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	1,026 cf	**37.00'W x 62.00'L x 1.50'H Prismatoid** 3,441 cf Overall - 875 cf Embedded = 2,566 cf x 40.0% Voids
#2	171.50'	820 cf	**12.0" Round Pipe Storage** x 18 Inside #1 L= 58.0'
#3	171.50'	55 cf	**12.0" Round Pipe Storage** x 2 Inside #1 L= 35.0'
		1,901 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	172.50'	**12.0" Round Culvert** L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 172.50' / 171.50' S= 0.0526 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	171.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.44 cfs @ 12.00 hrs HW=171.09' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=171.00' (Free Discharge)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond SIS CC-2:


Hydrograph
Inflow
Outflow
Discarded
Primary
1.32 cfs
Inflow Area=0.320 ac
Peak Elev=171.66'
Storage=662 cf
0.44 cfs
0.44 cfs
0.00 cfs
Flow (cfs)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond SIS CC-3:

Inflow Area = 0.580 ac, 96.55% Impervious, Inflow Depth > 4.86" for 10-Year event
Inflow = 3.71 cfs @ 12.11 hrs, Volume= 0.235 af
Outflow = 0.72 cfs @ 11.80 hrs, Volume= 0.235 af, Atten= 81%, Lag= 0.0 min
Discarded = 0.72 cfs @ 11.80 hrs, Volume= 0.235 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 175.81' @ 12.48 hrs Surf.Area= 3,780 sf Storage= 2,832 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 23.1 min (769.3 - 746.3)

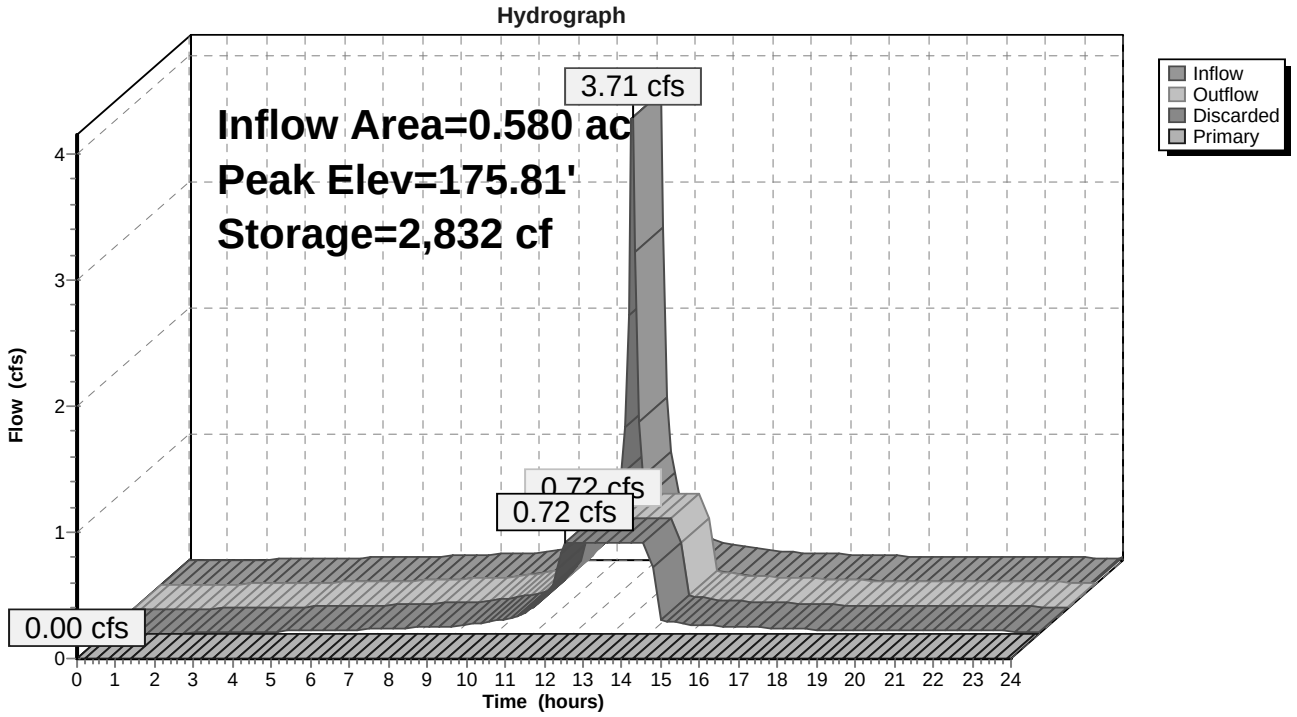
Volume	Invert	Avail.Storage	Storage Description
#1	174.50'	2,008 cf	**21.00'W x 180.00'L x 2.00'H Prismatoid** 7,560 cf Overall - 2,541 cf Embedded = 5,019 cf x 40.0% Voids
#2	175.00'	2,474 cf	**18.0" Round Pipe Storage** x 8 Inside #1 L= 175.0'
#3	175.00'	67 cf	**18.0" Round Pipe Storage** x 2 Inside #1 L= 19.0'
#4	176.50'	10 cf	**2.00'W x 2.00'L x 2.50'H Prismatoid**
		4,559 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	176.50'	**12.0" Round Culvert** L= 36.3' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 176.50' / 174.00' S= 0.0689 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	174.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.72 cfs @ 11.80 hrs HW=174.56' (Free Discharge)
↑└**2=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=174.50' (Free Discharge)
↑└**1=Culvert** (Controls 0.00 cfs)

Pond SIS CC-3:


Hydrograph
Inflow
Outflow
Discarded
Primary
3.71 cfs
Inflow Area=0.580 ac
Peak Elev=175.81'
Storage=2,832 cf
0.72 cfs
0.72 cfs
0.00 cfs
Flow (cfs)
0 1 2 3 4
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond SIS CC-4:

Inflow Area = 0.210 ac,100.00% Impervious, Inflow Depth > 4.99" for 10-Year event
Inflow = 1.38 cfs @ 12.11 hrs, Volume= 0.087 af
Outflow = 0.35 cfs @ 11.90 hrs, Volume= 0.088 af, Atten= 75%, Lag= 0.0 min
Discarded = 0.35 cfs @ 11.90 hrs, Volume= 0.088 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 175.96' @ 12.40 hrs Surf.Area= 1,815 sf Storage= 867 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 14.0 min (759.3 - 745.4)

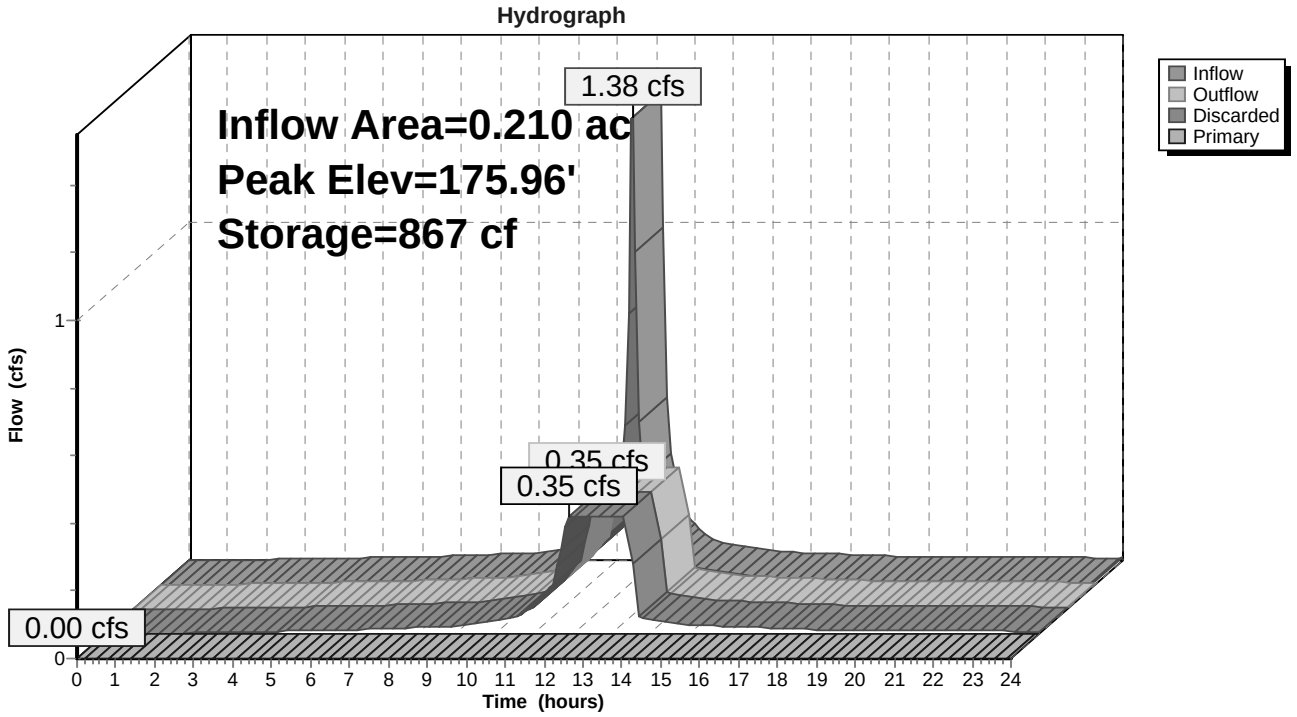
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	830 cf	**11.00'W x 165.00'L x 1.50'H Prismatoid** 2,723 cf Overall - 646 cf Embedded = 2,076 cf x 40.0% Voids
#2	175.50'	632 cf	**12.0" Round Pipe Storage** x 5 Inside #1 L= 161.0'
#3	175.50'	14 cf	**12.0" Round Pipe Storage** x 2 Inside #1 L= 9.0'
#4	176.50'	6 cf	**2.00'W x 2.00'L x 1.50'H Prismatoid**
		1,483 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	176.50'	**12.0" Round Culvert** L= 6.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 176.50' / 176.00' S= 0.0806 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	175.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.35 cfs @ 11.90 hrs HW=175.06' (Free Discharge)
↑└**2=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
↑└**1=Culvert** (Controls 0.00 cfs)

Pond SIS CC-4:

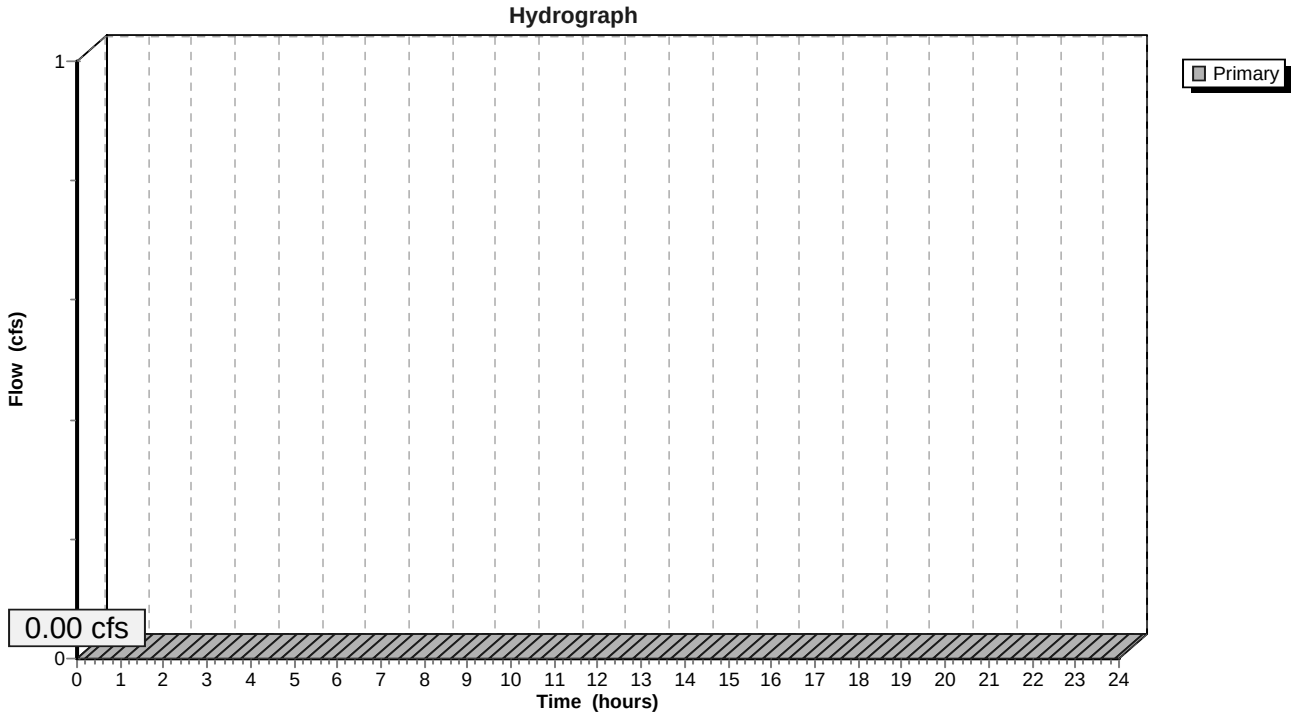

Hydrograph
Inflow Area=0.210 ac
Peak Elev=175.96'
Storage=867 cf
1.38 cfs
0.35 cfs
0.35 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Link POA-1:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-1:

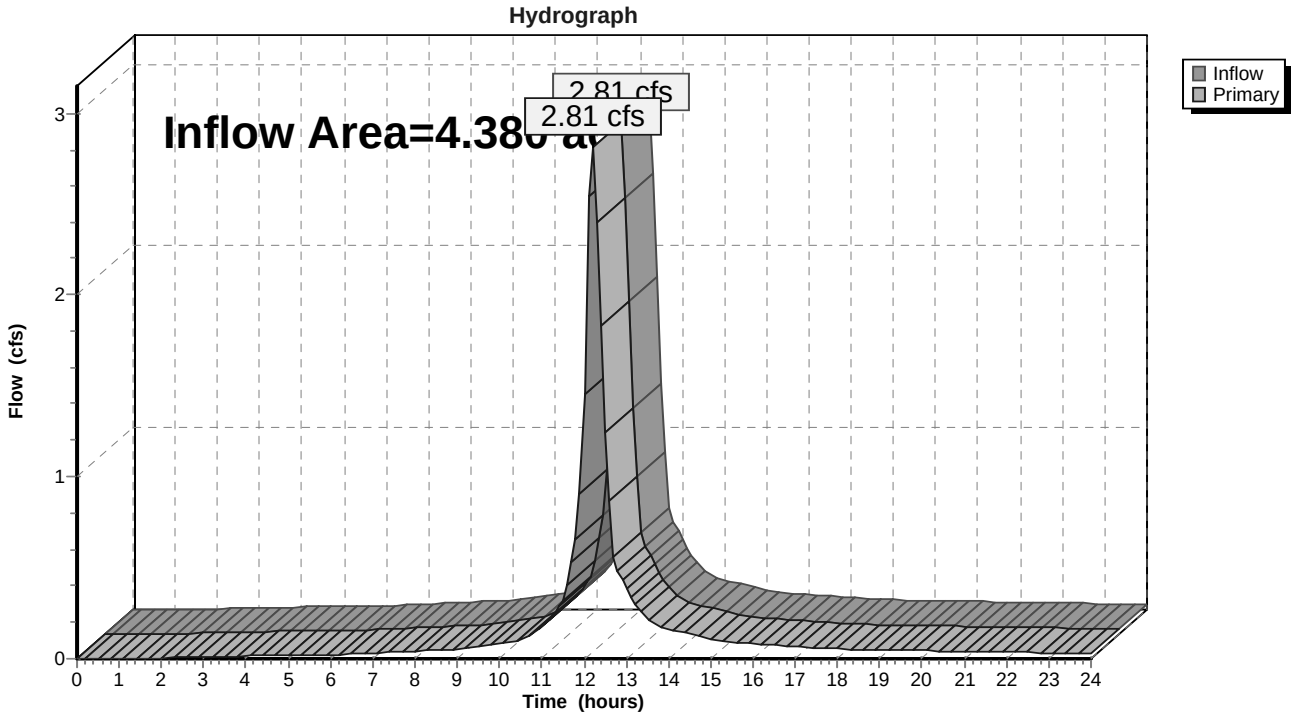


Summary for Link POA-2:

Inflow Area = 4.380 ac, 54.11% Impervious, Inflow Depth > 0.69" for 10-Year event
Inflow = 2.81 cfs @ 12.19 hrs, Volume= 0.253 af
Primary = 2.81 cfs @ 12.19 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-2:

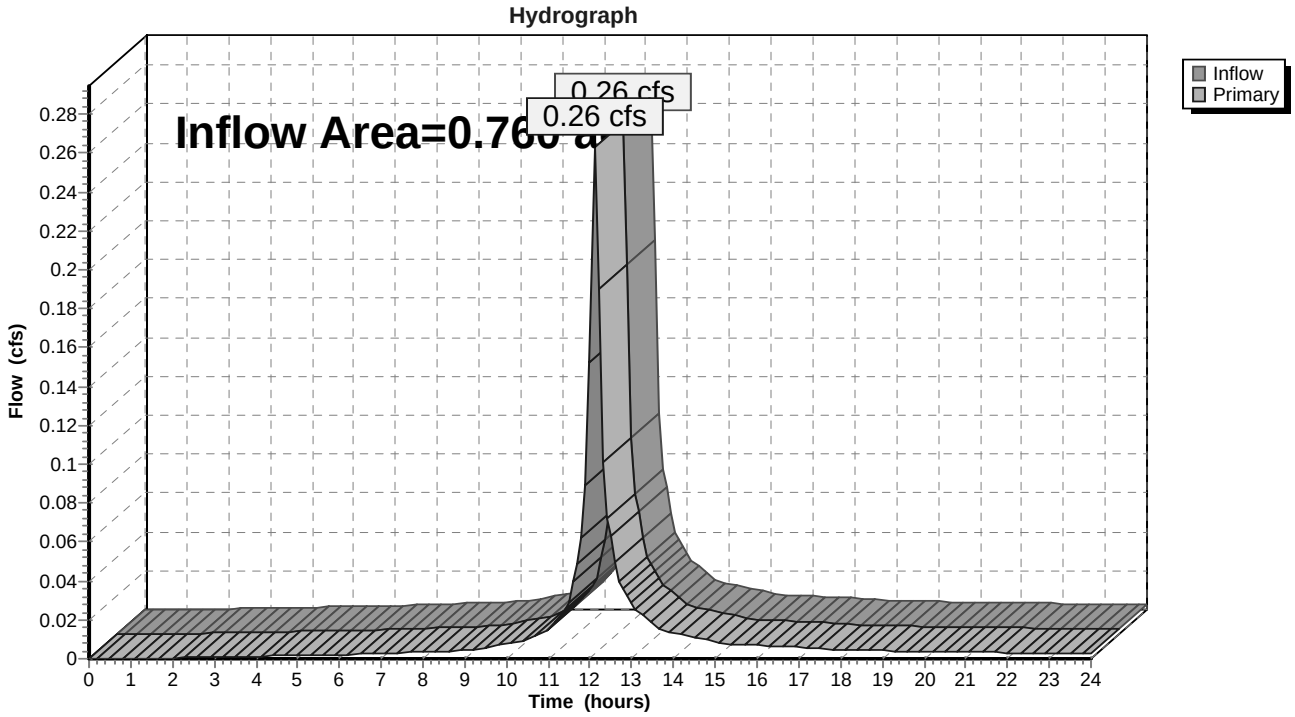


Summary for Link POA-3:

Inflow Area = 0.760 ac, 38.16% Impervious, Inflow Depth > 0.31" for 10-Year event
Inflow = 0.26 cfs @ 12.11 hrs, Volume= 0.020 af
Primary = 0.26 cfs @ 12.11 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-3:

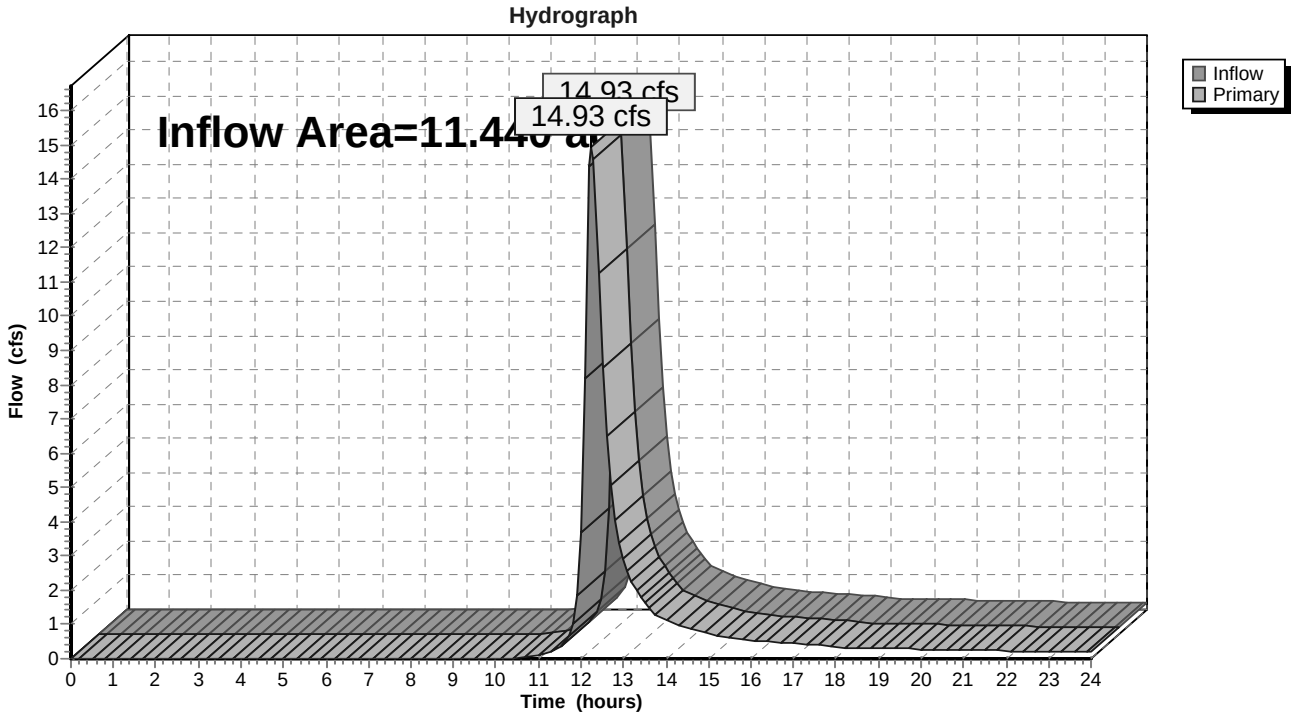


Summary for Link POA-4:

Inflow Area = 11.440 ac, 12.76% Impervious, Inflow Depth > 1.25" for 10-Year event
Inflow = 14.93 cfs @ 12.26 hrs, Volume= 1.187 af
Primary = 14.93 cfs @ 12.26 hrs, Volume= 1.187 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-4:

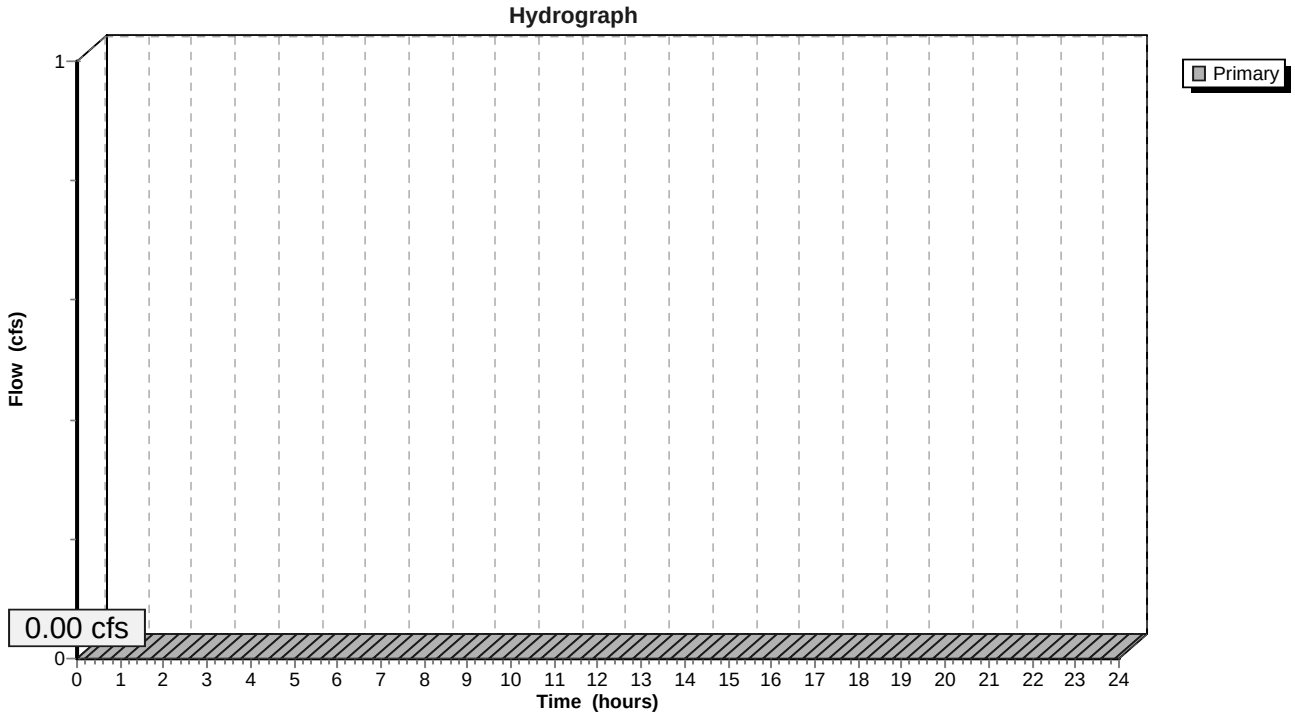


Summary for Link POA-5:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-5:

