INSITE
ENGINEERING, SURVEYING &
LANDSCAPE ARCHITECTURE, P.C.

# STORMWATER POLLUTION PREVENTION PLAN

**For**

**Putnam Valley Fire Station #1**
**Town of Putnam Valley, New York**

**January 21, 2020**

**Owner Information:**

Putnam Valley Volunteer Fire Department, Inc.
P.O. Box 21
Putnam Valley, NY 10579

**Note: This report in conjunction with the project plans make up the complete Stormwater Pollution Prevention Plan.**

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## 1.0 INTRODUCTION

### 1.1 Project Description

The proposed project is located on Oscawana Lake Road in the Town of Putnam Valley, New York. The attached Location Map (Figure 1) depicts the subject property and its surroundings. The 10.3± acre property is identified as Tax Map number 72.20-01-7.12. It is proposed to construct a firehouse and associated parking areas.

### 1.2 Existing Site Conditions

The subject property is bordered to the north by the existing Putnam Valley Ambulance Corps, to the east by an existing stream, to the south by residential properties, and to the west by Oscawana Lake Road. The property is currently undeveloped and consists of approximately 3 acres of meadow and brush on the western most portion of the property with the remaining portions of the property being wooded. According to the USDA/SCS Soil Mapping onsite soils consist of Paxton fine sandy loam (PnB, PnC, PnD and PoC), Charlton Loam (ChE), Leicester Loam (LeB) and Chatfield Charlton Complex (CrC) soils. The Paxton and Leicester soils are in hydrologic group C while the Chatfield Charlton soils are in hydrological group B. An existing highpoint exists on the western portion of the property. To the west of this highpoint stormwater runoff discharges towards Oscawana Lake Road while to the east of this highpoint stormwater runoff discharges to the existing wetland and stream along the eastern border of the property.

An area near the central location of the site was filled with construction debris. A natural soil cap is proposed to be installed prior to site development to cover the subject construction debris.

### 1.3 Proposed Site Conditions

It is proposed to construct a 13,800 sf± (footprint area) firehouse and associated parking areas in the western portion of the site. Water will be supplied to the firehouse by a drilled well, and wastewater will be treated by a subsurface treatment system.

Stormwater runoff is proposed to be directed to the west and east to maintain current drainage patterns to the greatest extent practical. In general, stormwater runoff will either sheet flow or be conveyed with a collection system consisting of HDPE pipe and swales. The stormwater will be treated with two infiltration basins. Two design lines were chosen to assess the stormwater runoff in both the existing and proposed conditions. These design lines are located at the western and eastern edges of the proposed project. The areas contributing to each design line are delineated on Figures 2 and 3.

## 2.0 STORMWATER MANAGEMENT

The subject project proposes the disturbance of approximately 5.8 acres; thus, the project will require coverage under the New York State Department of Environmental Conservation (NYSDEC) SPDES General Permit No. GP-0-15-002. In order to meet the requirements, set forth by this permit, the latest edition of the NYSDEC *New York State Stormwater Management Design Manual* (NYSSMDM) was referenced for the design of the proposed stormwater management system. Two infiltration basins defined by the NYSSMDM are proposed to treat and attenuate stormwater runoff from the project.

The “HydroCAD” Stormwater Modeling System,” by HydroCAD Software Solutions LLC in Tamworth, New Hampshire, was used to model and assess the peak stormwater flows for the subject project. HydroCAD is a computer aided design program for modeling the hydrology and hydraulics of stormwater runoff. It is based primarily on hydrology techniques developed by the United States Department of Agriculture, Soil Conservation Service (USDA, SCS) TR-20 method combined with standard hydraulic calculations. For details on the input data for the subcatchment and design storm, please refer to Appendix A & B.

The input requirements for the HydroCAD computer program are as follows:

Subcatchments (contributing watershed/sub-watersheds)

- Design storm rainfall in inches
- CN (runoff curve number) values which are based on soil type and land use/ground cover
- Tc (time of concentration) flow path information

Stormwater Basins

- Surface area at appropriate elevations
- Flood elevation
- Outlet structure information

The following is a general description of the input data used to calculate the pre- and post-development stormwater runoff values. For detailed information for each subcatchment and pond, see Appendices A & B. The precipitation value for the 90% rainfall event were taken from the NYSWDM. The precipitation values for the remaining various design storms analyzed were obtained from the Northeast Regional Climate Center. The values provided are for 24-hour design storms.

