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# STORMWATER MANAGEMENT REPORT

PROJECT:
***236 CHAPEL STREET, NEWTON, MA***


**Prepared by: Spruhan Engineering, P.C.**
**Date: May 25th, 2023.**

# Contents

# 1. Introduction

Spruhan Engineering, P.C. has prepared this Storm Water Report for the proposed development located at 58 Cherry Place, Newton, Massachusetts.

The proposed development consists of 2 stories + basement multi-family residence dwelling, paved driveway, walkway, steps and landscaped areas. The purpose of this report is to demonstrate that the proposed conditions do not create any increased flowrate or runoff from the site. This is achieved by installing a drainage system composed by one storm tech chamber.

# 2. Existing Conditions

The existing property is located at 236 Chapel Street, Newton, Massachusetts. The site is bounded by residential dwellings on the rear and side. The property is located between Middle St and Green St. The existing roof area on the lot is 953.79 S.F., the existing paved driveway area is 1,025.15 S.F., other proposed impervious areas of 217.40 S.F., and the existing landscaped area on the lot is 8,071.66 S.F.

## 2.1 Existing Topography and Drainage Infrastructure

The property slopes from the left side (Northwest) to the right side (Southeast) of the lot ranging between approximately 4.01%. As there is no drainage system currently installed, all storm water scours across the surface at grade.

# 3. Proposed Conditions

## 3.1 Project Description

The proposed development consists of 2 stories + basement multi-family residence dwelling, paved driveway, walkway, steps and open and closed landings and landscaped areas. The proposed roof will have an area of 3,439.14 S.F, the proposed driveways will have an area of 1,172.67 S.F., the remaining unconnected impervious will have an area of 651.90 S.F. and the remaining landscaped portion will have an area of 5,086.21 S.F.

## 3.2 Storm Water Runoff

HydroCAD was used to model the site for the existing and proposed conditions for the 2-year, 10-year, 25-year, and 100-year type III storm events based on Atlas-14 Rain information for Middlesex County Central Area. HydroCAD calculations can be seen in Appendix A. The following table shows a summary of the existing and proposed conditions on the site as they relate to flowrate and volume of storm water runoff for each of the storm events.

| SUMMARY TABLE | | | | |
|---|---|---|---|---|
| Rainfall Event | Runoff Flow Rate (cfs) | | Volume of Runoff (cf) | |
| | Existing | Proposed | Existing | Proposed |
| 2-Year | 0.32 | 0.10 | 1,096 | 334 |
| 10-Year | 0.62 | 0.23 | 1,989 | 721 |
| 25-Year | 0.80 | 0.32 | 2,530 | 963 |
| 100-Year | 1.58 | 0.73 | 4,940 | 2,337 |

## 3.3 Infiltration System

A drainage system composed by one set of storm tech chambers (7 chamber) and is proposed to control the runoff rate from the post construction site, which calculations and configuration are shown next:

**236 Chapel St, Newton, MA.**

Date: April 25th, 2023
Calculations by: E.R.G.

**STORMWATER MANAGEMENT CALCULATIONS**
**SYSTEM #1**

**Design Criteria:**

| | |
|---|---|
| Impervious roof = | 3,357.22 SF |
| Driveway = | 1,172.67 SF |
| Other Impervious = | 651.90 SF |
| Design for | 2" Rainstorm |
| Storage by 1 chamber = | 49 CF |
| Chamber height = | 30.0" (2.5') |
| Stone cover thickness= | 6" (0.5') |
| Stone base thickness= | 6" (0.5') |
| Void ratio (crushed stone) = | 0.40 |

**Total Storage Required:**

Total = 3,357.22 SF + 1,172.67 SF + 651.90 SF = **5,068.21 SF**

$V_R$ = (2"/12) (5,068.21 SF) = **863.63 CF**

**CAPACITY OF PROPOSED STORM TECH SYSTEM**

Total Volume= (7'x 11' x (0.5'+2.5'+0.5') x 7 UNIT) = 1,886.50 CF

Capacity for 7 UNIT = 343 CF

Storage Capacity in Crushed Stone = (Total Volume – Capacity of Units) x Void Ratio = (1,886.50 CF – 343 CF) x 0.4 = 617.40 CF

Total Storage Provided = Capacity in Crushed Stone + Total Capacity in Units = 617.40 CF + 343 CF = 960.40 CF

Since Total Storage Provided (960.40 CF) > Total Storage Required (863.63 CF)

**Therefore, utilize 7-Stormtech chambers with 0.5 ft. of crushed stone as cover and 0.5 ft. of crushed stone beneath to contain 2" Storm Event**

## 3.4 Low Impact Development (LID)

Low Impact Development (LID) strategies use careful site design and decentralized stormwater management to reduce the environmental footprint of new growth and redevelopment. This approach improves water quality, minimizes the need for expensive pipe and pond stormwater systems, and creates more attractive developments.

The following strategies outline the LID methods that were implemented in this project.

1. **Infiltration Trench:** These are standard stormwater management structures that store water in the void space between crushed stone or gravel; the water slowly percolates downward into the subsoil.

Management Objectives:

- Remove suspended solids, heavy metals trash, oil, and grease.
- Reduce peak discharge rate and total runoff volume.
- Provide modest infiltration and recharge.
- Provide snow storage areas.

2. **Use of Filter Mitts:**
   - Erosion control
   - Detains sediment, absorbs orders and degrades volatile organic compounds allows water by-pass, and is a food resource for beneficial microorganisms, which remediate by metabolizing wood preservatives, petroleum products, pesticides and both chlorinated and non-chlorinated hydrocarbons in stormwater runoff from reaching water resources, prevents erosion and silting on embankments parallel to creeks, lakes, and rivers, prevents erosion and turf loss on roadsides, hillsides, playing fields, and golf courses.
3. **Maintenance of Paved Surfaces:**
   - No coal-tar pavement sealants.
   - No sodium de-icers.
   - Street sweeping

## 3.5 MassDEP Stormwater management Summary

**Standard 1: No New Untreated Discharges**

"No new untreated stormwater conveyances (e.g., outfalls) will discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth."

- The project does not propose a connection to the city drain main.
- The whole roof & both driveways will be captured by a sub-surface infiltration system.

**Standard 2: Peak Attenuation**

"Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates."

- Most of the proposed impervious areas will be captured by the infiltration trench. The infiltration system was designed to reduce the flowrate and total runoff volume generated from the site post construction and to retain at least 2" of rain on the total proposed impervious areas.

Further information can be found on the Appendix A "HydroCAD calculations" and a summary of these calculations can be found on section 3.3 of this report.

**Standard 3: Recharge**

"Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre- development conditions based on soil type. This condition is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook."

- Proposed site improvements include a storm water recharge system designed to reduce the runoff from the lot and improve groundwater recharge.

A drainage system composed by one set of Stormtech (7 chambers) proposed to control the runoff rate from the post construction site, which calculations and configuration are shown on section 3.3.

**Standard 4: Water Quality**

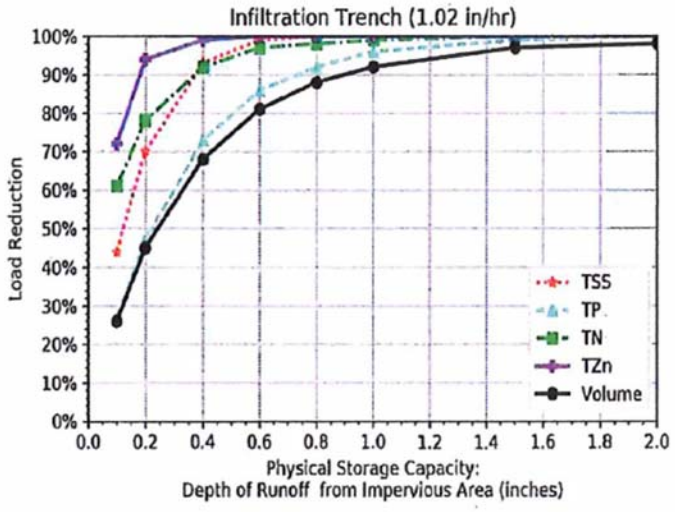
According to the City of Newton Stormwater Management and Erosion Control Rules and Regulations for "New development" site shall be designed to:

a. Retain the volume of runoff equivalent to, or greater than, two (2) inches multiplied by the total post-construction impervious surface area on the site; and
b. Remove 90% of the average annual load of Total Suspended Solids generated from the total post-construction impervious area on the site; and
c. Calculate the existing and proposed average annual Total Phosphorus (TP) load based on the land use(s) and demonstrate 60% reduction of the TP load generated from the total post-construction impervious surface area on the site: and
d. Whenever feasible exceed the above minimum phosphorus removal requirement. Infiltration BMPs, bioretention areas, constructed stormwater wetlands, and filter

systems are recommended ways to reduce phosphorus in stormwater discharges.

Since an infiltration system with a capacity to store 2" of runoff depth is being proposed and the infiltration rate used is 8.27 in/hr (Rawls rate) the TSS and a total phosphorus reduction achieved is 85%.

The following tables/charts were used to get the load reduction.




INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

*Version 1, Automated: Mar. 4, 2008*

Location: 236 CHAPEL ST, NEWTON, MA

**TSS Removal Calculation Worksheet**

| B<br>BMP[1] | C<br>TSS Removal Rate[1] | D<br>Starting TSS Load* | E<br>Amount Removed (C*D) | F<br>Remaining Load (D-E) |
|---|---|---|---|---|
| Infiltration Trench | 0.80 | 1.00 | 0.80 | 0.20 |
| Deep Sump and Hooded Catch Basin | 0.25 | 0.20 | 0.05 | 0.15 |
| | 0.00 | 0.15 | 0.00 | 0.15 |
| | 0.00 | 0.15 | 0.00 | 0.15 |
| | 0.00 | 0.15 | 0.00 | 0.15 |

**Total TSS Removal =** 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 236 CHAPEL ST, NEWTON, MA
Prepared By: SPRUHAN ENGINEERING
Date: 25-May-23

*Equals remaining load from previous BMP (E) which enters the BMP

| | | Cumulative Load Reduction | | | | |
|---|---|---|---|---|---|---|
| Infiltration Rate (in/hr) | Depth of Runoff from Impervious Area (inches) | TSS | Phosphorus | Nitrogen | Zinc | Runoff Volume |
| 1.02 | 0.1 | 44% | 27% | 61% | 72% | 26% |
| | 0.2 | 70% | 47% | 78% | 94% | 45% |
| | 0.4 | 93% | 73% | 92% | 99% | 68% |
| | 0.6 | 99% | 86% | 97% | 100% | 81% |
| | 0.8 | 100% | 92% | 98% | 100% | 88% |
| | 1.0 | 100% | 96% | 99% | 100% | 92% |
| | 1.5 | 100% | 99% | 100% | 100% | 97% |
| | 2.0 | 100% | 100% | 100% | 100% | 98% |

| PHOSPHORUS LOADS / REDUCTIONS | | | |
|---|---|---|---|
| **TP = A*L** | | | |
| **Where:** | | | |
| A | = | Total impervious area of post-development (acres) | |
| L | = | Load of a pollutant in pounds per acre per year. | |
| $A_C$ | = | Captured impervious area of post-development (acres) | |
| **PRE-DEVELOPMENT PHOSPHORUS LOADING (Lpre)** | | | |
| Tppre | = | A*L | |
| Tppre | = | 0.0504 Acres X | 1.96 lbs/acre/year |
| Tppre | = | **0.099 lbs/year** | |
| **POST-DEVELOPMENT PHOSPHORUS LOADING (Lpost)** | | | |
| $TP_{post}$ | = | A*L | |
| $TP_{post}$ | = | 0.1217 Acres x | 2.32 lbs/acre/year |
| $TP_{post}$ | = | 0.282 lbs/year | |
| **REDUCED TP LOAD** | | | |
| REDUCED TP | = | $A_C$*L | |
| REDUCED TP | = | 0.1040 Acres x | 2.32 lbs/acre/year |
| REDUCED TP | = | 0.241 lbs/year | |
| **TOTAL PHOSPHORUS REDUCTION % (TP)** | | | |
| **TP RED. (%)** | = | **85.44 %** | |

**Standard 5: Land Uses with Higher Potential Pollutant Loads**

"For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff form such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the

specific structural stormwater BMP's determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook."

- The project does not propose Land Uses with Higher Potential Pollutant Loads – N/A.

**Standard 6: Critical Areas**

"Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook."

- The project is not located in a critical area – N/A

**Standard 7: Redevelopment**

The City of Newton Stormwater Management and Erosion Control Rules and Regulations define new development and redevelopment as if follows:

- **New development**: Any construction or disturbance of land that is currently in a natural vegetated state. New development also includes any disturbance beyond existing impervious and disturbed areas that is contiguous to redevelopment projects.
- **Redevelopment**: Any construction, land alteration, demolition or improvement of impervious surfaces that does not meet the definition of new development. The following activity is excluded from this definition: Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, and correcting substandard intersections and drainage, repaving, and adding sidewalks and curbing.

Therefore, this project is considered a new development and both the site plan and stormwater report have been prepared to meet those standards.

**Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control**

"A plan to control construction related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented."

- Erosion and sedimentation controls will be installed before construction and maintained during the project.

- Further information can be found in the erosion control site plan and in the appendix C of this report.

**Standard 9: Long Term Operation and Maintenance Plan**

"A long-term operation and maintenance plan shall be delivered and implemented to ensure that stormwater management systems function as designed."

- Operations and Maintenance Plan will be the responsibility of the owner. The details of this plan can be found in the attached appendix C.

**Standard 10: Prohibition of Illicit Discharges**

"All illicit discharges to the stormwater management system are prohibited."

- There are currently no known illicit discharges within the project limits.
- The project does not propose any illicit discharges.

# 4. Soil Information

The NRCS Web Soil Survey shows one Map Unit inside our area of interest. This is listed next and the percentages of Area of Interest in the Map Unit Legend Table:

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| 626B | Merrimac-Urban land complex, 0 to 8 percent slopes | 0.3 | 100.0% |
| **Totals for Area of Interest** | | **0.3** | **100.0%** |

Map unit **626B** refers to **gravelly sandy loam**, these soils have a Hydrological soil group "D".

Also, a test pit was performed on the site which properties were applied to the HydroCAD software calculations and Drawdown time calculations as well.

Further detailed information is described in Appendix B.

# 5. Test Pit

| DEEP OBSERVATION HOLE LOG | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEEP OBSERVATION HOLE NUMBER: | | | | TP-1 | | GROUND ELEVATION: | | | | | 49.8'± |
| Depth (in) | Horizon/ Layer | Matrix: Color-Moist | Redoximorphic Features | | | Texture (USDA) | Coarse Fragments (Percent by Volume) | | Structure | Consistence (Moist) | Other |
| | | | Depth (in) | Color | Percent | | Gravel | Cobbles & Stones | | | |
| 0-12 (48.80' ±) | A | 10YR 3 2 | -- | -- | -- | SANDY LOAM | <5 | <5 | MASSIVE | FRIABLE | -- |
| 12-24 (47.80' ±) | Bw | 10YR 5 6 | -- | -- | -- | SANDY LOAM | <5 | <5 | MASSIVE | FRIABLE | -- |
| 24-108 (40.80' ±) | C | 7.5Y 6 3 | NONE | -- | -- | GRAVEL | 50 | 10 | GRANULAR | LOOSE | -- |
| NOTES:<br>1. NO GROUND WATER OBSERVED.<br>2. NO REFUSAL<br>3. LOGGED BY MATTHEW MUI, SE14259 ON 12/08/2022. | | | | | | | | | | | |

| DEEP OBSERVATION HOLE LOG | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEEP OBSERVATION HOLE NUMBER: | | | | TP-2 | | GROUND ELEVATION: | | | | | 45.5'± |
| Depth (in) | Horizon/ Layer | Matrix: Color-Moist | Redoximorphic Features | | | Texture (USDA) | Coarse Fragments (Percent by Volume) | | Structure | Consistence (Moist) | Other |
| | | | Depth (in) | Color | Percent | | Gravel | Cobbles & Stones | | | |
| 0-8 (44.83' ±) | A | 10YR 3 2 | -- | -- | -- | SANDY LOAM | <5 | <5 | MASSIVE | FRIABLE | -- |
| 8-20 (43.83' ±) | Bw | 10YR 5 6 | -- | -- | -- | SANDY LOAM | <5 | <5 | MASSIVE | FRIABLE | -- |
| 20-108 (36.50' ±) | C | 7.5Y 6 3 | NONE | -- | -- | GRAVEL | 50 | 10 | GRANULAR | LOOSE | -- |
| NOTES:<br>1. NO GROUND WATER OBSERVED.<br>2. NO REFUSAL<br>3. LOGGED BY MATTHEW MUI, SE14259 ON 12/08/2022. | | | | | | | | | | | |

# 6. Drawdown time (Time to empty) Calculations.

- Drainage system:

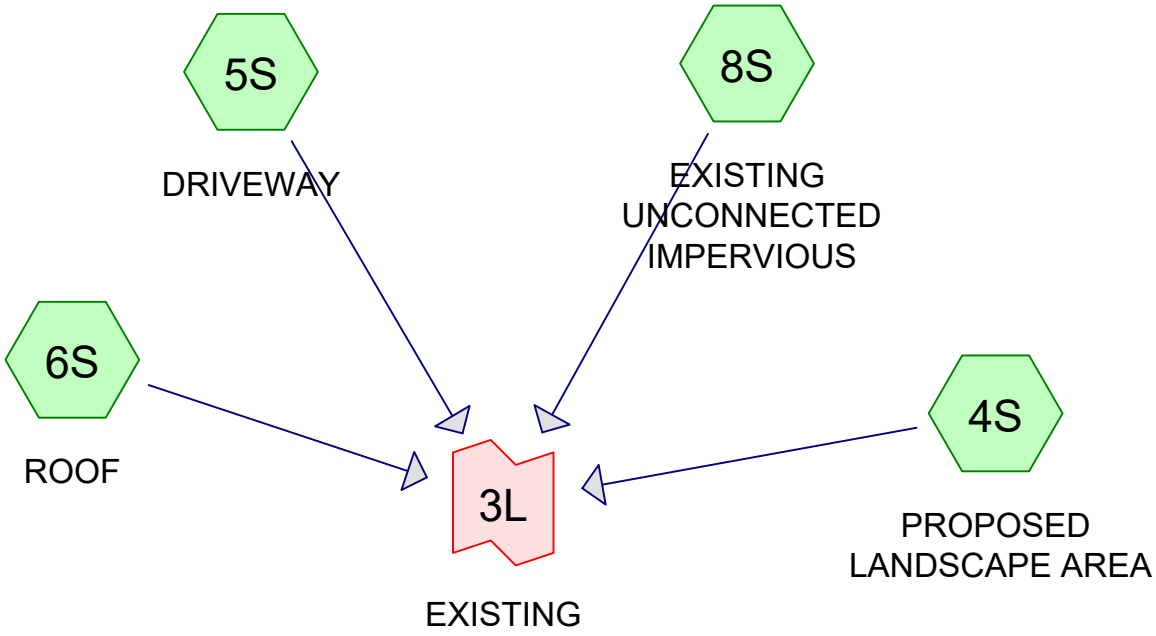
**Drawdown time (Time to empty) Calculations**

$$Time = \frac{rv}{(k)(Bottom\ Area)}$$

Time $_{drawdown}$= (690.40 cf) / [(8.27 in/hr) (1ft/12in) (539.0 sf)]

**Time = 2.59 hr < 72.00hr**

# Appendix A – HydroCAD Calculations




Subcat Reach Pond Link

**Routing Diagram for 3 - EXIST**
Prepared by SPRUHAN ENGINEERING, Printed 5/22/2023
HydroCAD® 10.00-25 s/n 09067 © 2019 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (sq-ft) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 8,072 | 69 | 50-75% Grass cover, Fair, HSG B (4S) |
| 788 | 98 | Paved parking, HSG B (5S) |
| 954 | 98 | Roofs, HSG B (6S) |
| 370 | 98 | Unconnected pavement, HSG B (8S) |
| 85 | 98 | Unconnected roofs, HSG B (8S) |
| **10,269** | **75** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (sq-ft) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0 | HSG A | |
| 10,269 | HSG B | 4S, 5S, 6S, 8S |
| 0 | HSG C | |
| 0 | HSG D | |
| 0 | Other | |
| **10,269** | | **TOTAL AREA** |

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 4S: PROPOSED** Runoff Area=8,072 sf 0.00% Impervious Runoff Depth=0.81"
Tc=5.0 min CN=69 Runoff=0.16 cfs 543 cf

**Subcatchment 5S: DRIVEWAY** Runoff Area=788 sf 100.00% Impervious Runoff Depth=3.02"
Tc=5.0 min CN=98 Runoff=0.06 cfs 198 cf

**Subcatchment 6S: ROOF** Runoff Area=954 sf 100.00% Impervious Runoff Depth=3.02"
Tc=5.0 min CN=98 Runoff=0.07 cfs 240 cf

**Subcatchment 8S: EXISTING** Runoff Area=455 sf 100.00% Impervious Runoff Depth=3.02"
Tc=5.0 min CN=98 Runoff=0.03 cfs 114 cf

**Link 3L: EXISTING** Inflow=0.32 cfs 1,096 cf
Primary=0.32 cfs 1,096 cf

**Total Runoff Area = 10,269 sf Runoff Volume = 1,096 cf Average Runoff Depth = 1.28"**
**78.61% Pervious = 8,072 sf 21.39% Impervious = 2,197 sf**

## Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

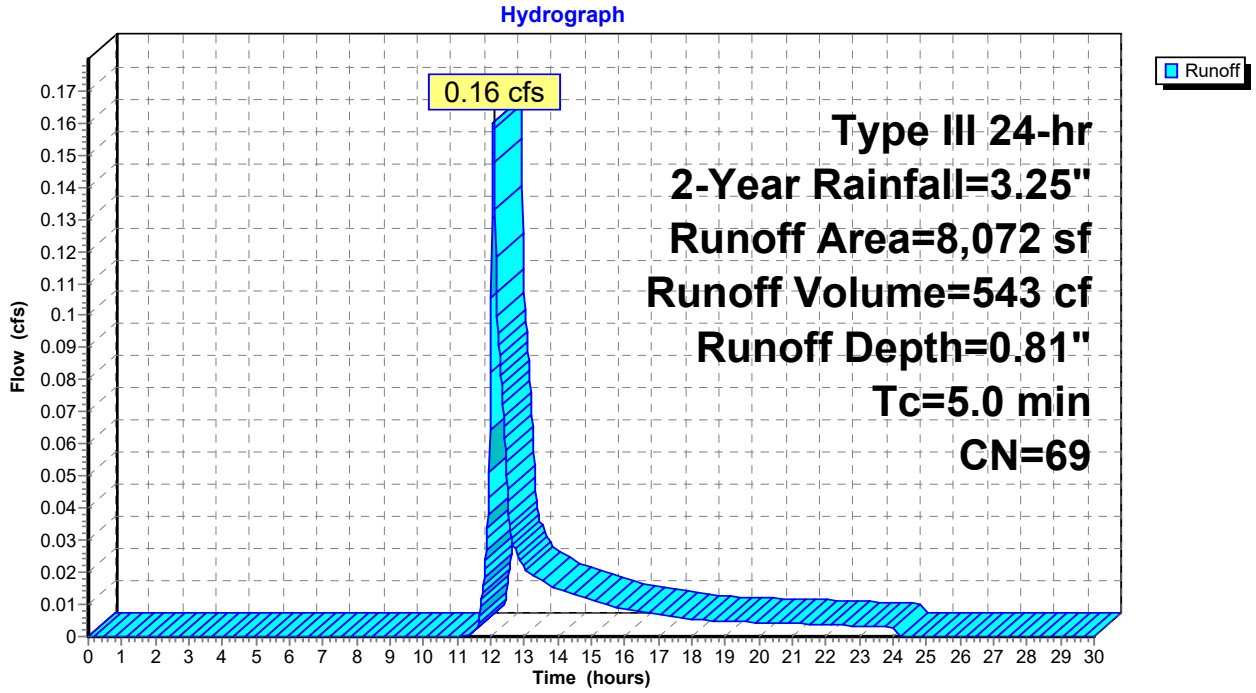
Runoff = 0.16 cfs @ 12.09 hrs, Volume= 543 cf, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

| Area (sf) | CN | Description |
|---|---|---|
| 8,072 | 69 | 50-75% Grass cover, Fair, HSG B |
| 8,072 | | 100.00% Pervious Area |

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

## Subcatchment 4S: PROPOSED LANDSCAPE AREA



## Summary for Subcatchment 5S: DRIVEWAY

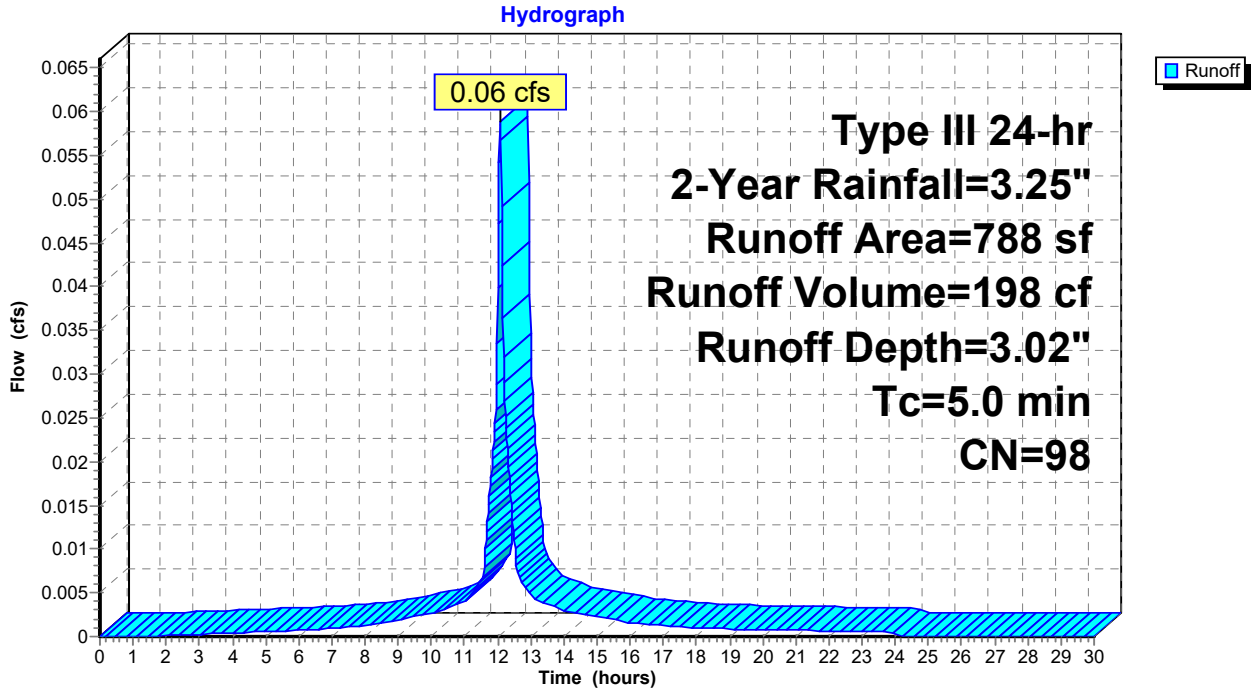
Runoff = 0.06 cfs @ 12.07 hrs, Volume= 198 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

| Area (sf) | CN | Description |
|---|---|---|
| 788 | 98 | Paved parking, HSG B |
| 788 | | 100.00% Impervious Area |