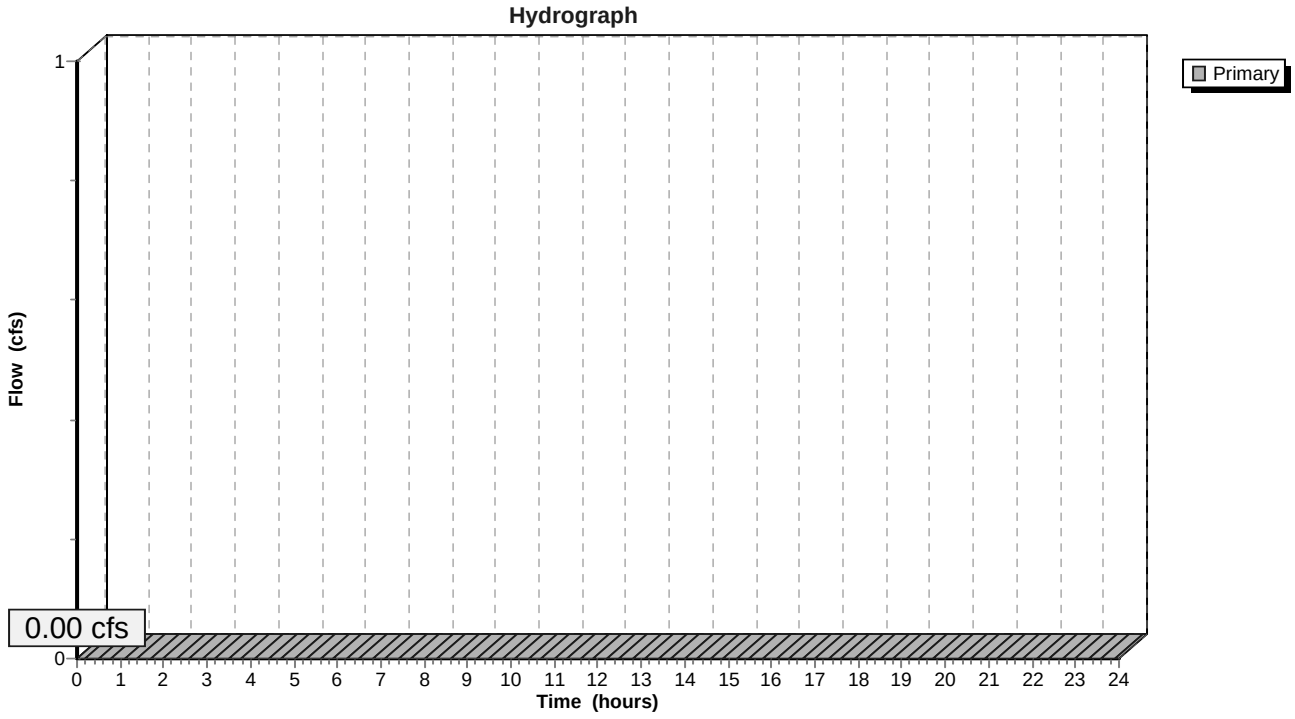


Summary for Link POA-6:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-6:

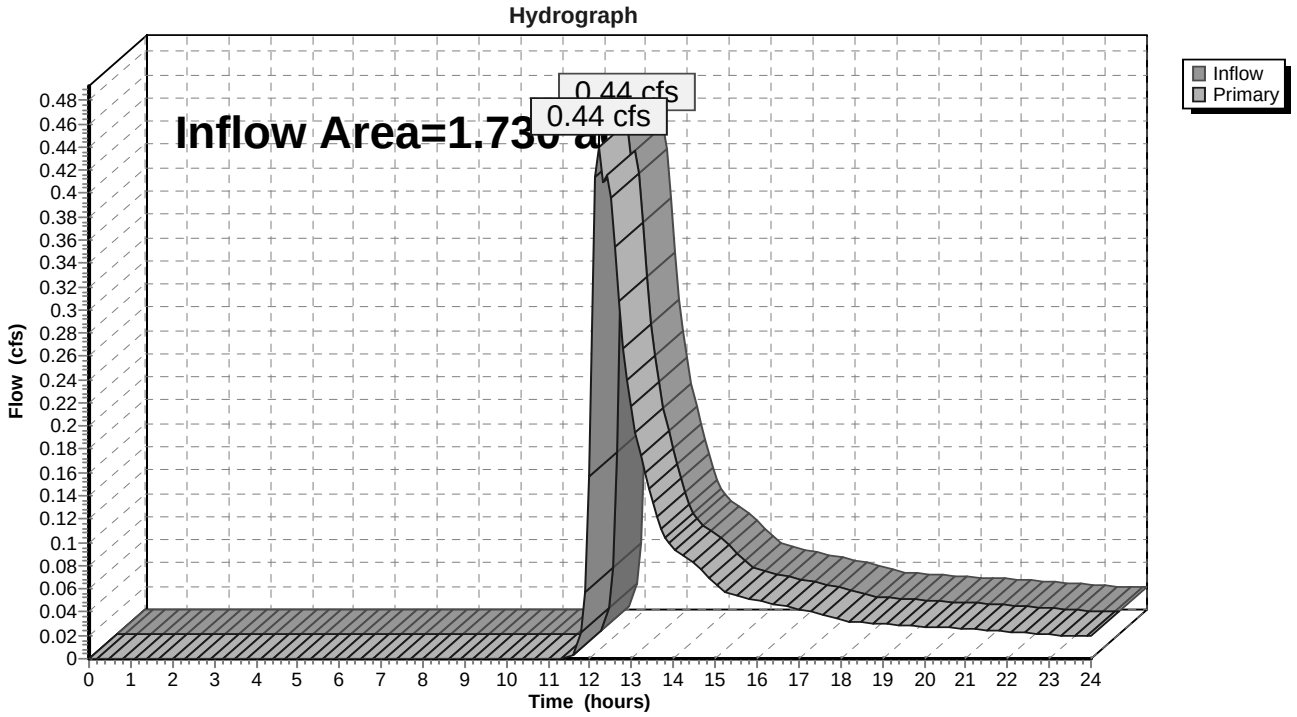


Summary for Link POA-7:

Inflow Area = 1.730 ac, 0.00% Impervious, Inflow Depth > 0.50" for 10-Year event
Inflow = 0.44 cfs @ 12.20 hrs, Volume= 0.072 af
Primary = 0.44 cfs @ 12.20 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-7:



Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment CCPR-2A: Runoff Area=1.730 ac 20.81% Impervious Runoff Depth>2.89"
Flow Length=232' Tc=9.9 min CN=42/98 Runoff=5.84 cfs 0.416 af

Subcatchment CCPR-2B: Runoff Area=1.080 ac 73.15% Impervious Runoff Depth>6.18"
Tc=6.0 min CN=39/98 Runoff=8.56 cfs 0.556 af

Subcatchment CCPR-2C: Runoff Area=0.100 ac 30.00% Impervious Runoff Depth>6.48"
Tc=6.0 min CN=80/98 Runoff=0.92 cfs 0.054 af

Subcatchment CCPR-2D: Runoff Area=0.110 ac 100.00% Impervious Runoff Depth>7.99"
Tc=6.0 min CN=0/98 Runoff=1.14 cfs 0.073 af

Subcatchment CCPR-2E: Runoff Area=0.580 ac 96.55% Impervious Runoff Depth>7.82"
Tc=6.0 min CN=57/98 Runoff=5.90 cfs 0.378 af

Subcatchment CCPR-2F: Runoff Area=0.780 ac 66.67% Impervious Runoff Depth>5.81"
Tc=6.0 min CN=41/98 Runoff=5.82 cfs 0.378 af

Subcatchment CCPR-3A: Runoff Area=0.230 ac 21.74% Impervious Runoff Depth>6.31"
Tc=6.0 min CN=80/98 Runoff=2.08 cfs 0.121 af

Subcatchment CCPR-3B: Runoff Area=0.210 ac 19.05% Impervious Runoff Depth>2.46"
Tc=6.0 min CN=38/98 Runoff=0.60 cfs 0.043 af

Subcatchment CCPR-3C: Runoff Area=0.320 ac 62.50% Impervious Runoff Depth>5.57"
Tc=6.0 min CN=42/98 Runoff=2.30 cfs 0.149 af

Subcatchment CCPR-4A: Runoff Area=6.430 ac 0.78% Impervious Runoff Depth>3.65"
Flow Length=740' Tc=17.6 min CN=61/98 Runoff=26.06 cfs 1.953 af

Subcatchment CCPR-4B: Runoff Area=1.110 ac 91.89% Impervious Runoff Depth>7.44"
Tc=6.0 min CN=39/98 Runoff=10.70 cfs 0.688 af

Subcatchment CCPR-4C: Runoff Area=0.210 ac 100.00% Impervious Runoff Depth>7.99"
Tc=6.0 min CN=0/98 Runoff=2.18 cfs 0.140 af

Subcatchment CCPR-4E: Runoff Area=0.570 ac 31.58% Impervious Runoff Depth>5.00"
Tc=6.0 min CN=61/98 Runoff=4.00 cfs 0.237 af

Subcatchment MCPR-4A: Runoff Area=1.720 ac 0.00% Impervious Runoff Depth>5.13"
Flow Length=485' Tc=11.1 min CN=74/0 Runoff=11.84 cfs 0.735 af

Subcatchment MCPR-4B: Runoff Area=1.400 ac 0.00% Impervious Runoff Depth>4.66"
Flow Length=485' Tc=11.1 min CN=70/0 Runoff=8.82 cfs 0.543 af

Subcatchment PRCC-7A: Runoff Area=1.520 ac 0.00% Impervious Runoff Depth>1.55"
Flow Length=410' Tc=16.8 min CN=42/0 Runoff=2.24 cfs 0.196 af

Subcatchment PRCC-7B: Runoff Area=0.210 ac 0.00% Impervious Runoff Depth>3.50"
Tc=6.0 min CN=60/0 Runoff=1.11 cfs 0.061 af

Pond BASIN CC-1: Peak Elev=176.10' Storage=5,566 cf Inflow=8.56 cfs 0.556 af
Discarded=0.74 cfs 0.416 af Primary=5.34 cfs 0.132 af Outflow=6.08 cfs 0.548 af

Pond BASIN CC-2: Peak Elev=177.14' Storage=8,354 cf Inflow=11.99 cfs 0.781 af
Discarded=1.59 cfs 0.594 af Primary=7.45 cfs 0.187 af Outflow=9.04 cfs 0.780 af

Pond Basin CC-3: Peak Elev=176.97' Storage=7,938 cf Inflow=5.82 cfs 0.378 af
Discarded=0.28 cfs 0.269 af Primary=1.37 cfs 0.071 af Outflow=1.65 cfs 0.340 af

Pond FB CC-1: Peak Elev=169.04' Storage=1,195 cf Inflow=0.92 cfs 0.054 af
Discarded=0.05 cfs 0.045 af Primary=0.16 cfs 0.005 af Outflow=0.20 cfs 0.049 af

Pond FB CC-2: Peak Elev=170.43' Storage=1,872 cf Inflow=2.08 cfs 0.121 af
Discarded=0.09 cfs 0.086 af Primary=1.32 cfs 0.035 af Outflow=1.41 cfs 0.121 af

Pond SIS CC-1: Peak Elev=173.30' Storage=6,684 cf Inflow=10.70 cfs 0.688 af
Discarded=0.79 cfs 0.525 af Primary=1.49 cfs 0.030 af Outflow=2.28 cfs 0.555 af

Pond SIS CC-2: Peak Elev=172.37' Storage=1,746 cf Inflow=2.30 cfs 0.149 af
Discarded=0.44 cfs 0.148 af Primary=0.00 cfs 0.000 af Outflow=0.44 cfs 0.148 af

Pond SIS CC-3: Peak Elev=176.60' Storage=4,549 cf Inflow=5.90 cfs 0.378 af
Discarded=0.72 cfs 0.347 af Primary=0.05 cfs 0.000 af Outflow=0.77 cfs 0.348 af

Pond SIS CC-4: Peak Elev=176.73' Storage=1,478 cf Inflow=2.18 cfs 0.140 af
Discarded=0.35 cfs 0.131 af Primary=0.16 cfs 0.002 af Outflow=0.51 cfs 0.132 af

Link POA-1:
Primary=0.00 cfs 0.000 af

Link POA-2: Inflow=12.10 cfs 0.698 af
Primary=12.10 cfs 0.698 af

Link POA-3: Inflow=1.77 cfs 0.078 af
Primary=1.77 cfs 0.078 af

Link POA-4: Inflow=41.69 cfs 2.907 af
Primary=41.69 cfs 2.907 af

Link POA-5:
Primary=0.00 cfs 0.000 af

Link POA-6:
Primary=0.00 cfs 0.000 af

Link POA-7: Inflow=2.71 cfs 0.257 af
Primary=2.71 cfs 0.257 af

Total Runoff Area = 18.310 ac Runoff Volume = 6.721 af Average Runoff Depth = 4.40"
77.50% Pervious = 14.190 ac 22.50% Impervious = 4.120 ac

Summary for Subcatchment CCPR-2A:

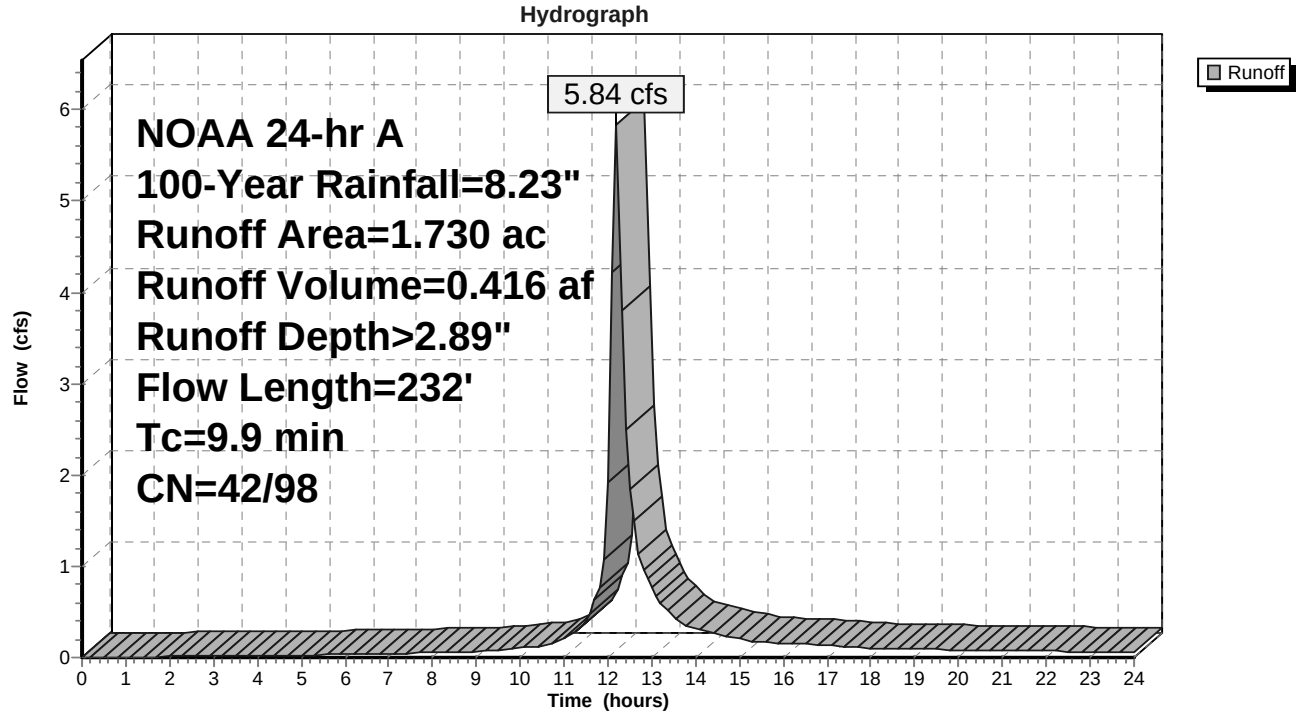
Runoff = 5.84 cfs @ 12.19 hrs, Volume= 0.416 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

	Area (ac)	CN	Description
	0.600	30	Woods, Good, HSG A
*	0.220	77	Wetlands, HSG A
	0.170	30	Meadow, non-grazed, HSG A
	0.290	98	Paved parking, HSG A
	0.070	98	Paved parking, HSG D
	0.320	39	>75% Grass cover, Good, HSG A
	0.060	80	>75% Grass cover, Good, HSG D
	1.730	54	Weighted Average
	1.370	42	79.19% Pervious Area
	0.360	98	20.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	25	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
6.6	207	0.0110	0.52		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.9	232	Total			

Subcatchment CCPR-2A:



Summary for Subcatchment CCPR-2B:

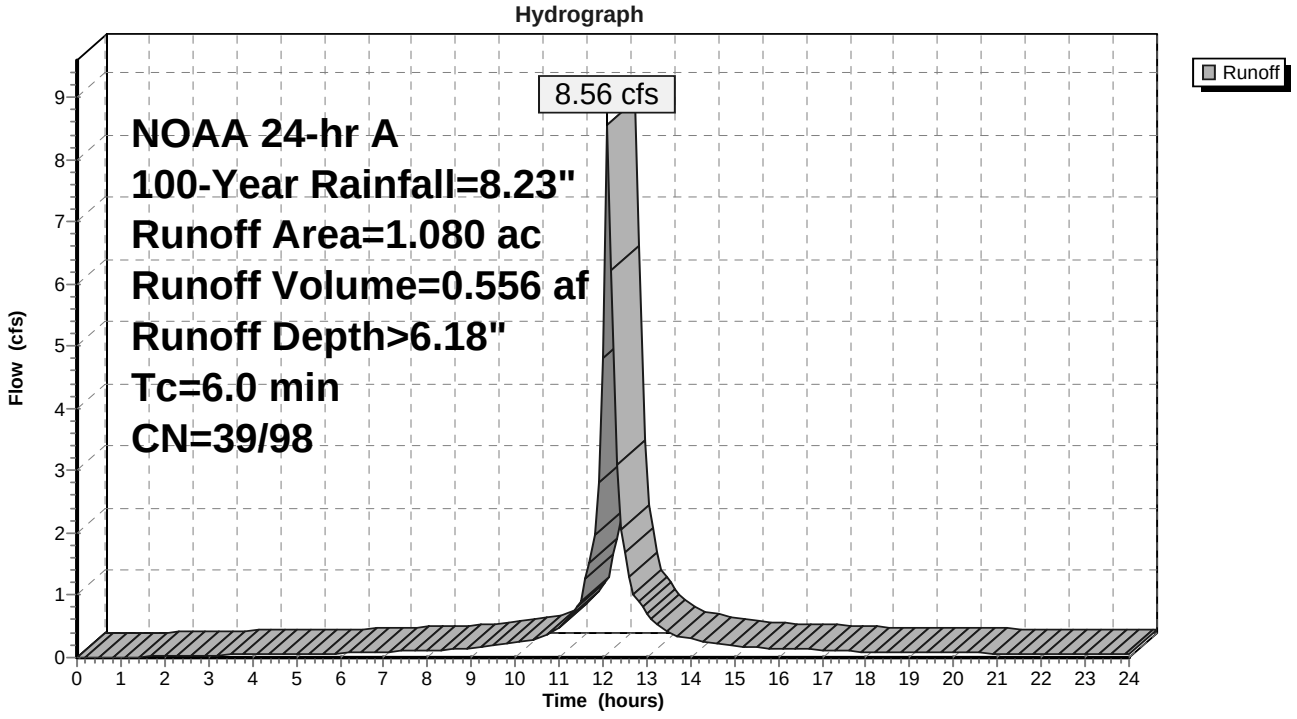
Runoff = 8.56 cfs @ 12.11 hrs, Volume= 0.556 af, Depth> 6.18"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.450	98	Roofs, HSG A
0.290	39	>75% Grass cover, Good, HSG A
0.090	98	Water Surface, HSG A
0.250	98	Paved parking, HSG A
1.080	82	Weighted Average
0.290	39	26.85% Pervious Area
0.790	98	73.15% Impervious Area

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

Subcatchment CCPR-2B:



Summary for Subcatchment CCPR-2C:

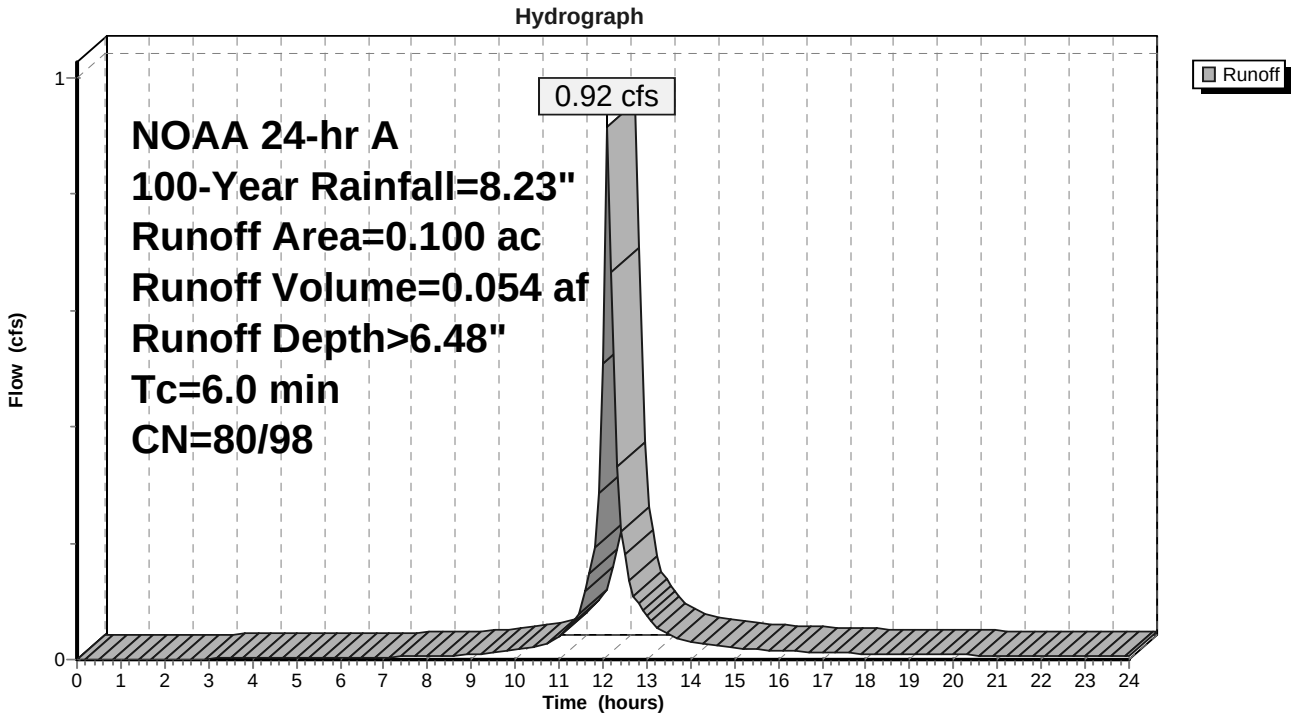
Runoff = 0.92 cfs @ 12.11 hrs, Volume= 0.054 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.030	98	Paved parking, HSG D
0.070	80	>75% Grass cover, Good, HSG D
0.100	85	Weighted Average
0.070	80	70.00% Pervious Area
0.030	98	30.00% Impervious Area

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

Subcatchment CCPR-2C:



Summary for Subcatchment CCPR-2D:

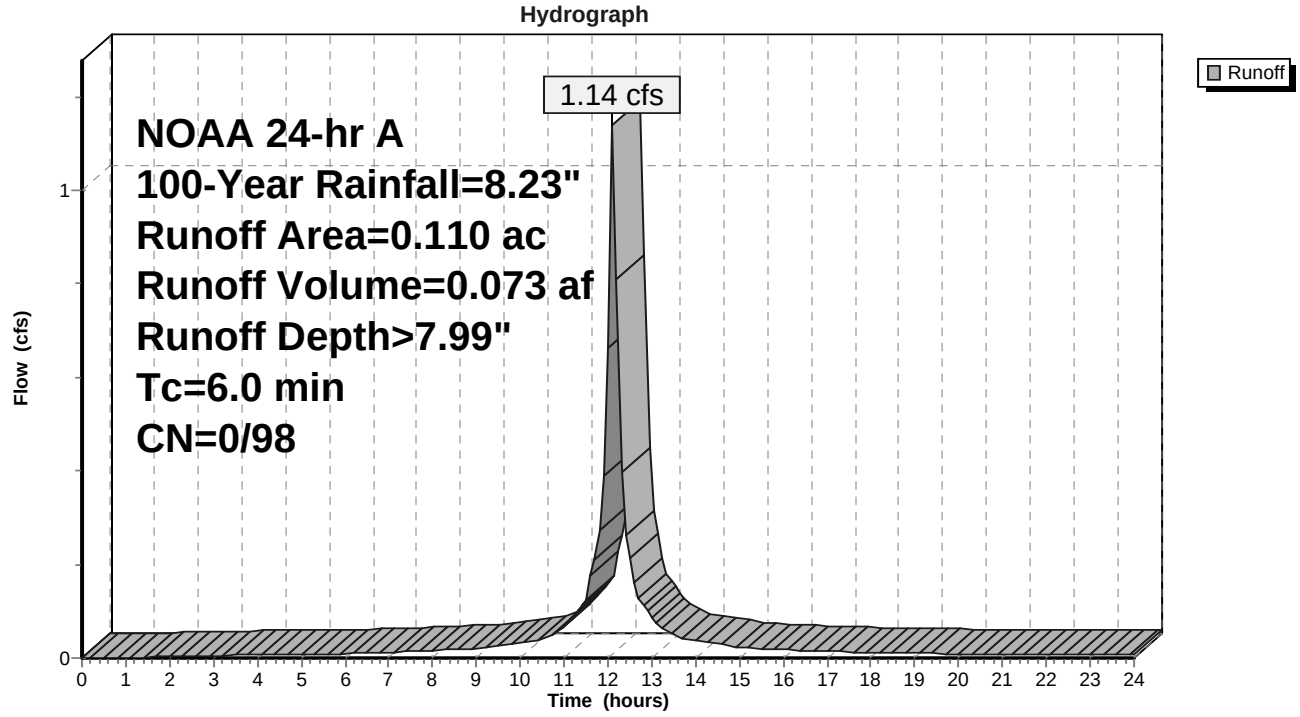
Runoff = 1.14 cfs @ 12.11 hrs, Volume= 0.073 af, Depth> 7.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.100	98	Roofs, HSG A
0.010	98	Roofs, HSG D
0.110	98	Weighted Average
0.110	98	100.00% Impervious Area