**Table 2.0.1 – Precipitation Values for Corresponding Design Storms**

| Design Storm | 24-Hour Rainfall |
|---|---|
| 90% Rainfall | 1.4” |
| 1-Year | 2.7” |
| 10-Year | 5.0” |
| 100-Year | 9.0” |

The CN (runoff curve number) values utilized in this report were referenced from the USDA, SCS publication *Urban Hydrology for Small Watersheds*. The following is a summary of the various land uses/ground covers and their associated CN values utilized in this report.

**Table 2.0.2 – Project Ground Cover and Associated Curve Numbers (CN)**

| Land Use/Ground Cover | CN Value |
|---|---|
| Paved Parking and Roofs | 98 |
| 50-75% Grass Cover, C Soil | 79 |
| Woods, Fair, C Soil | 73 |
| >75% Grass Cover, C Soil | 74 |
| Meadow, Non-Grazed, C Soil | 71 |
| >75% Grass Cover, B Soil | 61 |
| Meadow, Non-Grazed, B Soil | 58 |
| Woods, Good, C Soil | 70 |
| Woods, Good, B Soil | 55 |

## 2.1 NYSDEC Water Quality Volume, $WQ_v$

The NYSDEC SPDES General Permit GP-0-15-002 requires that the Water Quality Volume ($WQ_v$) be treated in order to provide pollutant removal. The water quality volume is directly related to the amount of impervious cover proposed on the project area. The infiltration basins have been utilized to meet the NYSDEC water quality treatment requirements.

The following equation was used to determine the water quality volume.

$$\text{Water quality volume } (WQ_v) = \frac{(P)(R_v)(A)}{12}$$

Where,

$WQ_v$ = water quality volume (in acre-feet)
P = 90% Rainfall Event Number
$R_v$ = 0.05 + 0.009(I), where I is percent impervious cover
A = site area in acres

The following table summarizes the water quality volume calculations for the subject project:

**Table 2.1.1 – $WQ_v$ Calculation**

| Subcatchment | P | $R_v$ | A | $WQ_v$ (ac-ft) | $WQ_v$ (c.f.) |
|---|---|---|---|---|---|
| 1.1S + 1.2S | 1.4 | 0.53 | 1.5 | 0.082 | 3,583 |
| 2.1S + 2.2S | 1.4 | 0.47 | 3.2 | 0.123 | 5,367 |

Two infiltration basins are proposed to provide water quality treatment for the new impervious surfaces as required by the NYSSMDM. As noted in Table 2.1.2, the infiltration basins are sized to capture and infiltrate greater than the required $WQ_v$ for the contributing subcatchment. An infiltration rate has been assumed based on available soil data. Pretreatment for the infiltration basin is proposed through sedimentation basin forebays. 50% WQv pretreatment has been proposed. The NYSSMDM requires 100% $WQ_v$ pretreatment based on infiltration rate of greater than 5 in/hr. The infiltration rate has been confirmed by field testing.

**Table 2.1.2 - Infiltration Basin**

| Subcatchments | Treatment Practice | NYSDEC Designation | Minimum $WQ_v$ (cf) | $WQ_v$ Provided (cf) | Pretreatment Volume Required (% of $WQ_v$) | Pretreatment Volume Provided (% of $WQ_v$) |
|---|---|---|---|---|---|---|
| 1.1S + 1.2S | 1.1AP &1.1BP | I-2 | 3,583 | 6,500 | 100% | 100% |
| 2.1S + 2.2S | 2.2P | I-2 | 5,367 | 5,430 | 100% | 100% |