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

### Subcatchment 5S: DRIVEWAY



## Summary for Subcatchment 6S: ROOF

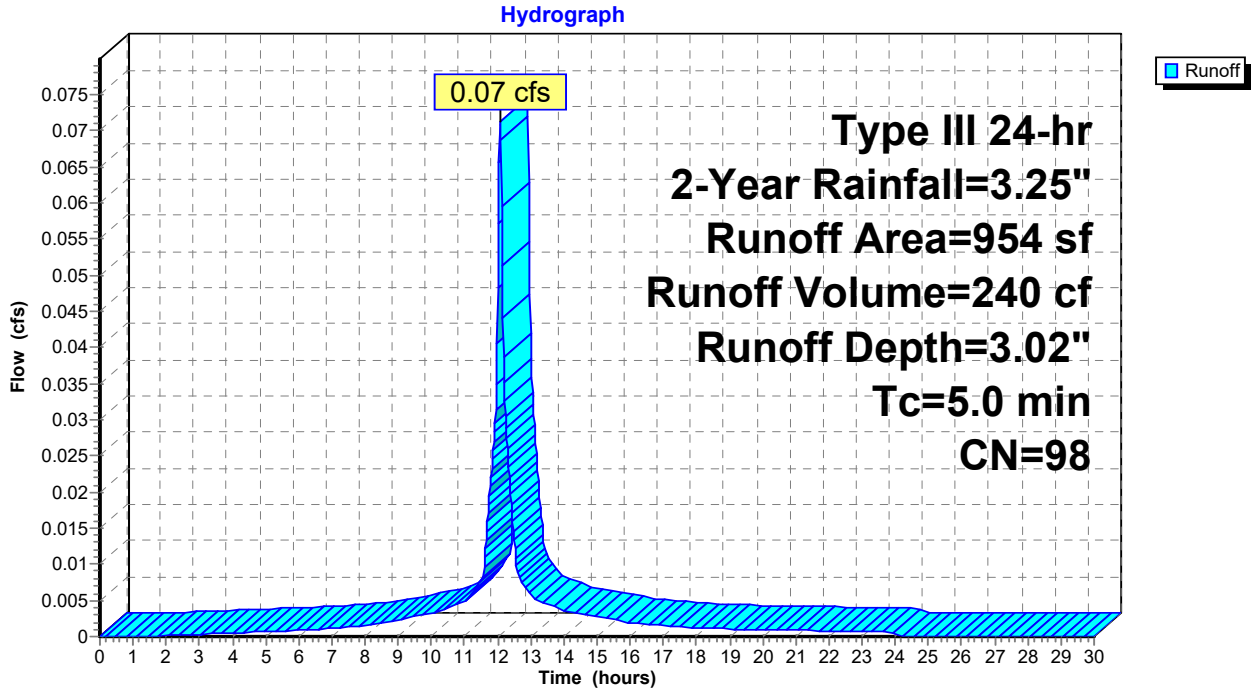
Runoff = 0.07 cfs @ 12.07 hrs, Volume= 240 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

| Area (sf) | CN | Description |
|---|---|---|
| 954 | 98 | Roofs, HSG B |
| 954 | | 100.00% Impervious Area |

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

## Subcatchment 6S: ROOF



## Summary for Subcatchment 8S: EXISTING UNCONNECTED IMPERVIOUS

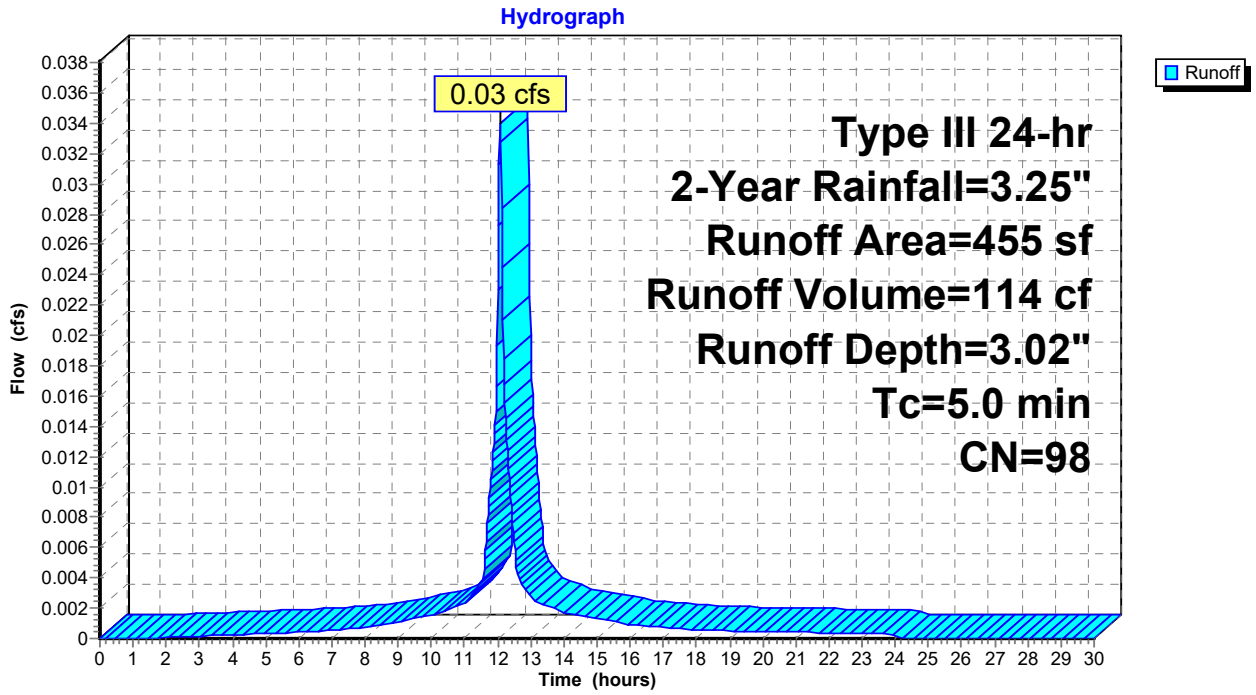
Runoff = 0.03 cfs @ 12.07 hrs, Volume= 114 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 85 | 98 | Unconnected roofs, HSG B |
| | 209 | 98 | Unconnected pavement, HSG B |
| | 73 | 98 | Unconnected pavement, HSG B |
| | 31 | 98 | Unconnected pavement, HSG B |
| * | 29 | 98 | Unconnected pavement, HSG B |
| * | 28 | 98 | Unconnected pavement, HSG B |
| | 455 | 98 | Weighted Average |
| | 455 | | 100.00% Impervious Area |
| | 455 | | 100.00% Unconnected |

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

## Subcatchment 8S: EXISTING UNCONNECTED IMPERVIOUS

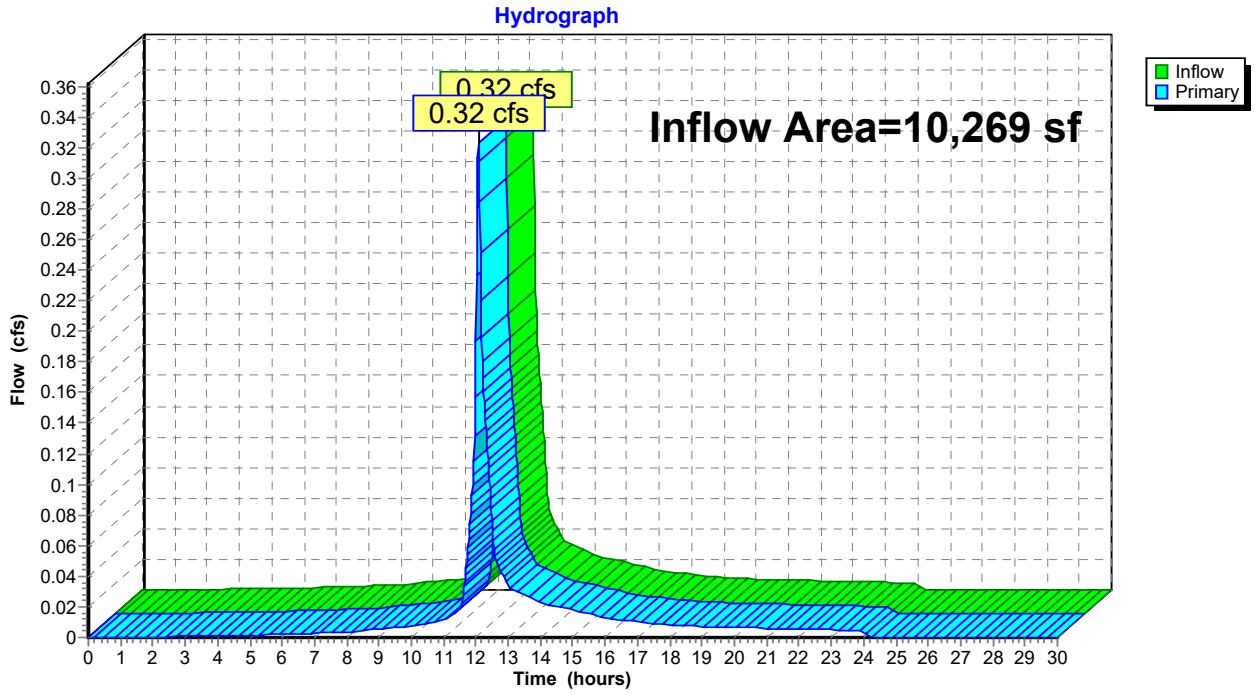


## Summary for Link 3L: EXISTING

Inflow Area = 10,269 sf, 21.39% Impervious, Inflow Depth = 1.28" for 2-Year event
Inflow = 0.32 cfs @ 12.08 hrs, Volume= 1,096 cf
Primary = 0.32 cfs @ 12.08 hrs, Volume= 1,096 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Link 3L: EXISTING



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 4S: PROPOSED** Runoff Area=8,072 sf 0.00% Impervious Runoff Depth=1.74"
Tc=5.0 min CN=69 Runoff=0.38 cfs 1,172 cf

**Subcatchment 5S: DRIVEWAY** Runoff Area=788 sf 100.00% Impervious Runoff Depth=4.46"
Tc=5.0 min CN=98 Runoff=0.09 cfs 293 cf

**Subcatchment 6S: ROOF** Runoff Area=954 sf 100.00% Impervious Runoff Depth=4.46"
Tc=5.0 min CN=98 Runoff=0.10 cfs 355 cf

**Subcatchment 8S: EXISTING** Runoff Area=455 sf 100.00% Impervious Runoff Depth=4.46"
Tc=5.0 min CN=98 Runoff=0.05 cfs 169 cf

**Link 3L: EXISTING** Inflow=0.62 cfs 1,989 cf
Primary=0.62 cfs 1,989 cf

**Total Runoff Area = 10,269 sf Runoff Volume = 1,989 cf Average Runoff Depth = 2.32"**
**78.61% Pervious = 8,072 sf 21.39% Impervious = 2,197 sf**

## Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

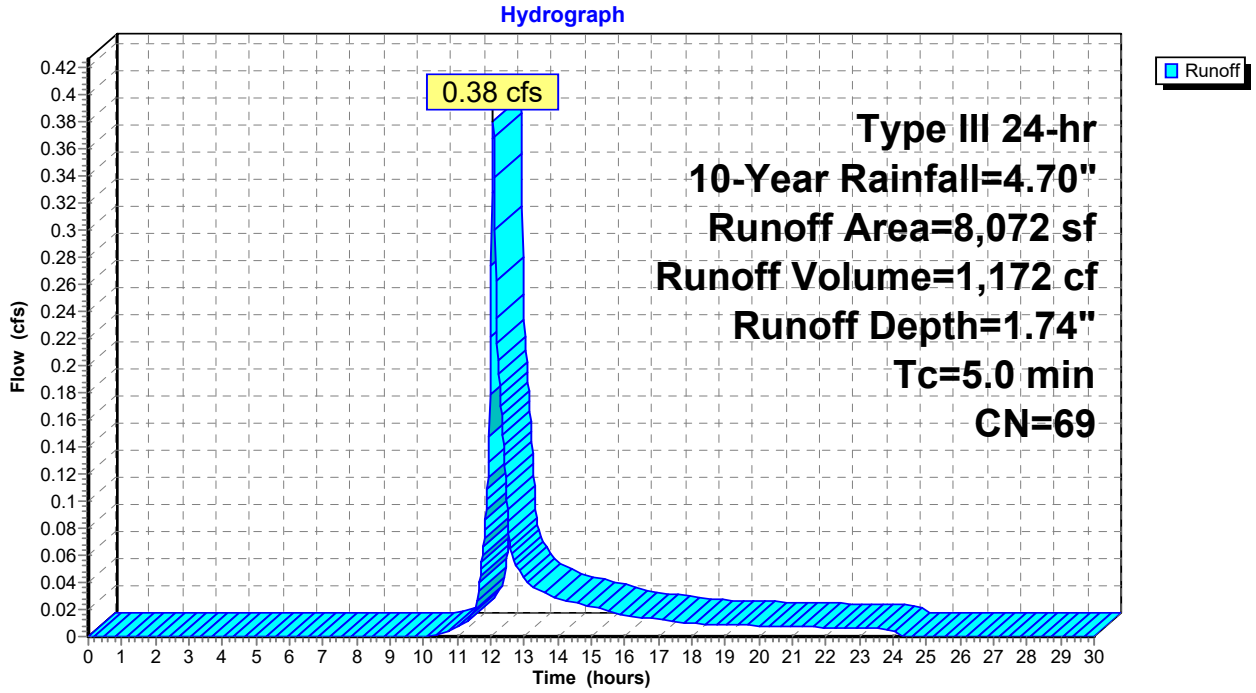
Runoff = 0.38 cfs @ 12.08 hrs, Volume= 1,172 cf, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

| Area (sf) | CN | Description |
|---|---|---|
| 8,072 | 69 | 50-75% Grass cover, Fair, HSG B |
| 8,072 | | 100.00% Pervious Area |

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

## Subcatchment 4S: PROPOSED LANDSCAPE AREA



## Summary for Subcatchment 5S: DRIVEWAY

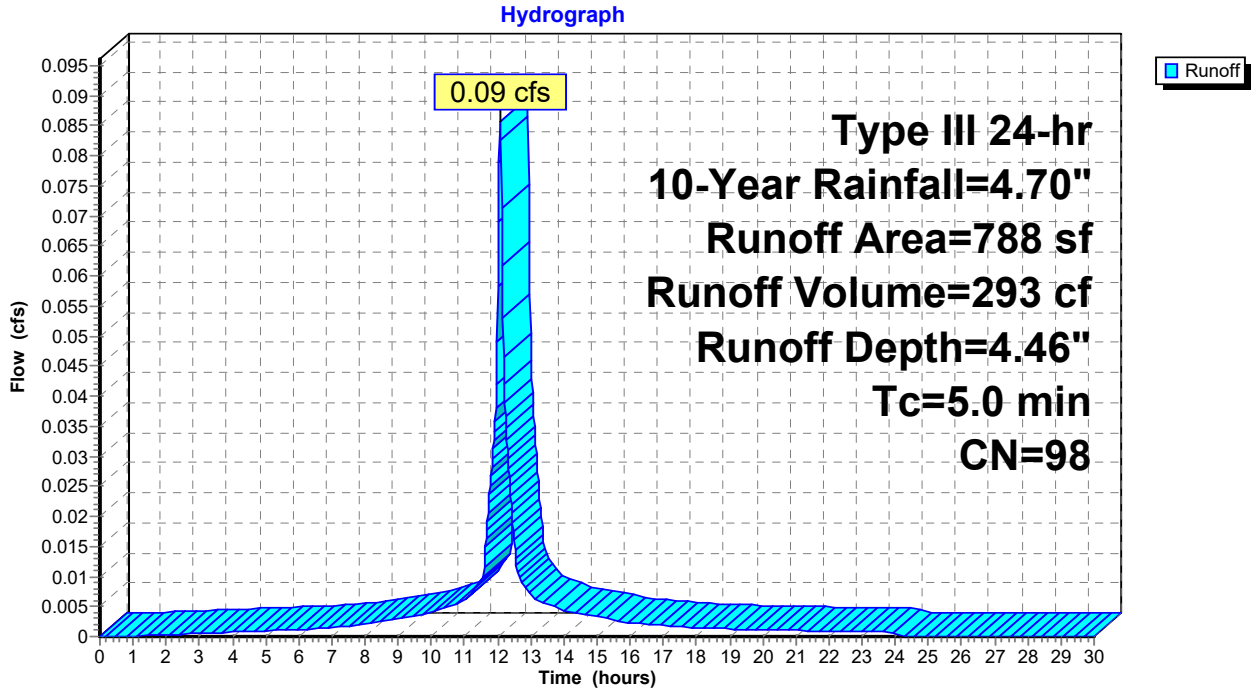
Runoff = 0.09 cfs @ 12.07 hrs, Volume= 293 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

| Area (sf) | CN | Description |
|---|---|---|
| 788 | 98 | Paved parking, HSG B |
| 788 | | 100.00% Impervious Area |

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

## Subcatchment 5S: DRIVEWAY



## Summary for Subcatchment 6S: ROOF

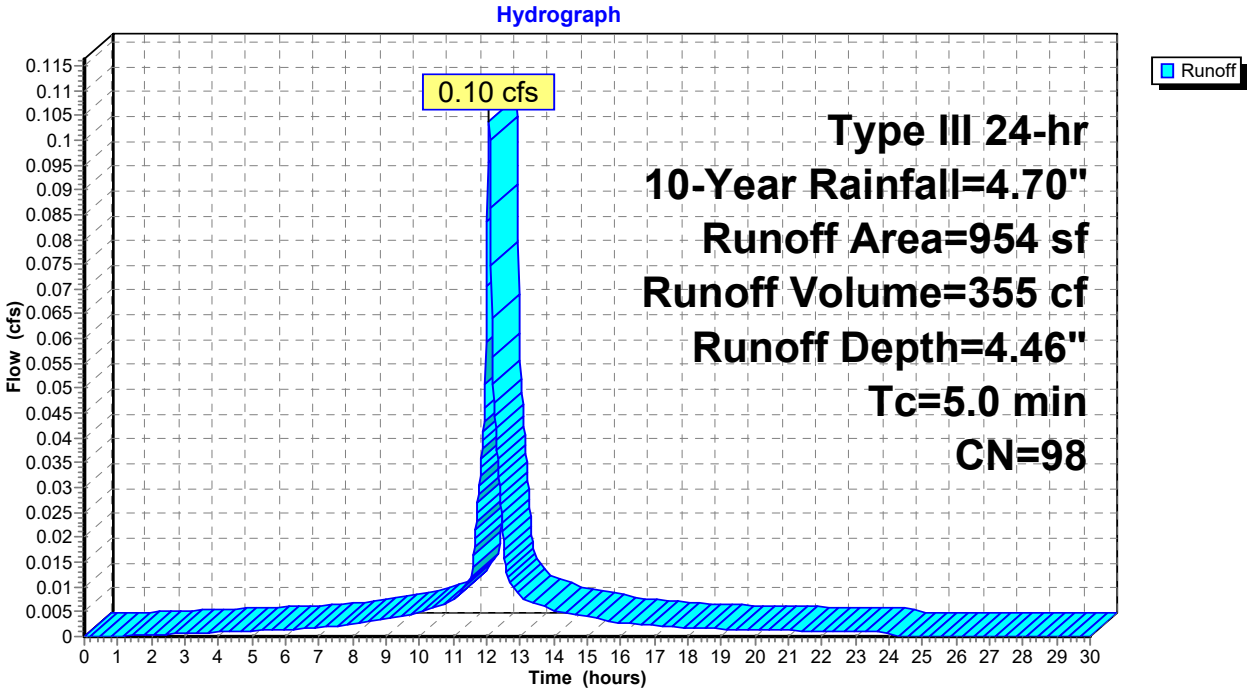
Runoff = 0.10 cfs @ 12.07 hrs, Volume= 355 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

| Area (sf) | CN | Description |
|---|---|---|
| 954 | 98 | Roofs, HSG B |
| 954 | | 100.00% Impervious Area |

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

### Subcatchment 6S: ROOF



## Summary for Subcatchment 8S: EXISTING UNCONNECTED IMPERVIOUS

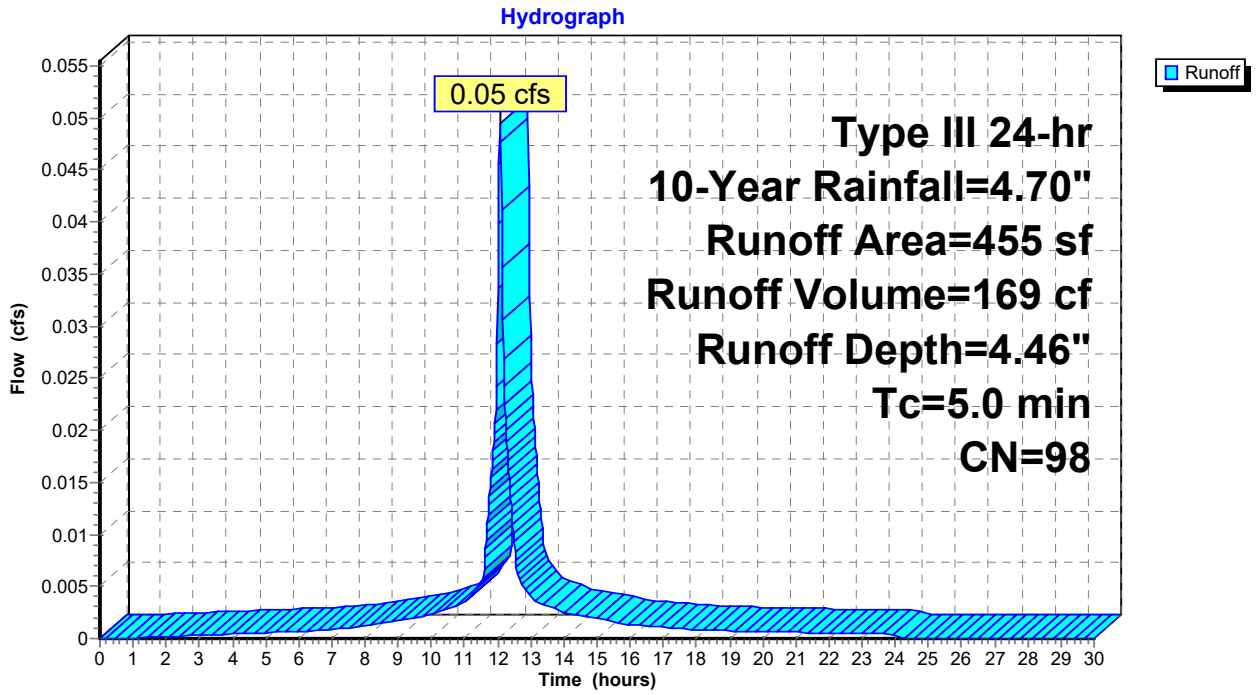
Runoff = 0.05 cfs @ 12.07 hrs, Volume= 169 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 85 | 98 | Unconnected roofs, HSG B |
| | 209 | 98 | Unconnected pavement, HSG B |
| | 73 | 98 | Unconnected pavement, HSG B |
| | 31 | 98 | Unconnected pavement, HSG B |
| * | 29 | 98 | Unconnected pavement, HSG B |
| * | 28 | 98 | Unconnected pavement, HSG B |
| | 455 | 98 | Weighted Average |
| | 455 | | 100.00% Impervious Area |
| | 455 | | 100.00% Unconnected |

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

## Subcatchment 8S: EXISTING UNCONNECTED IMPERVIOUS

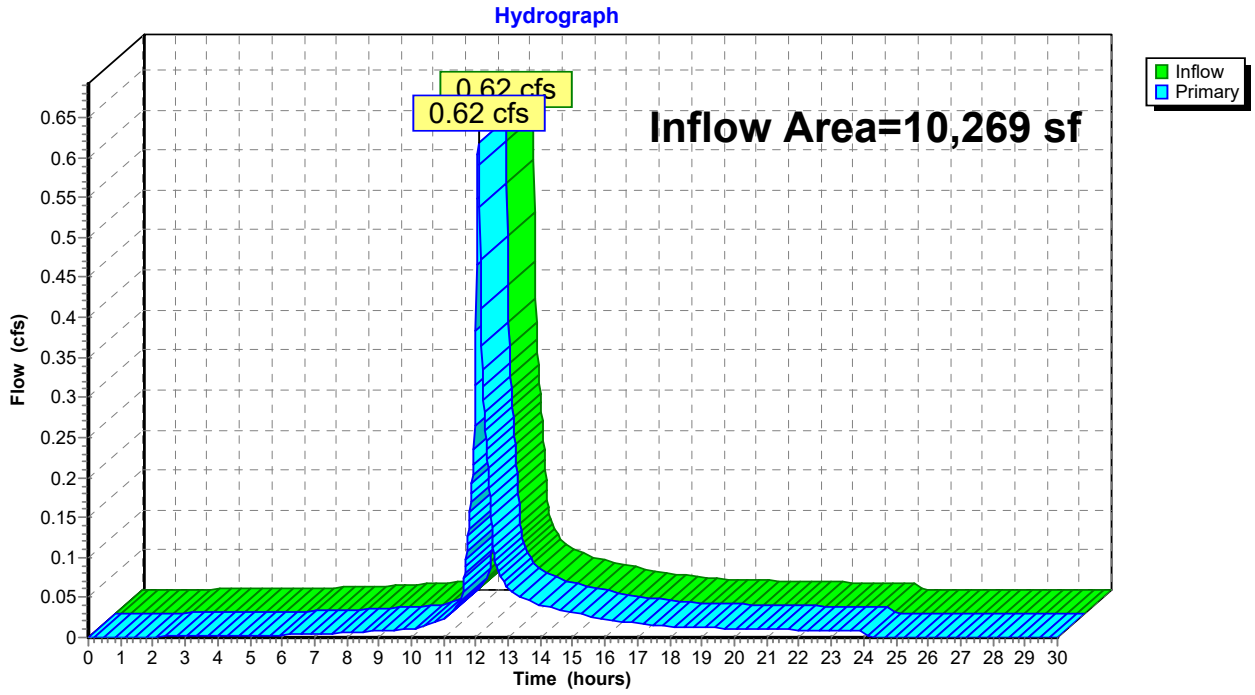


## Summary for Link 3L: EXISTING

Inflow Area = 10,269 sf, 21.39% Impervious, Inflow Depth = 2.32" for 10-Year event
Inflow = 0.62 cfs @ 12.08 hrs, Volume= 1,989 cf
Primary = 0.62 cfs @ 12.08 hrs, Volume= 1,989 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Link 3L: EXISTING



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 4S: PROPOSED** Runoff Area=8,072 sf 0.00% Impervious Runoff Depth=2.33"
Tc=5.0 min CN=69 Runoff=0.52 cfs 1,566 cf

**Subcatchment 5S: DRIVEWAY** Runoff Area=788 sf 100.00% Impervious Runoff Depth=5.26"
Tc=5.0 min CN=98 Runoff=0.10 cfs 346 cf

**Subcatchment 6S: ROOF** Runoff Area=954 sf 100.00% Impervious Runoff Depth=5.26"
Tc=5.0 min CN=98 Runoff=0.12 cfs 418 cf

**Subcatchment 8S: EXISTING** Runoff Area=455 sf 100.00% Impervious Runoff Depth=5.26"
Tc=5.0 min CN=98 Runoff=0.06 cfs 200 cf