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

Subcatchment CCPR-2D:



Summary for Subcatchment CCPR-2E:

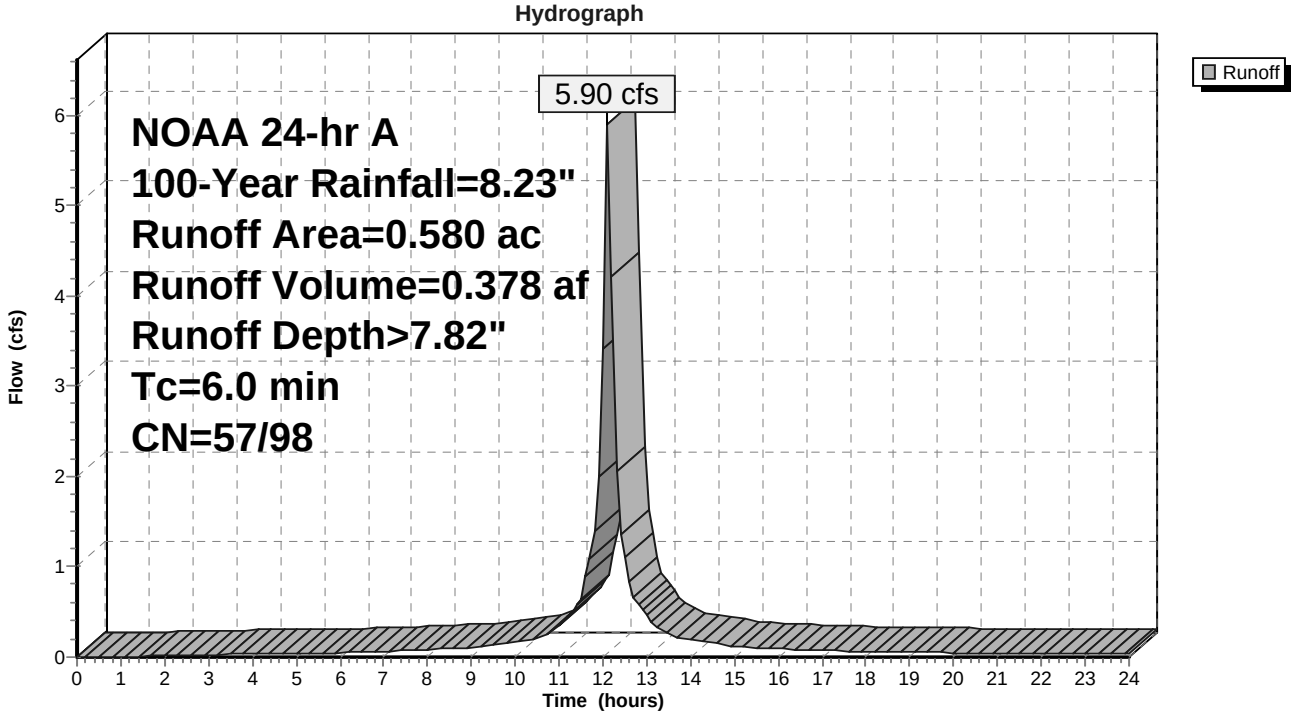
Runoff = 5.90 cfs @ 12.11 hrs, Volume= 0.378 af, Depth> 7.82"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG A
0.170	98	Paved parking, HSG C
0.010	39	>75% Grass cover, Good, HSG A
0.010	74	>75% Grass cover, Good, HSG C
0.220	98	Roofs, HSG A
0.580	97	Weighted Average
0.020	57	3.45% Pervious Area
0.560	98	96.55% Impervious Area

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

Subcatchment CCPR-2E:



Summary for Subcatchment CCPR-2F:

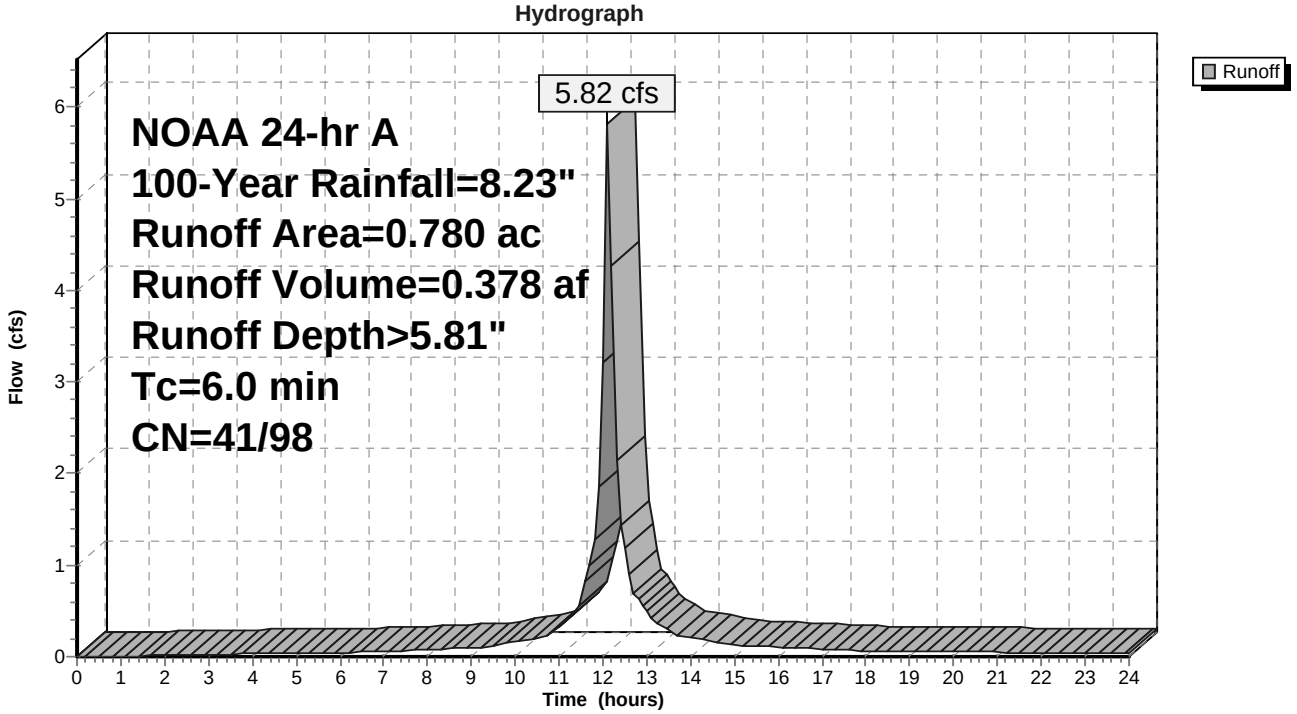
Runoff = 5.82 cfs @ 12.11 hrs, Volume= 0.378 af, Depth> 5.81"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.250	98	Paved parking, HSG A
0.150	98	Paved parking, HSG C
0.030	98	Roofs, HSG A
0.090	98	Water Surface, HSG A
0.130	39	>75% Grass cover, Good, HSG A
0.010	74	>75% Grass cover, Good, HSG C
0.100	30	Meadow, non-grazed, HSG A
0.020	96	Gravel surface, HSG A
0.780	79	Weighted Average
0.260	41	33.33% Pervious Area
0.520	98	66.67% Impervious Area

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

Subcatchment CCPR-2F:



Summary for Subcatchment CCPR-3A:

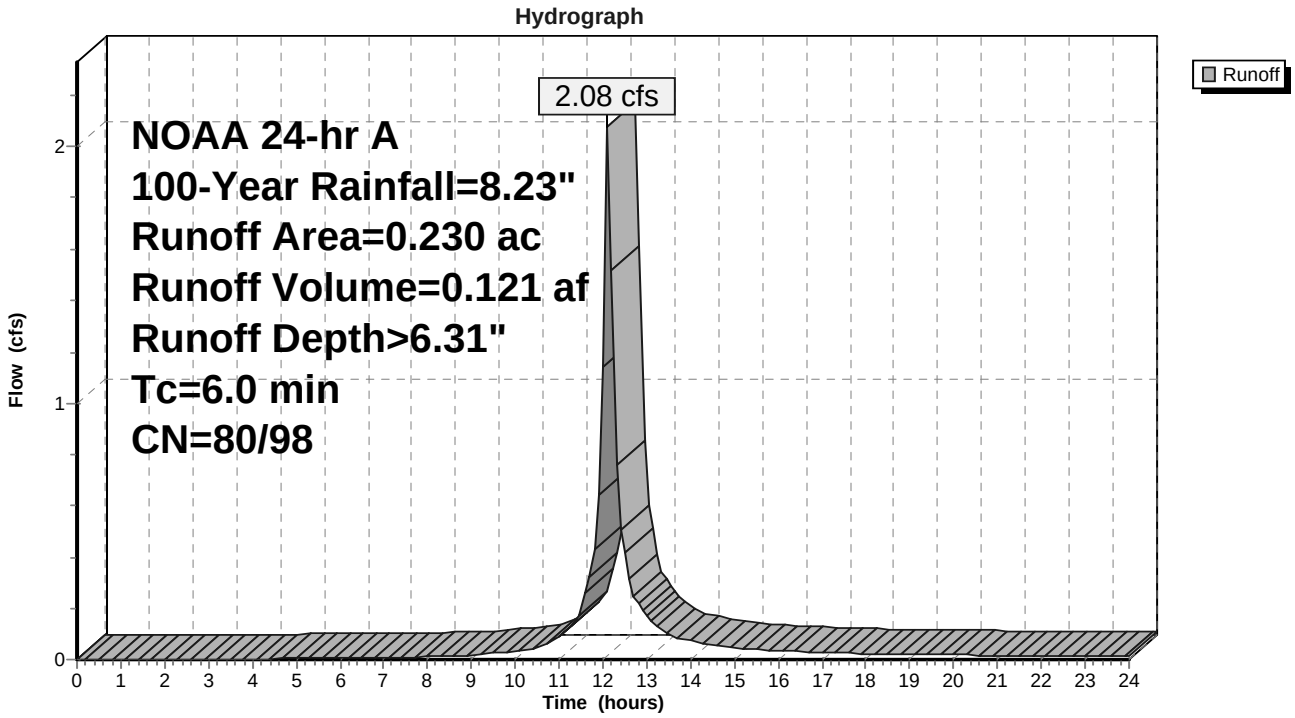
Runoff = 2.08 cfs @ 12.11 hrs, Volume= 0.121 af, Depth> 6.31"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.180	80	>75% Grass cover, Good, HSG D
0.050	98	Paved parking, HSG D
0.230	84	Weighted Average
0.180	80	78.26% Pervious Area
0.050	98	21.74% Impervious Area

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

Subcatchment CCPR-3A:



Summary for Subcatchment CCPR-3B:

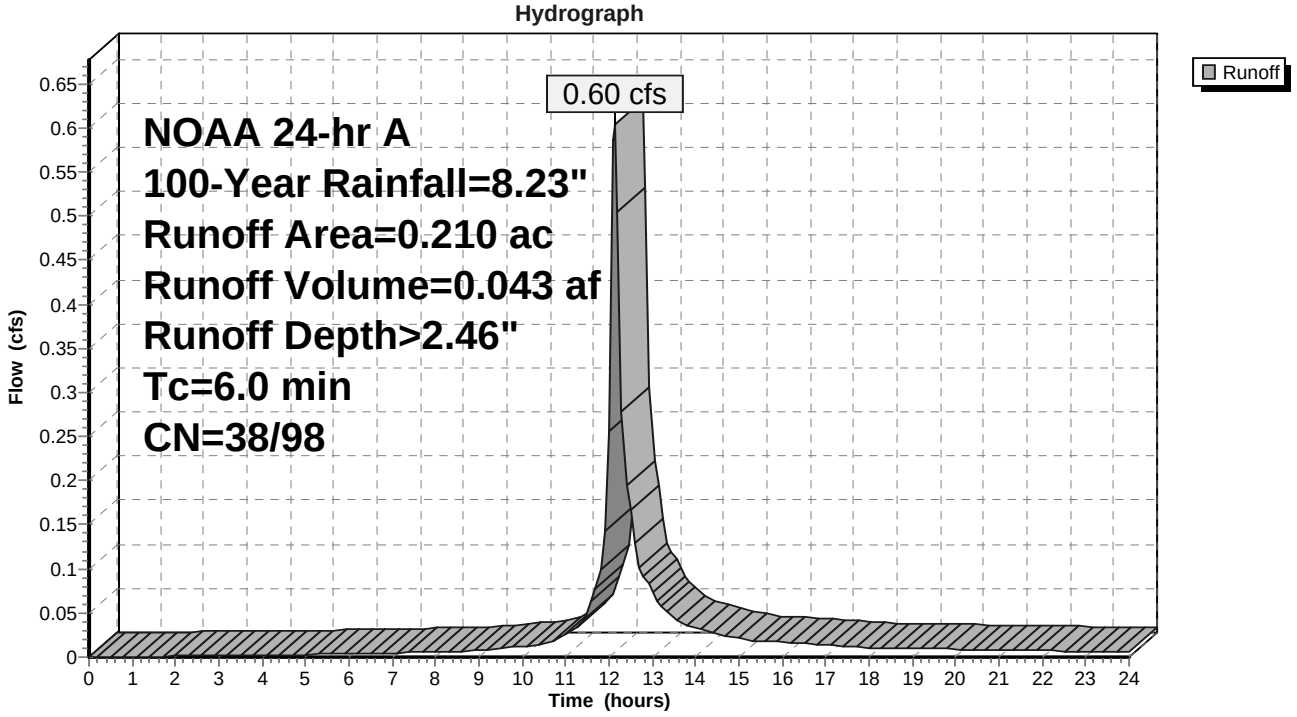
Runoff = 0.60 cfs @ 12.13 hrs, Volume= 0.043 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.100	39	>75% Grass cover, Good, HSG A
0.010	80	>75% Grass cover, Good, HSG D
0.060	30	Brush, Good, HSG A
0.030	98	Water Surface, HSG A
0.010	98	Paved parking, HSG A
0.210	50	Weighted Average
0.170	38	80.95% Pervious Area
0.040	98	19.05% Impervious Area

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

Subcatchment CCPR-3B:



Summary for Subcatchment CCPR-3C:

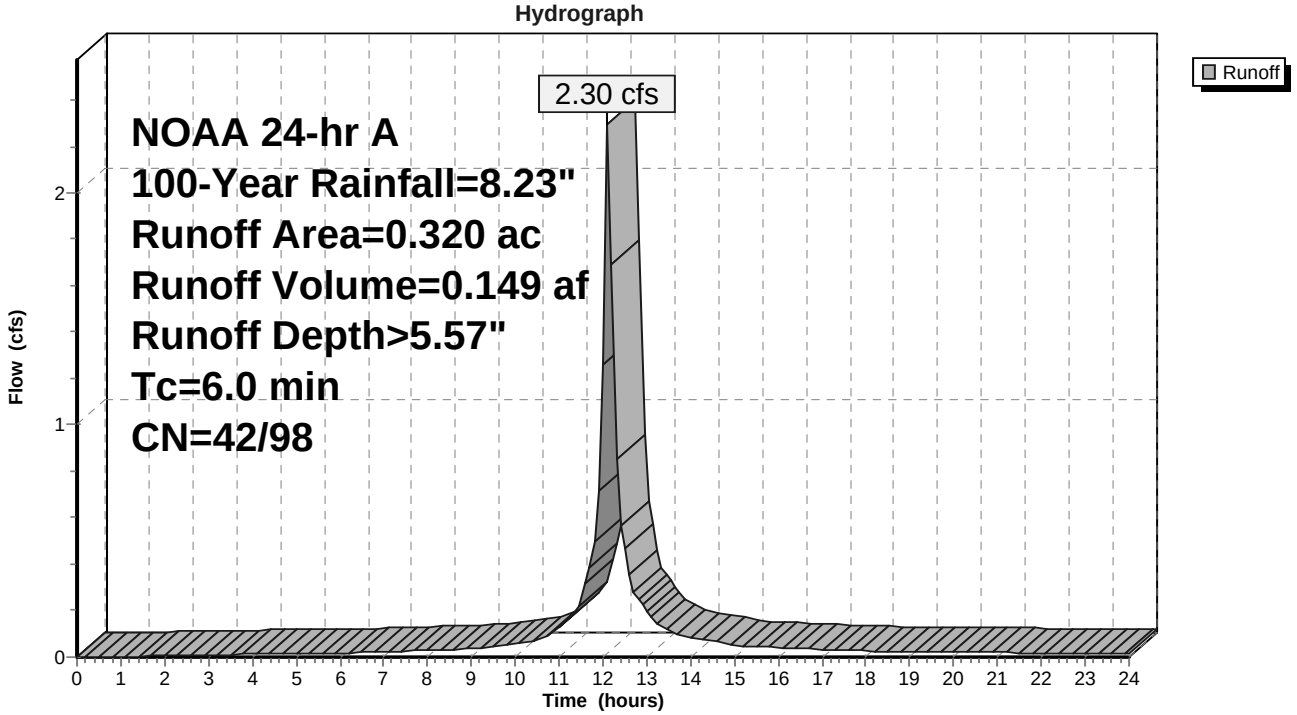
Runoff = 2.30 cfs @ 12.11 hrs, Volume= 0.149 af, Depth> 5.57"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.030	98	Paved parking, HSG A
0.040	98	Roofs, HSG A
0.110	39	>75% Grass cover, Good, HSG A
0.010	80	>75% Grass cover, Good, HSG D
0.130	98	Water Surface, HSG A
0.320	77	Weighted Average
0.120	42	37.50% Pervious Area
0.200	98	62.50% Impervious Area

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

Subcatchment CCPR-3C:



Summary for Subcatchment CCPR-4A:

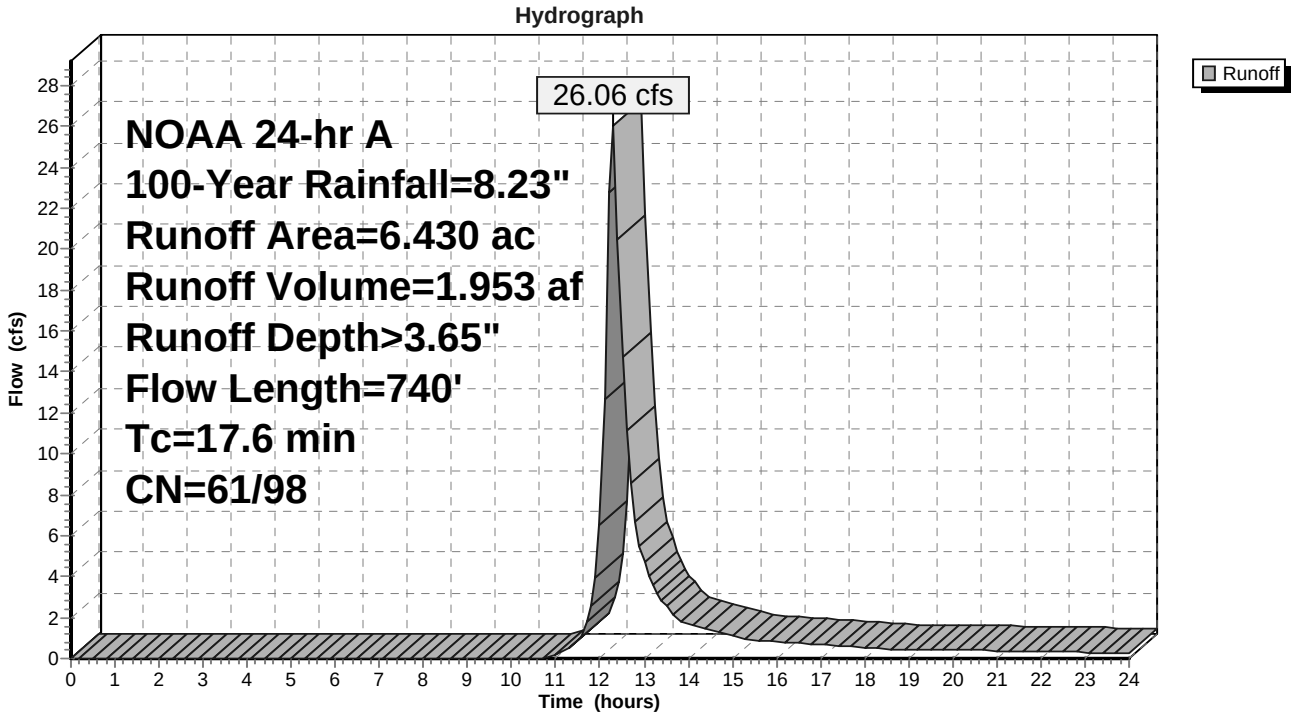
Runoff = 26.06 cfs @ 12.29 hrs, Volume= 1.953 af, Depth> 3.65"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

	Area (ac)	CN	Description
	0.490	30	Brush, Good, HSG A
*	1.810	77	Wetlands, HSG A
	0.310	30	Meadow, non-grazed, HSG A
	0.330	30	Woods, Good, HSG A
	0.030	55	Woods, Good, HSG B
	0.070	48	Brush, Good, HSG B
	0.360	65	Brush, Good, HSG C
	0.980	70	Woods, Good, HSG C
	0.600	77	Woods, Good, HSG D
	0.550	73	Brush, Good, HSG D
	0.850	39	>75% Grass cover, Good, HSG A
	0.030	98	Water Surface, HSG A
	0.020	98	Roofs, HSG A
	6.430	61	Weighted Average
	6.380	61	99.22% Pervious Area
	0.050	98	0.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
11.9	690	0.0190	0.96		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.6	740	Total			

Subcatchment CCPR-4A:



Summary for Subcatchment CCPR-4B:

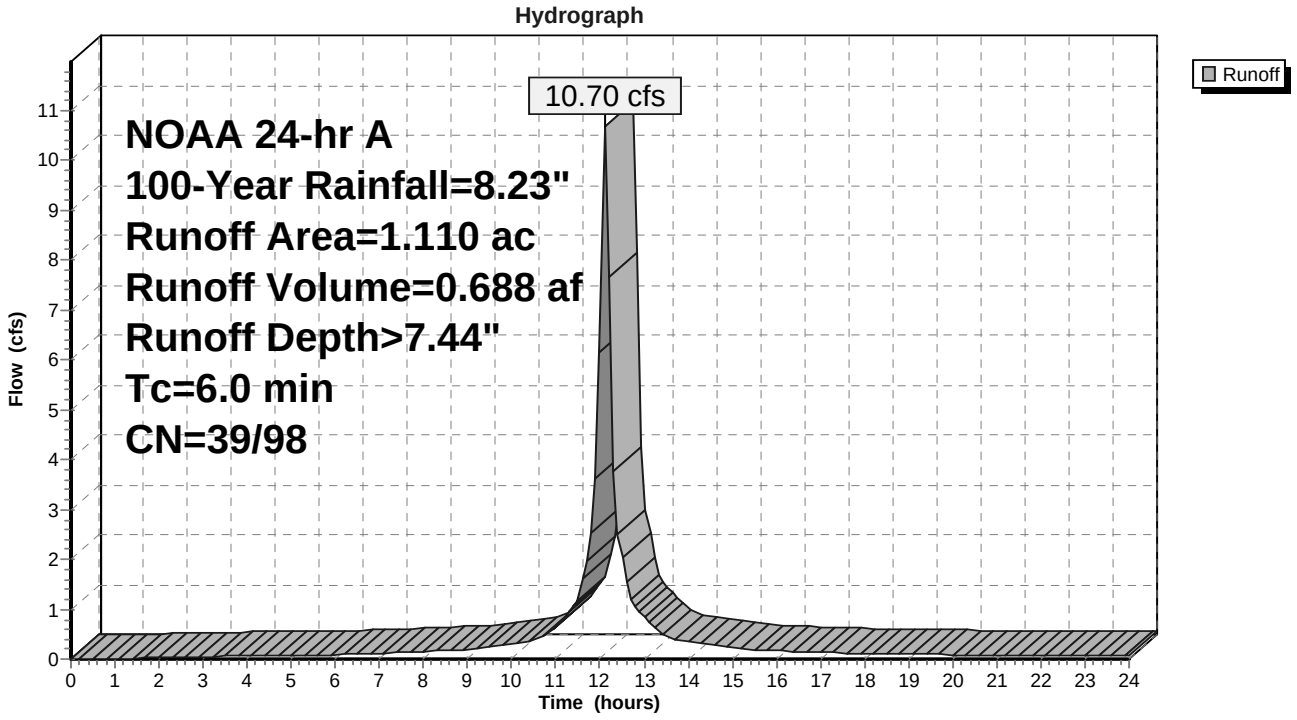
Runoff = 10.70 cfs @ 12.11 hrs, Volume= 0.688 af, Depth> 7.44"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.610	98	Paved parking, HSG A
0.410	98	Roofs, HSG A
0.090	39	>75% Grass cover, Good, HSG A
1.110	93	Weighted Average
0.090	39	8.11% Pervious Area
1.020	98	91.89% Impervious Area