## 2.2 NYSDEC Runoff Reduction Volume, $RR_V$

The Runoff Reduction Volume ($RR_v$) criterion is intended to replicate pre-development hydrology by maintaining preconstruction infiltration, peak flow runoff, discharge volume, as well as minimizing concentrated stormwater flow. As stated in Chapter 4 of the NYSSMDM, $RR_v$ may be treated with standard stormwater management practices (SMP's) sized in accordance with the Chapter 4/6 requirements, or with green infrastructure practices (GIP's) sized in accordance with the requirements set forth for each practice in Chapter 5. This requirement has been achieved to the greatest extent practical on the subject project by providing infiltration practices as suitable soils exist onsite. Runoff reduction is achieved when runoff from a percentage of the impervious area on the site is captured, routed through an SMP or a GIP, infiltrated to the ground, reused, reduced by evapotranspiration, and eventually removed from the stormwater discharge from the site.

Section 4.3 of the NYSSMDM states for sites that do not achieve runoff reduction to pre-construction condition must, at a minimum reduce a percentage of the runoff from impervious areas to be constructed on the site a minimum $RR_v$. The following equation can be used to determine the minimum runoff reduction volume:

The minimum runoff reduction volume shall be $RRv_{minimum} = \frac{(P)(R_v)(Ai)}{12}$

Where,

S = Hydrologic Soil Group (HSG) Specific Reduction Factor
A*ic* = Total Area of New Impervious Cover
A*i* = Impervious cover targeted for Runoff Reduction
= (S)(A*ic*)
Rv = 0.95

For detailed calculations of the runoff reduction for the site see Appendix D. Two standard practice with RRv capacity (infiltration basin) will be applied at the site. RRv practices have been employed to the maximum extent practicable throughout the site.

A summary of the RRv required vs provided for the entire development area is provided below.

**Table 2.2.1 RRv Summary**

| RRv Criteria | Volume (c.f.) |
|---|---|
| RRv Initial = Water Quality Volume[1] | 8,950 |
| RRv Minimum | 2,544 |
| RRv Provided | 8,950 |

As indicated in the table above, the entire RRv cannot be provided, however, the RRv minimum has been achieved.

2.3 NYSDEC Stream Channel Protection Volume, $CP_v$

The Stream Channel Protection ($CP_v$) criterion is intended to protect stream channels from erosion and is accomplished by the 24-hour extended detention of the one-year, 24-hour storm event. Section 4.4 of the NYSSMDM states that CPv can be provided by fully infiltrating the one-year, 24-hour design storm. Infiltration Basin 1.2P and 2.2P is designed to fully infiltrate the one-year, 24-hour design storm.

2.4 NYSDEC Overbank Flood Control, $Q_p$, and Extreme Flood Control, $Q_f$

The Overbank Flood Control ($Q_p$) requirement is intended to prevent an increase in the frequency and magnitude of out-of-bank flooding events generated by urban development. Overbank control requires storage to attenuate the post-development 10-year, 24-hour peak discharge to pre-development rates. The Extreme Flood Control ($Q_p$) requirement is intended to (a) prevent the increased risk of flood damage from large storm events, (b) maintain the boundaries of the pre-development 100-year flood plain, and (c) protect the physical integrity of stormwater management practices. Extreme flood control requires storage to attenuate the post-development 100-year, 24-hour peak discharge to pre-development rates. The stormwater management system has been sized to meet both of these requirements (see Appendix B).

**Existing and Proposed Peak Flows**

| 24-HOUR DESIGN STORM | | | | |
|---|---|---|---|---|
| | 10-YEAR (Overbank Flood Control) | | 100-YEAR (Extreme Flood Control) | |
| | Existing | Proposed | Existing | Proposed |
| Design Line 1 | 2.7 | 0.7 | 6.7 | 6.7 |
| Design Line 2 | 6.3 | 3.3 | 14.2 | 14.2 |

## 3.0 STORMWATER CONVEYANCE SYSTEM

The stormwater collection and conveyance systems for the project will consist of drain inlets, catch basins, and HDPE pipe. The systems have been sized to collect and convey at minimum the 25-year, 1-hour design storm using the Rational Method. Also, the existing collection system on Oscawana Lake Road was analyzed for the 25-year, 1-hour design storm using the rational method. The Rational Method is a standard method used by engineers to develop flow rates for sizing collection systems. The Rational Method calculates flows based on a one-hour design storm. See Appendix H for the sizing calculations.