**Link 3L: EXISTING** Inflow=0.80 cfs 2,530 cf
Primary=0.80 cfs 2,530 cf

**Total Runoff Area = 10,269 sf Runoff Volume = 2,530 cf Average Runoff Depth = 2.96"**
**78.61% Pervious = 8,072 sf 21.39% Impervious = 2,197 sf**

## Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

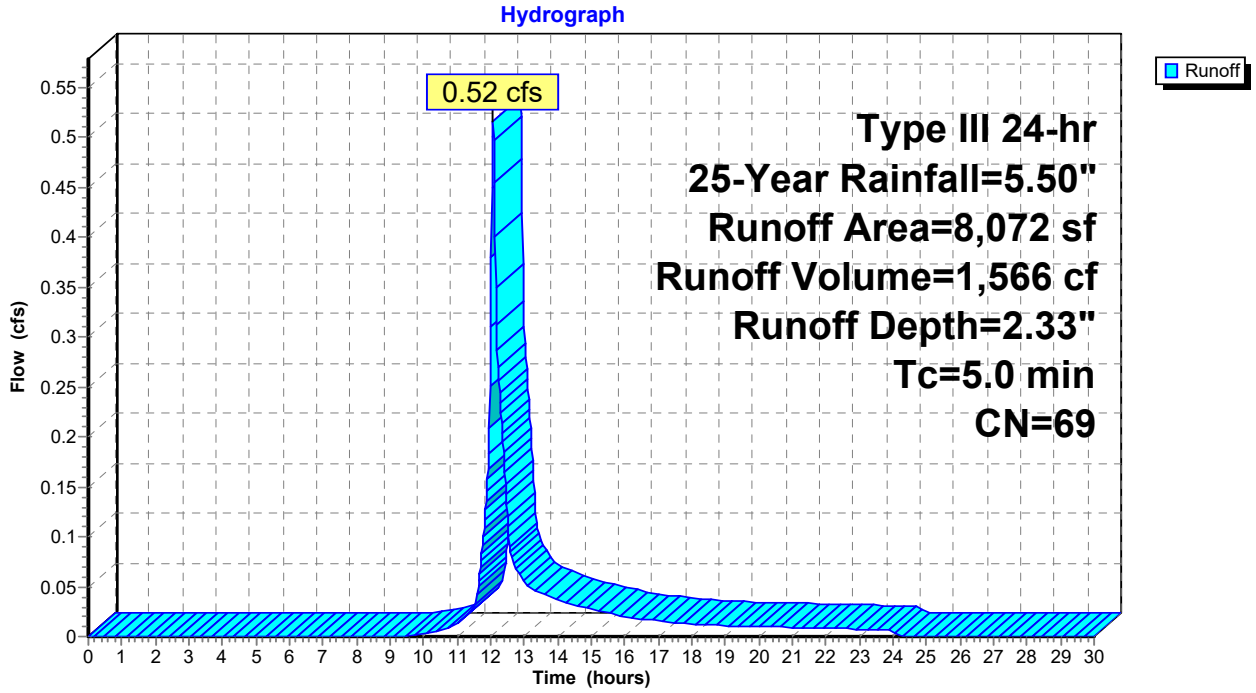
Runoff = 0.52 cfs @ 12.08 hrs, Volume= 1,566 cf, Depth= 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

| Area (sf) | CN | Description |
|---|---|---|
| 8,072 | 69 | 50-75% Grass cover, Fair, HSG B |
| 8,072 | | 100.00% Pervious Area |

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

## Subcatchment 4S: PROPOSED LANDSCAPE AREA



## Summary for Subcatchment 5S: DRIVEWAY

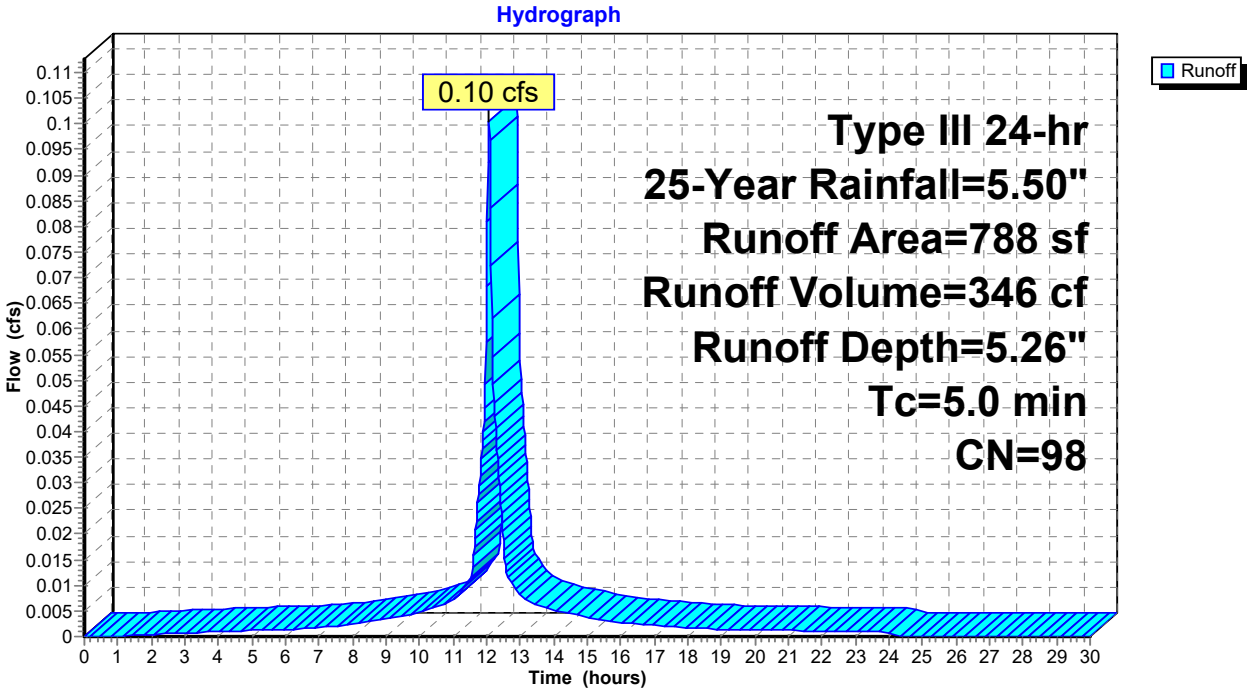
Runoff = 0.10 cfs @ 12.07 hrs, Volume= 346 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

| Area (sf) | CN | Description |
|---|---|---|
| 788 | 98 | Paved parking, HSG B |
| 788 | | 100.00% Impervious Area |

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

## Subcatchment 5S: DRIVEWAY



## Summary for Subcatchment 6S: ROOF

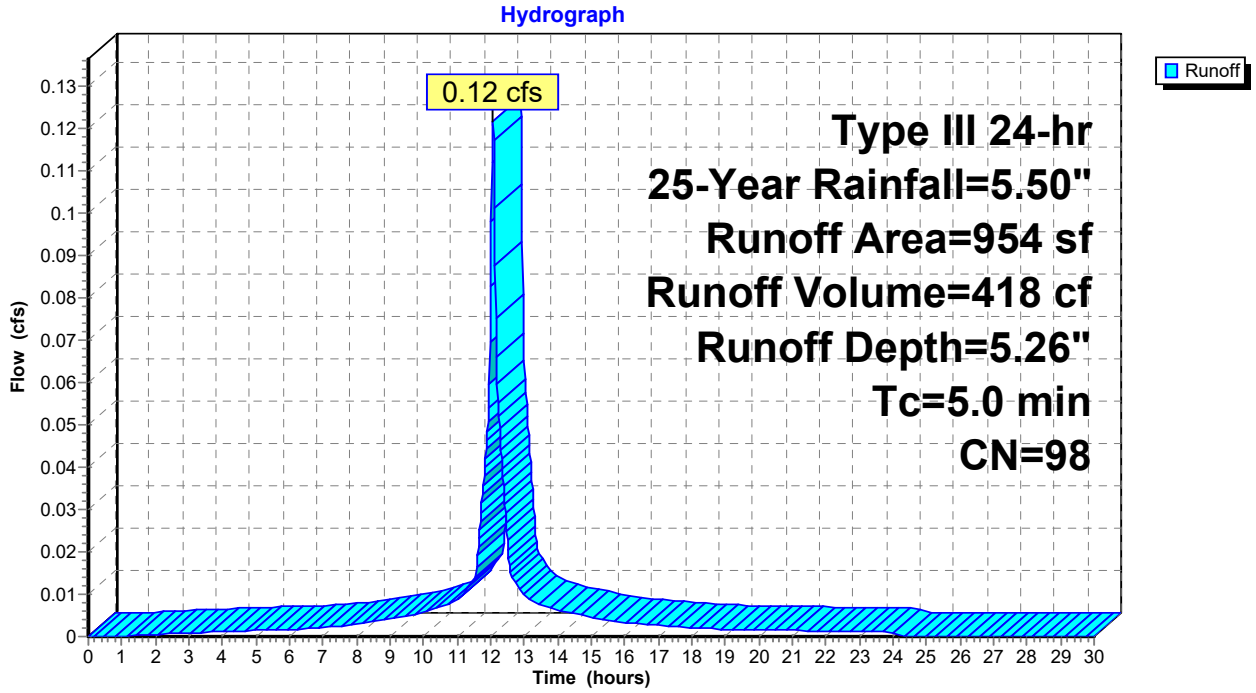
Runoff = 0.12 cfs @ 12.07 hrs, Volume= 418 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

| Area (sf) | CN | Description |
|---|---|---|
| 954 | 98 | Roofs, HSG B |
| 954 | | 100.00% Impervious Area |

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

## Subcatchment 6S: ROOF



## Summary for Subcatchment 8S: EXISTING UNCONNECTED IMPERVIOUS

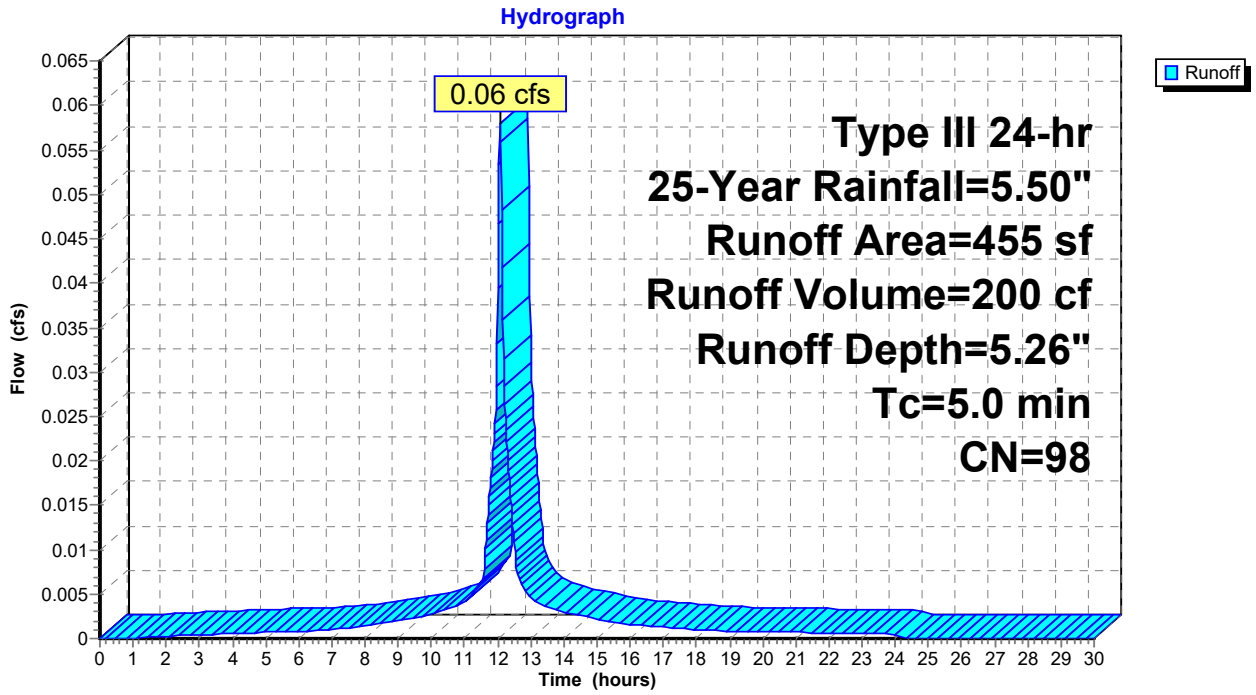
Runoff = 0.06 cfs @ 12.07 hrs, Volume= 200 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 85 | 98 | Unconnected roofs, HSG B |
| | 209 | 98 | Unconnected pavement, HSG B |
| | 73 | 98 | Unconnected pavement, HSG B |
| | 31 | 98 | Unconnected pavement, HSG B |
| * | 29 | 98 | Unconnected pavement, HSG B |
| * | 28 | 98 | Unconnected pavement, HSG B |
| | 455 | 98 | Weighted Average |
| | 455 | | 100.00% Impervious Area |
| | 455 | | 100.00% Unconnected |

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

## Subcatchment 8S: EXISTING UNCONNECTED IMPERVIOUS

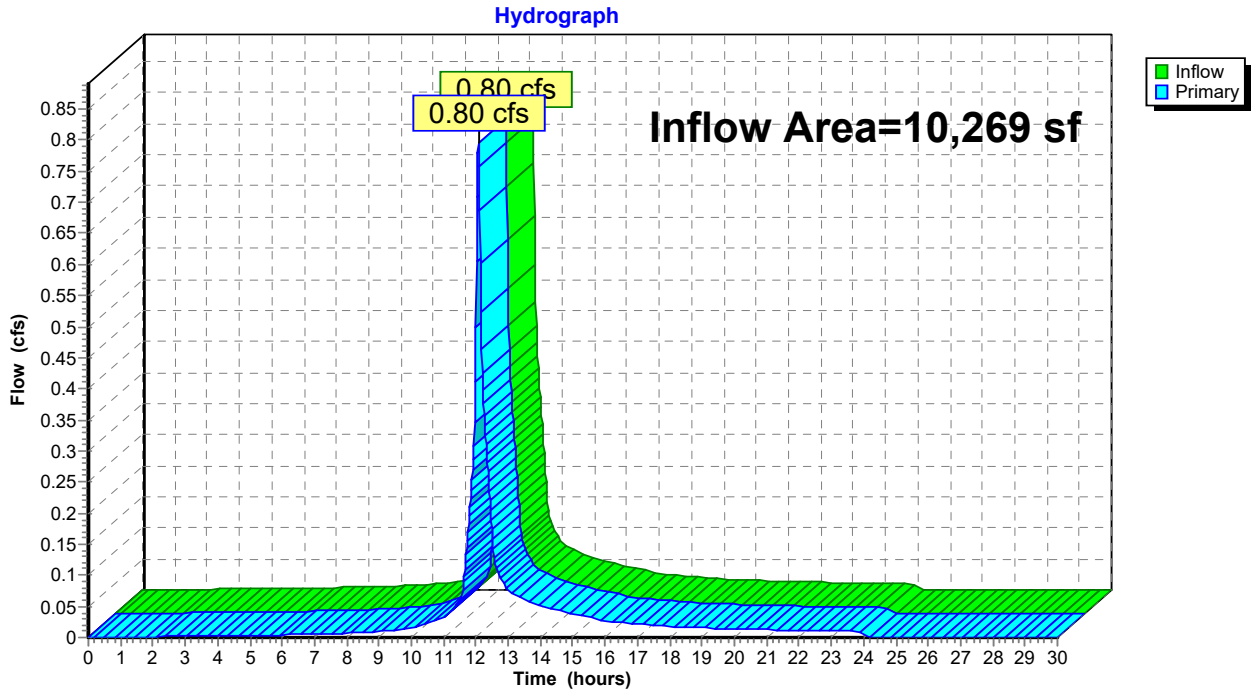


## Summary for Link 3L: EXISTING

Inflow Area = 10,269 sf, 21.39% Impervious, Inflow Depth = 2.96" for 25-Year event
Inflow = 0.80 cfs @ 12.08 hrs, Volume= 2,530 cf
Primary = 0.80 cfs @ 12.08 hrs, Volume= 2,530 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Link 3L: EXISTING



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 4S: PROPOSED** Runoff Area=8,072 sf 0.00% Impervious Runoff Depth=5.02"
Tc=5.0 min CN=69 Runoff=1.13 cfs 3,377 cf

**Subcatchment 5S: DRIVEWAY** Runoff Area=788 sf 100.00% Impervious Runoff Depth=8.54"
Tc=5.0 min CN=98 Runoff=0.16 cfs 561 cf

**Subcatchment 6S: ROOF** Runoff Area=954 sf 100.00% Impervious Runoff Depth=8.54"
Tc=5.0 min CN=98 Runoff=0.19 cfs 679 cf

**Subcatchment 8S: EXISTING** Runoff Area=455 sf 100.00% Impervious Runoff Depth=8.54"
Tc=5.0 min CN=98 Runoff=0.09 cfs 324 cf

**Link 3L: EXISTING** Inflow=1.58 cfs 4,940 cf
Primary=1.58 cfs 4,940 cf

**Total Runoff Area = 10,269 sf Runoff Volume = 4,940 cf Average Runoff Depth = 5.77"**
**78.61% Pervious = 8,072 sf 21.39% Impervious = 2,197 sf**

## Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

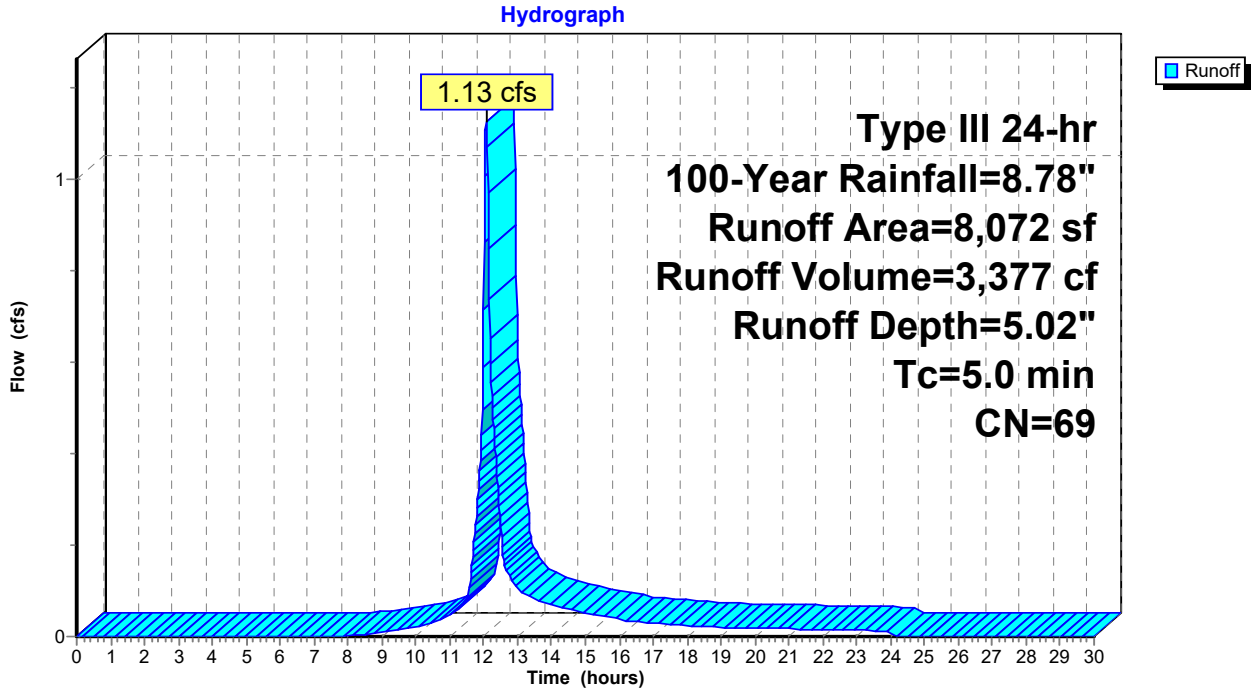
Runoff = 1.13 cfs @ 12.08 hrs, Volume= 3,377 cf, Depth= 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

| Area (sf) | CN | Description |
|---|---|---|
| 8,072 | 69 | 50-75% Grass cover, Fair, HSG B |
| 8,072 | | 100.00% Pervious Area |

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

## Subcatchment 4S: PROPOSED LANDSCAPE AREA



## Summary for Subcatchment 5S: DRIVEWAY

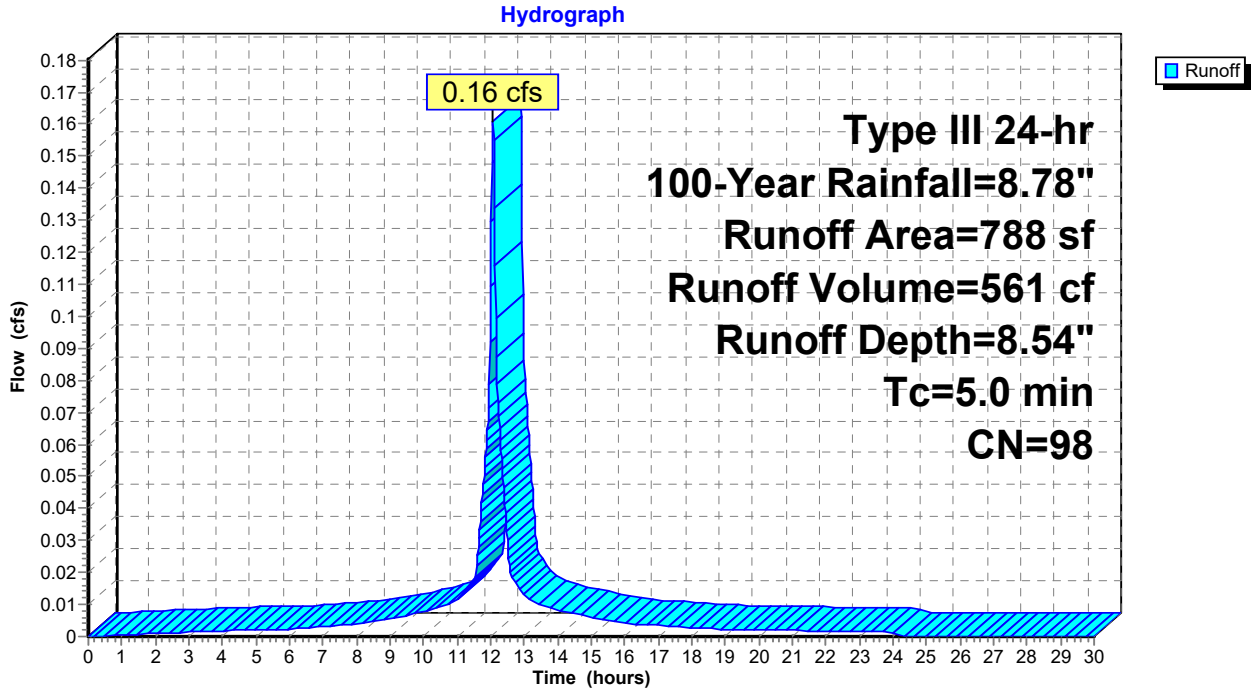
Runoff = 0.16 cfs @ 12.07 hrs, Volume= 561 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

| Area (sf) | CN | Description |
|---|---|---|
| 788 | 98 | Paved parking, HSG B |
| 788 | | 100.00% Impervious Area |

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

## Subcatchment 5S: DRIVEWAY



## Summary for Subcatchment 6S: ROOF

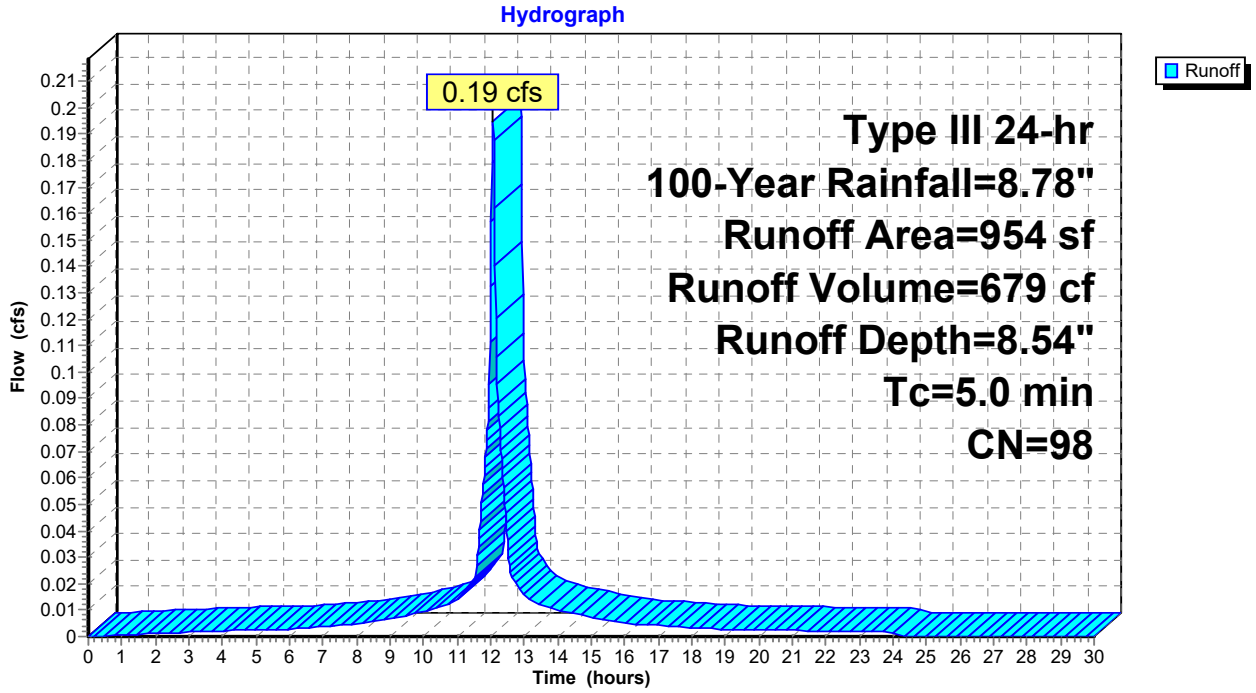
Runoff = 0.19 cfs @ 12.07 hrs, Volume= 679 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

| Area (sf) | CN | Description |
|---|---|---|
| 954 | 98 | Roofs, HSG B |
| 954 | | 100.00% Impervious Area |