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

Subcatchment CCPR-4B:



Summary for Subcatchment CCPR-4C:

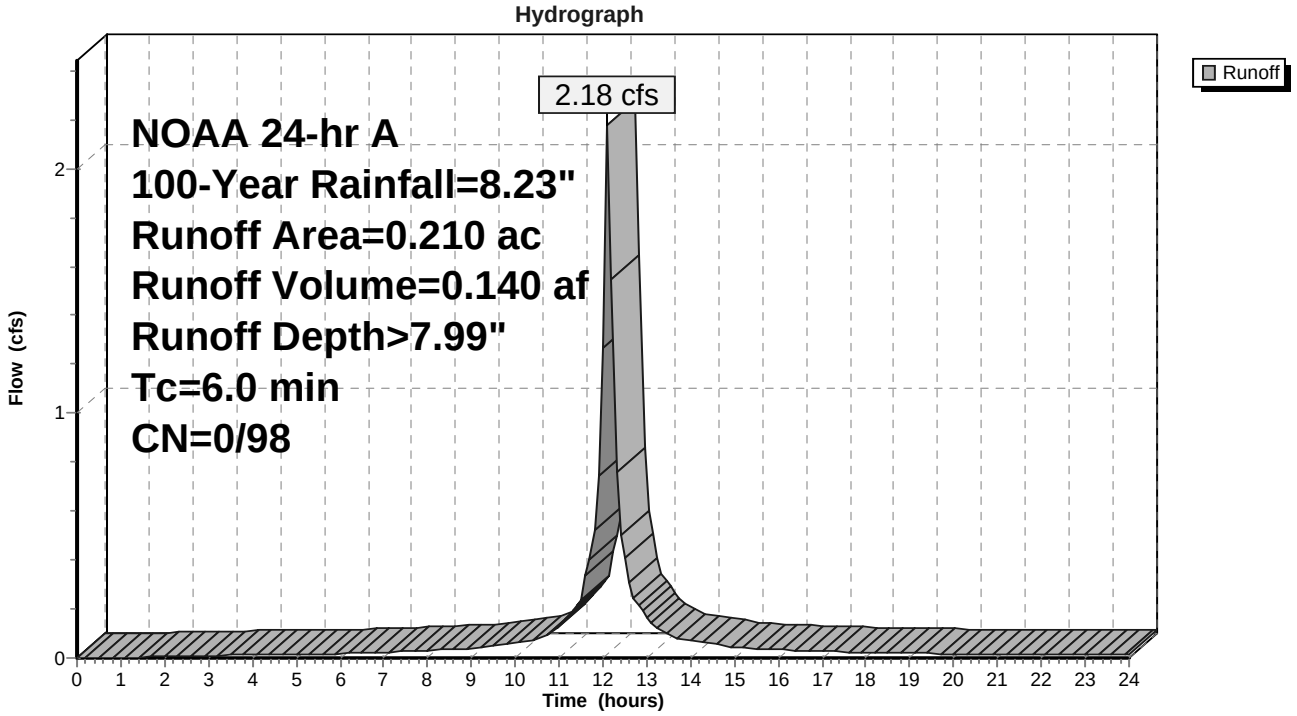
Runoff = 2.18 cfs @ 12.11 hrs, Volume= 0.140 af, Depth> 7.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.210	98	Roofs, HSG A
0.210	98	100.00% Impervious Area

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

Subcatchment CCPR-4C:



Summary for Subcatchment CCPR-4E:

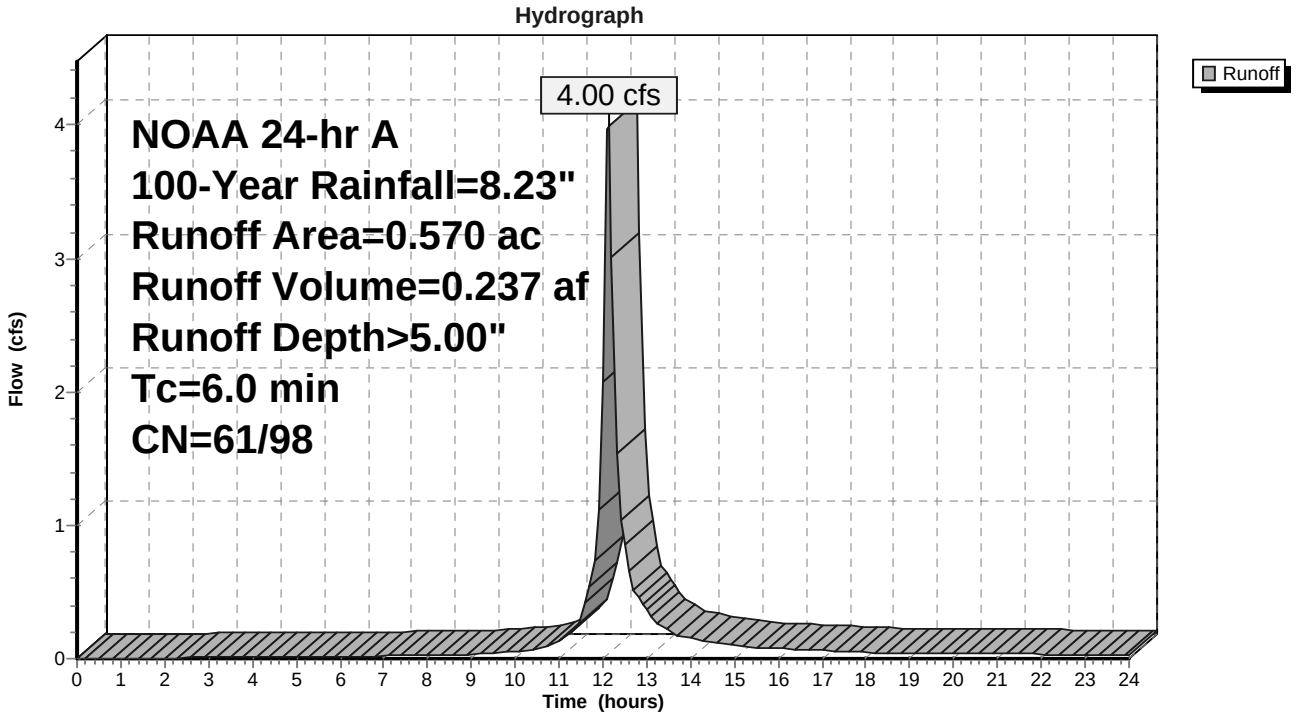
Runoff = 4.00 cfs @ 12.12 hrs, Volume= 0.237 af, Depth> 5.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.020	98	Roofs, HSG A
0.010	98	Roofs, HSG C
0.140	39	>75% Grass cover, Good, HSG A
0.250	74	>75% Grass cover, Good, HSG C
0.140	98	Water Surface, HSG A
0.010	98	Water Surface, HSG C
0.570	73	Weighted Average
0.390	61	68.42% Pervious Area
0.180	98	31.58% Impervious Area

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

Subcatchment CCPR-4E:



Summary for Subcatchment MCPR-4A:

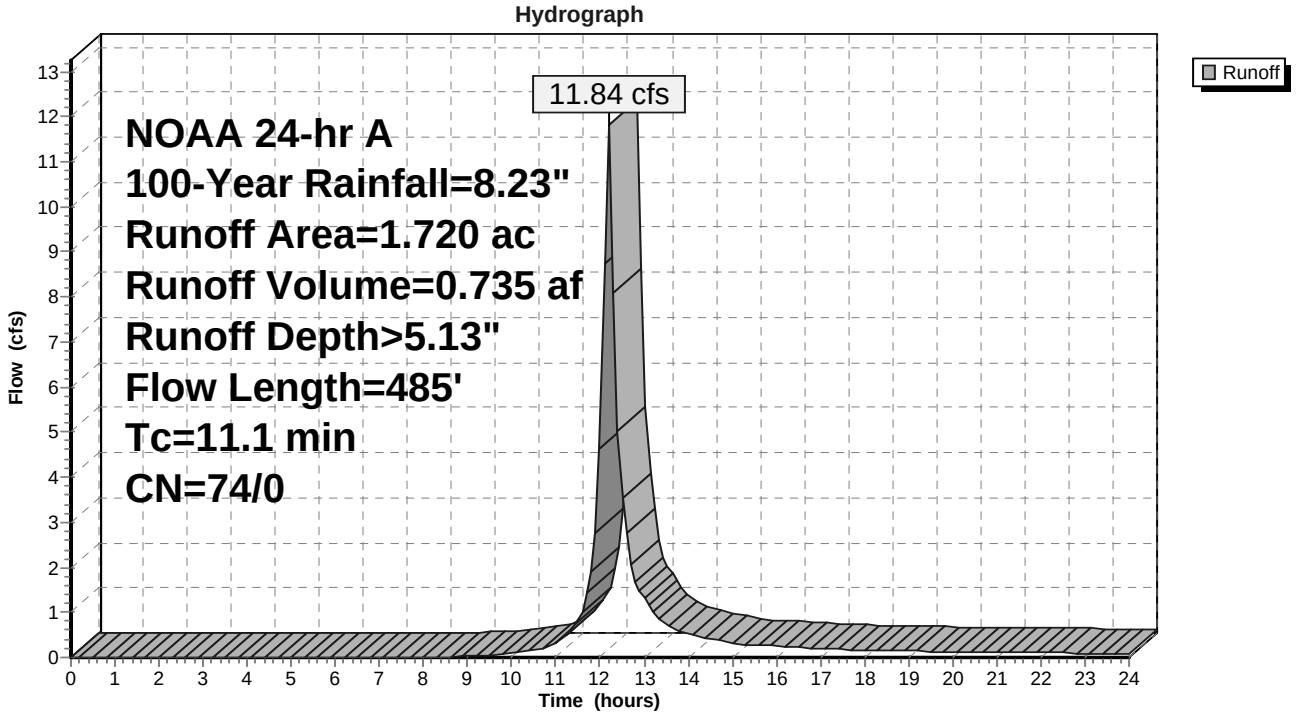
Runoff = 11.84 cfs @ 12.20 hrs, Volume= 0.735 af, Depth> 5.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.870	70	Woods, Good, HSG C
0.040	96	Gravel surface, HSG C
0.100	71	Meadow, non-grazed, HSG C
0.410	77	Woods, Good, HSG D
0.290	78	Meadow, non-grazed, HSG D
0.010	96	Gravel surface, HSG D
1.720	74	Weighted Average
1.720	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.0	435	0.1290	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	485	Total			

Subcatchment MCPR-4A:



Summary for Subcatchment MCPR-4B:

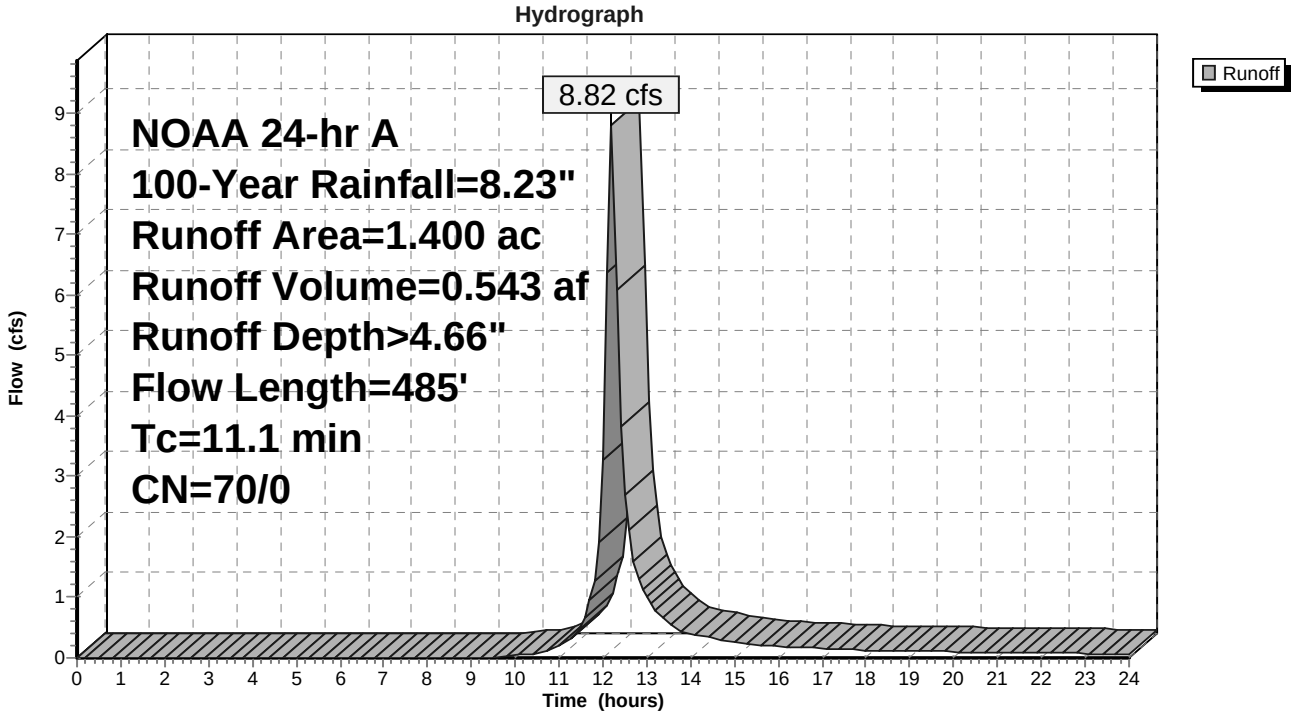
Runoff = 8.82 cfs @ 12.20 hrs, Volume= 0.543 af, Depth> 4.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
1.360	70	Woods, Good, HSG C
0.020	96	Gravel surface, HSG C
0.020	71	Meadow, non-grazed, HSG C
1.400	70	Weighted Average
1.400	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.0	435	0.1290	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	485	Total			

Subcatchment MCPR-4B:



Summary for Subcatchment PRCC-7A:

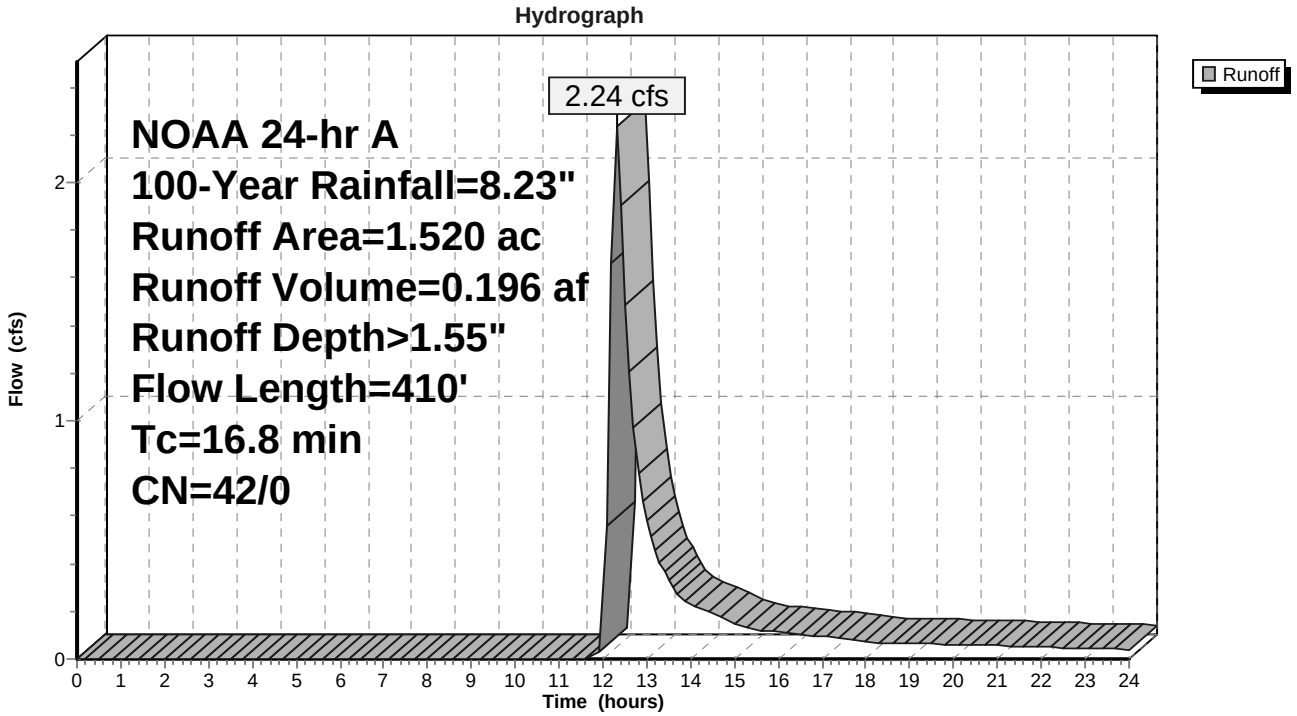
Runoff = 2.24 cfs @ 12.31 hrs, Volume= 0.196 af, Depth> 1.55"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

	Area (ac)	CN	Description
	0.050	96	Gravel surface, HSG A
	0.110	39	>75% Grass cover, Good, HSG A
	0.110	30	Meadow, non-grazed, HSG A
	0.950	30	Woods, Good, HSG A
*	0.300	77	Wetlands, HSG A
	1.520	42	Weighted Average
	1.520	42	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	25	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.16"
0.6	10	0.5000	0.27		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.16"
9.9	375	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.8	410	Total			

Subcatchment PRCC-7A:



Summary for Subcatchment PRCC-7B:

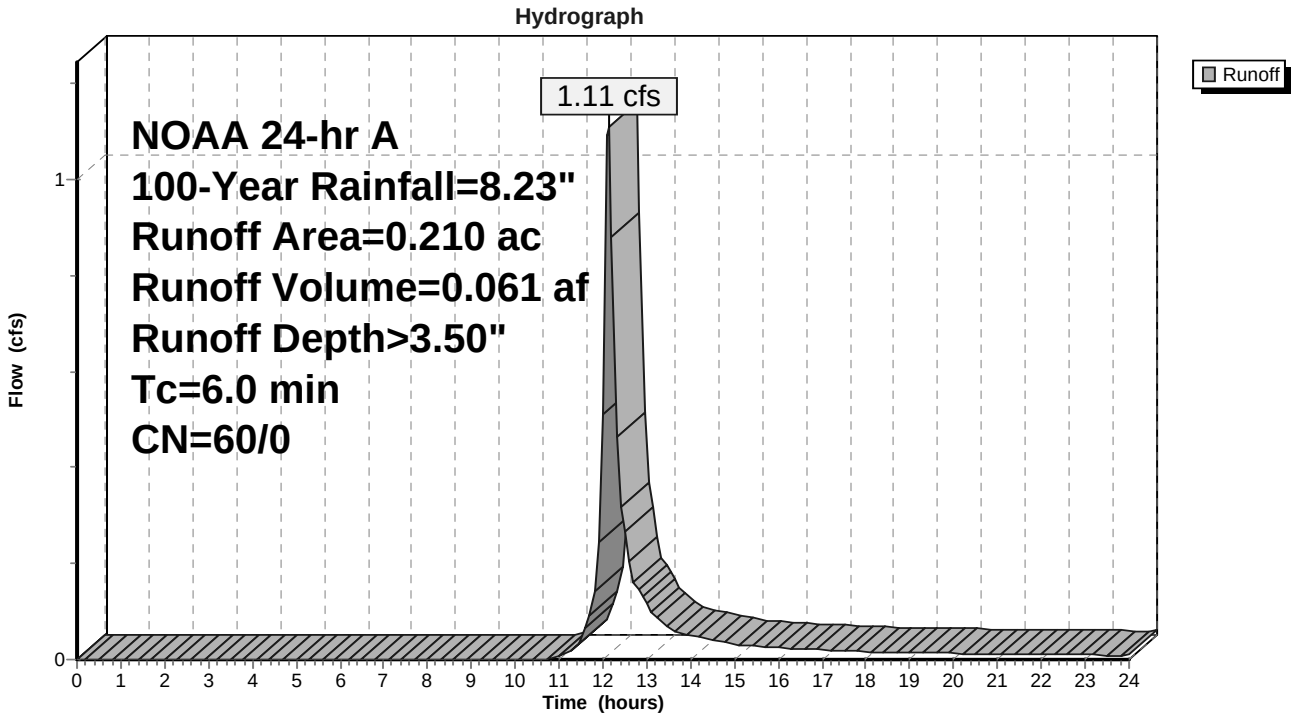
Runoff = 1.11 cfs @ 12.12 hrs, Volume= 0.061 af, Depth> 3.50"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NOAA 24-hr A 100-Year Rainfall=8.23"

Area (ac)	CN	Description
0.080	74	>75% Grass cover, Good, HSG C
0.060	30	Meadow, non-grazed, HSG A
0.070	71	Meadow, non-grazed, HSG C
0.210	60	Weighted Average
0.210	60	100.00% Pervious Area

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

Subcatchment PRCC-7B:



Summary for Pond BASIN CC-1:

Inflow Area = 1.080 ac, 73.15% Impervious, Inflow Depth > 6.18" for 100-Year event
Inflow = 8.56 cfs @ 12.11 hrs, Volume= 0.556 af
Outflow = 6.08 cfs @ 12.19 hrs, Volume= 0.548 af, Atten= 29%, Lag= 4.4 min
Discarded = 0.74 cfs @ 12.18 hrs, Volume= 0.416 af
Primary = 5.34 cfs @ 12.19 hrs, Volume= 0.132 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 176.10' @ 12.18 hrs Surf.Area= 3,857 sf Storage= 5,566 cf

Plug-Flow detention time= 56.3 min calculated for 0.548 af (99% of inflow)
Center-of-Mass det. time= 47.0 min (793.8 - 746.8)

Volume	Invert	Avail.Storage	Storage Description
#1	174.00'	9,568 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

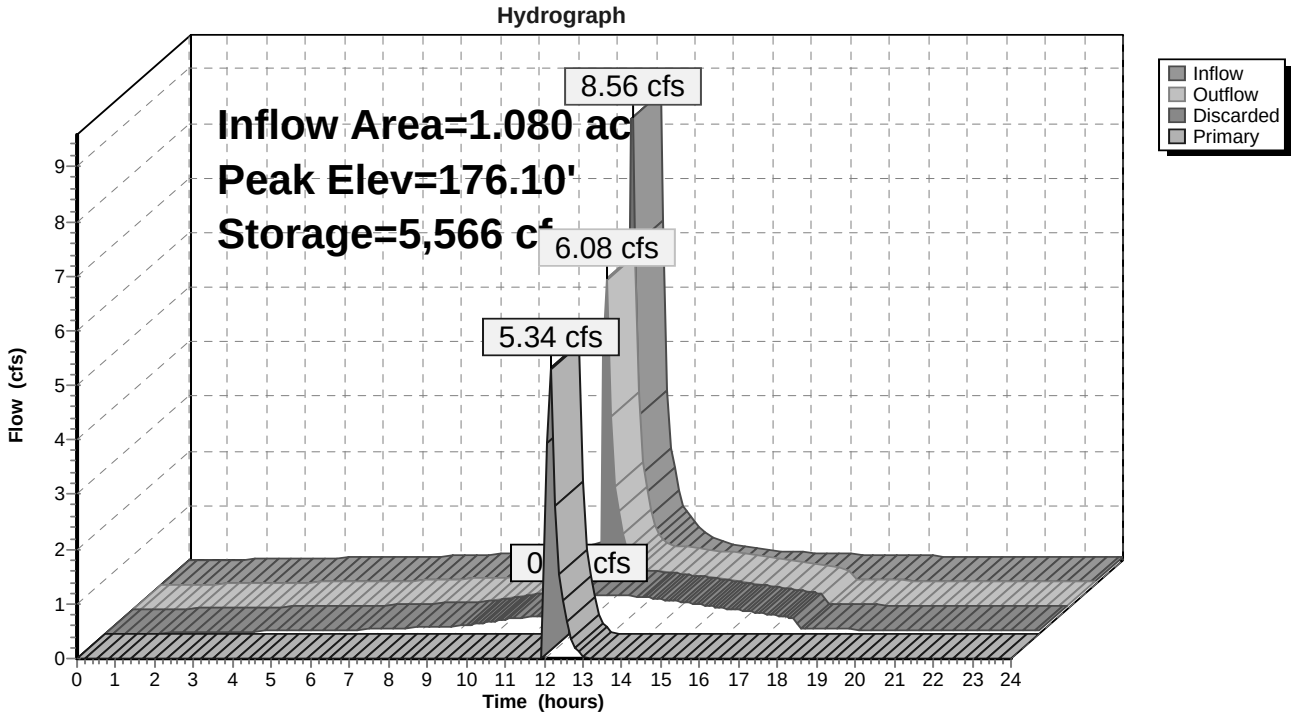
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.00	1,464	0	0
176.00	3,733	5,197	5,197
177.00	5,008	4,371	9,568

Device	Routing	Invert	Outlet Devices
#1	Primary	176.00'	**75.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	174.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.74 cfs @ 12.18 hrs HW=176.09' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.74 cfs)

Primary OutFlow Max=5.06 cfs @ 12.19 hrs HW=176.09' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 5.06 cfs @ 0.72 fps)

Pond BASIN CC-1:



Summary for Pond BASIN CC-2:

Inflow Area = 1.970 ac, 9.14% Impervious, Inflow Depth > 4.76" for 100-Year event
Inflow = 11.99 cfs @ 12.18 hrs, Volume= 0.781 af
Outflow = 9.04 cfs @ 12.32 hrs, Volume= 0.780 af, Atten= 25%, Lag= 8.4 min
Discarded = 1.59 cfs @ 12.32 hrs, Volume= 0.594 af
Primary = 7.45 cfs @ 12.32 hrs, Volume= 0.187 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 177.14' @ 12.32 hrs Surf.Area= 8,296 sf Storage= 8,354 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 25.7 min (824.3 - 798.6)

Volume	Invert	Avail.Storage	Storage Description
#1	176.00'	14,678 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

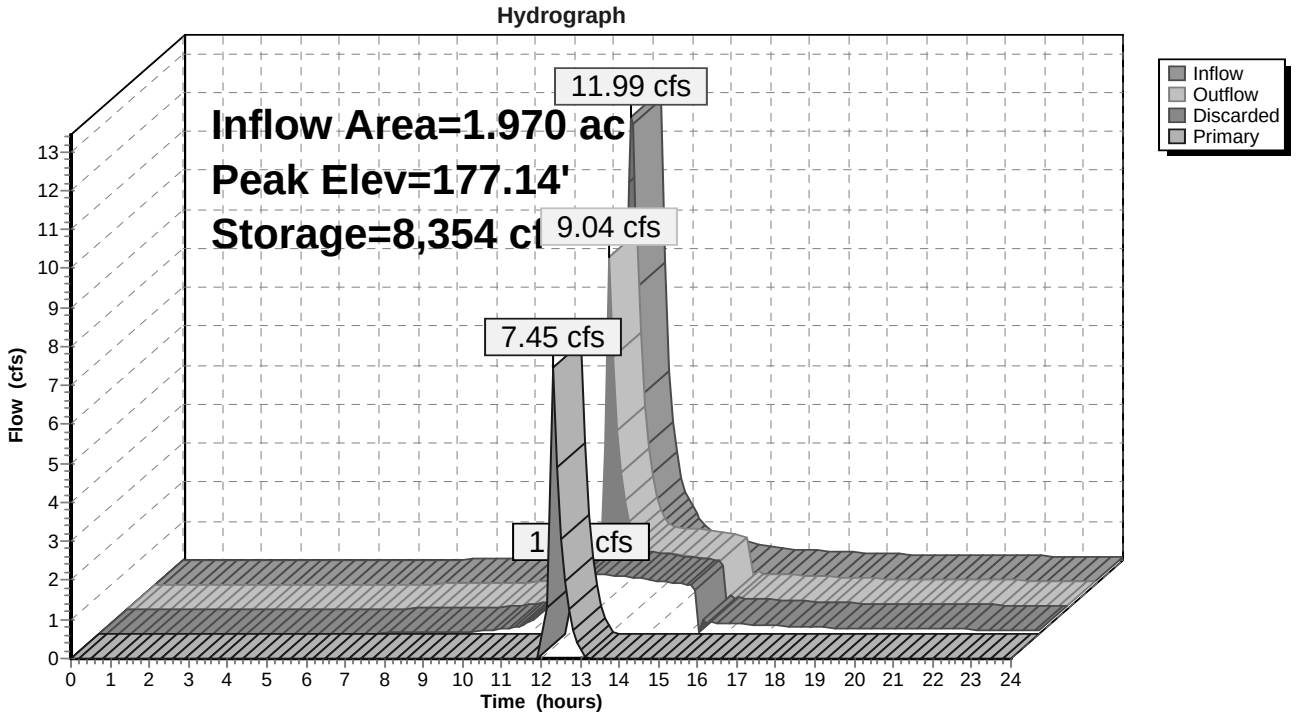
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
176.00	6,371	0	0
177.85	9,497	14,678	14,678

Device	Routing	Invert	Outlet Devices
#1	Primary	176.85'	**20.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	176.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.58 cfs @ 12.32 hrs HW=177.12' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 1.58 cfs)

Primary OutFlow Max=6.94 cfs @ 12.32 hrs HW=177.13' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 6.94 cfs @ 1.26 fps)

Pond BASIN CC-2:



Summary for Pond Basin CC-3:

Inflow Area = 0.780 ac, 66.67% Impervious, Inflow Depth > 5.81" for 100-Year event
Inflow = 5.82 cfs @ 12.11 hrs, Volume= 0.378 af
Outflow = 1.65 cfs @ 12.39 hrs, Volume= 0.340 af, Atten= 72%, Lag= 16.8 min
Discarded = 0.28 cfs @ 12.39 hrs, Volume= 0.269 af
Primary = 1.37 cfs @ 12.39 hrs, Volume= 0.071 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 176.97' @ 12.39 hrs Surf.Area= 5,045 sf Storage= 7,938 cf

Plug-Flow detention time= 214.1 min calculated for 0.339 af (90% of inflow)
Center-of-Mass det. time= 170.0 min (919.9 - 749.9)

Volume	Invert	Avail.Storage	Storage Description
#1	174.00'	13,726 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

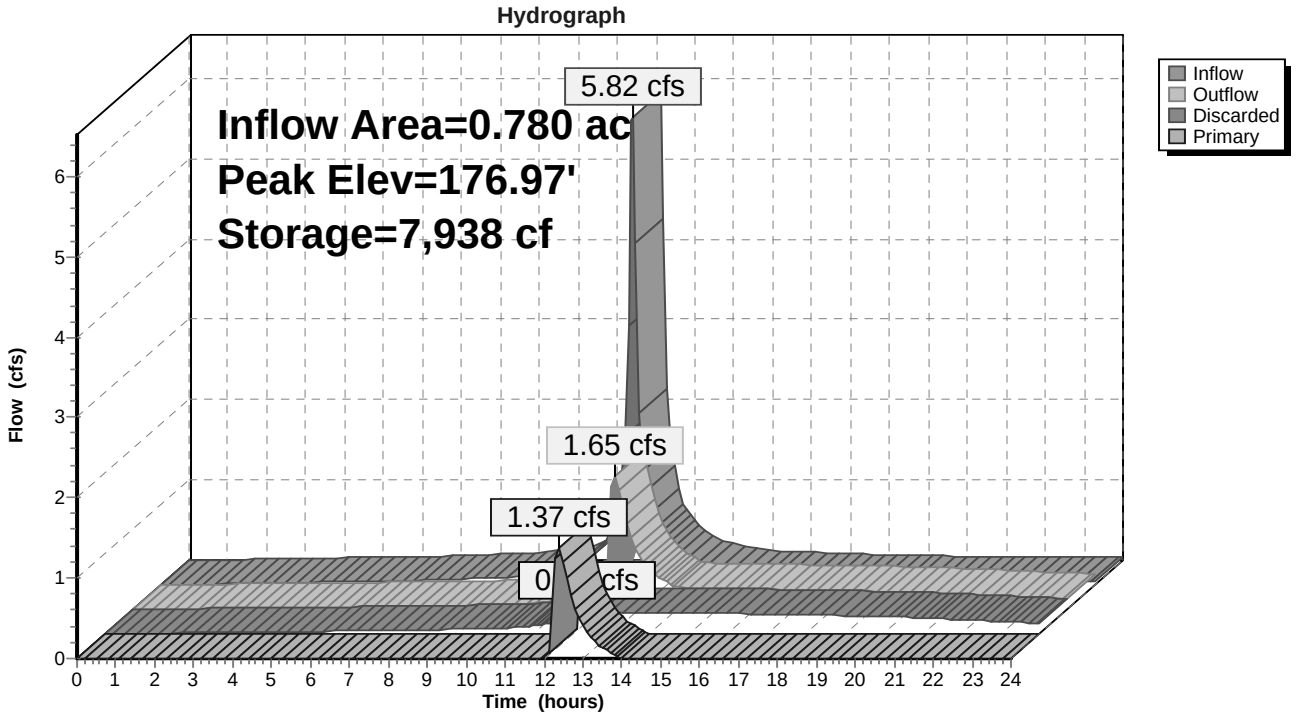
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.00	265	0	0
175.00	1,483	874	874
176.00	3,918	2,701	3,575
178.00	6,233	10,151	13,726

Device	Routing	Invert	Outlet Devices
#1	Primary	177.00'	**50.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	175.00'	**12.0" Round Culvert** L= 247.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 175.00' / 173.50' S= 0.0061 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	176.75'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Discarded	174.00'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.28 cfs @ 12.39 hrs HW=176.97' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=1.36 cfs @ 12.39 hrs HW=176.97' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Culvert** (Passes 1.36 cfs of 3.19 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 1.36 cfs @ 1.54 fps)

Pond Basin CC-3:



Summary for Pond FB CC-1:

Inflow Area = 0.100 ac, 30.00% Impervious, Inflow Depth > 6.48" for 100-Year event
Inflow = 0.92 cfs @ 12.11 hrs, Volume= 0.054 af
Outflow = 0.20 cfs @ 12.52 hrs, Volume= 0.049 af, Atten= 78%, Lag= 24.4 min
Discarded = 0.05 cfs @ 12.52 hrs, Volume= 0.045 af
Primary = 0.16 cfs @ 12.52 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 169.04' @ 12.52 hrs Surf.Area= 889 sf Storage= 1,195 cf

Plug-Flow detention time= 226.1 min calculated for 0.049 af (91% of inflow)
Center-of-Mass det. time= 185.9 min (955.9 - 770.0)

Volume	Invert	Avail.Storage	Storage Description
#1	167.00'	1,798 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

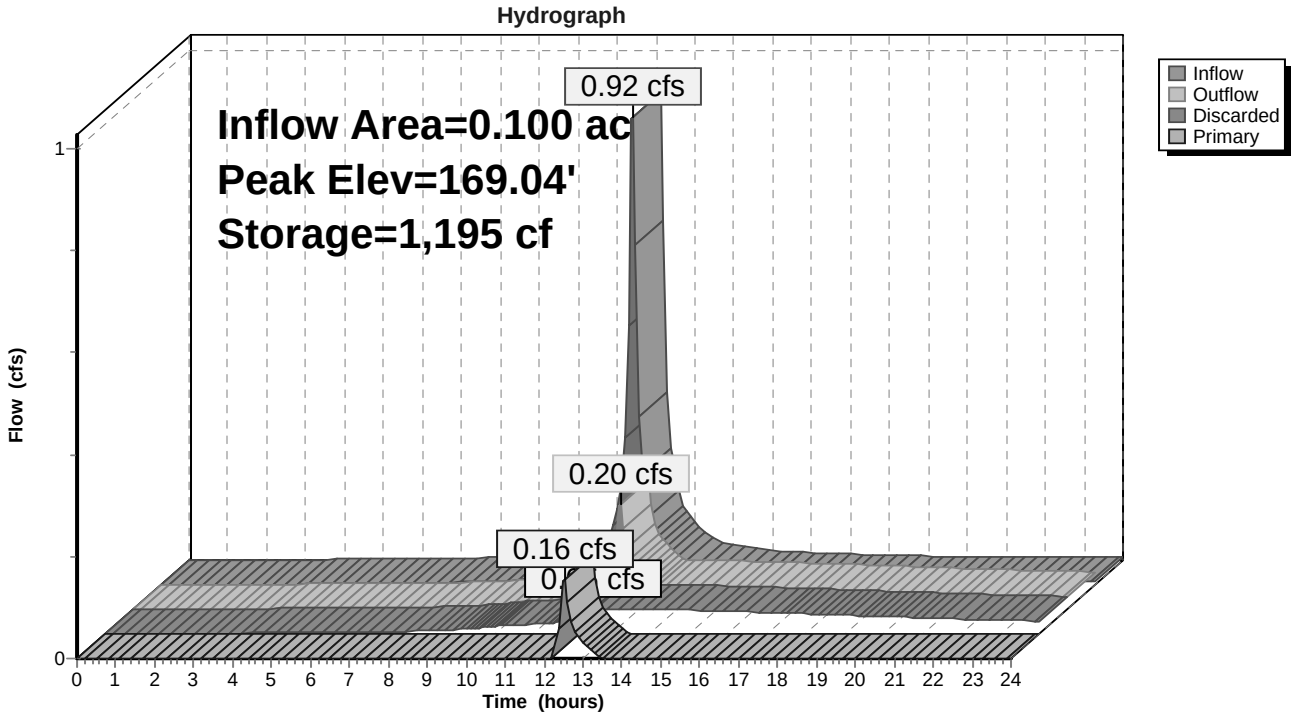
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
167.00	323	0	0
168.00	562	443	443
169.65	1,081	1,355	1,798

Device	Routing	Invert	Outlet Devices
#1	Primary	167.00'	**8.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 167.00' / 166.70' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	169.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	167.00'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.05 cfs @ 12.52 hrs HW=169.04' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.14 cfs @ 12.52 hrs HW=169.04' (Free Discharge)
└**1=Culvert** (Passes 0.14 cfs of 1.69 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 0.14 cfs @ 0.62 fps)

Pond FB CC-1:


Hydrograph
Inflow
Outflow
Discarded
Primary
0.92 cfs
Inflow Area=0.100 ac
Peak Elev=169.04'
Storage=1,195 cf
0.20 cfs
0.16 cfs
Flow (cfs)
Time (hours)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond FB CC-2:

Inflow Area = 0.230 ac, 21.74% Impervious, Inflow Depth > 6.31" for 100-Year event
Inflow = 2.08 cfs @ 12.11 hrs, Volume= 0.121 af
Outflow = 1.41 cfs @ 12.24 hrs, Volume= 0.121 af, Atten= 32%, Lag= 7.4 min
Discarded = 0.09 cfs @ 12.24 hrs, Volume= 0.086 af
Primary = 1.32 cfs @ 12.24 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 170.43' @ 12.24 hrs Surf.Area= 1,695 sf Storage= 1,872 cf

Plug-Flow detention time= 126.3 min calculated for 0.121 af (100% of inflow)
Center-of-Mass det. time= 125.9 min (900.4 - 774.5)

Volume	Invert	Avail.Storage	Storage Description
#1	169.00'	1,997 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

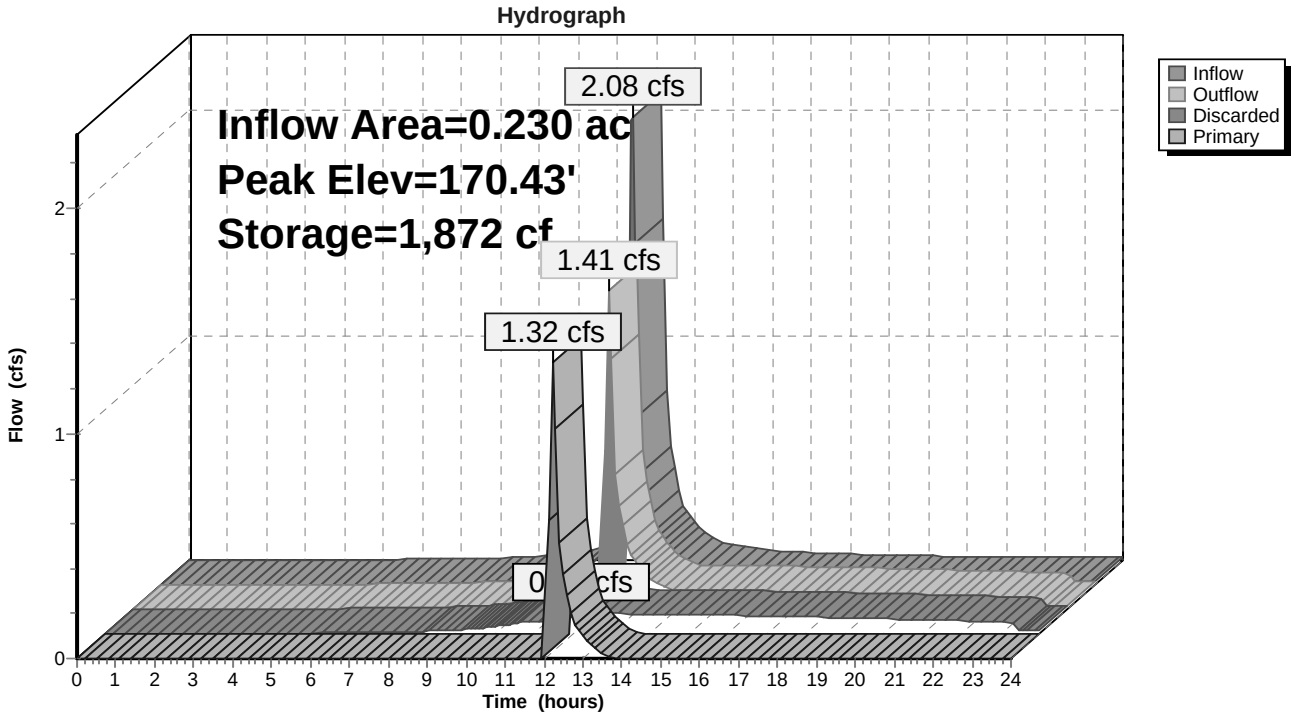
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.00	941	0	0
170.00	1,457	1,199	1,199
170.50	1,736	798	1,997

Device	Routing	Invert	Outlet Devices
#1	Primary	168.25'	**8.0" Round Culvert** L= 83.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 168.25' / 167.80' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	170.25'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	169.00'	**2.410 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.09 cfs @ 12.24 hrs HW=170.40' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=1.15 cfs @ 12.24 hrs HW=170.40' (Free Discharge)
└**1=Culvert** (Passes 1.15 cfs of 1.54 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 1.15 cfs @ 1.25 fps)

Pond FB CC-2:


Hydrograph
Inflow
Outflow
Discarded
Primary
2.08 cfs
Inflow Area=0.230 ac
Peak Elev=170.43'
Storage=1,872 cf
1.41 cfs
1.32 cfs
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond SIS CC-1:

Inflow Area = 1.110 ac, 91.89% Impervious, Inflow Depth > 7.44" for 100-Year event
Inflow = 10.70 cfs @ 12.11 hrs, Volume= 0.688 af
Outflow = 2.28 cfs @ 12.10 hrs, Volume= 0.555 af, Atten= 79%, Lag= 0.0 min
Discarded = 0.79 cfs @ 11.40 hrs, Volume= 0.525 af
Primary = 1.49 cfs @ 12.10 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 173.30' @ 12.12 hrs Surf.Area= 4,140 sf Storage= 6,684 cf

Plug-Flow detention time= 117.9 min calculated for 0.553 af (80% of inflow)
Center-of-Mass det. time= 58.4 min (800.0 - 741.6)

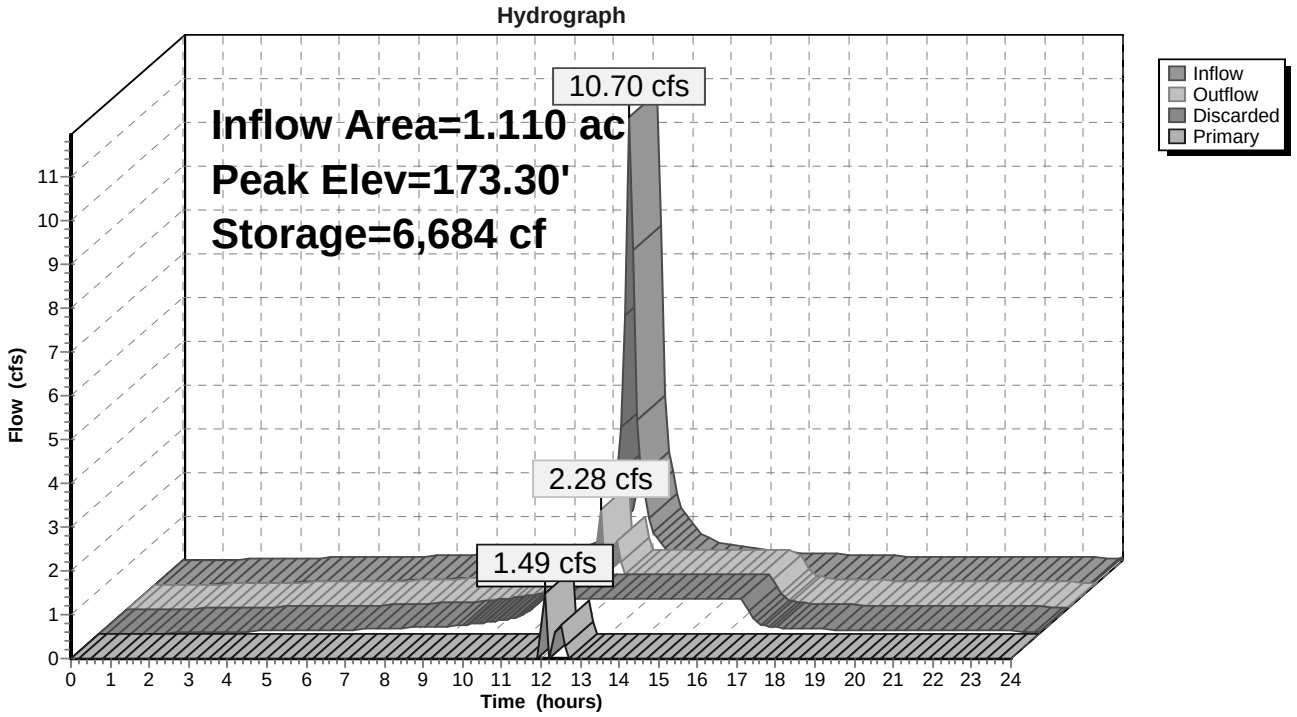
Volume	Invert	Avail.Storage	Storage Description
#1	170.00'	2,446 cf	**46.00'W x 90.00'L x 2.50'H Prismatoid** 10,350 cf Overall - 4,235 cf Embedded = 6,115 cf x 40.0% Voids
#2	170.50'	3,958 cf	**24.0" Round Pipe Storage** x 15 Inside #1 L= 84.0'
#3	170.50'	276 cf	**24.0" Round Pipe Storage** x 2 Inside #1 L= 44.0'
#4	172.50'	6 cf	**2.00'W x 2.00'L x 1.50'H Prismatoid**-Impervious
		6,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	172.50'	**12.0" Round Culvert** L= 14.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 172.50' / 169.00' S= 0.2465 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	170.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.79 cfs @ 11.40 hrs HW=170.35' (Free Discharge)
↑└**2=Exfiltration** (Exfiltration Controls 0.79 cfs)

Primary OutFlow Max=1.51 cfs @ 12.10 hrs HW=173.26' (Free Discharge)
↑└**1=Culvert** (Inlet Controls 1.51 cfs @ 2.35 fps)

Pond SIS CC-1:


Hydrograph
Inflow
Outflow
Discarded
Primary
10.70 cfs
2.28 cfs
1.49 cfs
Inflow Area=1.110 ac
Peak Elev=173.30'
Storage=6,684 cf
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond SIS CC-2:

Inflow Area = 0.320 ac, 62.50% Impervious, Inflow Depth > 5.57" for 100-Year event
Inflow = 2.30 cfs @ 12.11 hrs, Volume= 0.149 af
Outflow = 0.44 cfs @ 11.80 hrs, Volume= 0.148 af, Atten= 81%, Lag= 0.0 min
Discarded = 0.44 cfs @ 11.80 hrs, Volume= 0.148 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 172.37' @ 12.53 hrs Surf.Area= 2,294 sf Storage= 1,746 cf

Plug-Flow detention time= 25.5 min calculated for 0.147 af (99% of inflow)
Center-of-Mass det. time= 22.8 min (775.0 - 752.1)