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

## Subcatchment 6S: ROOF



## Summary for Subcatchment 8S: EXISTING UNCONNECTED IMPERVIOUS

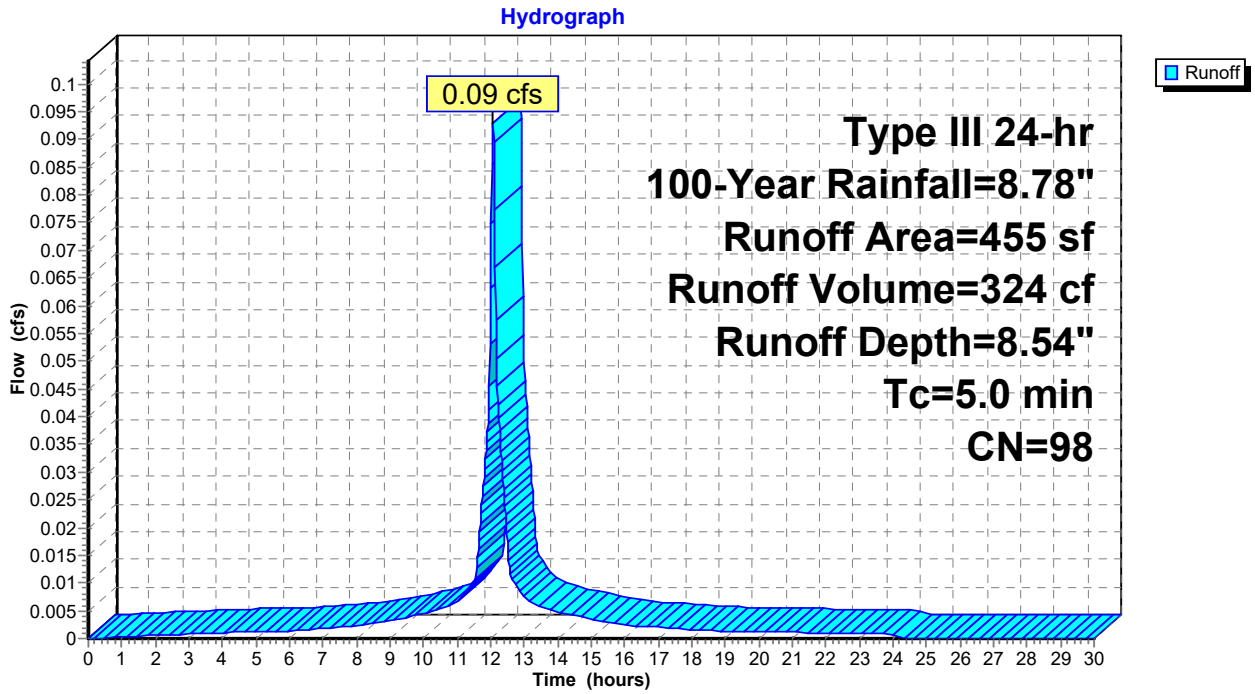
Runoff = 0.09 cfs @ 12.07 hrs, Volume= 324 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 85 | 98 | Unconnected roofs, HSG B |
| | 209 | 98 | Unconnected pavement, HSG B |
| | 73 | 98 | Unconnected pavement, HSG B |
| | 31 | 98 | Unconnected pavement, HSG B |
| * | 29 | 98 | Unconnected pavement, HSG B |
| * | 28 | 98 | Unconnected pavement, HSG B |
| | 455 | 98 | Weighted Average |
| | 455 | | 100.00% Impervious Area |
| | 455 | | 100.00% Unconnected |

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

## Subcatchment 8S: EXISTING UNCONNECTED IMPERVIOUS

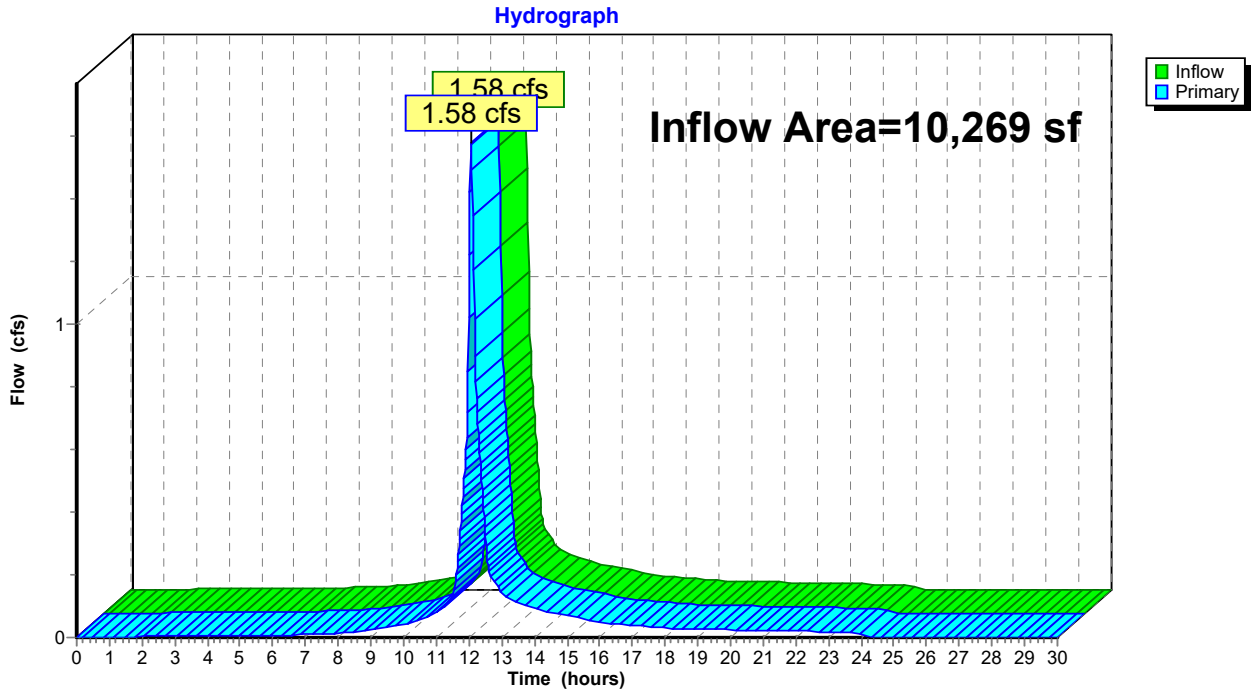


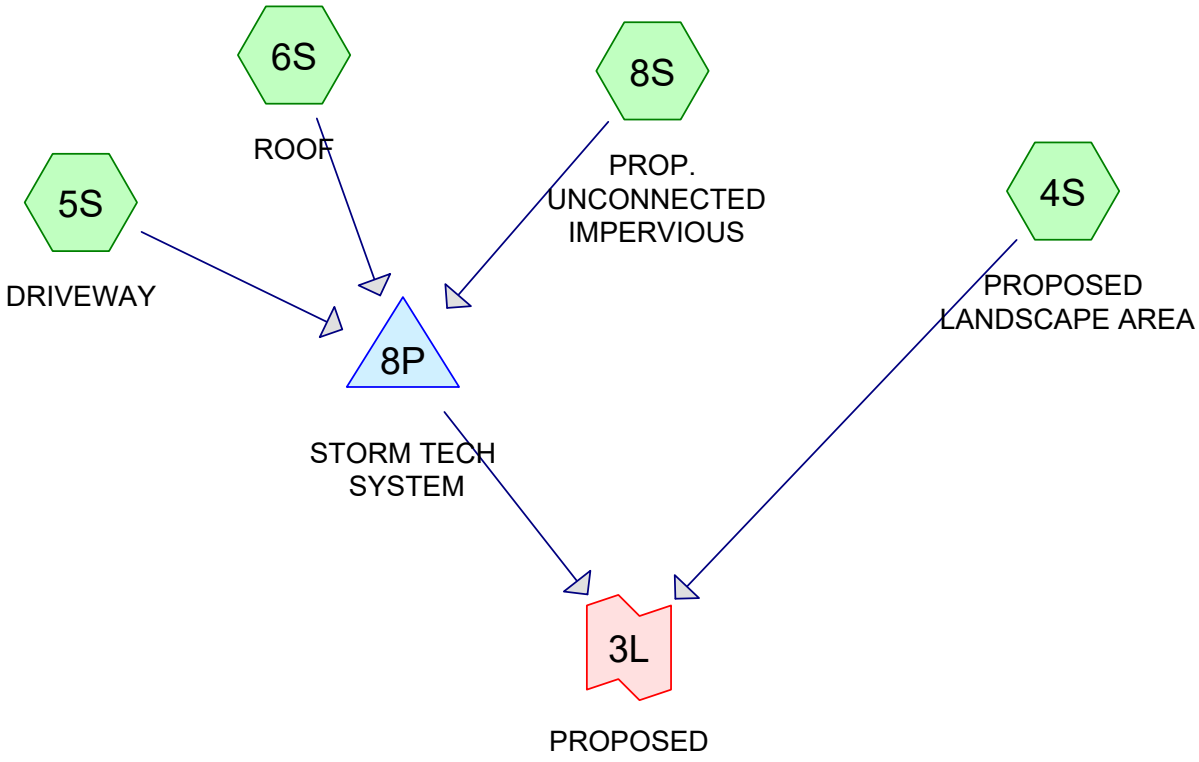
## Summary for Link 3L: EXISTING

Inflow Area = 10,269 sf, 21.39% Impervious, Inflow Depth = 5.77" for 100-Year event
Inflow = 1.58 cfs @ 12.07 hrs, Volume= 4,940 cf
Primary = 1.58 cfs @ 12.07 hrs, Volume= 4,940 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Link 3L: EXISTING






Subcat Reach Pond Link

**Routing Diagram for 4 - PROP**
Prepared by SPRUHAN ENGINEERING, Printed 5/31/2023
HydroCAD® 10.00-25 s/n 09067 © 2019 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (sq-ft) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 4,966 | 69 | 50-75% Grass cover, Fair, HSG B (4S) |
| 1,173 | 98 | Paved parking, HSG A (5S) |
| 3,357 | 98 | Roofs, HSG A (6S) |
| 690 | 98 | Unconnected pavement, HSG A (8S) |
| 82 | 98 | Unconnected roofs, HSG A (8S) |
| **10,268** | **84** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (sq-ft) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 5,302 | HSG A | 5S, 6S, 8S |
| 4,966 | HSG B | 4S |
| 0 | HSG C | |
| 0 | HSG D | |
| 0 | Other | |
| **10,268** | | **TOTAL AREA** |

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 4S: PROPOSED** Runoff Area=4,966 sf 0.00% Impervious Runoff Depth=0.81"
Tc=5.0 min CN=69 Runoff=0.10 cfs 334 cf

**Subcatchment 5S: DRIVEWAY** Runoff Area=1,173 sf 100.00% Impervious Runoff Depth=3.02"
Tc=5.0 min CN=98 Runoff=0.09 cfs 295 cf

**Subcatchment 6S: ROOF** Runoff Area=3,357 sf 100.00% Impervious Runoff Depth=3.02"
Tc=5.0 min CN=98 Runoff=0.25 cfs 844 cf

**Subcatchment 8S: PROP.** Runoff Area=772 sf 100.00% Impervious Runoff Depth=3.02"
Tc=5.0 min CN=98 Runoff=0.06 cfs 194 cf

**Pond 8P: STORM TECH SYSTEM** Peak Elev=43.40' Storage=239 cf Inflow=0.40 cfs 1,333 cf
Discarded=0.10 cfs 1,333 cf Primary=0.00 cfs 0 cf Outflow=0.10 cfs 1,333 cf

**Link 3L: PROPOSED** Inflow=0.10 cfs 334 cf
Primary=0.10 cfs 334 cf

**Total Runoff Area = 10,268 sf Runoff Volume = 1,667 cf Average Runoff Depth = 1.95"**
**48.36% Pervious = 4,966 sf 51.64% Impervious = 5,302 sf**

## Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

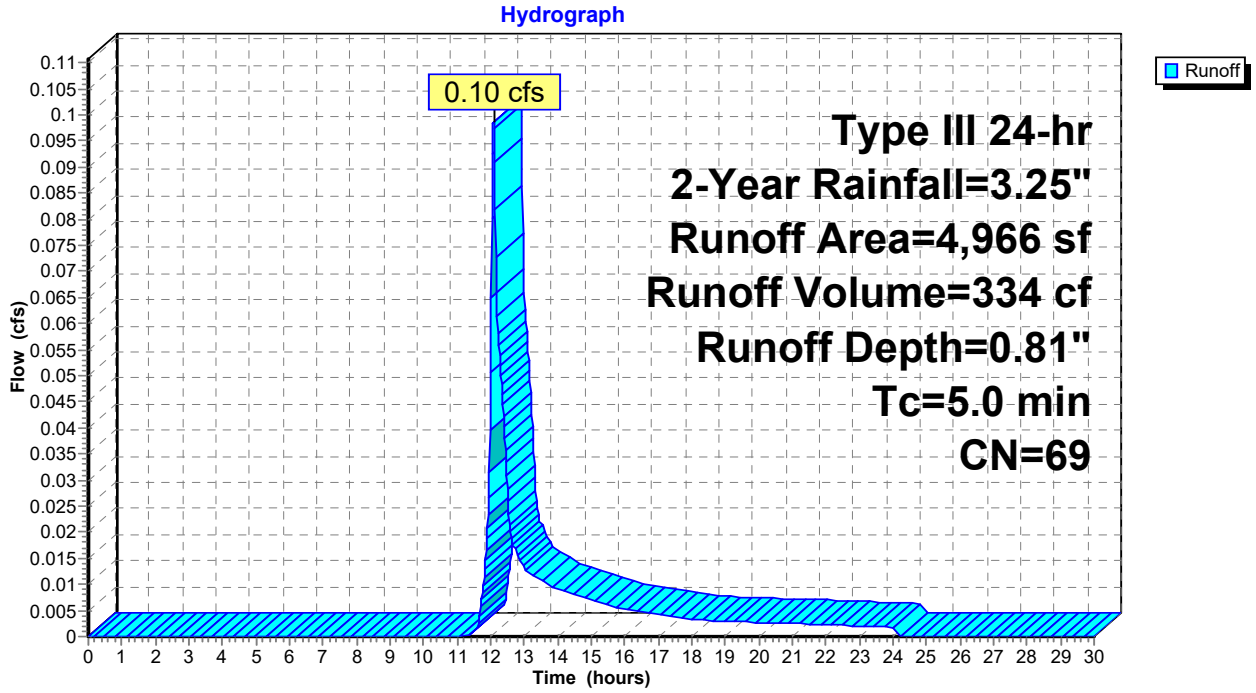
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 334 cf, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

| Area (sf) | CN | Description |
|---|---|---|
| 4,966 | 69 | 50-75% Grass cover, Fair, HSG B |
| 4,966 | | 100.00% Pervious Area |

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

## Subcatchment 4S: PROPOSED LANDSCAPE AREA



## Summary for Subcatchment 5S: DRIVEWAY

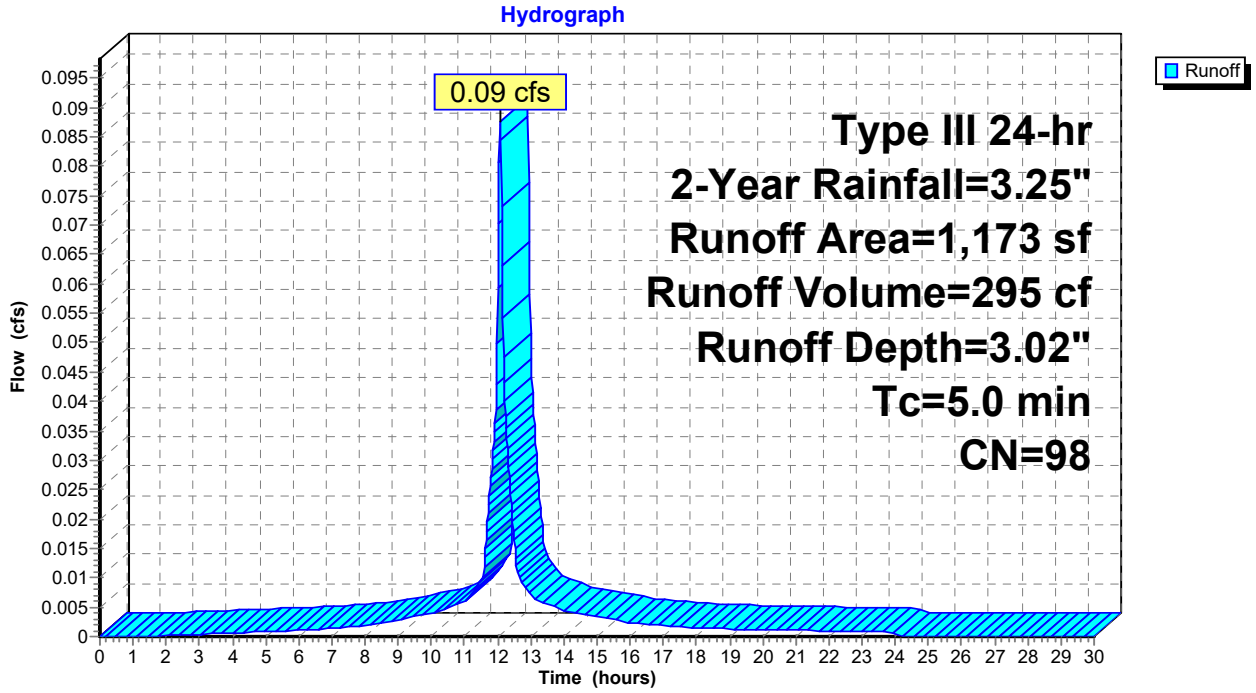
Runoff = 0.09 cfs @ 12.07 hrs, Volume= 295 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

| Area (sf) | CN | Description |
|---|---|---|
| 1,173 | 98 | Paved parking, HSG A |
| 1,173 | | 100.00% Impervious Area |

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

## Subcatchment 5S: DRIVEWAY



## Summary for Subcatchment 6S: ROOF

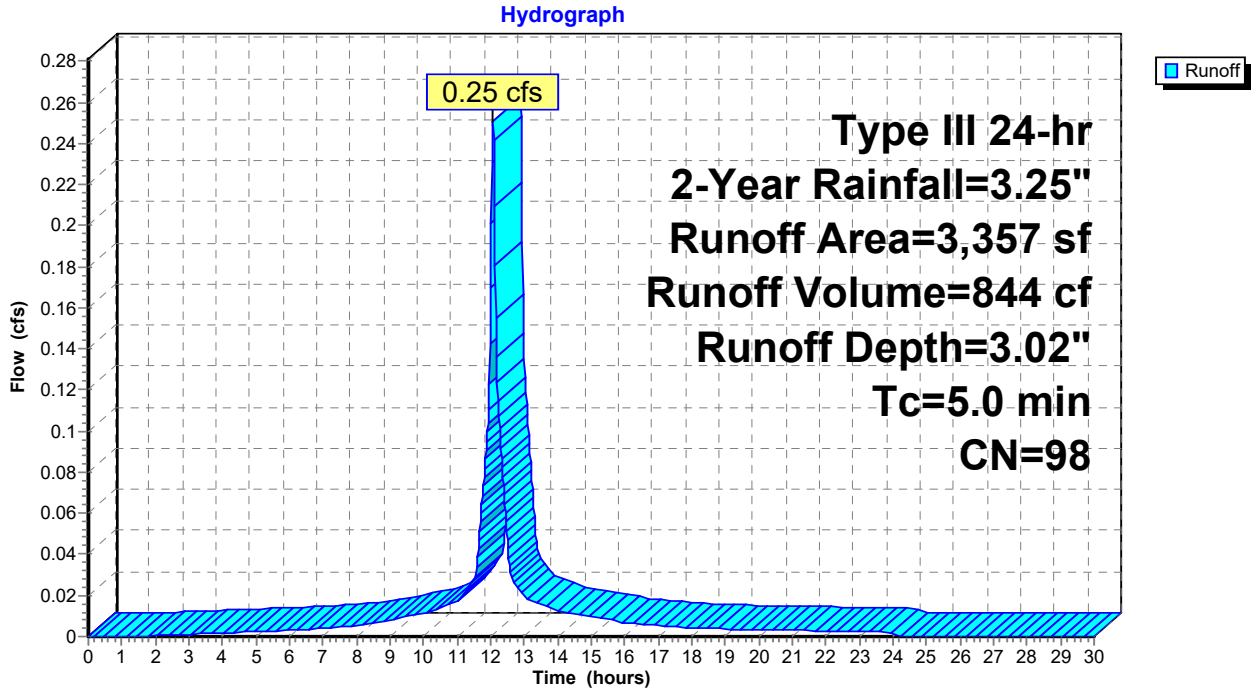
Runoff = 0.25 cfs @ 12.07 hrs, Volume= 844 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

| Area (sf) | CN | Description |
|---|---|---|
| 3,357 | 98 | Roofs, HSG A |
| 3,357 | | 100.00% Impervious Area |

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

## Subcatchment 6S: ROOF



## Summary for Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS

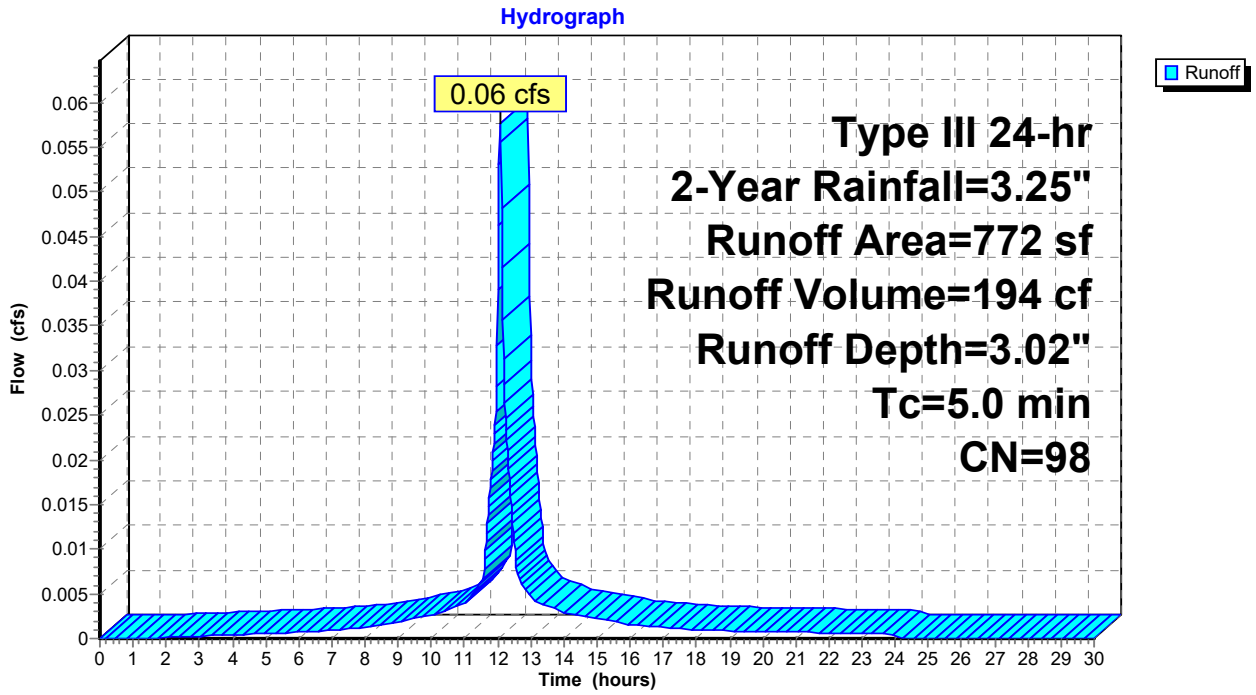
Runoff = 0.06 cfs @ 12.07 hrs, Volume= 194 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 152 | 98 | Unconnected pavement, HSG A |
| | 82 | 98 | Unconnected roofs, HSG A |
| | 182 | 98 | Unconnected pavement, HSG A |
| | 123 | 98 | Unconnected pavement, HSG A |
| | 96 | 98 | Unconnected pavement, HSG A |
| * | 137 | 98 | Unconnected pavement, HSG A |
| | 772 | 98 | Weighted Average |
| | 772 | | 100.00% Impervious Area |
| | 772 | | 100.00% Unconnected |

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

## Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS



## Summary for Pond 8P: STORM TECH SYSTEM

Inflow Area = 5,302 sf,100.00% Impervious, Inflow Depth = 3.02" for 2-Year event
Inflow = 0.40 cfs @ 12.07 hrs, Volume= 1,333 cf
Outflow = 0.10 cfs @ 11.78 hrs, Volume= 1,333 cf, Atten= 74%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.78 hrs, Volume= 1,333 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 43.40' @ 12.41 hrs Surf.Area= 543 sf Storage= 239 cf

Plug-Flow detention time= 10.9 min calculated for 1,332 cf (100% of inflow)
Center-of-Mass det. time= 11.0 min ( 766.1 - 755.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 42.50' | 632 cf | **49.08'W x 11.07'L x 3.50'H Field A**<br>1,902 cf Overall - 322 cf Embedded = 1,580 cf x 40.0% Voids |
| #2A | 43.00' | 322 cf | **ADS_StormTech SC-740 +Cap** x 7 Inside #1<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>7 Chambers in 7 Rows |
| #3 | 45.99' | 10 cf | **Ponding** Listed below -Impervious |
| | | 964 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Elevation (feet) | Cum.Store (cubic-feet) |
|---|---|
| 45.99 | 0 |
| 47.00 | 5 |
| 47.20 | 10 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 42.50' | **8.270 in/hr Exfiltration over Surface area** |
| #2 | Primary | 46.00' | **4.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Discarded OutFlow** Max=0.10 cfs @ 11.78 hrs HW=42.55' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=42.50' (Free Discharge)
↑**2=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 8P: STORM TECH SYSTEM - Chamber Wizard Field A

**Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)**
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 30.0" Spacing = 81.0" C-C Row Spacing

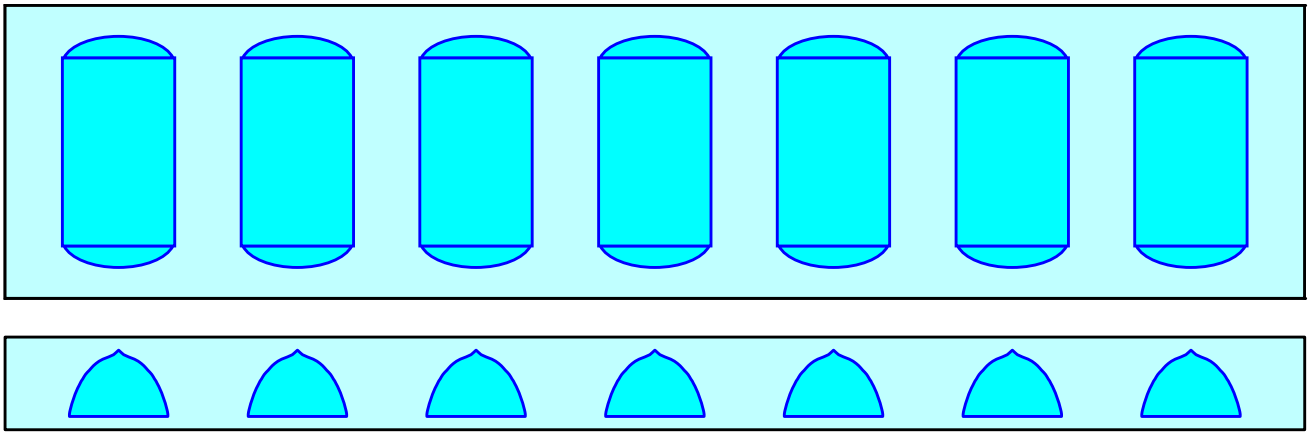
1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +14.0" End Stone x 2 = 11.07' Base Length
7 Rows x 51.0" Wide + 30.0" Spacing x 6 + 26.0" Side Stone x 2 = 49.08' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

7 Chambers x 45.9 cf = 321.6 cf Chamber Storage

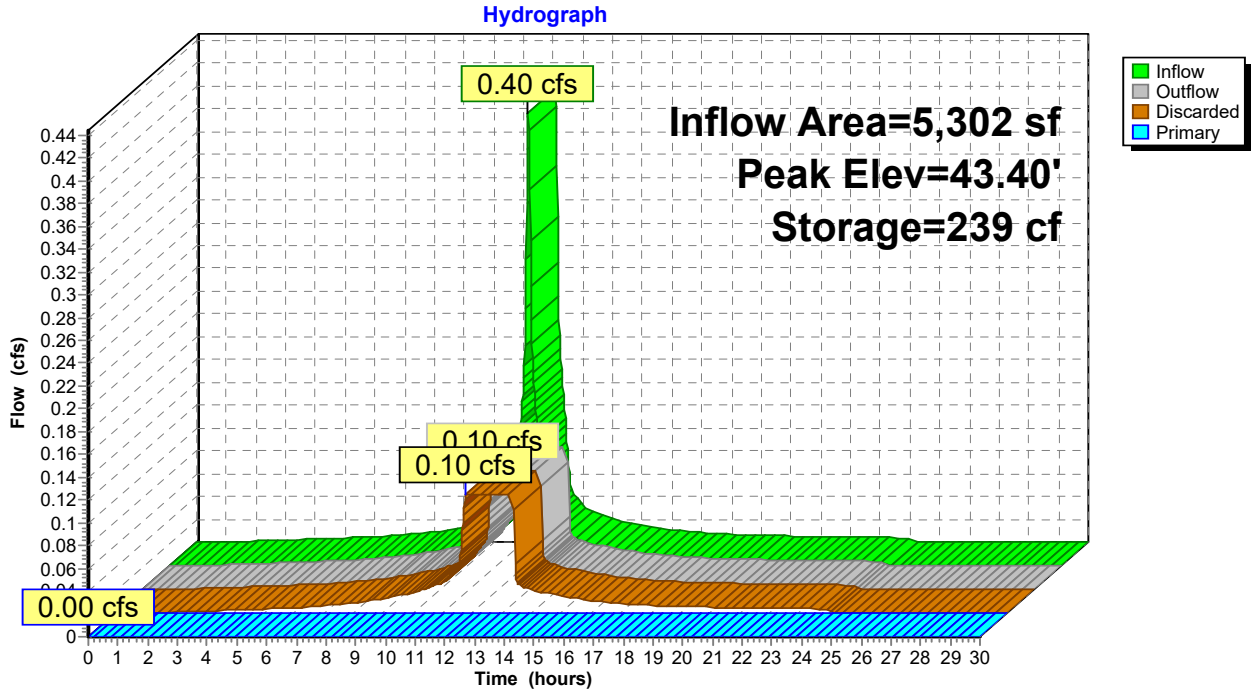
1,901.7 cf Field - 321.6 cf Chambers = 1,580.2 cf Stone x 40.0% Voids = 632.1 cf Stone Storage

Chamber Storage + Stone Storage = 953.6 cf = 0.022 af
Overall Storage Efficiency = 50.1%
Overall System Size = 11.07' x 49.08' x 3.50'

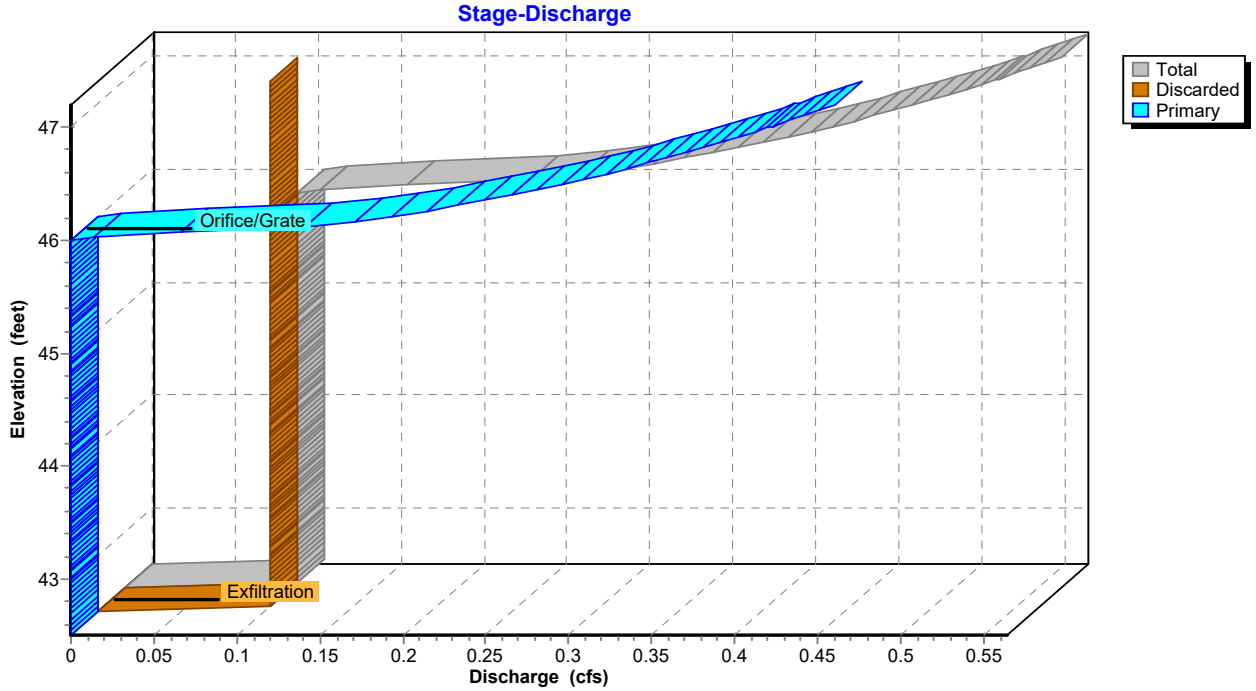
7 Chambers
70.4 cy Field
58.5 cy Stone



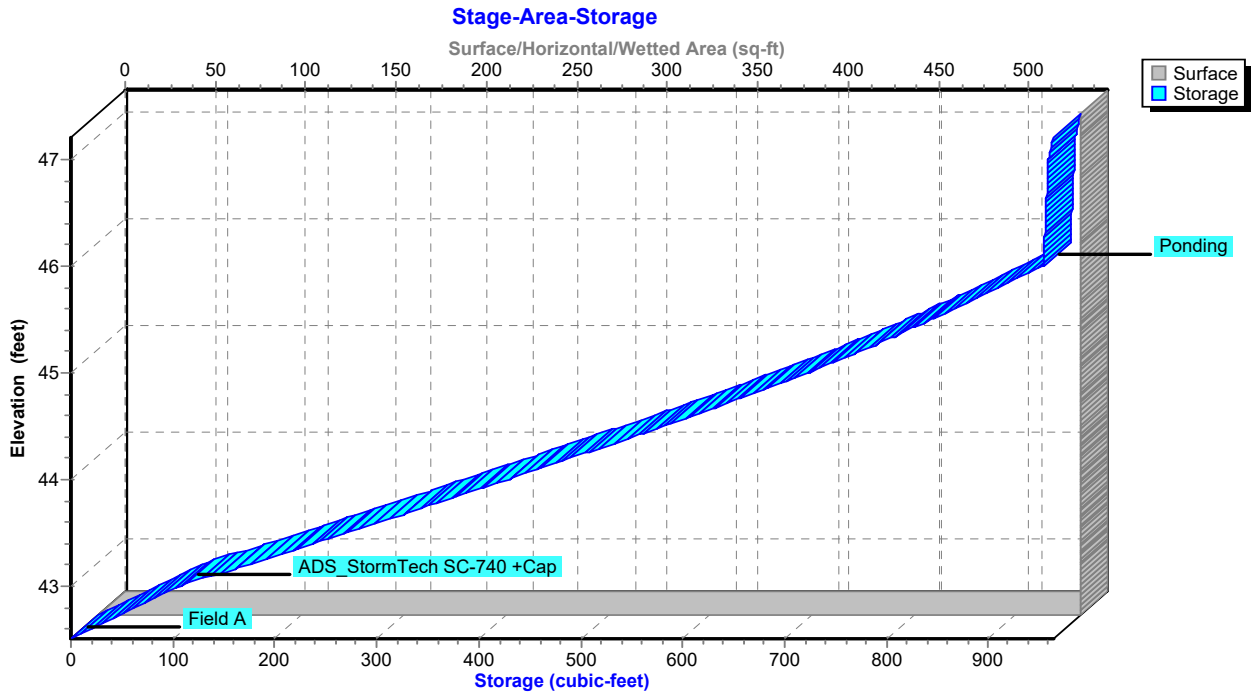
## Pond 8P: STORM TECH SYSTEM




## Pond 8P: STORM TECH SYSTEM



## Pond 8P: STORM TECH SYSTEM

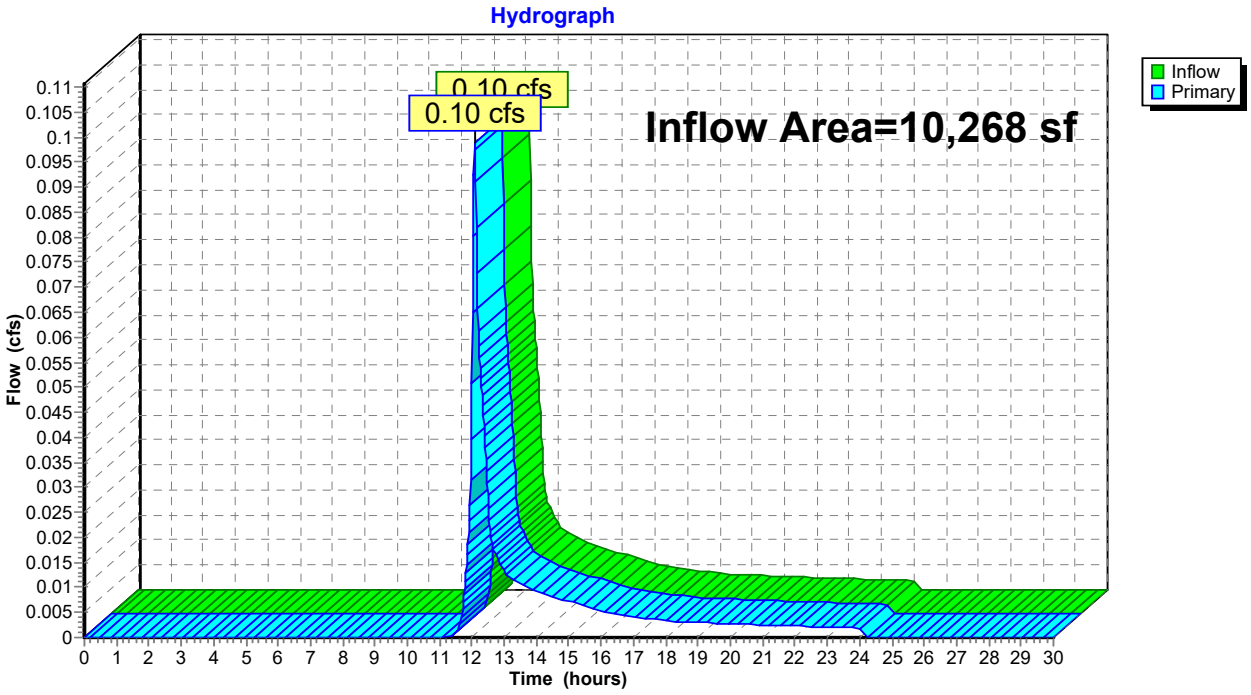


## Summary for Link 3L: PROPOSED

Inflow Area = 10,268 sf, 51.64% Impervious, Inflow Depth = 0.39" for 2-Year event
Inflow = 0.10 cfs @ 12.09 hrs, Volume= 334 cf
Primary = 0.10 cfs @ 12.09 hrs, Volume= 334 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Link 3L: PROPOSED



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 4S: PROPOSED** Runoff Area=4,966 sf 0.00% Impervious Runoff Depth=1.74"
Tc=5.0 min CN=69 Runoff=0.23 cfs 721 cf

**Subcatchment 5S: DRIVEWAY** Runoff Area=1,173 sf 100.00% Impervious Runoff Depth=4.46"
Tc=5.0 min CN=98 Runoff=0.13 cfs 436 cf

**Subcatchment 6S: ROOF** Runoff Area=3,357 sf 100.00% Impervious Runoff Depth=4.46"
Tc=5.0 min CN=98 Runoff=0.37 cfs 1,249 cf

**Subcatchment 8S: PROP.** Runoff Area=772 sf 100.00% Impervious Runoff Depth=4.46"
Tc=5.0 min CN=98 Runoff=0.08 cfs 287 cf

**Pond 8P: STORM TECH SYSTEM** Peak Elev=44.14' Storage=474 cf Inflow=0.58 cfs 1,972 cf
Discarded=0.10 cfs 1,972 cf Primary=0.00 cfs 0 cf Outflow=0.10 cfs 1,972 cf

**Link 3L: PROPOSED** Inflow=0.23 cfs 721 cf
Primary=0.23 cfs 721 cf

**Total Runoff Area = 10,268 sf Runoff Volume = 2,693 cf Average Runoff Depth = 3.15"**
**48.36% Pervious = 4,966 sf 51.64% Impervious = 5,302 sf**

## Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

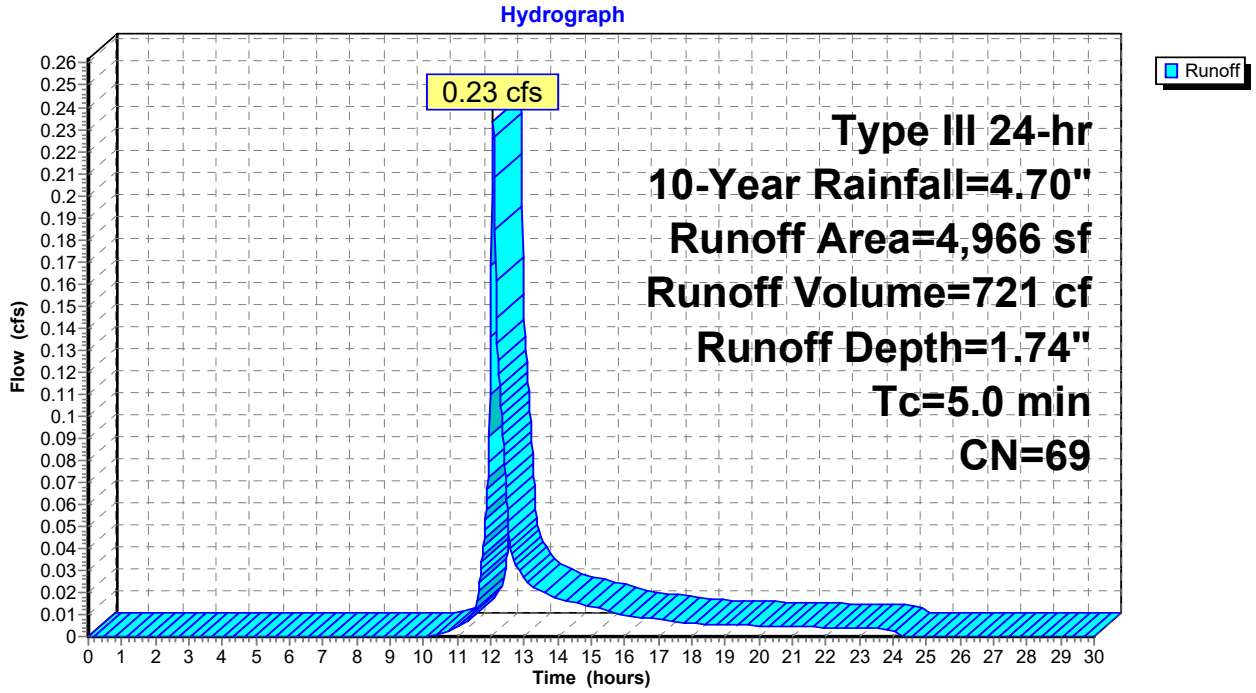
Runoff = 0.23 cfs @ 12.08 hrs, Volume= 721 cf, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

| Area (sf) | CN | Description |
|---|---|---|
| 4,966 | 69 | 50-75% Grass cover, Fair, HSG B |
| 4,966 | | 100.00% Pervious Area |

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

## Subcatchment 4S: PROPOSED LANDSCAPE AREA



## Summary for Subcatchment 5S: DRIVEWAY

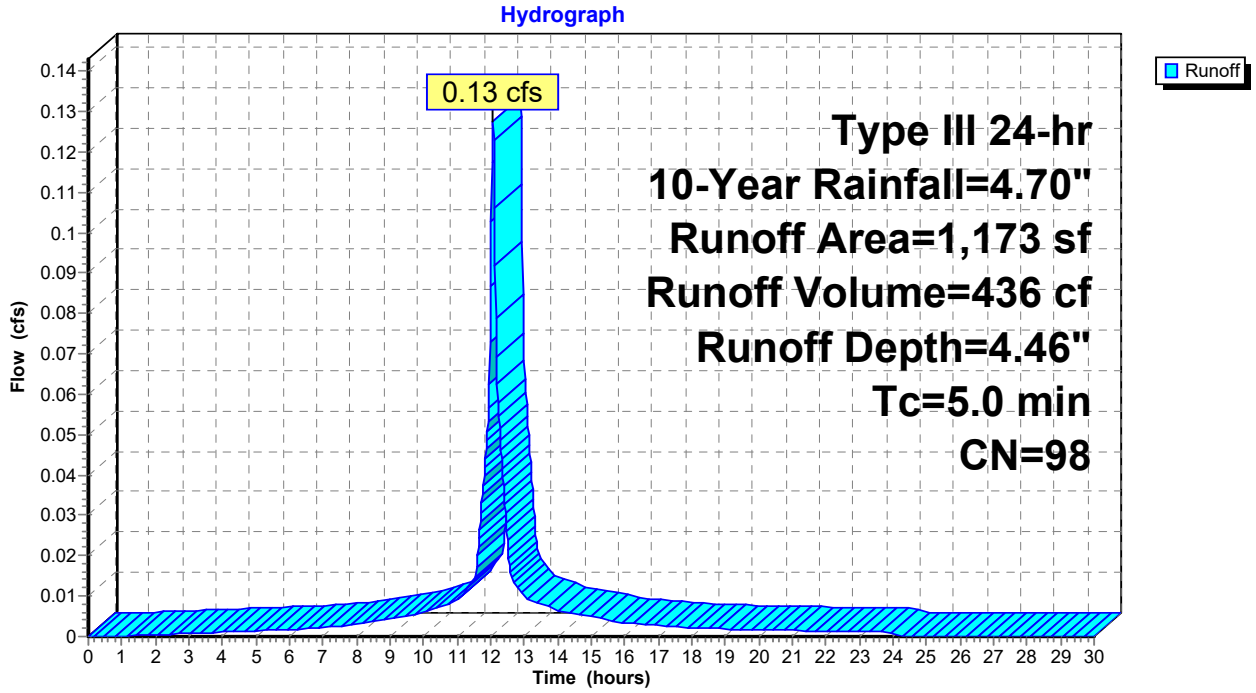
Runoff = 0.13 cfs @ 12.07 hrs, Volume= 436 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

| Area (sf) | CN | Description |
|---|---|---|
| 1,173 | 98 | Paved parking, HSG A |
| 1,173 | | 100.00% Impervious Area |

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

## Subcatchment 5S: DRIVEWAY



## Summary for Subcatchment 6S: ROOF

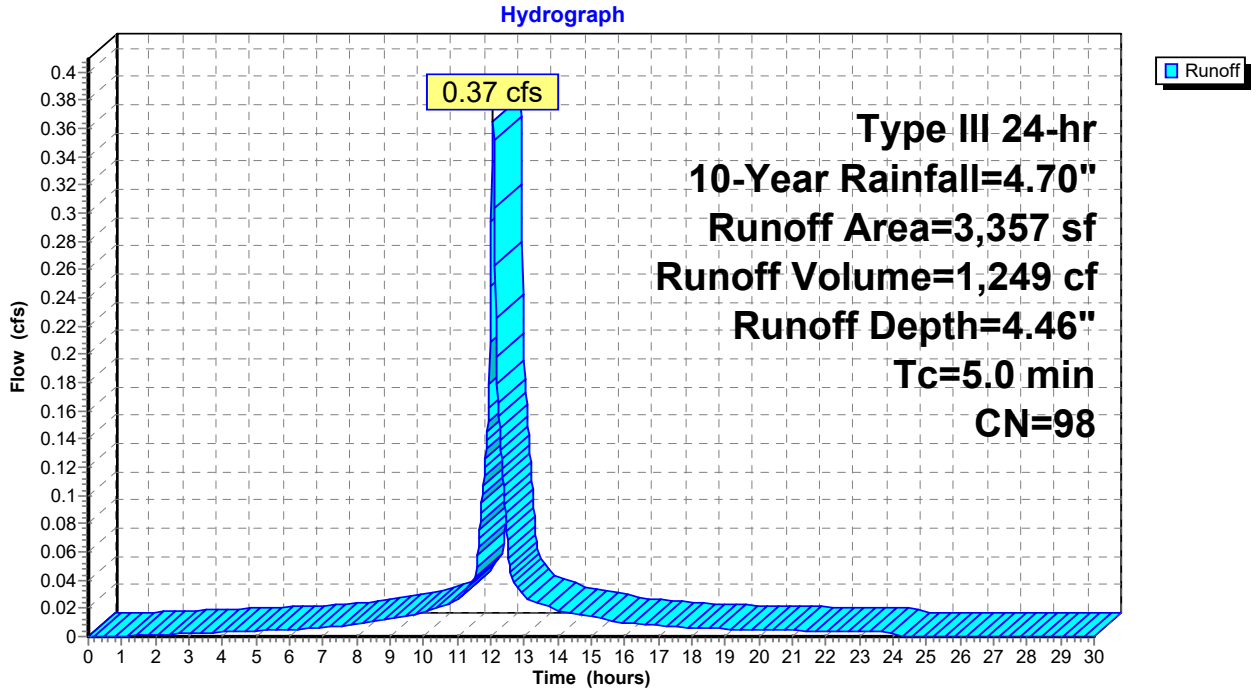
Runoff = 0.37 cfs @ 12.07 hrs, Volume= 1,249 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

| Area (sf) | CN | Description |
|---|---|---|
| 3,357 | 98 | Roofs, HSG A |
| 3,357 | | 100.00% Impervious Area |

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

## Subcatchment 6S: ROOF



## Summary for Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS

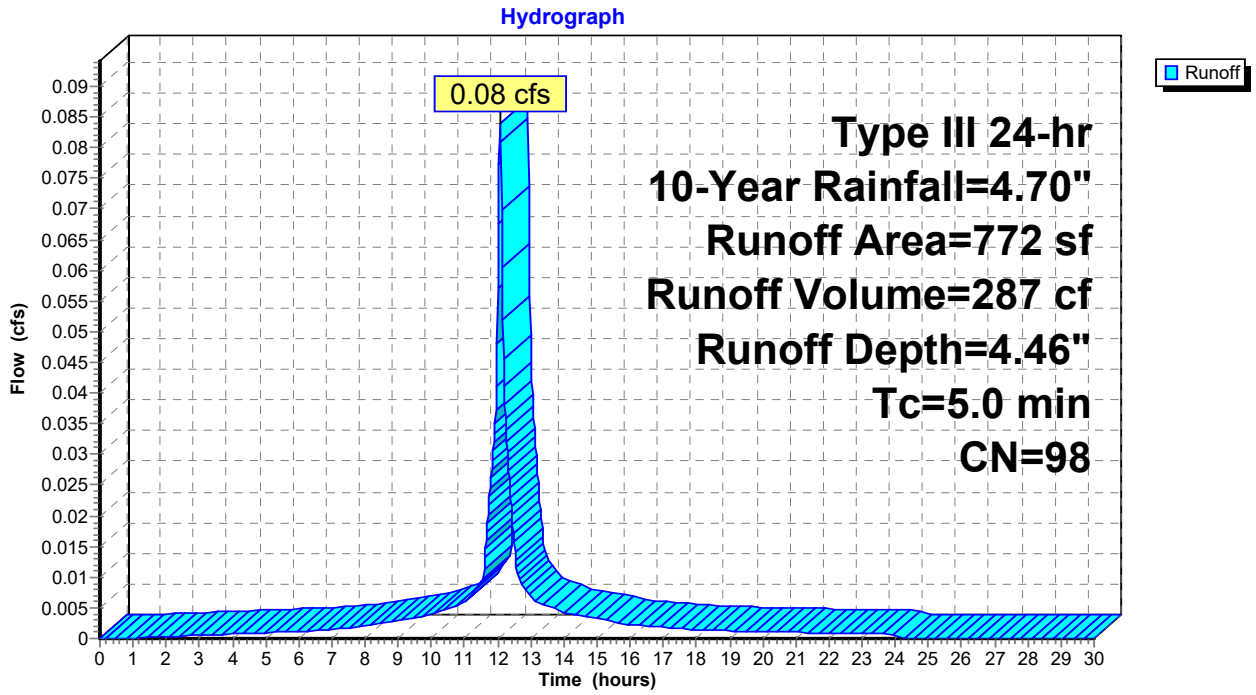
Runoff = 0.08 cfs @ 12.07 hrs, Volume= 287 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 152 | 98 | Unconnected pavement, HSG A |
| | 82 | 98 | Unconnected roofs, HSG A |
| | 182 | 98 | Unconnected pavement, HSG A |
| | 123 | 98 | Unconnected pavement, HSG A |
| | 96 | 98 | Unconnected pavement, HSG A |
| * | 137 | 98 | Unconnected pavement, HSG A |
| | 772 | 98 | Weighted Average |
| | 772 | | 100.00% Impervious Area |
| | 772 | | 100.00% Unconnected |

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

## Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS



## Summary for Pond 8P: STORM TECH SYSTEM

Inflow Area = 5,302 sf,100.00% Impervious, Inflow Depth = 4.46" for 10-Year event
Inflow = 0.58 cfs @ 12.07 hrs, Volume= 1,972 cf
Outflow = 0.10 cfs @ 11.68 hrs, Volume= 1,972 cf, Atten= 82%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.68 hrs, Volume= 1,972 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 44.14' @ 12.51 hrs Surf.Area= 543 sf Storage= 474 cf

Plug-Flow detention time= 23.7 min calculated for 1,971 cf (100% of inflow)
Center-of-Mass det. time= 23.6 min ( 771.8 - 748.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 42.50' | 632 cf | **49.08'W x 11.07'L x 3.50'H Field A**<br>1,902 cf Overall - 322 cf Embedded = 1,580 cf x 40.0% Voids |
| #2A | 43.00' | 322 cf | **ADS_StormTech SC-740 +Cap** x 7 Inside #1<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>7 Chambers in 7 Rows |
| #3 | 45.99' | 10 cf | **Ponding** Listed below -Impervious |
| | | 964 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Elevation (feet) | Cum.Store (cubic-feet) |
|---|---|
| 45.99 | 0 |
| 47.00 | 5 |
| 47.20 | 10 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 42.50' | **8.270 in/hr Exfiltration over Surface area** |
| #2 | Primary | 46.00' | **4.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Discarded OutFlow** Max=0.10 cfs @ 11.68 hrs HW=42.55' (Free Discharge)
**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=42.50' (Free Discharge)
**2=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 8P: STORM TECH SYSTEM - Chamber Wizard Field A

**Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)**
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 30.0" Spacing = 81.0" C-C Row Spacing