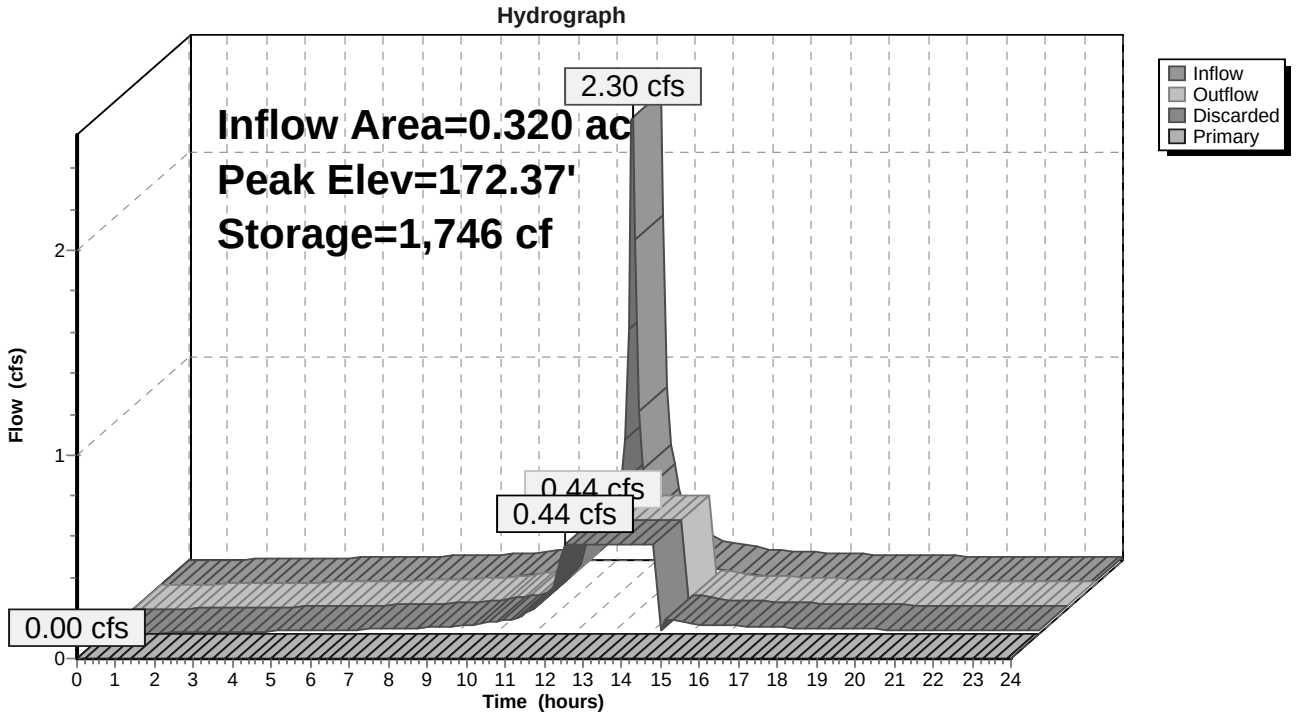
Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	1,026 cf	**37.00'W x 62.00'L x 1.50'H Prismatoid** 3,441 cf Overall - 875 cf Embedded = 2,566 cf x 40.0% Voids
#2	171.50'	820 cf	**12.0" Round Pipe Storage** x 18 Inside #1 L= 58.0'
#3	171.50'	55 cf	**12.0" Round Pipe Storage** x 2 Inside #1 L= 35.0'
		1,901 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	172.50'	**12.0" Round Culvert** L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 172.50' / 171.50' S= 0.0526 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	171.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.44 cfs @ 11.80 hrs HW=171.03' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=171.00' (Free Discharge)
↑**1=Culvert** (Controls 0.00 cfs)

Pond SIS CC-2:


Hydrograph
Inflow
Outflow
Discarded
Primary
2.30 cfs
Inflow Area=0.320 ac
Peak Elev=172.37'
Storage=1,746 cf
0.44 cfs
0.44 cfs
0.00 cfs
Flow (cfs)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond SIS CC-3:

Inflow Area = 0.580 ac, 96.55% Impervious, Inflow Depth > 7.82" for 100-Year event
Inflow = 5.90 cfs @ 12.11 hrs, Volume= 0.378 af
Outflow = 0.77 cfs @ 12.50 hrs, Volume= 0.348 af, Atten= 87%, Lag= 23.4 min
Discarded = 0.72 cfs @ 12.51 hrs, Volume= 0.347 af
Primary = 0.05 cfs @ 12.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 176.60' @ 12.50 hrs Surf.Area= 3,784 sf Storage= 4,549 cf

Plug-Flow detention time= 78.6 min calculated for 0.348 af (92% of inflow)
Center-of-Mass det. time= 40.1 min (781.1 - 741.0)

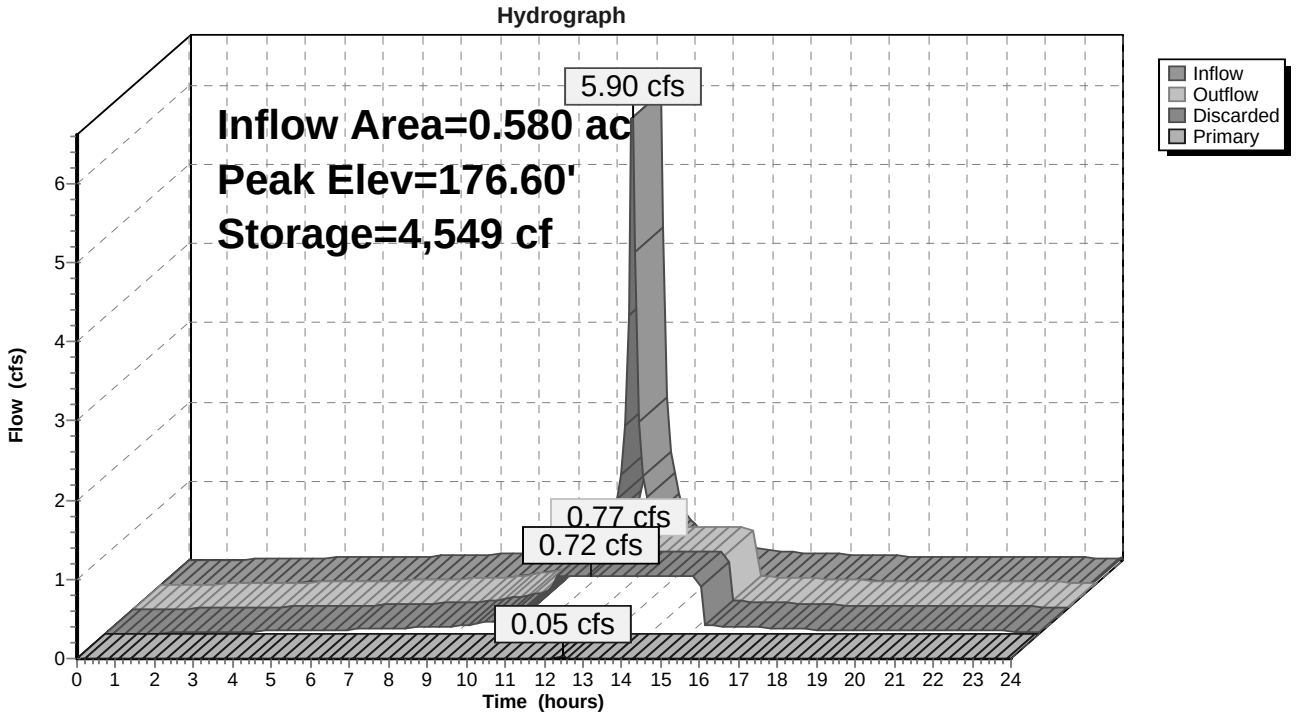
Volume	Invert	Avail.Storage	Storage Description
#1	174.50'	2,008 cf	**21.00'W x 180.00'L x 2.00'H Prismatoid** 7,560 cf Overall - 2,541 cf Embedded = 5,019 cf x 40.0% Voids
#2	175.00'	2,474 cf	**18.0" Round Pipe Storage** x 8 Inside #1 L= 175.0'
#3	175.00'	67 cf	**18.0" Round Pipe Storage** x 2 Inside #1 L= 19.0'
#4	176.50'	10 cf	**2.00'W x 2.00'L x 2.50'H Prismatoid**
		4,559 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	176.50'	**12.0" Round Culvert** L= 36.3' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 176.50' / 174.00' S= 0.0689 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	174.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.72 cfs @ 12.51 hrs HW=176.60' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=0.05 cfs @ 12.50 hrs HW=176.60' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.05 cfs @ 1.10 fps)

Pond SIS CC-3:


Hydrograph
Inflow Area=0.580 ac
Peak Elev=176.60'
Storage=4,549 cf
5.90 cfs
0.77 cfs
0.72 cfs
0.05 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond SIS CC-4:

Inflow Area = 0.210 ac,100.00% Impervious, Inflow Depth > 7.99" for 100-Year event
Inflow = 2.18 cfs @ 12.11 hrs, Volume= 0.140 af
Outflow = 0.51 cfs @ 12.41 hrs, Volume= 0.132 af, Atten= 77%, Lag= 18.3 min
Discarded = 0.35 cfs @ 12.45 hrs, Volume= 0.131 af
Primary = 0.16 cfs @ 12.41 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 176.73' @ 12.43 hrs Surf.Area= 1,819 sf Storage= 1,478 cf

Plug-Flow detention time= 53.5 min calculated for 0.132 af (95% of inflow)
Center-of-Mass det. time= 25.0 min (764.8 - 739.8)

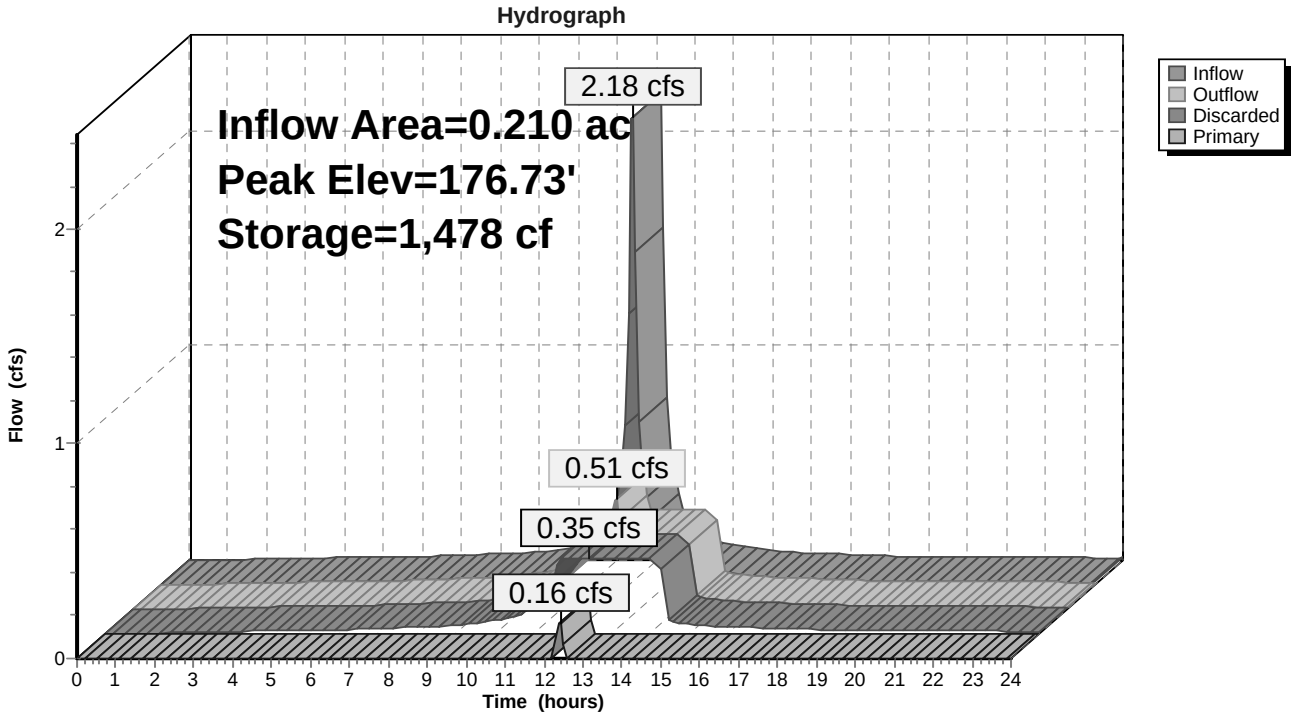
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	830 cf	**11.00'W x 165.00'L x 1.50'H Prismatoid** 2,723 cf Overall - 646 cf Embedded = 2,076 cf x 40.0% Voids
#2	175.50'	632 cf	**12.0" Round Pipe Storage** x 5 Inside #1 L= 161.0'
#3	175.50'	14 cf	**12.0" Round Pipe Storage** x 2 Inside #1 L= 9.0'
#4	176.50'	6 cf	**2.00'W x 2.00'L x 1.50'H Prismatoid**
		1,483 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	176.50'	**12.0" Round Culvert** L= 6.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 176.50' / 176.00' S= 0.0806 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	175.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.35 cfs @ 12.45 hrs HW=176.68' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.14 cfs @ 12.41 hrs HW=176.71' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.14 cfs @ 1.23 fps)

Pond SIS CC-4:

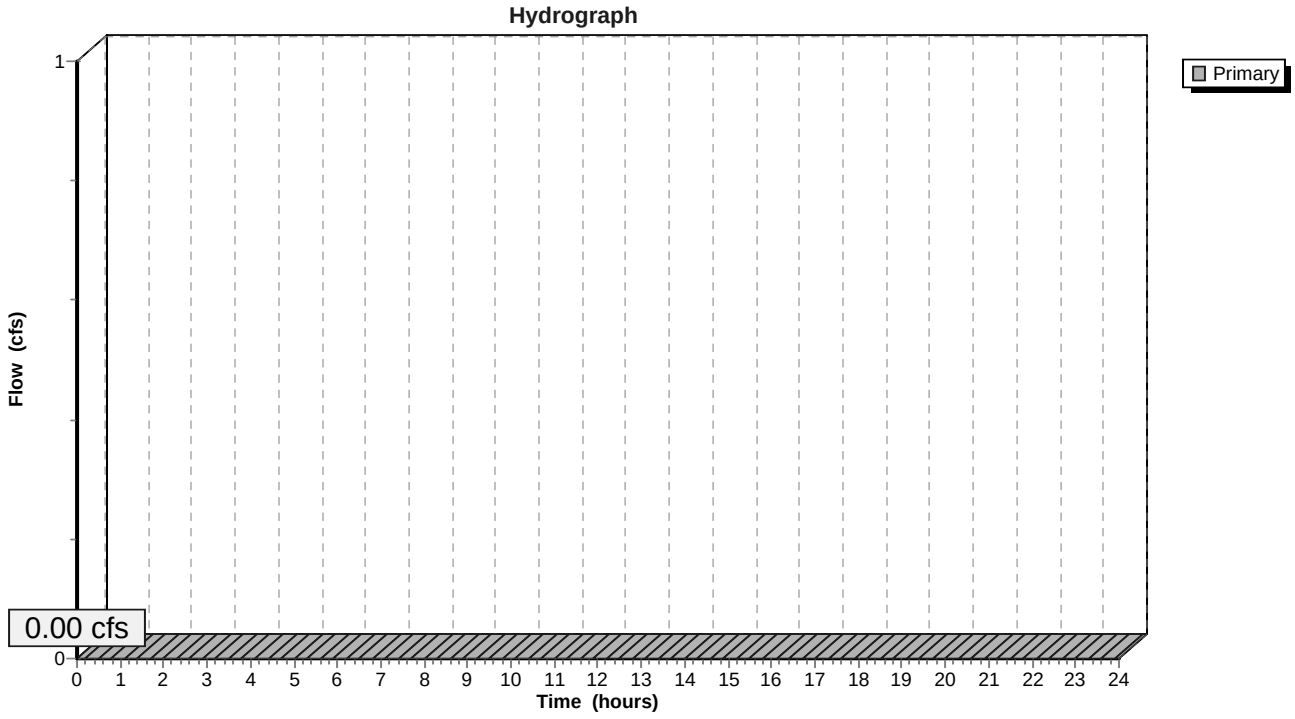

Hydrograph
Inflow Area=0.210 ac
Peak Elev=176.73'
Storage=1,478 cf
2.18 cfs
0.51 cfs
0.35 cfs
0.16 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Link POA-1:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-1:

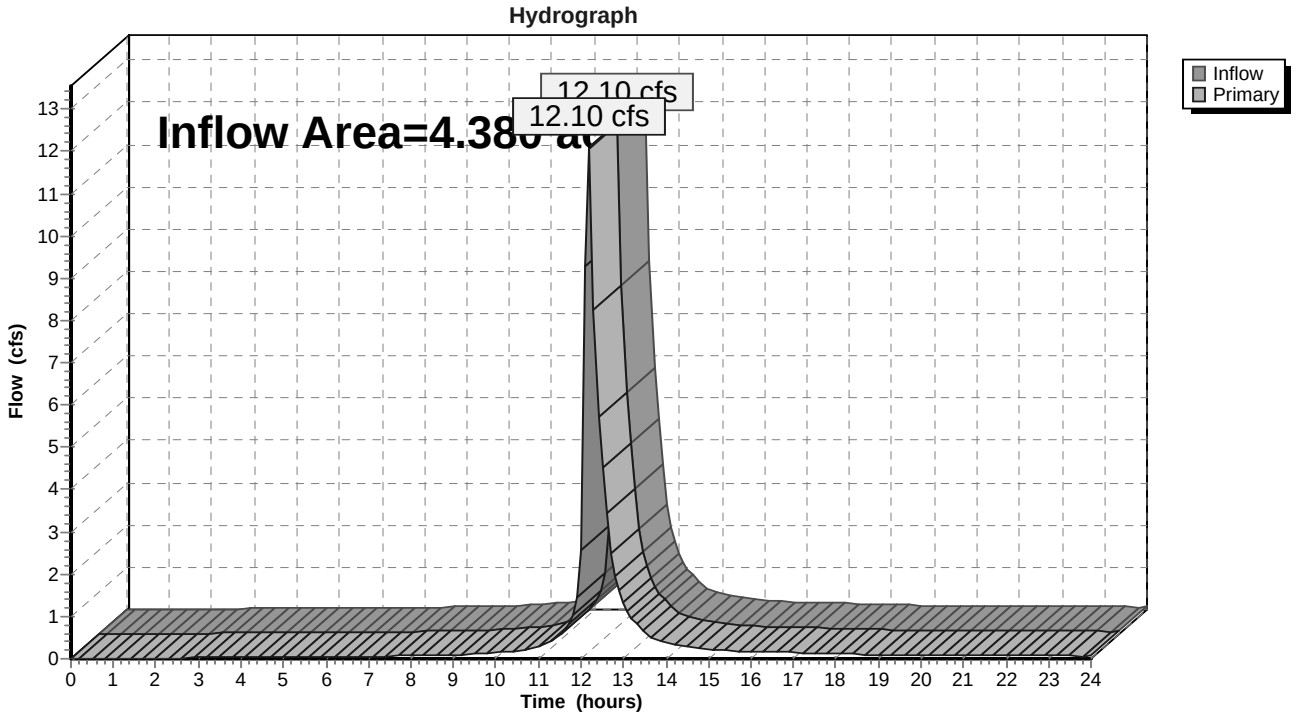


Summary for Link POA-2:

Inflow Area = 4.380 ac, 54.11% Impervious, Inflow Depth > 1.91" for 100-Year event
Inflow = 12.10 cfs @ 12.19 hrs, Volume= 0.698 af
Primary = 12.10 cfs @ 12.19 hrs, Volume= 0.698 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-2:

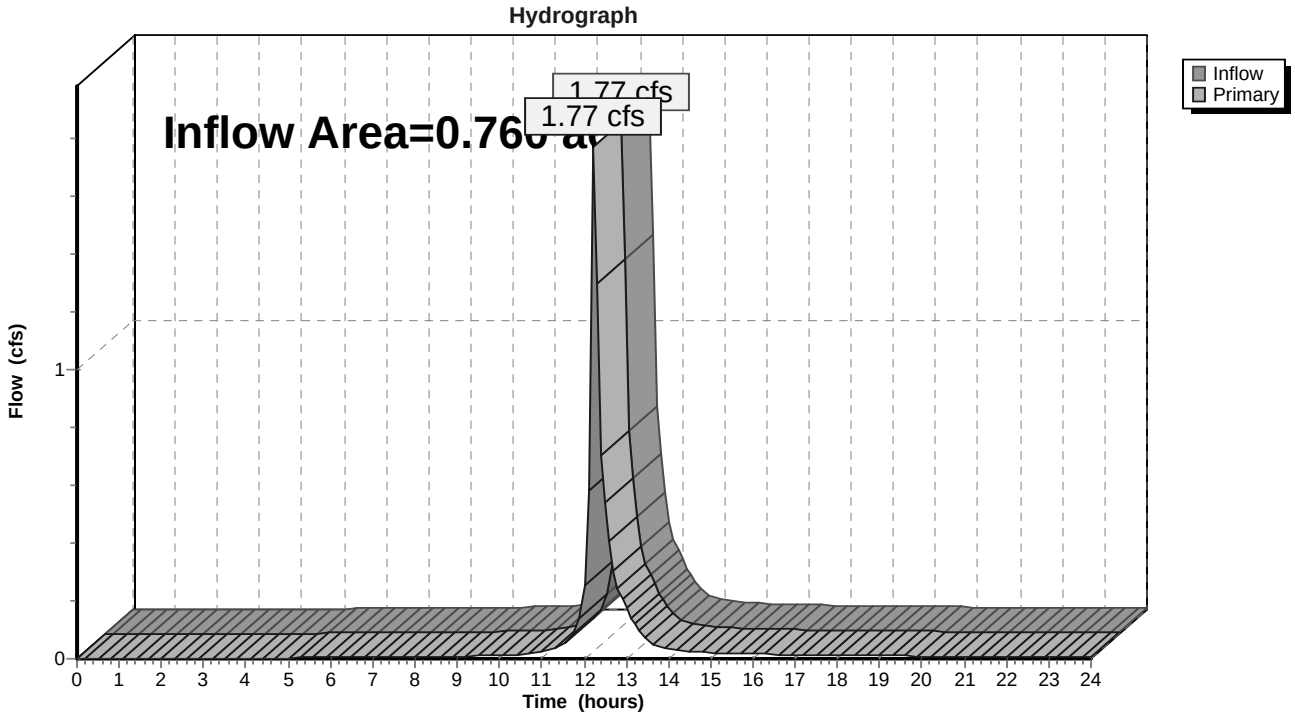


Summary for Link POA-3:

Inflow Area = 0.760 ac, 38.16% Impervious, Inflow Depth > 1.23" for 100-Year event
Inflow = 1.77 cfs @ 12.22 hrs, Volume= 0.078 af
Primary = 1.77 cfs @ 12.22 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-3:

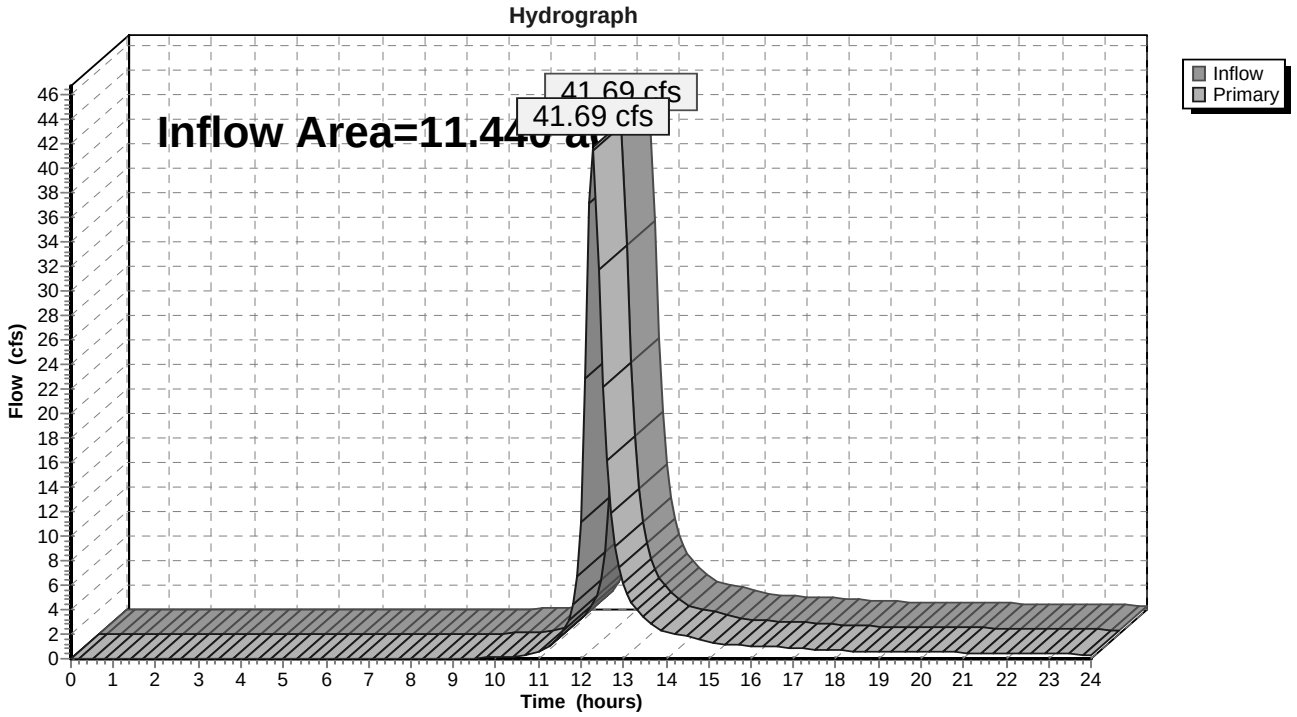


Summary for Link POA-4:

Inflow Area = 11.440 ac, 12.76% Impervious, Inflow Depth > 3.05" for 100-Year event
Inflow = 41.69 cfs @ 12.28 hrs, Volume= 2.907 af
Primary = 41.69 cfs @ 12.28 hrs, Volume= 2.907 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-4:

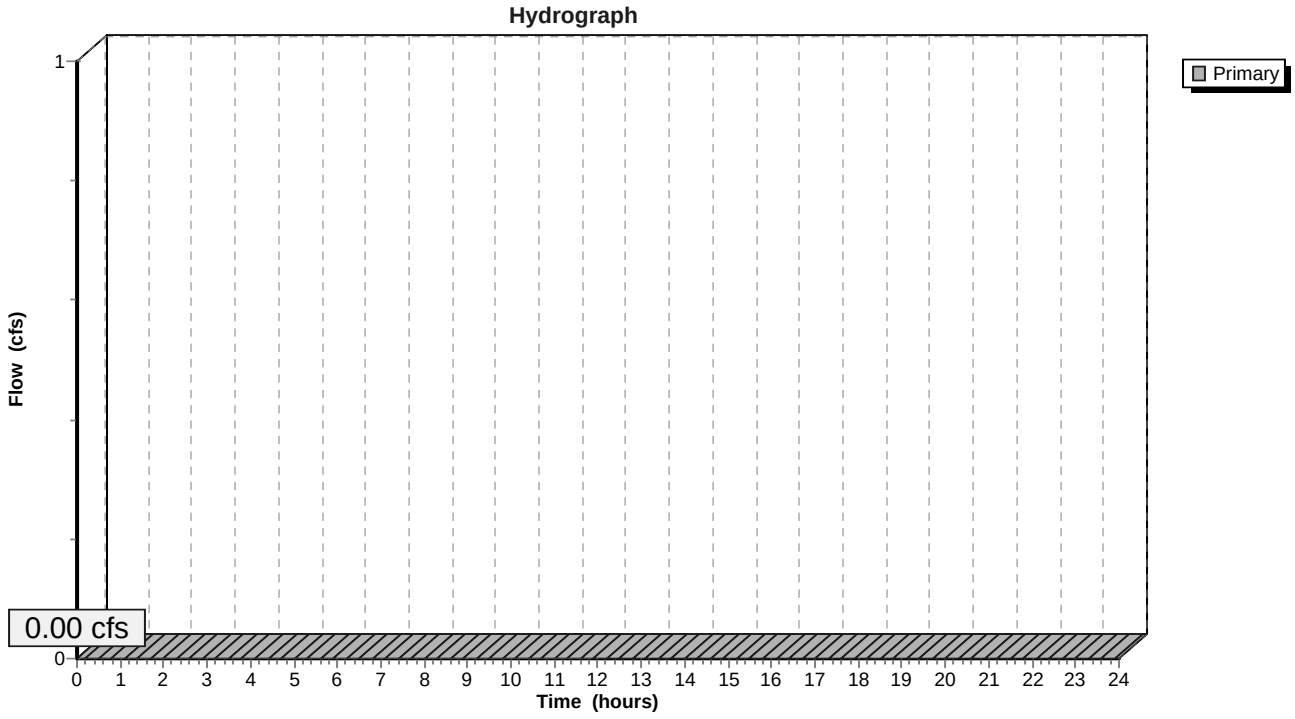


Summary for Link POA-5:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-5:

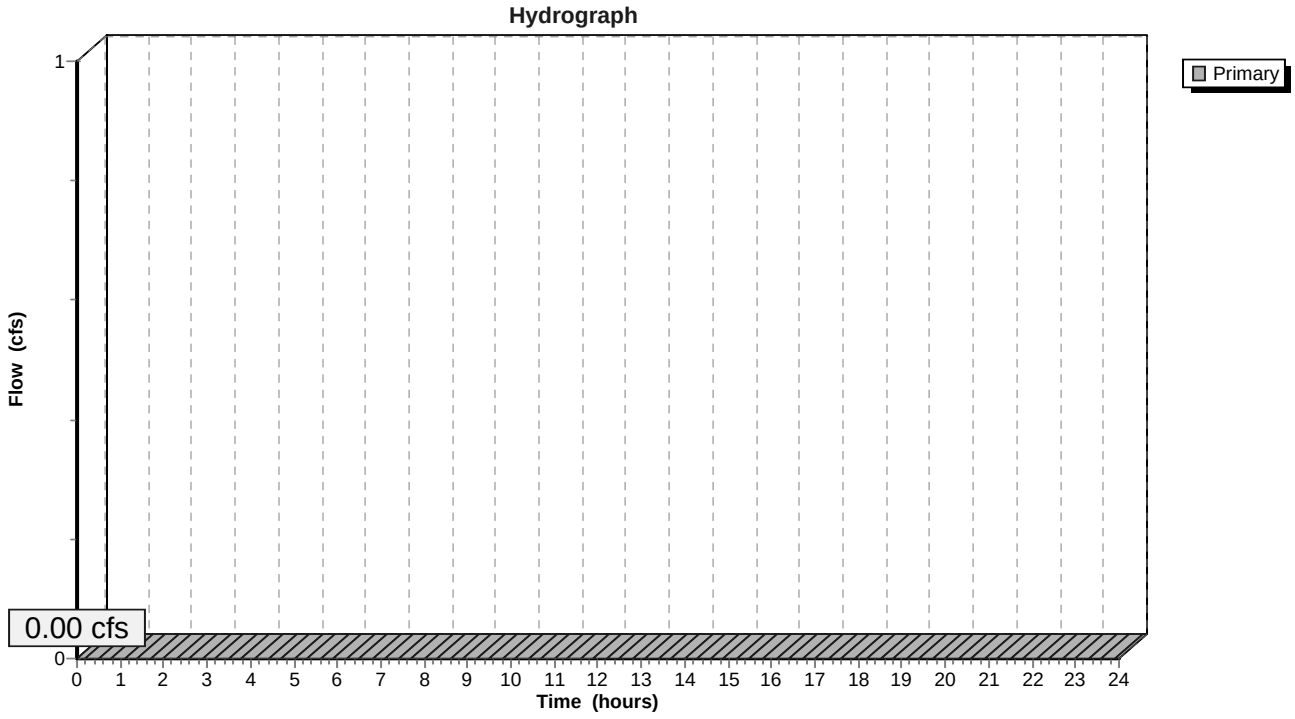


Summary for Link POA-6:

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-6:

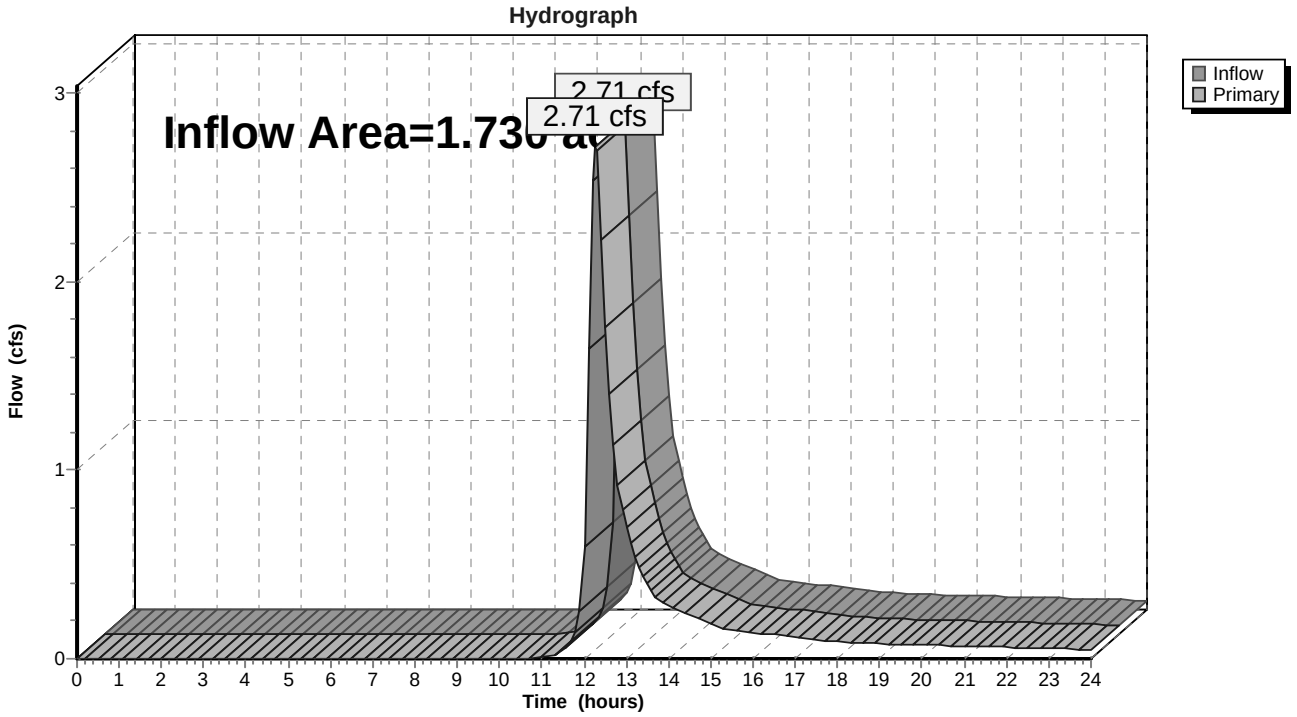


Summary for Link POA-7:

Inflow Area = 1.730 ac, 0.00% Impervious, Inflow Depth > 1.78" for 100-Year event
Inflow = 2.71 cfs @ 12.27 hrs, Volume= 0.257 af
Primary = 2.71 cfs @ 12.27 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-7:



Attachment 6 – Water Quality Unit Sizing

Project: Coolidge Crossing
Location: Sherborn, MA
Prepared For: Civil Design Group

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

Q = (qu) (A) (WQV)

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
DMH-1	0.13	0.0002031	6.0	0.100	1.00	774.00	0.16
DMH-3	0.26	0.0004063	6.0	0.100	1.00	774.00	0.31
DMH-5	0.61	0.0009531	6.0	0.100	1.00	774.00	0.74
DMH-7	0.05	0.0000781	6.0	0.100	1.00	774.00	0.06
CB-12A	0.25	0.0003906	6.0	0.100	1.00	774.00	0.30
DMH-13	0.34	0.0005313	6.0	0.100	1.00	774.00	0.41
DMH-15	0.40	0.0006250	6.0	0.100	1.00	774.00	0.48

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COOLIDGE CROSSING
SHERBORN, MA

Area	**0.13 ac**	Unit Site Designation	**DMH-1**
Weighted C	**0.9**	Rainfall Station #	**68**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.00	0.00	9.1
0.04	9.5%	18.8%	0.00	0.00	9.2
0.06	8.7%	27.5%	0.01	0.01	8.4
0.08	10.1%	37.6%	0.01	0.01	9.7
0.10	7.2%	44.8%	0.01	0.01	6.9
0.12	6.0%	50.8%	0.01	0.01	5.8
0.14	6.3%	57.1%	0.02	0.02	6.1
0.16	5.6%	62.7%	0.02	0.02	5.4
0.18	4.7%	67.4%	0.02	0.02	4.5
0.20	3.6%	71.0%	0.02	0.02	3.5
0.25	8.2%	79.1%	0.03	0.03	7.8
0.50	14.9%	94.0%	0.06	0.06	13.9
0.75	3.2%	97.3%	0.09	0.09	2.9
1.00	1.2%	98.5%	0.12	0.12	1.1
1.50	0.7%	99.2%	0.18	0.18	0.6
2.00	0.8%	100.0%	0.23	0.23	0.6
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					95.4
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**89.0%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COOLIDGE CROSSING
SHERBORN, MA

Area	**0.26 ac**	Unit Site Designation	**DMH-3**
Weighted C	**0.9**	Rainfall Station #	**68**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.00	0.00	9.0
0.04	9.5%	18.8%	0.01	0.01	9.1
0.06	8.7%	27.5%	0.01	0.01	8.4
0.08	10.1%	37.6%	0.02	0.02	9.7
0.10	7.2%	44.8%	0.02	0.02	6.8
0.12	6.0%	50.8%	0.03	0.03	5.7
0.14	6.3%	57.1%	0.03	0.03	6.0
0.16	5.6%	62.7%	0.04	0.04	5.3
0.18	4.7%	67.4%	0.04	0.04	4.4
0.20	3.6%	71.0%	0.05	0.05	3.4
0.25	8.2%	79.1%	0.06	0.06	7.6
0.50	14.9%	94.0%	0.12	0.12	13.3
0.75	3.2%	97.3%	0.18	0.18	2.7
1.00	1.2%	98.5%	0.23	0.23	1.0
1.50	0.7%	99.2%	0.35	0.35	0.5
2.00	0.8%	100.0%	0.47	0.47	0.5
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					93.6
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**87.2%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH® ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

COOLIDGE CROSSING
SHERBORN, MA

Area	**0.61 ac**	Unit Site Designation	**DMH-5**
Weighted C	**0.9**	Rainfall Station #	**68**
t_c	**6 min**		
CDS Model	**2015-4**	CDS Treatment Capacity	**1.4 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.01	0.01	9.0
0.04	9.5%	18.8%	0.02	0.02	9.1
0.06	8.7%	27.5%	0.03	0.03	8.3
0.08	10.1%	37.6%	0.04	0.04	9.6
0.10	7.2%	44.8%	0.05	0.05	6.8
0.12	6.0%	50.8%	0.07	0.07	5.7
0.14	6.3%	57.1%	0.08	0.08	5.9
0.16	5.6%	62.7%	0.09	0.09	5.2
0.18	4.7%	67.4%	0.10	0.10	4.3
0.20	3.6%	71.0%	0.11	0.11	3.3
0.25	8.2%	79.1%	0.14	0.14	7.4
0.50	14.9%	94.0%	0.27	0.27	12.5
0.75	3.2%	97.3%	0.41	0.41	2.5
1.00	1.2%	98.5%	0.55	0.55	0.9
1.50	0.7%	99.2%	0.82	0.82	0.4
2.00	0.8%	100.0%	1.10	1.10	0.3
					91.2
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**84.8%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COOLIDGE CROSSING
SHERBORN, MA

Area	**0.05 ac**	Unit Site Designation	**DMH-7**
Weighted C	**0.9**	Rainfall Station #	**68**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.00	0.00	9.1
0.04	9.5%	18.8%	0.00	0.00	9.2
0.06	8.7%	27.5%	0.00	0.00	8.5
0.08	10.1%	37.6%	0.00	0.00	9.8
0.10	7.2%	44.8%	0.00	0.00	6.9
0.12	6.0%	50.8%	0.01	0.01	5.8
0.14	6.3%	57.1%	0.01	0.01	6.1
0.16	5.6%	62.7%	0.01	0.01	5.4
0.18	4.7%	67.4%	0.01	0.01	4.5
0.20	3.6%	71.0%	0.01	0.01	3.5
0.25	8.2%	79.1%	0.01	0.01	7.9
0.50	14.9%	94.0%	0.02	0.02	14.3
0.75	3.2%	97.3%	0.03	0.03	3.1
1.00	1.2%	98.5%	0.05	0.05	1.2
1.50	0.7%	99.2%	0.07	0.07	0.7
2.00	0.8%	100.0%	0.09	0.09	0.7
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					96.5
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**90.1%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Brief Stormceptor Sizing Report - CB-12A

Project Information & Location			
Project Name	Coolidge Crossing	**Project Number**	668301
City	Sherborn	**State/ Province**	Massachusetts
Country	United States of America	**Date**	1/22/2021
Designer Information		**EOR Information (optional)**	
Name	David Adams	**Name**	
Company	Contech	**Company**	Civil Design Group
Phone #	207-885-6191	**Phone #**	
Email	dadams@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	CB-12A
Target TSS Removal (%)	80
TSS Removal (%) Provided	93
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	93
STC 900	96
STC 1200	96
STC 1800	97
STC 2400	97
STC 3600	98
STC 4800	98
STC 6000	99
STC 7200	99
STC 11000	99
STC 13000	99
STC 16000	99

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A FORTERRA COMPANY

Sizing Details

Drainage Area	
Total Area (acres)	0.25
Imperviousness %	100.0

Rainfall	
Station Name	BLUE HILL
State/Province	Massachusetts
Station ID #	0736
Years of Records	58
Latitude	42°12'44"N
Longitude	71°6'53"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COOLIDGE CROSSING
SHERBORN, MA

Area	**0.34 ac**	Unit Site Designation	**DMH-13**
Weighted C	**0.9**	Rainfall Station #	**68**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.01	0.01	9.0
0.04	9.5%	18.8%	0.01	0.01	9.1
0.06	8.7%	27.5%	0.02	0.02	8.4
0.08	10.1%	37.6%	0.02	0.02	9.6
0.10	7.2%	44.8%	0.03	0.03	6.8
0.12	6.0%	50.8%	0.04	0.04	5.7
0.14	6.3%	57.1%	0.04	0.04	5.9
0.16	5.6%	62.7%	0.05	0.05	5.3
0.18	4.7%	67.4%	0.06	0.06	4.4
0.20	3.6%	71.0%	0.06	0.06	3.4
0.25	8.2%	79.1%	0.08	0.08	7.5
0.50	14.9%	94.0%	0.15	0.15	12.9
0.75	3.2%	97.3%	0.23	0.23	2.6
1.00	1.2%	98.5%	0.31	0.31	0.9
1.50	0.7%	99.2%	0.46	0.46	0.5
2.00	0.8%	100.0%	0.61	0.61	0.4
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					92.5
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**86.1%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COOLIDGE CROSSING
SHERBORN, MA

Area	**0.40 ac**	Unit Site Designation	**DMH-15**
Weighted C	**0.9**	Rainfall Station #	**68**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.01	0.01	9.0
0.04	9.5%	18.8%	0.01	0.01	9.1
0.06	8.7%	27.5%	0.02	0.02	8.3
0.08	10.1%	37.6%	0.03	0.03	9.6
0.10	7.2%	44.8%	0.04	0.04	6.8
0.12	6.0%	50.8%	0.04	0.04	5.7
0.14	6.3%	57.1%	0.05	0.05	5.9
0.16	5.6%	62.7%	0.06	0.06	5.2
0.18	4.7%	67.4%	0.06	0.06	4.3
0.20	3.6%	71.0%	0.07	0.07	3.3
0.25	8.2%	79.1%	0.09	0.09	7.4
0.50	14.9%	94.0%	0.18	0.18	12.7
0.75	3.2%	97.3%	0.27	0.27	2.5
1.00	1.2%	98.5%	0.36	0.36	0.9
1.50	0.7%	99.2%	0.54	0.54	0.4
2.00	0.8%	100.0%	0.72	0.72	0.4
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					91.7
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**85.3%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Attachment 7 – Operation & Maintenance Plan

OPERATION AND MAINTENANCE PLAN

&

LONG-TERM POLLUTION PREVENTION PLAN

FOR

COOLIDGE CROSSING

RESIDENTIAL APARTMENT COMMUNITY

84 & 86 COOLIDGE STREET
(PORTIONS OF ASSESSORS MAP 5 LOTS 54 & 55)
SHERBORN, MA 01770

PREPARED FOR:

BAYSTONE DEVELOPMENT

21 CENTER STREET
WESTON, MA 02493

PREPARED BY:

CIVIL DESIGN GROUP, LLC
21 HIGH STREET, SUITE 207
NORTH ANDOVER, MA 01845

DATE: JANUARY 22, 2021

1.0 OPERATION AND MAINTENANCE PLAN

1.1 INTRODUCTION

In accordance with the standards set forth by the Massachusetts Department of Environmental Protection (MADEP) Stormwater Management Policy, Civil Design Group, LLC has prepared the following Operation and Maintenance (O&M) Plan for *Coolidge Crossing*.

PROPERTY INFORMATION

PROPERTY ADDRESS	LANDOWNER & STORMWATER MANAGEMENT SYSTEM OWNER
COOLIDGE CROSSING 84 COOLIDGE STREET SHERBORN, MA 01770	Owner: Baystone Development
	Contact: TBD (interim contact Baystone Development)
	Phone: TBD (interim phone 781-894-9898 – Baystone Development)

The landowner shall be responsible for the long-term operation and maintenance of the site and the stormwater management system and shall be responsible for record keeping of inspections, maintenance and repairs. If the site owner changes, the new site owner shall assume all responsibilities outlined in this O&M plan. The site owner shall hire a qualified professional to conduct scheduled inspections and maintain records in accordance with the inspection schedule outline enclosed within this document.

Site Engineer: Civil Design Group, LLC
Address: 21 High Street, Suite 207, North Andover, MA 01845
Office Phone: 978-794-5400
Contact: Matthew Leidner, P.E.

The components of the stormwater management system shall be inspected, monitored and maintained in accordance with the following to ensure that the on-site stormwater management/ best management practice facilities for the project function as intended. Routine inspection and proper maintenance of these individual components is essential to providing the long-term enhancement of both the quality and quantity of the runoff from the site.

The proposed stormwater management best management practices (BMPs) have been designed to collect and convey runoff from developed areas in accordance with the Massachusetts DEP's Stormwater Management Handbook. The drainage system consists of deep sump hooded catch basins, manholes, water quality units, infiltration basins, subsurface infiltration systems (SISs) and outfalls with riprap aprons.

Street Sweeping

Sweeping of the project roadways shall be performed twice a year, once in the spring and once in the fall, to reduce the amount of sediment and debris entering the catch basins.

Deep Sump Hooded Catch Basins

Stormwater runoff from proposed pavement areas is directed via curbing and site grading to catch basins with deep sumps and hooded outlets. These structures are designed to trap and remove sediment and larger particles from the stormwater and improve the performance of subsequent BMP's. The sumps are a minimum of 4' in depth and a routine inspection and cleaning schedule shall be followed to ensure optimal effectiveness.

Inspection Frequency:	Quarterly
Inspection Tools:	Manhole hook; survey rod; sludge judge
Items to Inspect:	Measure sediment in sump using survey rod; visually check for floating debris or trash; visually check for oil and if more than a sheen is present, use sludge judge to measure thickness of layer; visually ensure that hood is in place; visually ensure that grate is in good condition; visually ensure that outlet pipe is unobstructed
Maintenance Threshold(s):	Annually or ≥24" sediment in sump (whichever comes first); discernible layer of oil/hydrocarbons on surface; floating trash
Maintenance Equipment:	Vactor or clamshell for sediment removal; vactor and/or oil sorbent pads for oil/hydrocarbon removal; net for floating debris or trash removal

Water Quality Units

Proprietary water quality units are designed to remove heavy particles, floating debris and hydrocarbons from stormwater. Stormwater enters the system where floatables and oils are separated prior to the clarified stormwater runoff discharging to an outlet pipe. The project design proposes to use Contech model CDS1515-3, Contech model CDS 2015-4, and Stormceptor model STC-450i units.

Inspection Frequency:	Quarterly and after storm events exceeding the 2-year, 24-hour storm (i.e. 3.34" of rain in 24 hours).
Inspection Tools:	Manhole hook; survey rod; sludge judge
Items to Inspect:	Measure sediment in sump using survey rod; use sludge judge to measure thickness of oil layer through oil port; visually ensure that insert and weir are in good condition; visually ensure that cover is in good condition
Maintenance Threshold(s):	≥8" sediment and/or a discernible layer of oil/hydrocarbons
Maintenance Equipment:	Vactor

Infiltration Basins

Basins CC-1, CC-2, and CC-3 are designed to treat, detain, and infiltrate stormwater. The side slopes and floor of the basin are vegetated with stone on the lowest portions of the floor to enhance infiltration.

Inspection Frequency:	Quarterly
Inspection Tools:	Ruler or survey rod to measure sediment
Items to Inspect:	Measure any accumulated sediment using a ruler or survey rod; visually inspect for erosion on the side slopes
Maintenance Threshold(s):	≥4" sediment; mow side slopes at least twice annually and remove clippings to avoid clogging of downstream structures; remove weeds,

	sediment, and other debris from stone routinely throughout the year and replace stone as needed to maintain a clean & neat appearance of the basin floor; repair any noted issues as required
Maintenance Equipment:	Skid steer or similar small machine for removing sediment; shovels for hand removal of sediment in tight areas such as around the outlet control structures; mower/trimmer for mowing (mow at least twice per year and remove clippings)

Subsurface Infiltration Systems (SISs)

Subsurface infiltration systems (SISs) CC-1, CC-2, CC-3, and CC-4 are designed to infiltrate runoff from the site. These systems are comprised of pipe and stone. The systems are equipped with inspection/cleanout ports to facilitate inspection for standing water and sediment accumulation.

Inspection Frequency:	Quarterly
Inspection Tools:	Ruler or survey rod to measure sediment
Items to Inspect:	Measure any accumulated sediment using a ruler or survey rod; inspect for standing water if more than 72 hours have elapsed since the previous rain event.
Maintenance Threshold(s):	≥1" sediment
Maintenance Equipment:	Water jet and vactor

Riprap Aprons

The riprap aprons are intended to dissipate energy and spread out flow prior to discharge.

Inspection Frequency:	Quarterly
Inspection Tools:	None (all visual)
Items to Inspect:	Visually ensure that flared end section is intact; visually ensure that riprap and interspersed boulders are intact; visually inspect that pipe is unobstructed; visually inspect downgradient slope for evidence of re-concentration of sheet flow; visually inspect downgradient wetland area(s) for signs of adverse impacts such as erosion or sedimentation
Maintenance Threshold(s):	Trim vegetation around pipe annually to maintain accessibility and visibility for inspection purposes, remove sediment if present, replace any displaced stones
Maintenance Equipment:	Mower/trimmer for trimming vegetation, hand methods or equipment as required for sediment removal and stone replacement

1.2 ILLICIT DISCHARGE STATEMENT

Illicit discharges to the stormwater management system are discharges not entirely comprised of stormwater. Discharges to the stormwater management system from the following activities or facilities are permissible: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

There are no known illicit discharges currently at the site nor are any illicit discharges proposed as part of the project. The stormwater management system is not intended to convey any illicit discharges and or pollutants and as such, control measures that are identified within this report shall be strictly adhered to in order to

minimize the risk of contamination. Any unknown existing illicit discharges that are discovered as part of the development of the subject site shall be eliminated in accordance with local, state and federal regulations.

2.0 LONG-TERM POLLUTION PREVENTION PLAN (LTPPP)

The Massachusetts DEP Stormwater Management Handbook requires that a Long-Term Pollution Prevention Plan (LTPPP) be prepared and incorporated as part of the Operation & Maintenance of the Stormwater Management System. The purpose of the LTPPP is to identify potential sources of pollution that may affect the quality of stormwater discharges, and to describe the implementation of practices to reduce the pollutants in stormwater discharges. The following items describe the source control and proper procedures for the LTPPP.

Solid Waste Storage:
There are no proposed exterior (un-covered) solid waste storage areas. Trash and recycling shall be stored either indoors or in closed containers. The homeowners association shall contract with a waste hauling company to service the development on a routine basis.