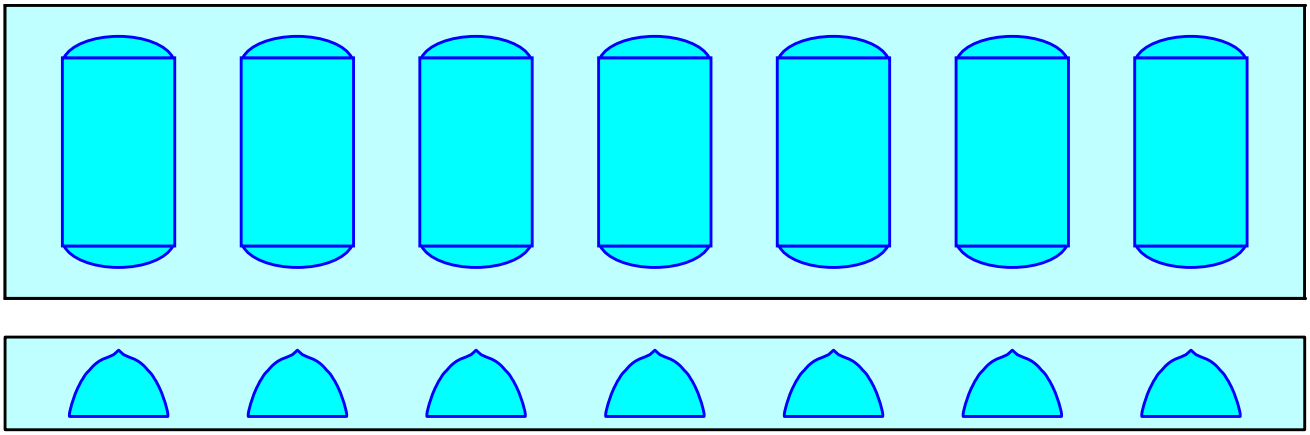
1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +14.0" End Stone x 2 = 11.07' Base Length
7 Rows x 51.0" Wide + 30.0" Spacing x 6 + 26.0" Side Stone x 2 = 49.08' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

7 Chambers x 45.9 cf = 321.6 cf Chamber Storage

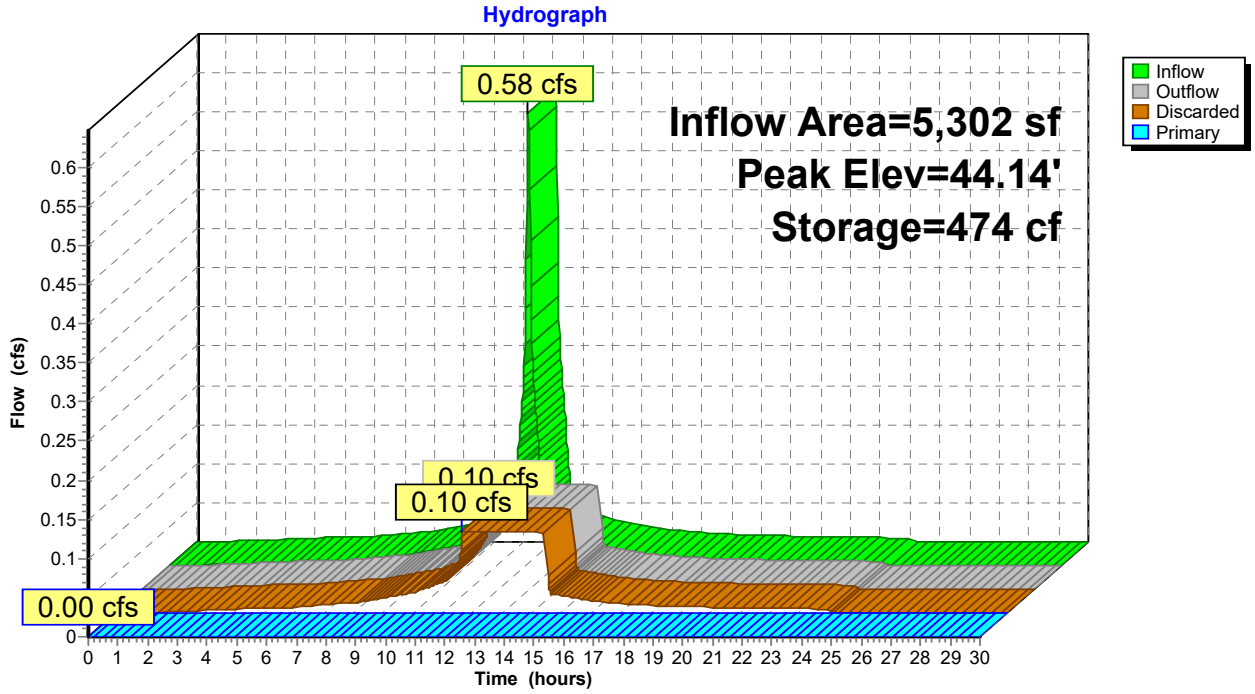
1,901.7 cf Field - 321.6 cf Chambers = 1,580.2 cf Stone x 40.0% Voids = 632.1 cf Stone Storage

Chamber Storage + Stone Storage = 953.6 cf = 0.022 af
Overall Storage Efficiency = 50.1%
Overall System Size = 11.07' x 49.08' x 3.50'

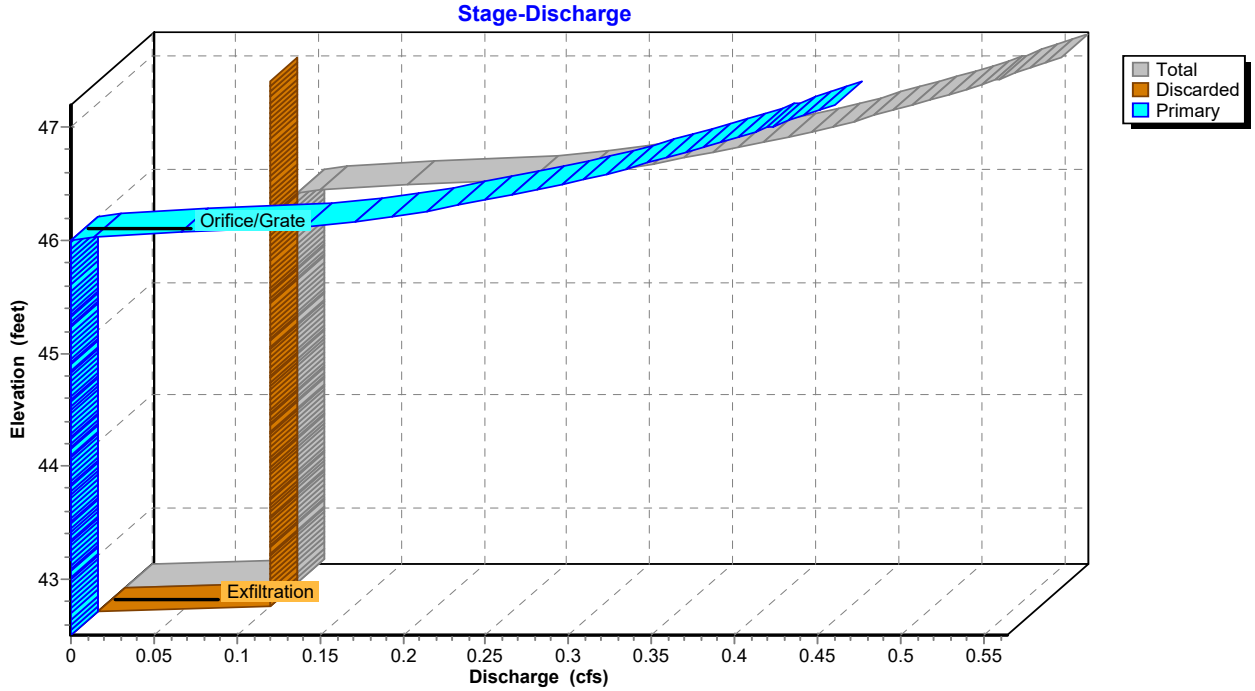
7 Chambers
70.4 cy Field
58.5 cy Stone



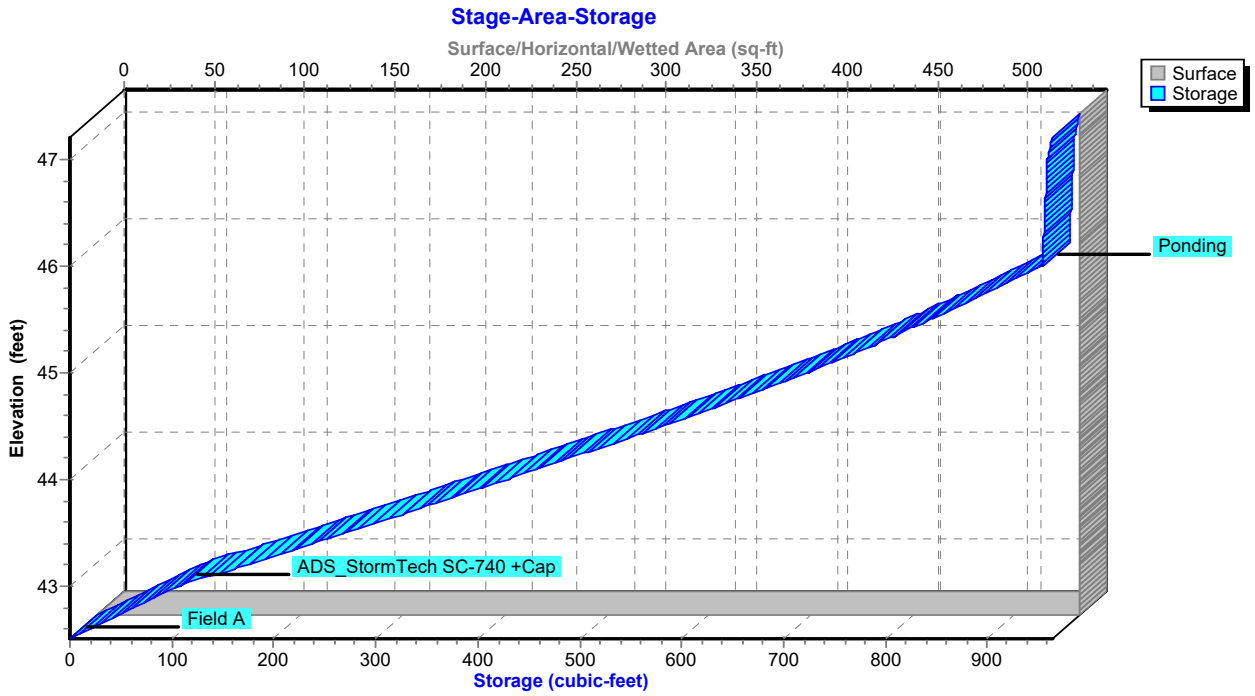
## Pond 8P: STORM TECH SYSTEM




## Pond 8P: STORM TECH SYSTEM



## Pond 8P: STORM TECH SYSTEM

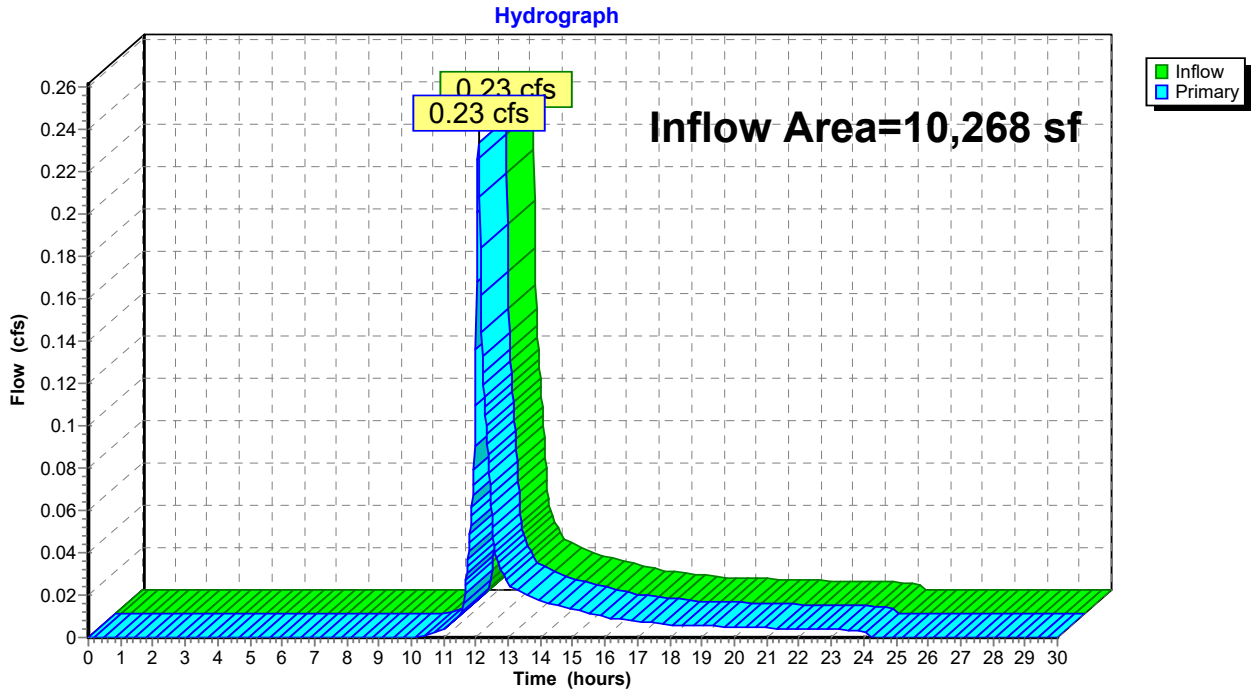


## Summary for Link 3L: PROPOSED

Inflow Area = 10,268 sf, 51.64% Impervious, Inflow Depth = 0.84" for 10-Year event
Inflow = 0.23 cfs @ 12.08 hrs, Volume= 721 cf
Primary = 0.23 cfs @ 12.08 hrs, Volume= 721 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Link 3L: PROPOSED



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 4S: PROPOSED** Runoff Area=4,966 sf 0.00% Impervious Runoff Depth=2.33"
Tc=5.0 min CN=69 Runoff=0.32 cfs 963 cf

**Subcatchment 5S: DRIVEWAY** Runoff Area=1,173 sf 100.00% Impervious Runoff Depth=5.26"
Tc=5.0 min CN=98 Runoff=0.15 cfs 514 cf

**Subcatchment 6S: ROOF** Runoff Area=3,357 sf 100.00% Impervious Runoff Depth=5.26"
Tc=5.0 min CN=98 Runoff=0.43 cfs 1,472 cf

**Subcatchment 8S: PROP.** Runoff Area=772 sf 100.00% Impervious Runoff Depth=5.26"
Tc=5.0 min CN=98 Runoff=0.10 cfs 339 cf

**Pond 8P: STORM TECH SYSTEM** Peak Elev=44.60' Storage=612 cf Inflow=0.68 cfs 2,325 cf
Discarded=0.10 cfs 2,325 cf Primary=0.00 cfs 0 cf Outflow=0.10 cfs 2,325 cf

**Link 3L: PROPOSED** Inflow=0.32 cfs 963 cf
Primary=0.32 cfs 963 cf

**Total Runoff Area = 10,268 sf Runoff Volume = 3,289 cf Average Runoff Depth = 3.84"**
**48.36% Pervious = 4,966 sf 51.64% Impervious = 5,302 sf**

## Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

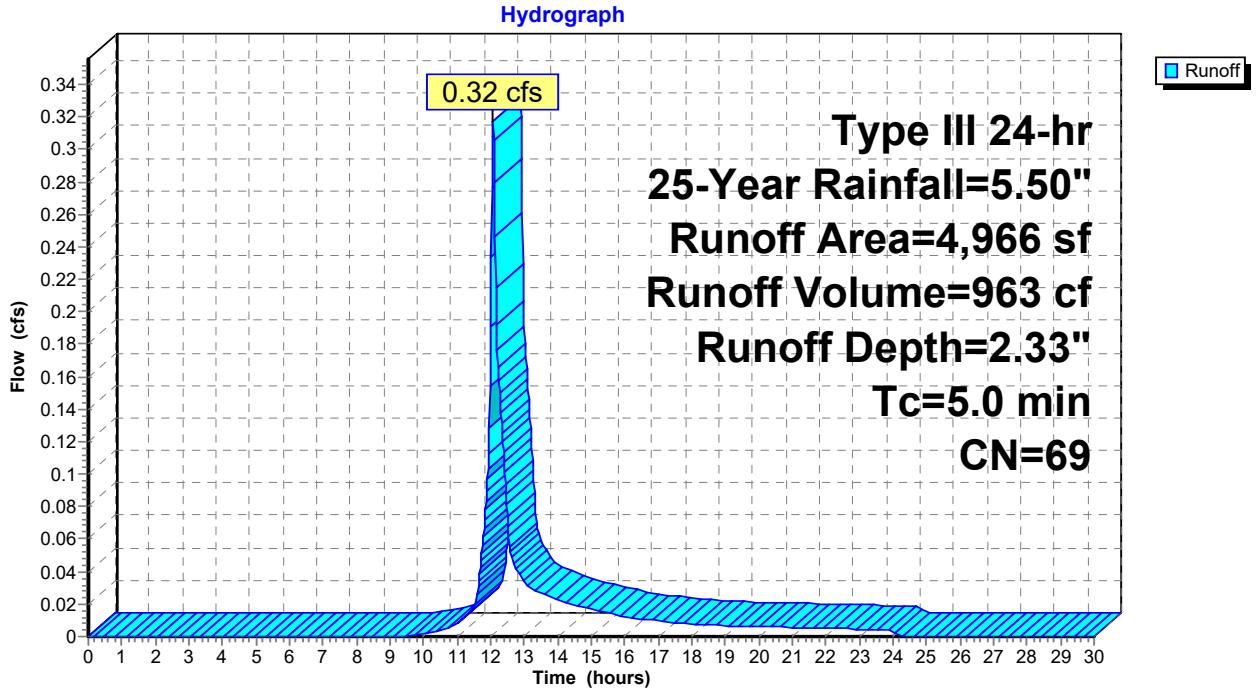
Runoff = 0.32 cfs @ 12.08 hrs, Volume= 963 cf, Depth= 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

| Area (sf) | CN | Description |
|---|---|---|
| 4,966 | 69 | 50-75% Grass cover, Fair, HSG B |
| 4,966 | | 100.00% Pervious Area |

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

## Subcatchment 4S: PROPOSED LANDSCAPE AREA



## Summary for Subcatchment 5S: DRIVEWAY

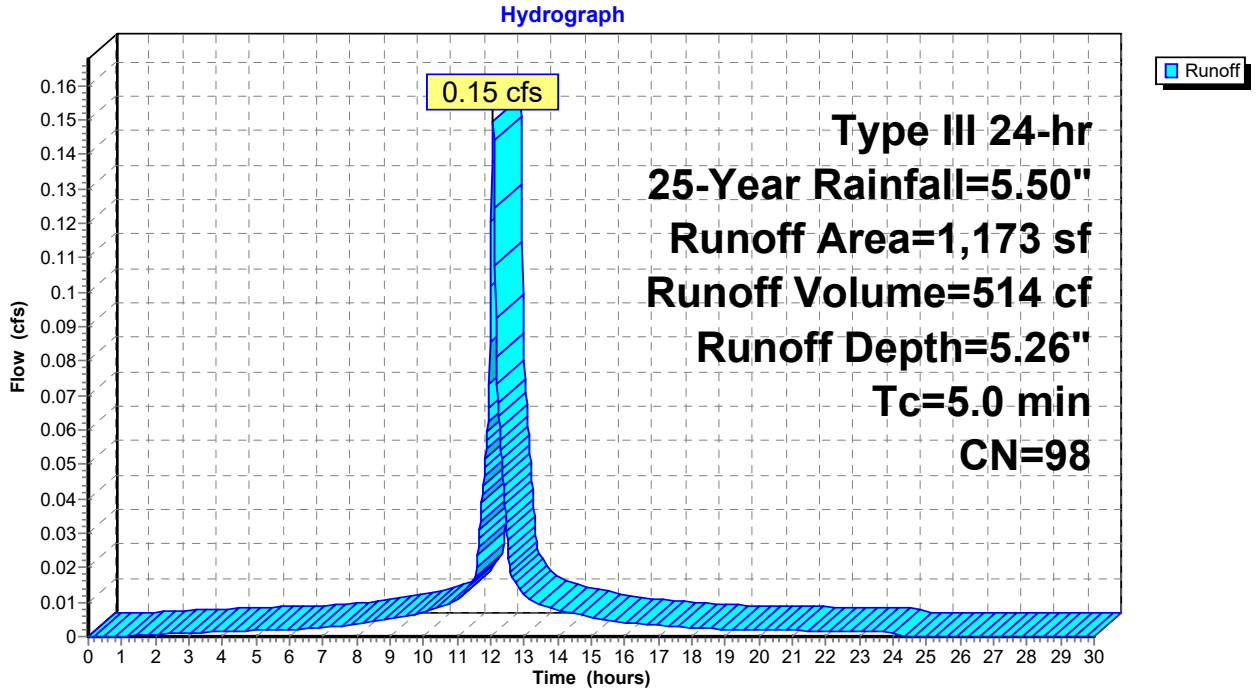
Runoff = 0.15 cfs @ 12.07 hrs, Volume= 514 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

| Area (sf) | CN | Description |
|---|---|---|
| 1,173 | 98 | Paved parking, HSG A |
| 1,173 | | 100.00% Impervious Area |

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

## Subcatchment 5S: DRIVEWAY



## Summary for Subcatchment 6S: ROOF

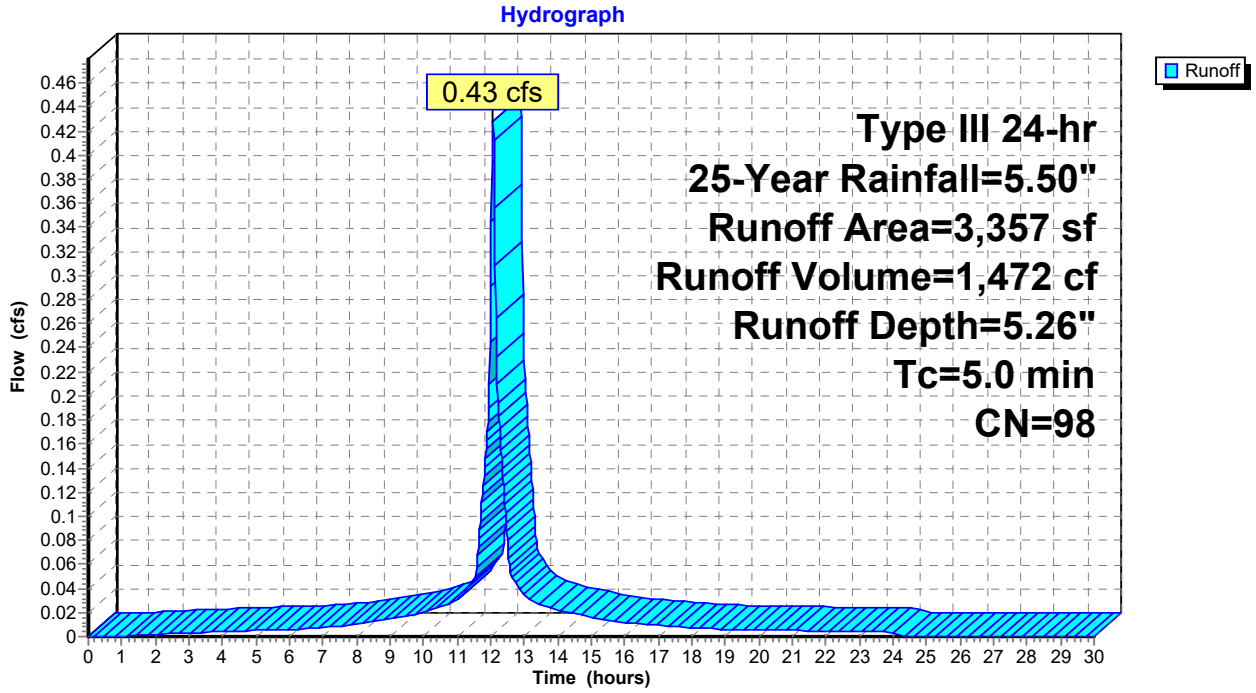
Runoff = 0.43 cfs @ 12.07 hrs, Volume= 1,472 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

| Area (sf) | CN | Description |
|---|---|---|
| 3,357 | 98 | Roofs, HSG A |
| 3,357 | | 100.00% Impervious Area |

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

## Subcatchment 6S: ROOF



## Summary for Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS

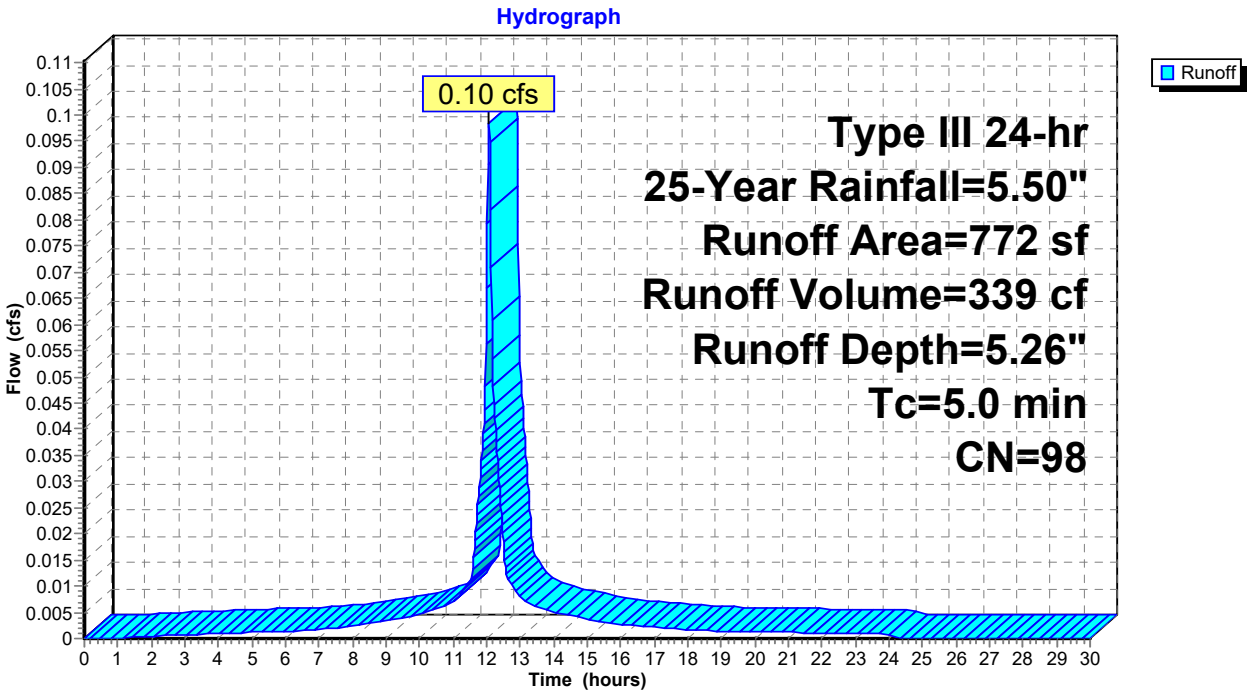
Runoff = 0.10 cfs @ 12.07 hrs, Volume= 339 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 152 | 98 | Unconnected pavement, HSG A |
| | 82 | 98 | Unconnected roofs, HSG A |
| | 182 | 98 | Unconnected pavement, HSG A |
| | 123 | 98 | Unconnected pavement, HSG A |
| | 96 | 98 | Unconnected pavement, HSG A |
| * | 137 | 98 | Unconnected pavement, HSG A |
| | 772 | 98 | Weighted Average |
| | 772 | | 100.00% Impervious Area |
| | 772 | | 100.00% Unconnected |

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

## Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS



## Summary for Pond 8P: STORM TECH SYSTEM

Inflow Area = 5,302 sf,100.00% Impervious, Inflow Depth = 5.26" for 25-Year event
Inflow = 0.68 cfs @ 12.07 hrs, Volume= 2,325 cf
Outflow = 0.10 cfs @ 11.64 hrs, Volume= 2,325 cf, Atten= 85%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.64 hrs, Volume= 2,325 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 44.60' @ 12.54 hrs Surf.Area= 543 sf Storage= 612 cf

Plug-Flow detention time= 32.1 min calculated for 2,324 cf (100% of inflow)
Center-of-Mass det. time= 32.1 min ( 777.7 - 745.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 42.50' | 632 cf | **49.08'W x 11.07'L x 3.50'H Field A**<br>1,902 cf Overall - 322 cf Embedded = 1,580 cf x 40.0% Voids |
| #2A | 43.00' | 322 cf | **ADS_StormTech SC-740 +Cap** x 7 Inside #1<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>7 Chambers in 7 Rows |
| #3 | 45.99' | 10 cf | **Ponding** Listed below -Impervious |
| | | 964 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Elevation (feet) | Cum.Store (cubic-feet) |
|---|---|
| 45.99 | 0 |
| 47.00 | 5 |
| 47.20 | 10 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 42.50' | **8.270 in/hr Exfiltration over Surface area** |
| #2 | Primary | 46.00' | **4.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Discarded OutFlow** Max=0.10 cfs @ 11.64 hrs HW=42.55' (Free Discharge)
**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=42.50' (Free Discharge)
**2=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 8P: STORM TECH SYSTEM - Chamber Wizard Field A

**Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)**
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 30.0" Spacing = 81.0" C-C Row Spacing

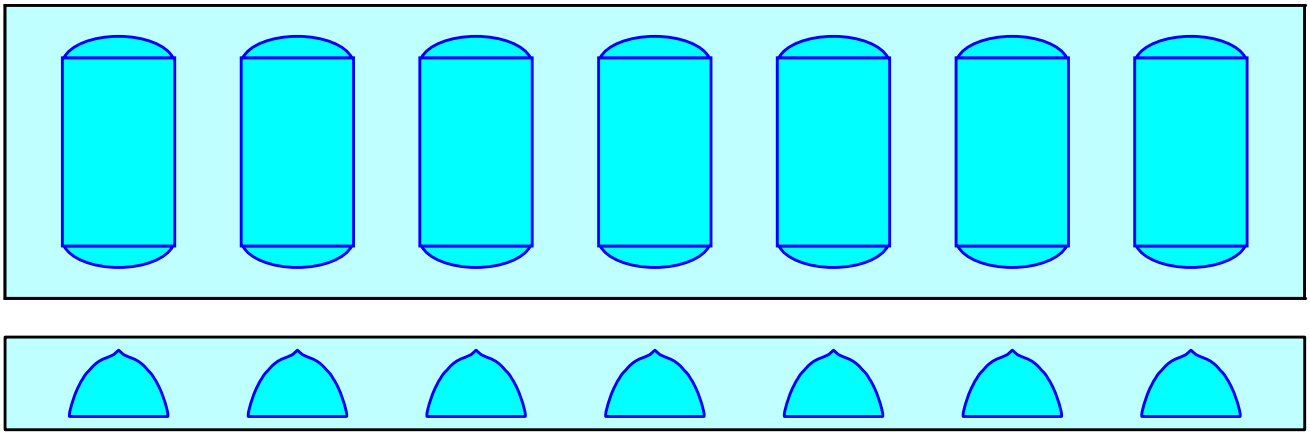
1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +14.0" End Stone x 2 = 11.07' Base Length
7 Rows x 51.0" Wide + 30.0" Spacing x 6 + 26.0" Side Stone x 2 = 49.08' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

7 Chambers x 45.9 cf = 321.6 cf Chamber Storage

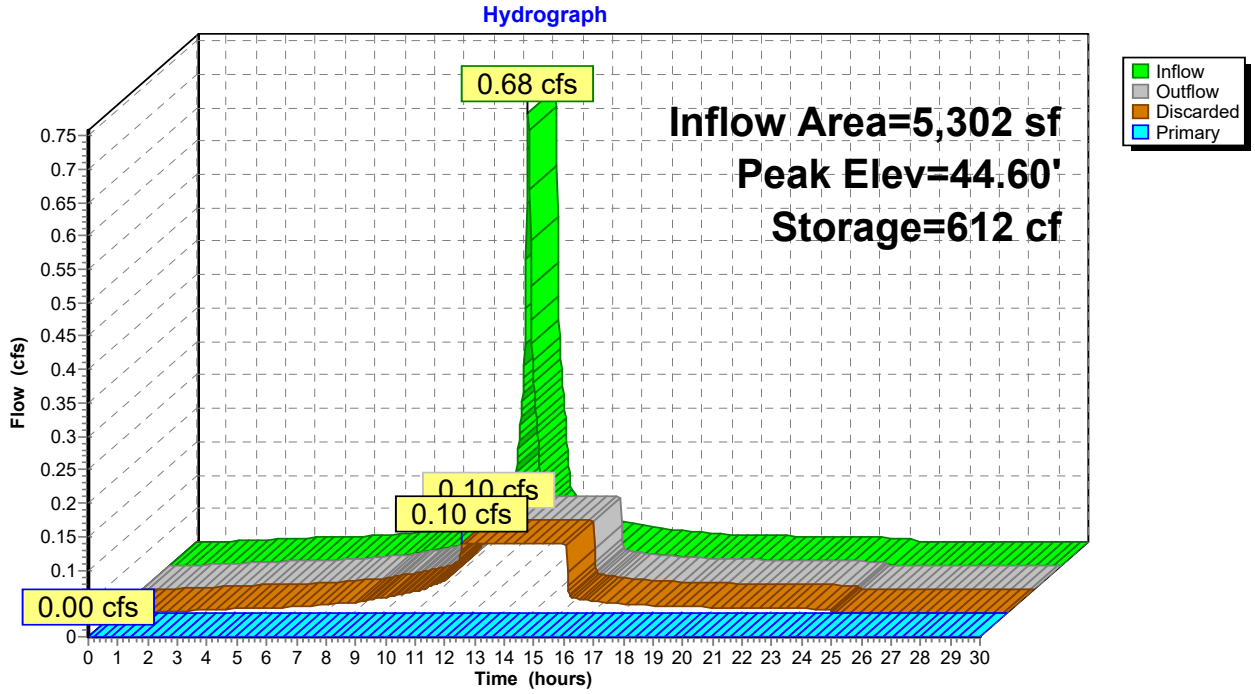
1,901.7 cf Field - 321.6 cf Chambers = 1,580.2 cf Stone x 40.0% Voids = 632.1 cf Stone Storage

Chamber Storage + Stone Storage = 953.6 cf = 0.022 af
Overall Storage Efficiency = 50.1%
Overall System Size = 11.07' x 49.08' x 3.50'

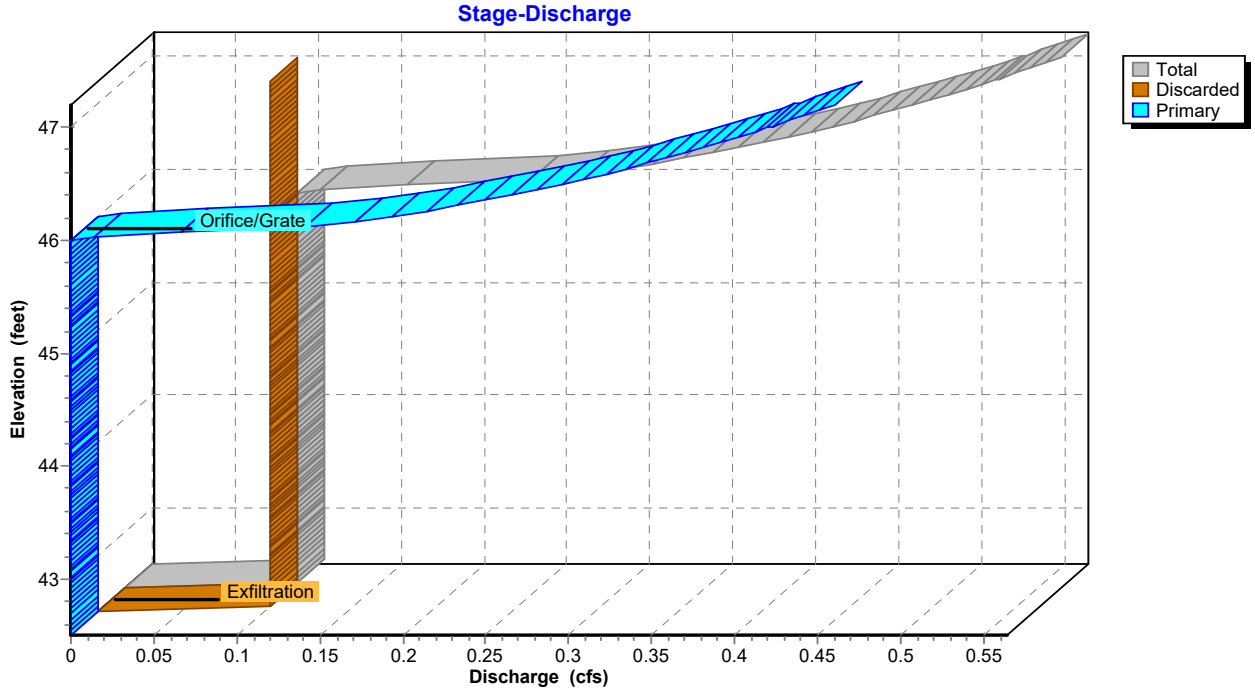
7 Chambers
70.4 cy Field
58.5 cy Stone



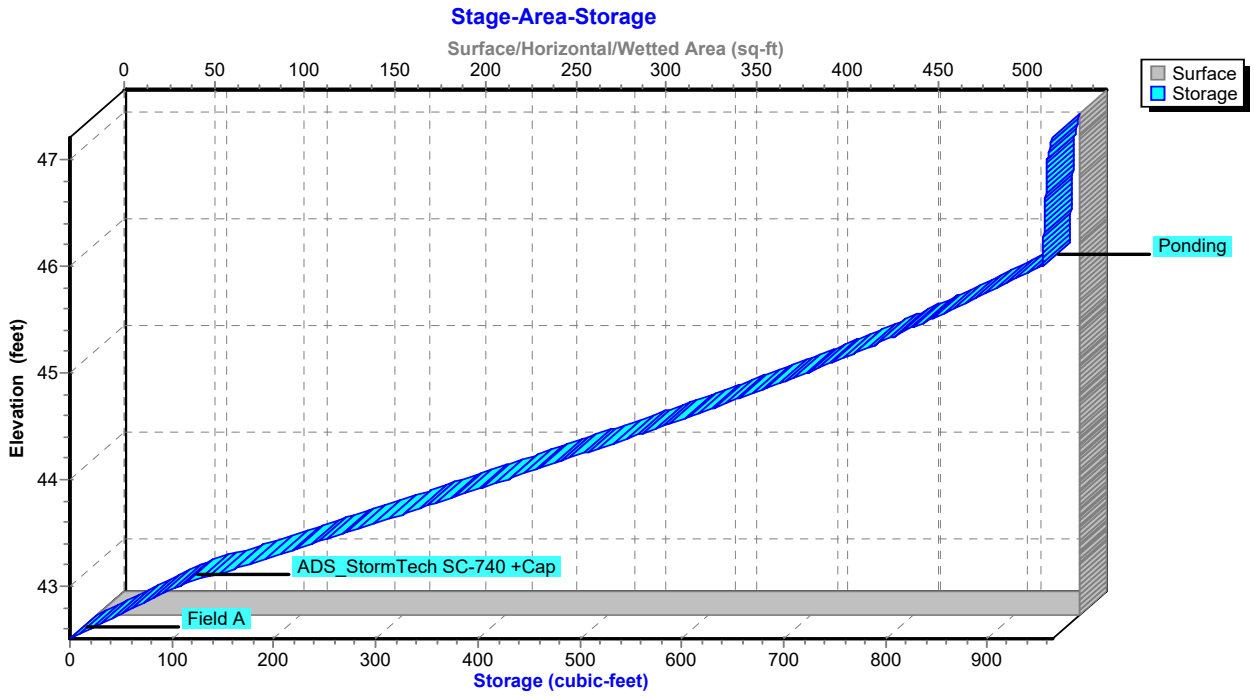
## Pond 8P: STORM TECH SYSTEM




## Pond 8P: STORM TECH SYSTEM



## Pond 8P: STORM TECH SYSTEM

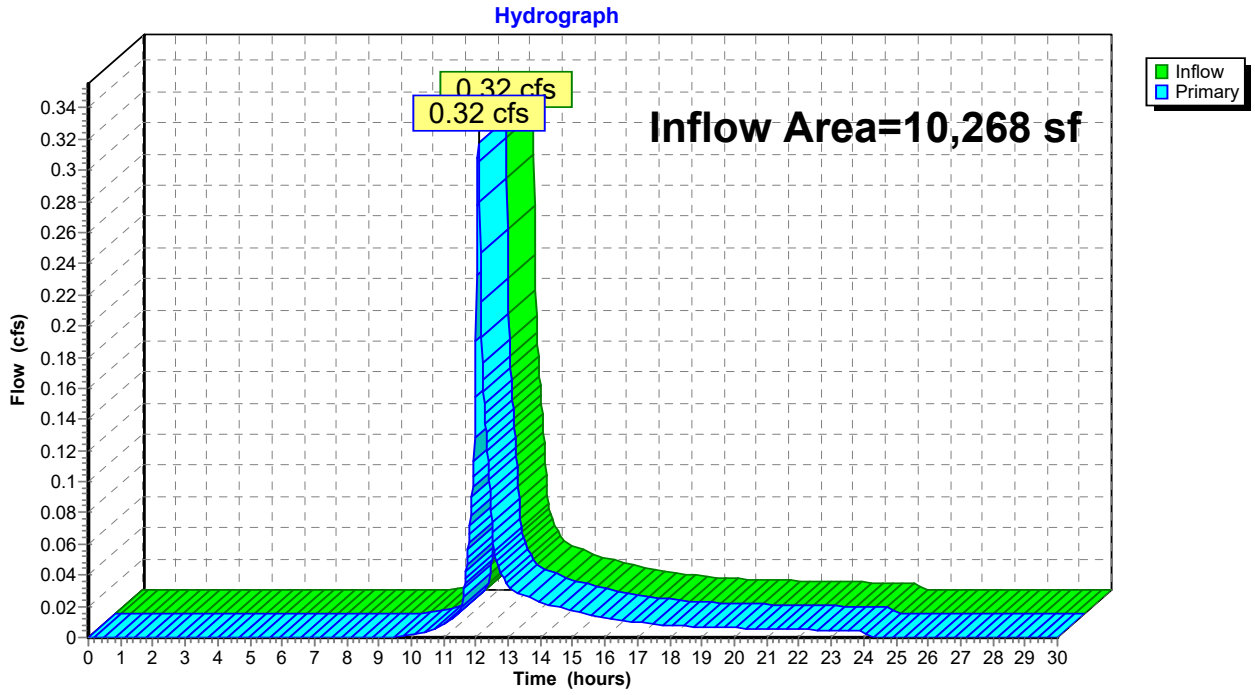


## Summary for Link 3L: PROPOSED

Inflow Area = 10,268 sf, 51.64% Impervious, Inflow Depth = 1.13" for 25-Year event
Inflow = 0.32 cfs @ 12.08 hrs, Volume= 963 cf
Primary = 0.32 cfs @ 12.08 hrs, Volume= 963 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Link 3L: PROPOSED



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 4S: PROPOSED** Runoff Area=4,966 sf 0.00% Impervious Runoff Depth=5.02"
Tc=5.0 min CN=69 Runoff=0.69 cfs 2,077 cf

**Subcatchment 5S: DRIVEWAY** Runoff Area=1,173 sf 100.00% Impervious Runoff Depth=8.54"
Tc=5.0 min CN=98 Runoff=0.24 cfs 835 cf

**Subcatchment 6S: ROOF** Runoff Area=3,357 sf 100.00% Impervious Runoff Depth=8.54"
Tc=5.0 min CN=98 Runoff=0.69 cfs 2,389 cf

**Subcatchment 8S: PROP.** Runoff Area=772 sf 100.00% Impervious Runoff Depth=8.54"
Tc=5.0 min CN=98 Runoff=0.16 cfs 549 cf

**Pond 8P: STORM TECH SYSTEM** Peak Elev=46.87' Storage=958 cf Inflow=1.08 cfs 3,773 cf
Discarded=0.10 cfs 3,508 cf Primary=0.41 cfs 259 cf Outflow=0.51 cfs 3,767 cf

**Link 3L: PROPOSED** Inflow=0.73 cfs 2,337 cf
Primary=0.73 cfs 2,337 cf

**Total Runoff Area = 10,268 sf Runoff Volume = 5,851 cf Average Runoff Depth = 6.84"**
**48.36% Pervious = 4,966 sf 51.64% Impervious = 5,302 sf**

## Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

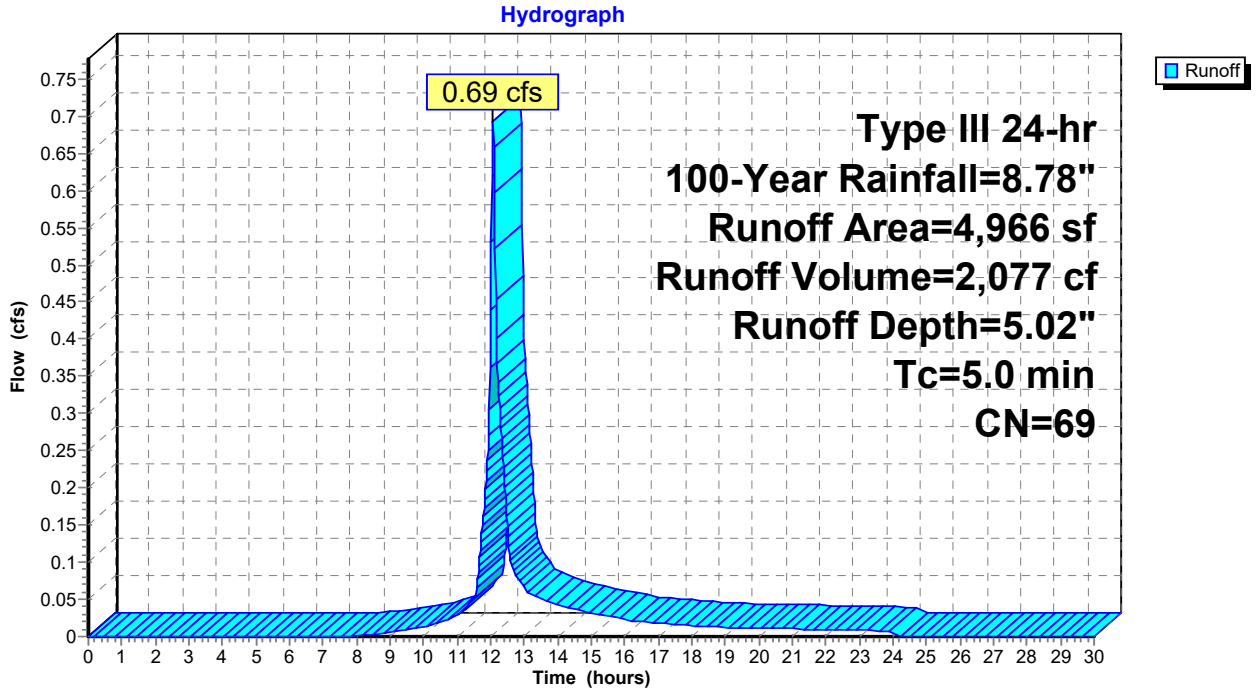
Runoff = 0.69 cfs @ 12.08 hrs, Volume= 2,077 cf, Depth= 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

| Area (sf) | CN | Description |
|---|---|---|
| 4,966 | 69 | 50-75% Grass cover, Fair, HSG B |
| 4,966 | | 100.00% Pervious Area |

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

## Subcatchment 4S: PROPOSED LANDSCAPE AREA



## Summary for Subcatchment 5S: DRIVEWAY

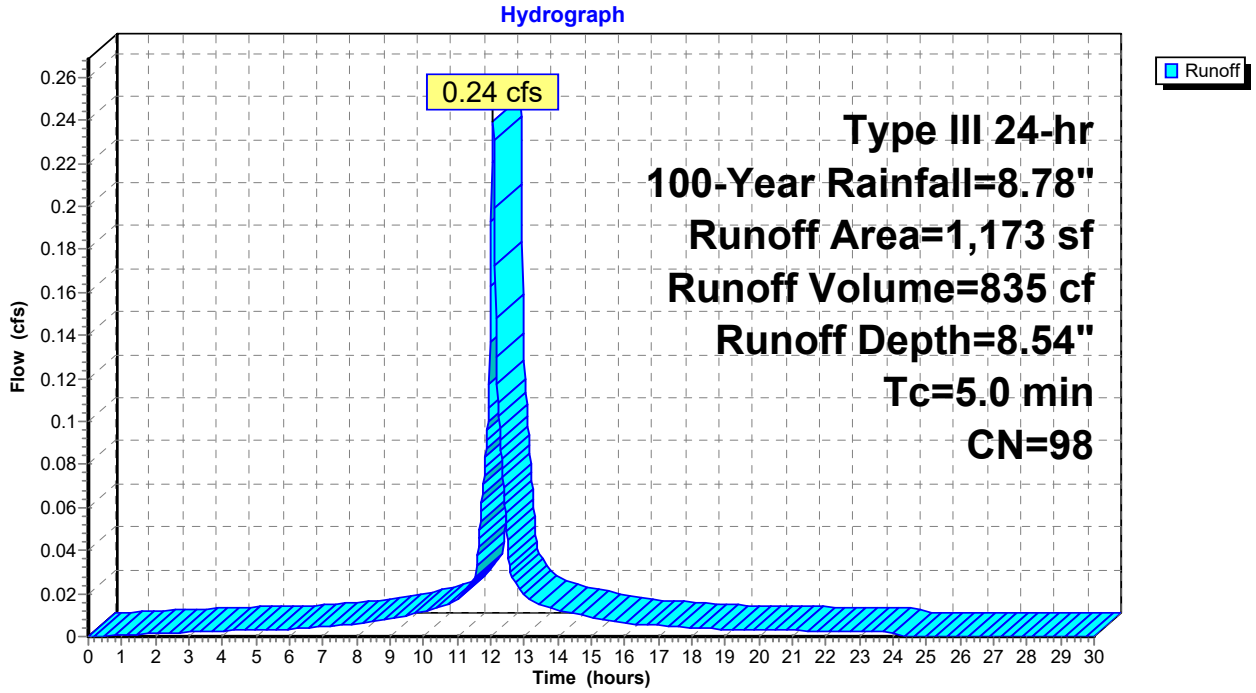
Runoff = 0.24 cfs @ 12.07 hrs, Volume= 835 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

| Area (sf) | CN | Description |
|---|---|---|
| 1,173 | 98 | Paved parking, HSG A |
| 1,173 | | 100.00% Impervious Area |

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

## Subcatchment 5S: DRIVEWAY



## Summary for Subcatchment 6S: ROOF

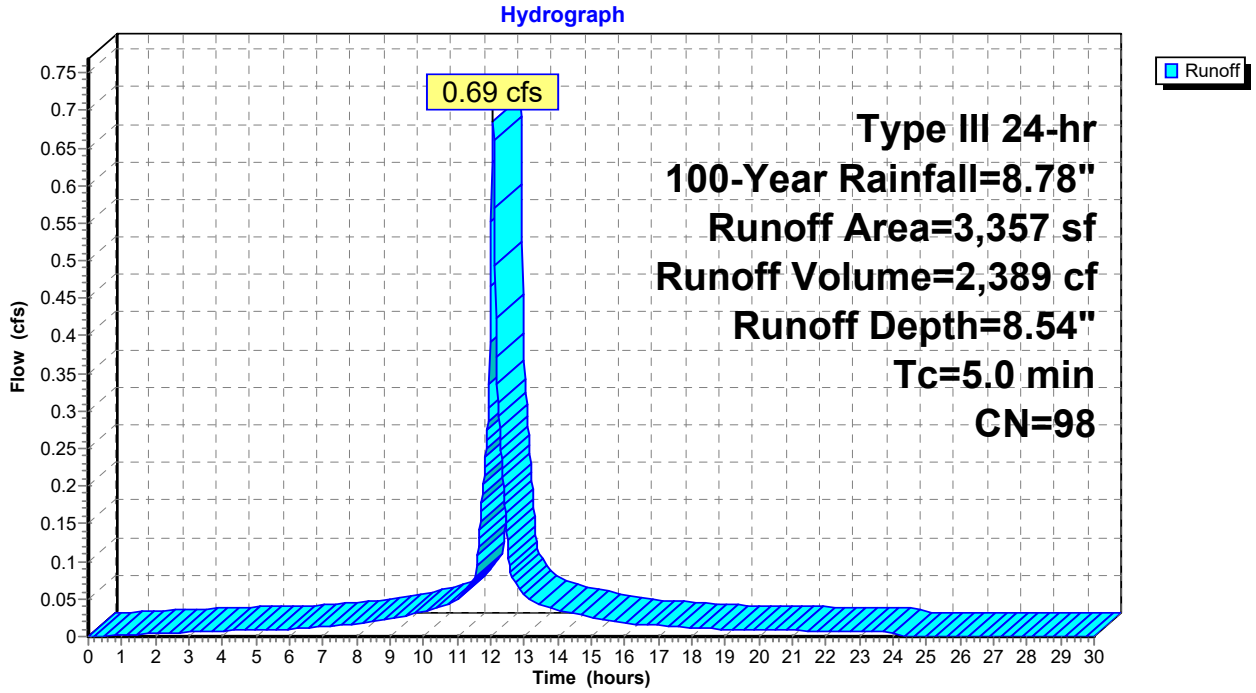
Runoff = 0.69 cfs @ 12.07 hrs, Volume= 2,389 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

| Area (sf) | CN | Description |
|---|---|---|
| 3,357 | 98 | Roofs, HSG A |
| 3,357 | | 100.00% Impervious Area |

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

## Subcatchment 6S: ROOF



## Summary for Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS

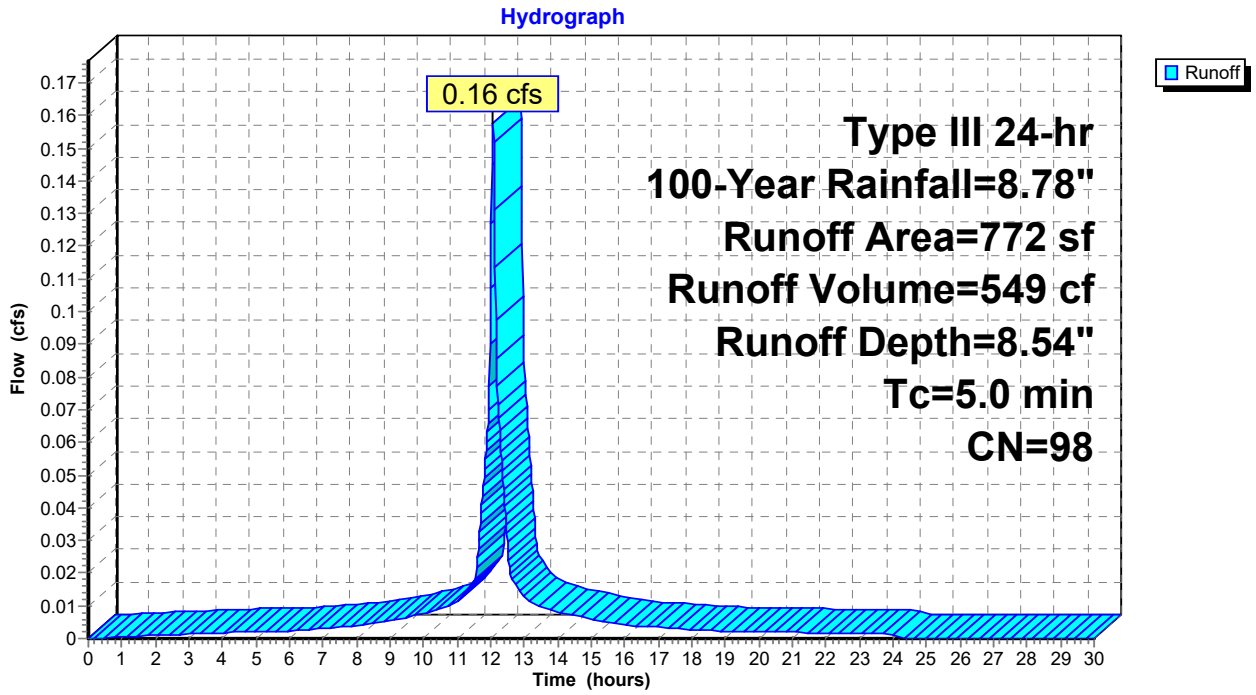
Runoff = 0.16 cfs @ 12.07 hrs, Volume= 549 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 152 | 98 | Unconnected pavement, HSG A |
| | 82 | 98 | Unconnected roofs, HSG A |
| | 182 | 98 | Unconnected pavement, HSG A |
| | 123 | 98 | Unconnected pavement, HSG A |
| | 96 | 98 | Unconnected pavement, HSG A |
| * | 137 | 98 | Unconnected pavement, HSG A |
| | 772 | 98 | Weighted Average |
| | 772 | | 100.00% Impervious Area |
| | 772 | | 100.00% Unconnected |