Street Sweeping
Sweeping of site drives and parking lots shall be performed twice a year, once in the spring and once in the fall, to reduce the amount of sediment and debris entering the catch basins. Swept materials shall be disposed of in accordance with applicable local and state requirements.

Deicing and Salt Storage
Deicing methods shall be used in conjunction with snow removal to maintain safe pedestrian and vehicular access. The management company will be responsible for maintaining roads, driveways, sidewalks and pedestrian access onsite. To the extent practicable, snow shall be piled in areas where the snowmelt will receive maximum treatment through the proposed BMPs. Deicing products shall be stored off-site or in a covered location. Deicing products such as calcium chloride, rock salt and/or sand may be used unless otherwise restricted by the municipality.

Snow Disposal
To the extent possible, snow shall be stored on pervious surfaces in upland areas away from water resources and wells. At these locations, snow meltwater can filter in to the soil, leaving behind sand and debris, which can be removed in the springtime. Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. In addition, a high volume of sand, sediment, and litter released from melting snow may be quickly transported through the drainage system into surface water. In no case shall snow be disposed of or stored in environmentally sensitive areas such as wetlands, floodplains, streams or other water bodies. If necessary to remove snow from the site, the snow shall be disposed of at an off-site location in accordance with applicable local, state and federal regulations.

Hazardous Materials Containment
Sources of potential spill hazards include vehicle fluids, liquid fuels, pesticides, paints, solvents, and liquid cleaning products. The majority of the spill hazards would likely occur within buildings and would not enter the stormwater drainage system. However, there are potential spill hazards from vehicle fluids or liquid fuels located outside of the buildings. These exterior spill hazards have the potential to enter the stormwater drainage system and shall be addressed as follows:

- Spill Hazards of pesticides, paints, and solvents shall be remediated using the manufacturers' recommended spill cleanup protocol.

- Vehicle fluids and liquid fuel spill shall be remediated according to the local and state regulations governing fuel spills.
- Any hazardous spills shall be cleaned up immediately after discovery
- Should a spill occur, this pollution prevention plan should be adjusted to include measures to prevent another spill of a similar nature. A description of the spill, along with the causes and cleanup measures should be included in the updated pollution prevention plan.

Septic System Management

Not applicable – the project utilizes a public sewer system.

Lawn, Garden, and Landscape Management:

Lawn areas shall be maintained and mowed regularly throughout the growing season. Any bare areas of lawn shall be reseeded and plants shall be pruned on an as-needed basis. Trash and debris shall be removed from landscaped and planted areas as-needed. Fertilizers, herbicides and pesticides shall be used within the amounts recommended by the manufacturer. These products shall be stored in containers indoors. Pet waste shall be disposed of properly.

p: 978-794-5400 f : 978.965.3971 www.cdgengineering.com

APPENDIX-A

EXAMPLE
OPERATION AND MAINTENANCE
REPORT FORMS

CIVIL DESIGN GROUP, LLC

ENGINEERING. LAND USE. PLANNING. PERMITTING.

21 High Street, Suite 207
North Andover, MA 01845
Tel 978.794.5400
www.cdgengineering.com

QUARTERLY STORMWATER INSPECTION REPORT (1/2)

Site:	Coolidge Crossing	**Date:**	
Address:	84 Coolidge Street, Sherborn, MA	**Time:**	
Inspector:		**Weather:**	

CATCH BASINS

Unit #	Sediment (inches)	Oil (inches)	Hood/ Pipes	Grate	Last Cleaned	Attention Recommended

QUARTERLY STORMWATER INSPECTION REPORT (2/2)

Site:	Coolidge Crossing	**Date:**	
Address:	84 Coolidge Street, Sherborn, MA	**Time:**	
Inspector:		**Weather:**	

WATER QUALITY UNITS

Unit #	Sediment (inches)	Oil (inches)	Trash	Cover	Last Cleaned	Attention Recommended

INFILTRATION BASINS

Unit #	Notes	Attention Recommended

SUBSURFACE INFILTRATION SYSTEMS

Unit #	Notes	Attention Recommended

RIPRAP APRONS

Unit #	Notes	Attention Recommended

APPENDIX-B

WATER QUALITY UNIT MAINTENANCE GUIDELINES

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

CONTECH ENGINEERED SOLUTIONS

800.925.5240
www.ContechES.com

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

Stormceptor®

Owner's Manual

April 2000

The Stormceptor® System is protected by one or more of the following patents:

Canadian Patent No. 2,009,208
Canadian Patent No. 2,137,942
Canadian Patent No. 2,175,277
Canadian Patent No. 2,180,305
Canadian Patent No. 2,206,338
U.S. Patent No. 4,985,148
U.S. Patent No. 5,498,331
U.S. Patent No. 5,725,760
U.S. Patent No. 5,753,115
U.S. Patent No. 5,849,181
U.S. Patent No. 6,068,765
Australia 693.164
Australia 707,133
New Zealand 314,646
European Paten Treaty 95 307 996.9

The Stormceptor System for

Stormwater Quality Improvement

Congratulations!

Your selection of a Stormceptor® System means that you have chosen the most recognized and efficient stormwater oil/sediment separator available. Stormceptor is a pollution control device that protects our lakes, rivers and streams from the harmful effects of non-point source pollution. Please address any questions or concerns regarding the Stormceptor Systems to Stormceptor Canada Inc at 1-800-565-4801 or visit our website at *www.stormceptor.com.*

What is a Stormceptor?

Stormceptor is a patented water quality structure that takes the place of a conventional manhole with in a storm drain system. Stormceptor removes free oil (TPH) and suspended solids (TSS) from stormwater preventing spills and non-point source pollution from entering downstream lakes and rivers. Key benefits of a Stormceptor include:

- Capable of removing 50% to 80% of the total sediment load when properly applied as a source control for small areas
- Removes free oil from stormwater during low flow conditions
- Will not scour or re-suspend trapped pollutants
- Excellent spill control device for commercial and industrial developments
- Easy to maintain (vacuum truck)
- STORMCEPTOR *clearly* marked on the cover (excluding inlet designs)
- Engineered and continually tested
- Vertical orientation therefore resulting in a smaller footprint

Please Maintain Your Stormceptor

To ensure long-term environmental protection through continual performance, **Stormceptor must be maintained**. The need for maintenance is determined through inspection of the Stormceptor. Procedures for inspection are provided in this document. Maintenance of the Stormceptor is performed from the surface via vacuum truck. . If you require a list of contacts for cleaning your Stormceptor please call one of our Stormceptor offices or your nearest Stormceptor affiliate (affiliates listed in Appendix 1).

How does Stormceptor® Work?

Stormceptor can be divided into two components:

- Lower treatment chamber
- Upper by-pass chamber

Stormwater flows into the by-pass chamber via the storm drain pipe. Low flows are diverted into the treatment chamber by a weir and drop pipe arrangement. The treatment chamber is always full of water. Water flows up through the outlet pipe based on the head at the inlet weir, and is discharged back into the by-pass chamber downstream of the weir. The downstream section of the by-pass chamber is connected to the outlet storm drainpipe.

Free oils and other liquids lighter than water will rise in the treatment chamber and become entrapped beneath the fiberglass insert since the outlet pipe is submerged. Sediment will settle to the bottom of the chamber by gravity. The circular design of the treatment chamber is critical to prevent turbulent eddy currents and to promote settling.

During high flow conditions, stormwater in the by-pass chamber will flow overtop of the weir and be conveyed to the outlet storm drain directly. Water that overflows the weir creates a backwater effect on the outlet pipe (head stabilization between the inlet drop pipe and outlet riser pipe) ensuring that excessive flow will not be forced into the treatment chamber, which could scour or re-suspend the settled material. The by-pass is an integral part of Stormceptor since other oil/grit separators have been noted to scour during high flow conditions (Schueler and Shepp, 1993).

Stormceptor Models and Identification

Stormceptor is available in both concrete and fiberglass. There are currently nine different sizes available. A concrete Stormceptor is denoted by STC (e.g. STC6000) preceding the model number. A fiberglass Stormceptor is denoted by STA (e.g. STA6000) preceding the model number.

In the concrete Stormceptor, a fiberglass insert separates the treatment chamber from the by-pass chamber. There is three insert designs: the "spool", the "disc" and the "inlet". The different insert designs are illustrated in Figures 1, 2 and 3. These designs are easily distinguishable from the surface once the cover has been removed. In the "spool" design you will see one large 914 mm (36") opening in the center of the insert with two 200 mm (8") inspection ports located either vertically on the sides of the 914 mm (36") opening or horizontally on either side of the opening. There are three versions of the in-line disc insert: "single inlet/outlet", "multiple inlet" and "submerged". In the "disc" design you will be able to see the inlet pipe, the drop pipe opening to the lower chamber, the weir, a 150 mm (6") oil inspection/cleanout pipe, a large 610 mm (24") riser pipe-opening offset on the outlet side of the structure, and the outlet pipe from the unit. The weir will be around the 610 mm (24") outlet pipe on the "multiple inlet" disc insert. The "submerged" disc insert has a higher weir and a second inlet drop pipe. In the "inlet" design you will be

able to see the 305 mm (12”) inlet drop pipe and 100 mm (4”) outlet riser pipe as well as a central 100mm [4”] oil inspection/cleanout port.

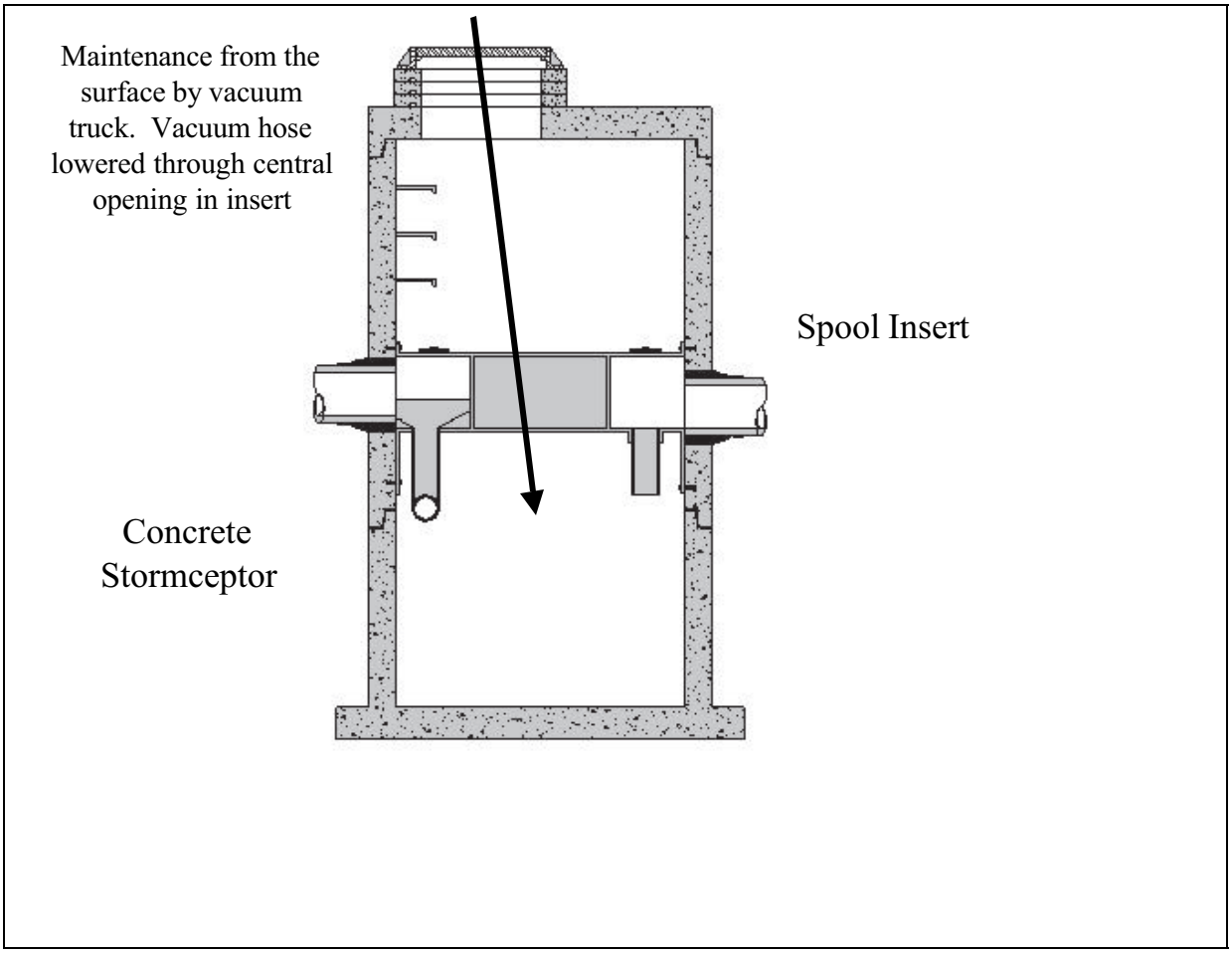


Figure 1 "Spool" Insert Concrete Stormceptor®

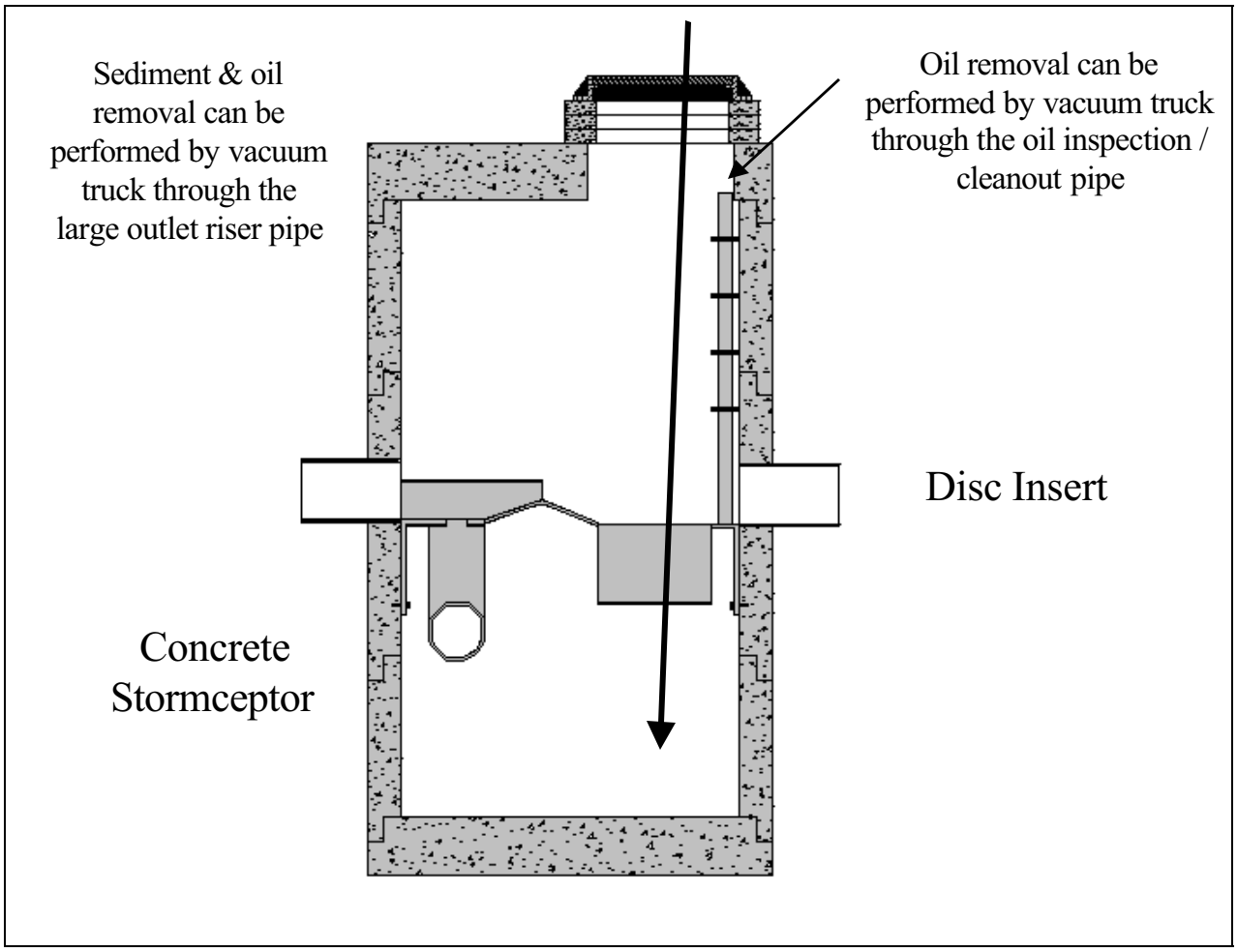
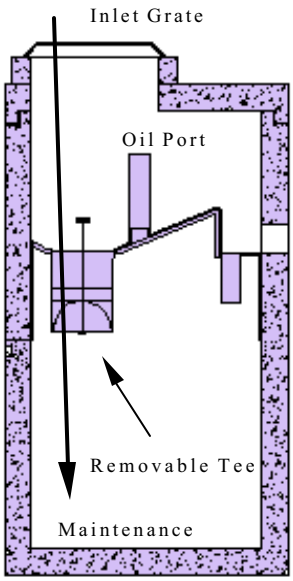


Figure 2 Single Inlet/Outlet "Disc" Insert Concrete Stormceptor®



Inlet Insert

Figure 3 STC 300/450 Inlet Insert

Sizes/Models

Dimensions of the fiberglass and concrete Stormceptor® units are provided in Table 1. Values of invert to grade are provided later in this document for your site. The total depth for cleaning will be the sum of the depth from invert to grade and invert to the bottom of the unit.

Table 1. Stormceptor Dimensions *

Model (Metric)	Model (US)	Pipe Invert to Bottom of STA Stormceptor m (in.)	Pipe Invert to Bottom of STC Stormceptor m (in.)
300	450	1.6 (64)	1.7 (68)
750	900	1.6 (64)	1.9 (74)
1000	1200	2.1 (81)	2.2 (86)
1500	1800	2.9 (115)	3.1 (122)
2000	2400	2.3 (89)	3.1 (122)
3000	3600	3.2 (127)	4.0 (158)
4000	4800	2.9 (113)	3.7 (146)
5000	6000	3.5 (138)	4.3 (170)
6000	7200	3.3 (128)	4.0 (158)

*** Depths are approximate**

The capacities of the different Stormceptor units are provided in Table 2.

Table 2. Stormceptor® Capacities				
Model (Metric)	Model (US)	Sediment Capacity L (US gal)	Oil Capacity L (US gal)	Total Holding Capacity L (US gal)
300	450	1275 (335)	325 (85)	1775 (470)
750	900	2460 (565)	915 (280)	4325 (950)
1000	1200	3260 (845)	915 (280)	5125 (1230)
1500	1800	5660 (1445)	915 (280)	7525 (1830)
2000	2400	6150 (1345)	2945 (880)	10925 (2495)
3000	3600	10415 (2600)	2945 (880)	15195 (3750)
4000	4800	14060 (3475)	3490 (1025)	20180 (5020)
5000	6000	18510 (4550)	3490 (1025)	24635 (6095)
6000	7200	23445 (5425)	4150 (1100)	31210 (7415)

Identification

Even if you do not have plans of your storm drain system you will be able to easily identify where the inline Stormceptor unit(s) (spool or disc insert) are since the name STORMCEPTOR is clearly embossed on the cover. You will be able to determine the location of "inlet" Stormceptor units with horizontal catch basin inlets by looking down the grate since the insert will be visible. The name Stormceptor is not embossed on the inlet models due to the variability of inlet grates used/approved across North America. Once you have found the unit, you may still be uncertain which model number it is. Comparing the measured depth from the water level (bottom of insert) to the bottom of the tank with Table 1 should help determine the size of the unit.

Starting in 1996, a metal serial number tag has been affixed to the inside of the unit. The serial number has the model number written on it. If the unit does not have a serial number, or if there is any uncertainty regarding the size of the interceptor using depth measurements, please contact Stormceptor at 1 800 565-4801 and we will help you determine the size of a particular unit.

What is the Maintenance Procedure?

Maintenance of Stormceptor is performed using vacuum trucks. No entry into the unit is required for maintenance of the spool insert, inlet insert or the smaller disc inserts. Entry to the level of the disc insert may be required for servicing the larger disc insert models. **DO NOT ENTER THE STORMCEPTOR CHAMBER** unless you have the proper equipment, have been trained and are qualified to enter a confined space, as identified by local Occupational Safety and Health Regulations (*e.g.* Canada Occupational Safety and Health Regulations – SOR/86-304). Without the proper equipment and training, entry into confined spaces can result in serious bodily harm and potentially death. Consult local, provincial, and/or state regulations to determine the requirements for confined space entry. Be aware that the insert may be slippery. In addition, be aware that some units do not have a safety grate to cover the outlet riser pipe that leads to the submerged, lower treatment chamber.

The Vacuum Service Industry is a well-established sector of the service industry that cleans underground tanks, sewers and catch basins. Costs to clean a Stormceptor® will vary based on the size of unit and transportation distances.

The depth of oil in the interceptor can be determined by inserting a dipstick tube in the 150 mm (6") oil inspection/cleanout pipe ("disc" design), or in the 914 mm (36") central access way ("spool" design), or in the 100 mm (4") cleanout pipe
("inlet" design).

Similarly, the depth of sediment can be measured from the surface without entry into the Stormceptor via a dipstick tube equipped with a ball valve (Sludge Judge). This tube would be inserted in the central opening ("spool" design) or in the 610 mm (24") opening ("disc" design), or in the 100 mm (4") cleanout pipe ("inlet" design). Maintenance should be performed once the sediment depth exceeds the guideline values provided in Table 3.

For the "spool" design Stormceptor maintenance is performed through the large central 914 mm (36") diameter opening for both the oil and the sediment. In the "disc" design, oil is removed through the 150 mm (6") oil inspection/cleanout pipe and sediment is removed through the 610 mm (24") diameter outlet riser pipe. Alternatively, oil could be removed from the 610 mm (24") opening if water is removed from the lower chamber to lower the oil level to the level of the drop pipes. For the "inlet" design, maintenance is performed through the 305mm (12") inlet drop pipe for the sediment, and oil can be removed from the 100 mm (4") oil/inspection cleanout pipe.

We recommend the following procedure to clean out the Stormceptor:

1. Check for oil (using a dipstick tube)
2. Remove any oil separately using a small portable pump
3. Decant the water from the unit to the sanitary sewer using a portable pump (**prior approval is required from the sewer authority/municipality**)
4. Remove the sludge from the bottom of the unit using a vacuum truck
5. Re-fill the Stormceptor with water where required by the local jurisdiction

How Often Is Maintenance Required?

Generally, annual maintenance is recommended but the required maintenance frequency will vary with the amount of pollution on your site (number of hydrocarbon spills, amount of sediment, etc.). It is recommended that the frequency of maintenance be increased or reduced based on local conditions. If the sediment load is high, maintenance may be required semi-annually. Conversely once the site has stabilized, maintenance may be required less frequently. Maintenance should be performed immediately after an oil spill or once the sediment depth in Stormceptor reaches the value specified in Table 3 based on the unit size.

In the "disc" design and "inlet" design, any potential obstructions at the inlet can be observed from the surface. The "disc" insert has been designed as a platform to facilitate maintenance of the Stormceptor and the storm drain system.

Table 3. Sediment Depths Indicating Required Maintenance		
Model (Metric)	Model (US)	Sediment Depth mm (in.)
300	450	200 (8)
750	900	200 (8)
1000	1200	250 (10)
1500	1800	375 (15)
2000	2400	300 (12)
3000	3600	425 (17)
4000	4800	375 (15)
5000	6000	450 (18)
6000	7200	375 (15)

What Should I do in the Event of an Oil Spill?

Stormceptor® is often implemented in areas where the potential for spills is great. Stormceptor should be cleaned immediately after a spill occurs by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required in the event of a spill.

Disposal of the Trapped Material Removed from Stormceptor

The requirements for the disposal of material from Stormceptor are similar to that of any other Best Management Practices (BMP). Local guidelines should be consulted prior to disposal of the separator contents.

In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste. In some areas, mixing the water with the sediment will create a slurry that can be discharged into a trunk sanitary sewer. In all disposal options, approval from the dsposal facility operator/agency is required. Petroleum waste products collected in Stormceptor (oil/chemical/fuel spills) should be removed by a licensed waste management company.

What if I see an oil rainbow or sheen at the Stormceptor outlet?

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a rainbow or sheen can be seen at very small oil concentrations (< 10 ppm). Stormceptor will remove over 95% of all free oil and the appearance of a sheen at the outlet with high influent oil concentrations does not mean that the unit is not working to this level of removal. In addition, if the influent oil is emulsified, the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified or dissolved oil conditions.

Attachment 8 – Illicit Discharge Statement

ILLICIT DISCHARGE STATEMENT

FOR

COOLIDGE CROSSING

RESIDENTIAL APARTMENT COMMUNITY

84 & 86 COOLIDGE STREET
(PORTIONS OF ASSESSORS MAP 5 LOTS 54 & 55)
SHERBORN, MA 01770

DATE: JANUARY 22, 2021

Illicit discharges to the stormwater management system are discharges not entirely comprised of stormwater. Discharges to the stormwater management system from the following activities or facilities are permissible: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

There are no known illicit discharges currently at the site nor are any illicit discharges proposed as part of the project. The stormwater management system is *not* intended to convey any illicit discharges and/or pollutants and as such, control measures that are identified within this report shall be strictly adhered to in order to minimize the risk of contamination. Any unknown existing illicit discharges that are discovered as part of the development of the subject site shall be eliminated in accordance with local, state and federal regulations.