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

## Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS



## Summary for Pond 8P: STORM TECH SYSTEM

Inflow Area = 5,302 sf,100.00% Impervious, Inflow Depth = 8.54" for 100-Year event
Inflow = 1.08 cfs @ 12.07 hrs, Volume= 3,773 cf
Outflow = 0.51 cfs @ 12.25 hrs, Volume= 3,767 cf, Atten= 53%, Lag= 10.7 min
Discarded = 0.10 cfs @ 11.38 hrs, Volume= 3,508 cf
Primary = 0.41 cfs @ 12.25 hrs, Volume= 259 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 46.87' @ 12.25 hrs Surf.Area= 543 sf Storage= 958 cf

Plug-Flow detention time= 54.4 min calculated for 3,767 cf (100% of inflow)
Center-of-Mass det. time= 53.3 min ( 792.4 - 739.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 42.50' | 632 cf | **49.08'W x 11.07'L x 3.50'H Field A**<br>1,902 cf Overall - 322 cf Embedded = 1,580 cf x 40.0% Voids |
| #2A | 43.00' | 322 cf | **ADS_StormTech SC-740 +Cap** x 7 Inside #1<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>7 Chambers in 7 Rows |
| #3 | 45.99' | 10 cf | **Ponding** Listed below -Impervious |
| | | 964 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Elevation (feet) | Cum.Store (cubic-feet) |
|---|---|
| 45.99 | 0 |
| 47.00 | 5 |
| 47.20 | 10 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 42.50' | **8.270 in/hr Exfiltration over Surface area** |
| #2 | Primary | 46.00' | **4.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Discarded OutFlow** Max=0.10 cfs @ 11.38 hrs HW=42.55' (Free Discharge)
**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

**Primary OutFlow** Max=0.37 cfs @ 12.25 hrs HW=46.76' (Free Discharge)
**2=Orifice/Grate** (Orifice Controls 0.37 cfs @ 4.18 fps)

## Pond 8P: STORM TECH SYSTEM - Chamber Wizard Field A

**Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)**
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 30.0" Spacing = 81.0" C-C Row Spacing

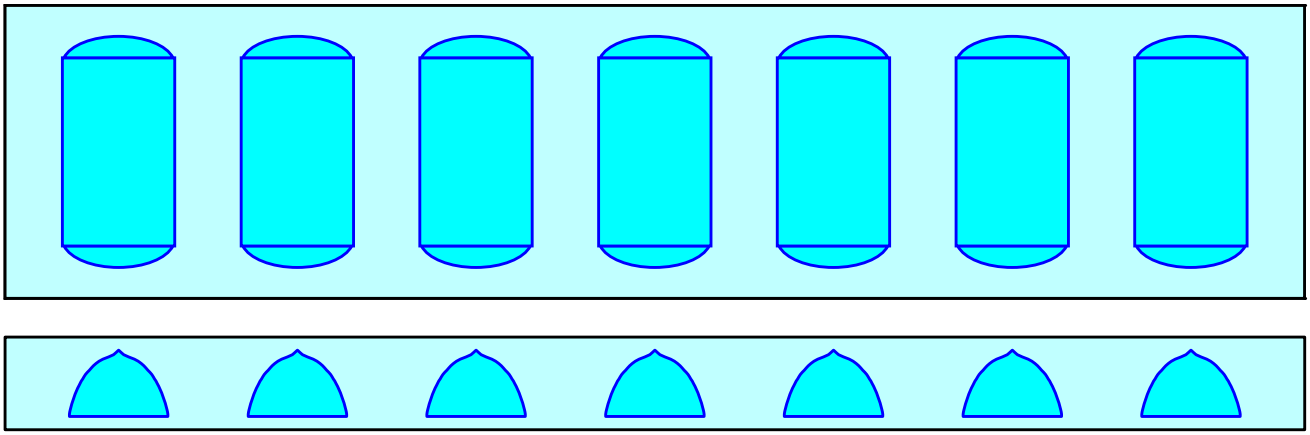
1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +14.0" End Stone x 2 = 11.07' Base Length
7 Rows x 51.0" Wide + 30.0" Spacing x 6 + 26.0" Side Stone x 2 = 49.08' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

7 Chambers x 45.9 cf = 321.6 cf Chamber Storage

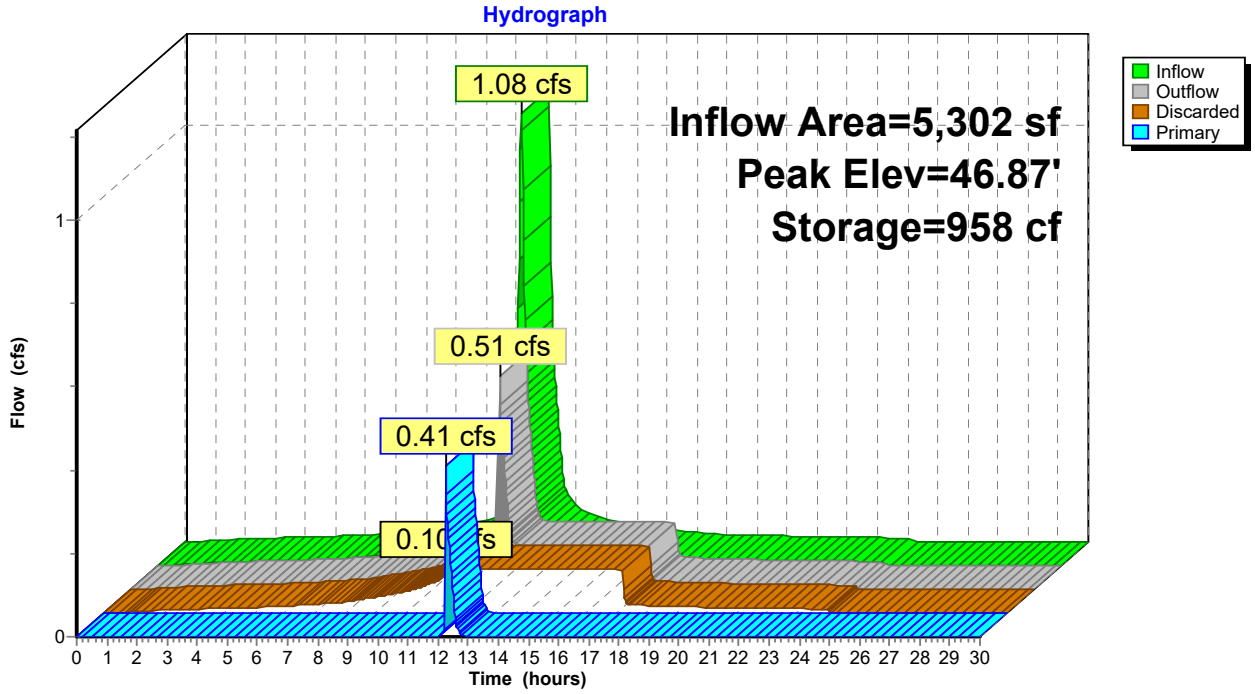
1,901.7 cf Field - 321.6 cf Chambers = 1,580.2 cf Stone x 40.0% Voids = 632.1 cf Stone Storage

Chamber Storage + Stone Storage = 953.6 cf = 0.022 af
Overall Storage Efficiency = 50.1%
Overall System Size = 11.07' x 49.08' x 3.50'

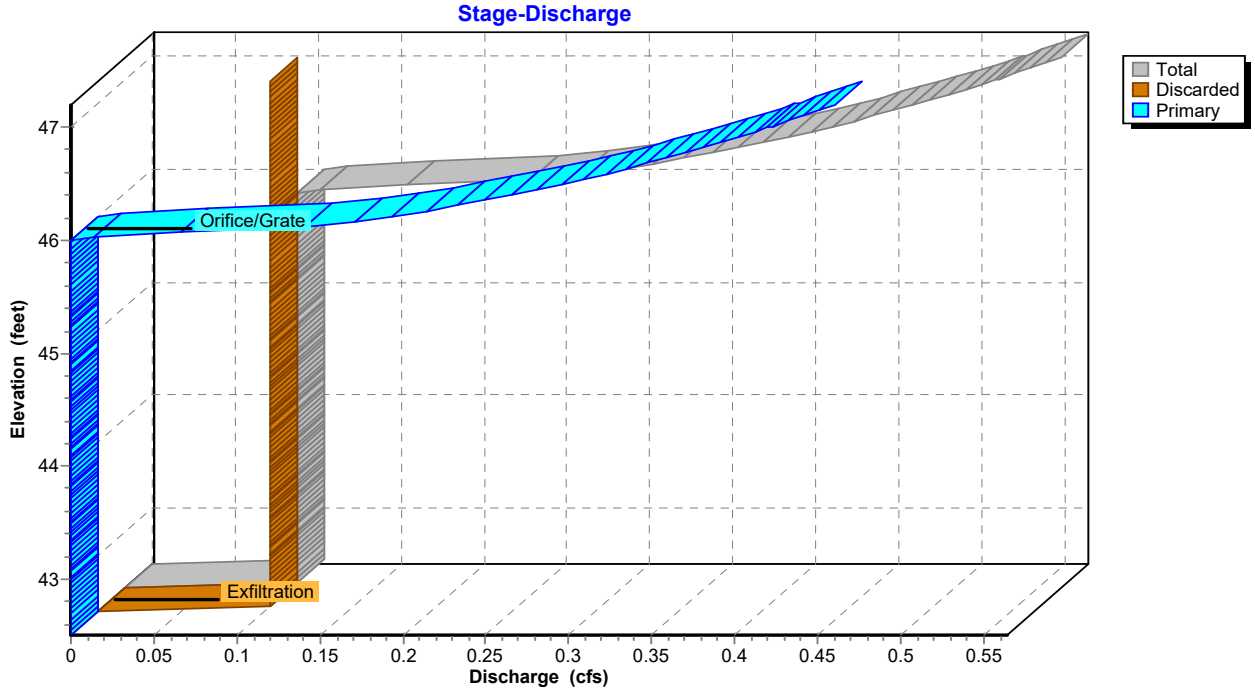
7 Chambers
70.4 cy Field
58.5 cy Stone



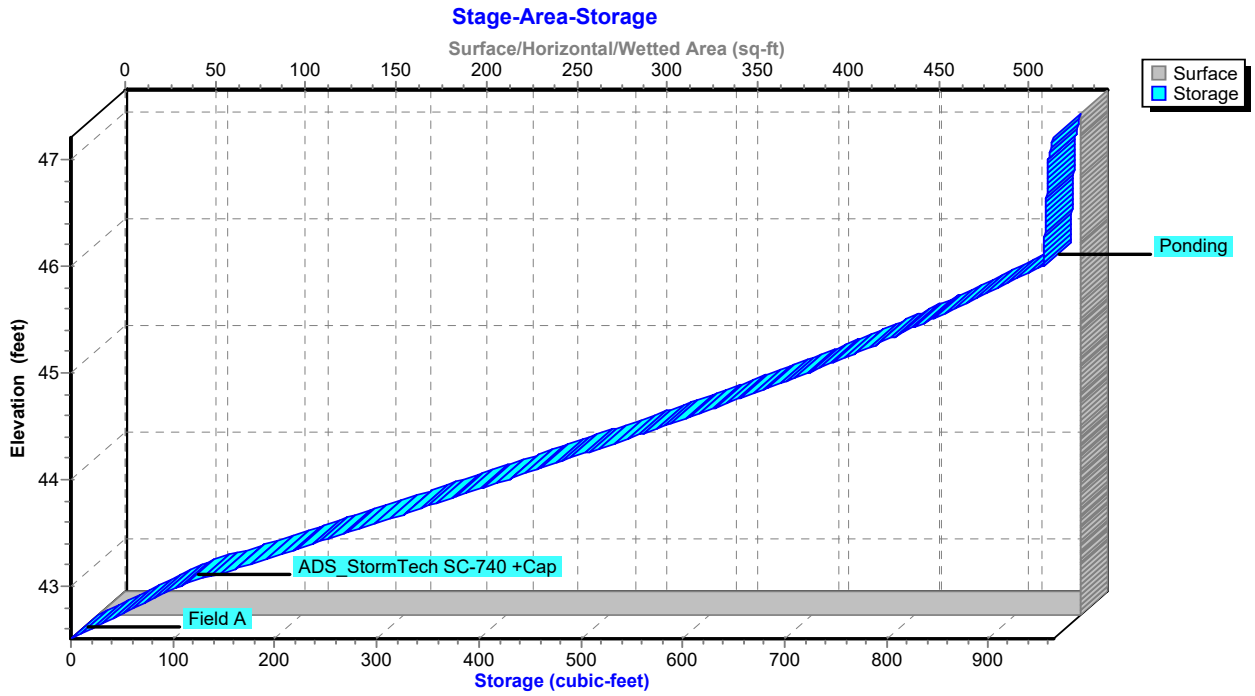
## Pond 8P: STORM TECH SYSTEM




## Pond 8P: STORM TECH SYSTEM



## Pond 8P: STORM TECH SYSTEM

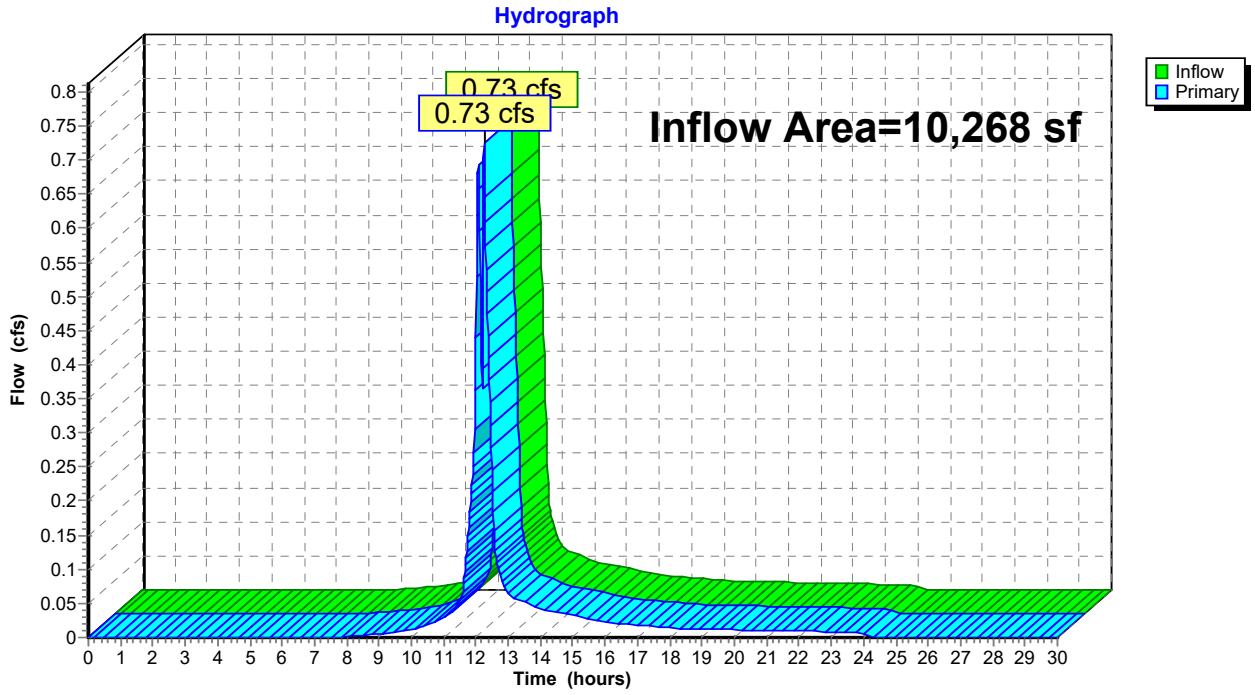


## Summary for Link 3L: PROPOSED

Inflow Area = 10,268 sf, 51.64% Impervious, Inflow Depth = 2.73" for 100-Year event
Inflow = 0.73 cfs @ 12.25 hrs, Volume= 2,337 cf
Primary = 0.73 cfs @ 12.25 hrs, Volume= 2,337 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Link 3L: PROPOSED



# Appendix B – Soil Information

# Custom Soil Resource Report
## Soil Map (236 Chapel St, Newton, MA)


Map Scale: 1:368 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 15 30 60 90

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

## MAP LEGEND

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

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

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

**Water Features**
- Streams and Canals

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

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 22, Sep 9, 2022

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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

# Map Unit Legend (236 Chapel St, Newton, MA)

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| 626B | Merrimac-Urban land complex, 0 to 8 percent slopes | 0.3 | 100.0% |
| **Totals for Area of Interest** | | **0.3** | **100.0%** |

# Map Unit Descriptions (236 Chapel St, Newton, MA)

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

# Middlesex County, Massachusetts

## 626B—Merrimac-Urban land complex, 0 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2tyr9
*Elevation:* 0 to 820 feet
*Mean annual precipitation:* 36 to 71 inches
*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 140 to 250 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Merrimac and similar soils:* 45 percent
*Urban land:* 40 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Merrimac

#### Setting

*Landform:* Outwash plains, outwash terraces, moraines, eskers, kames
*Landform position (two-dimensional):* Summit, shoulder, backslope, footslope
*Landform position (three-dimensional):* Crest, side slope, riser, tread
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

#### Typical profile

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

#### Properties and qualities

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Somewhat excessively drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to very high (1.42 to 99.90 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum content:* 2 percent
*Maximum salinity:* Nonsaline (0.0 to 1.4 mmhos/cm)
*Sodium adsorption ratio, maximum:* 1.0
*Available water supply, 0 to 60 inches:* Low (about 4.6 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* A

*Ecological site:* F144AY022MA - Dry Outwash
*Hydric soil rating:* No

### Description of Urban Land

#### Typical profile

*M - 0 to 10 inches:* cemented material

#### Properties and qualities

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* 0 inches to manufactured layer
*Runoff class:* Very high
*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)
*Available water supply, 0 to 60 inches:* Very low (about 0.0 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 8
*Hydrologic Soil Group:* D
*Hydric soil rating:* Unranked

### Minor Components

#### Windsor

*Percent of map unit:* 5 percent
*Landform:* Outwash terraces, dunes, outwash plains, deltas
*Landform position (three-dimensional):* Tread, riser
*Down-slope shape:* Linear, convex
*Across-slope shape:* Linear, convex
*Hydric soil rating:* No

#### Sudbury

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

#### Hinckley

*Percent of map unit:* 5 percent
*Landform:* Deltas, kames, eskers, outwash plains
*Landform position (two-dimensional):* Summit, shoulder, backslope
*Landform position (three-dimensional):* Head slope, nose slope, crest, side slope, rise
*Down-slope shape:* Convex
*Across-slope shape:* Convex, linear
*Hydric soil rating:* No

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# Appendix C - Storm Water Operations & Maintenance Plan

SPRUHAN ENGINEERING, P.C.

# OPERATIONS & MAINTENANCE PLAN

## 236 CHAPEL STREET, NEWTON, MA

06/05/2023


**Prepared by: Spruhan Engineering, P.C.**

# Operations & Maintenance Plan

## Introduction

The following Stormwater Operations & Maintenance plan is for 58 Cherry Place, Newton, MA. All erosion and sediment control measures to be used are to be constructed and installed according to the 'Massachusetts Erosion and Sediment Control Guidelines for Urban and Sub-Urban Areas.' The plan consists of the following elements:

- Owners' information
- Operation and maintenance guidance – Pre and Post Construction
- Landscape installation and maintenance guidance
- Proposed inspection log

All erosion and sediment control measures must be installed prior to the commencement of any work. All sediment and erosion control measures shall remain in place until the entire site has been stabilized. The site is deemed stabilized when all landscaped areas have been loamed and seeded with vegetation having had the chance to establish itself. Any proposed paved areas shall have their binder course of pavement installed prior to the removal of these control measures.

The long-term operation and maintenance of a stormwater management system is as critical to its performance as its design and construction. Proper operation and maintenance ensure that the BMP will continue to remove pollutants effectively over the long-term, decreases the risk of re-suspending sediment; and therefore, improves water quality. Without proper maintenance, BMPs are likely to fail and no longer provide the necessary stormwater treatment.

Property Owners: **236 Chapel LLC**

**Name and contact information:**

**236 Chapel LLC (Manger Omar Youssef)**
Emails: omar@zaribuilders.com
Address: 57 Cherry Pl, Newton, MA 02465

**Change on ownership:** The owner(s) of the stormwater management systems, with the exception of those associated with two-family dwellings, shall notify the Department of Public Works and Conservation Commission of changes in ownership or assignment of financial responsibility.

This plan is valid in perpetuity and any future property owners are solely responsible for the management of the stormwater system on-site in accordance with this O&M Plan.

## Operations & Maintenance

The following operations and maintenance plan has been developed in order to preserve the drainage infrastructure that will be constructed and to ensure the drainage and infiltration system continues to function as designed.

- **Before & During Construction Operation and Maintenance Plan:**
    - Significant efforts shall be made to only disturb the minimum amount of area necessary to reduce potential erosion and sediment runoff. The control of dust in disturbed areas shall consist of at the least, wetting of disturbed soil or application of calcium chloride as required to minimize airborne dust.
    - A stabilized construction entrance shall be installed to reduce the tracking of material onto the main road, &, if necessary, a wheel wash station put in place.
    - Hay wattles shall be installed per the site plan to prevent sediment from being washed off site.
    - All drainage structures shall be protected by filter fabric (or approved equal) to prevent sedimentation from entering the drainage system during the construction period.
    - Driveway, pavement, and roadway (if required) areas shall be swept to remove sediments prior to introduction into the storm water management system.
    - Drainage structures shall be inspected daily and cleaned as necessary of all sedimentation and construction materials during the construction period.
    - The contractor is required to contact the engineer of record for drainage system inspection at least 72 hours prior to backfilling in order to receive inspection signoff.

- **Post Construction Operation and Maintenance Plan**

  Once the construction is completed, it is the owner's responsibility to maintain the items outlined below to ensure the efficiency and integrity of the drainage systems. The post construction inspections shall take place at a minimum of once during the Spring (March-May), and a minimum of once during the fall (September – November) and after every major storm.

  - **All drainage structures and pipes** shall be inspected on a minimum on a semi-annual basis. These inspections shall take place during the spring and fall months of the year. The inspector shall take note of any debris/sediment/clogging and shall document the condition of each structure. Based upon the observed condition, the inspector shall make recommendations if any further action is required.

  - **All drainage structures, including manholes trench drains, cleanouts and catch basins**, shall be inspected four times per year and shall be cleaned of all sand, debris, and sediment four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.

  - **Roof Gutters and cleanouts** shall be inspected annually and after major rain events. Remove leaves and sediment as necessary to allow rainwater to flow to system.

  - **Storm-tech SC-740 Maintenance procedures:**
    - Storm-tech system shall be inspected at a minimum on a semi-annual basis, or after a major storm event.
    - Remove lid and cap from inspection ports which must be brought to finished grade.
    - Using a flashlight and stadia rod, measure the depth of sediment
    - If sediment is above 3" depth, then cleaning is required
    - A licensed professional shall provide cleanout/ flushing services of all sediment and debris via cleanouts and catch basins located per plans.
    - All caps and covers shall be replaced

  - Crushed stone infiltration system Maintenance procedures:

  - Crushed stone system shall be inspected at a minimum on a semi-annual basis, or after a major storm event.
  - A licensed professional shall provide cleanout/ flushing services of all sediment and debris via cleanouts and catch basins located per plans.
  - All caps and covers shall be replaced where necessary

**Other Activities:**

**Pavement Sweeping:** The paved areas shall be swept every quarter, so four (4) times per year.

**Lawn and Landscape Repairs:** The lawn and landscaped areas on the site shall be inspected in the spring and fall of each year and the areas shall be restabilized as needed by seeding as lawn or mulching landscaped areas.

An INSPECTION LOG example format is shown below on Table B.1. This must be filled every time an inspection or maintenance activity is performed on any element of the stormwater management on site, included but not limited to:

a) Pretreatment devices.

b) Vegetation or filter media.

c) control structures.

d) Embankments and slopes.

e) Inlet and outlet channels and structures.

f) Underground drainage.

g) Sediment and debris accumulation in storage and forebay areas (including catch basins).

h) Any nonstructural practices.

i) Any other item that could affect the proper function of the stormwater management system

j) Annual reporting must be submitted to the Department of Public Works.

*** FINAL IMPORTANT NOTE: PROVISIONS MUST EXIST ALLOWING THE CONCOM OR ITS DESIGNEE TO ENTER THE PROPERTY AT REASONABLE TIMES AND IN A REASONABLE MANNER FOR THE PURPOSE OF INSPECTION.**

**236 Chapel LLC**
PROPERTY OWNER

# OPERATION & MAINTENANCE PLAN
# LOG SHEET
# *236 CHAPEL STREET, NEWTON, MA*

## INSPECTION REPORT:

Inspection Firm:_____

Inspector's Name:_____Date:_____

Components Inspected: _____

Signed: _____

## SYSTEM MAINTENANCE:

Maintenance Firm:_____Date:_____

Catch Basin Cleaned: Yes_____No_____Comments:_____

_____

Manhole & Sumps Cleaned: Yes____No_____Comments:_____

_____

Drain Lines Inspected: Yes_____No_____Comments:_____

_____

Stormwater unit System Cleaned: Yes___No_____Comments:_____

_____

Crushed Stone System Cleaned: Yes_____No_____Comments:_____

_____

Estimate of Material Removed: _____

Other Comments: _____

Signed: _____

Table B.1. Inspection log

| STORMWATER MANAGEMENT SYSTEMS INSPECTION LOG | | | | | | |
|---|---|---|---|---|---|---|
| DATE | NAME OF INSPECTOR | NAME/TYPE OF BMP INSPECTED | CONDITION OF BMP OBSERVED | DESCRIPTION OF NEED FOR MAINTENANCE | OBSERVATIONS OF ANY PHYSICAL CHANGES TO SYSTEM COMPARED TO AS BUILT PLAN | ANNUAL SUBMISSION TO DPW |
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