## 4.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control should be accomplished by three basic principles: containment of sediment, treatment of dirty water, and stabilization of disturbed areas. Sediment should be contained with the use of silt fence at the toe of disturbed slopes. Disturbed areas should be permanently stabilized within 14 days of final grading to limit the required length of time that the temporary facilities must be utilized.

### 4.1 Temporary Erosion and Sediment Control Facilities

Temporary erosion and sediment control facilities should be installed and maintained as required to reduce the impacts to off-site properties. The Putnam Valley Volunteer Fire Department will be required to provide maintenance for the temporary erosion and sediment control facilities. In general, the following temporary methods and materials should be used to control erosion and sedimentation from the project site:

- Stabilized Construction Entrance
- Silt Fence Barriers
- Storm Drain Inlet Protection
- Sediment Trap

A stabilized construction entrance should be installed at the entrance to the site as shown on the plan. The design drawings will include details to guide the contractor in the construction of this entrance. The intent of the stabilized construction entrance is to prevent the “tracking” of soil from the site. Dust control should be accomplished with water sprinkling trucks if required. During dry periods, sprinkler trucks should wet all exposed earth surfaces as required to prevent the transport of air-borne particles to adjoining areas.

Siltation barriers constructed of geosynthetic filter cloth should be installed at the toe of all disturbed slopes. The intent of these barriers is to contain silt and sediment at the source and inhibit its transport by stormwater runoff. The siltation barriers will also help reduce the rate of runoff by creating filters through which the stormwater must pass. Siltation barriers should also be installed around catch basins and drain inlets. The intent of these barriers is to prevent silt and sedimentation from entering the stormwater collection system.

The proposed stormwater ponds will also act as a temporary sediment basin during construction. Most stormwater runoff from disturbed areas will be directed to the sediment traps. The traps will be sized in

accordance with the publication, *New York Standards and Specifications for Erosion and Sediment Control* (Blue Book).

In addition to the temporary sediment and erosion control measures listed above, pollution prevention measures on the site will also be accomplished by the use of a dumpster. All waste and scrap building materials on site shall be disposed of in the dumpster, with no waste being buried or improperly discarded. A portable toilet will be provided on site during construction for waste management.

4.2 Permanent Erosion and Sediment Control Facilities

Permanent erosion and sediment control will be accomplished by diverting stormwater runoff from steep slopes, controlling/reducing stormwater runoff velocities and volumes, and vegetative and structural surface stabilization. All of the permanent facilities are relatively maintenance free and only require periodic inspections. The Putnam Valley Volunteer Fire Department will provide maintenance for all the permanent erosion and sediment control facilities.

The temporary sediment traps should be cleaned of all sediment and debris, excavated to their final elevations and dimensions, and stabilized with the vegetation as indicated on the plans. Rip rap aprons will be used at the discharge end of all piped drainage systems. Runoff velocities will be reduced to levels that are non-erosive to the receiving waterbodies through use of these aprons.

Other than the buildings and paved surfaces, disturbed surfaces will be stabilized with vegetation. The vegetation will control stormwater runoff by preventing soil erosion, reducing runoff volume and velocities, and providing a filter medium. Permanent seeding should optimally be undertaken in the spring from March 21st through May 20th and in late summer from August 15th to October 15th. The stormwater sediment basin will allow for settlement of suspended sediment that is generated by stormwater runoff from the site. These facilities provide a central collection area for sediment deposition and eventual disposal.

## 5.0 IMPLEMENTATION AND MAINTENANCE

5.1 Construction Phase

Details associated with the implementation and maintenance of the proposed stormwater facilities and erosion control measures during construction will be shown on the project plans. A construction sequence will be provided to guide the contractor in the installation of the erosion control measures as well as the site plan features. The erosion control plan will include associated details and notes to aid the contractor in implementing the plan.

During construction, a Site Log Book, Appendix F, is required to be kept per NYSDEC SPDES General Permit GP-0-15-002. Erosion and sediment control inspections are required to be conducted as necessary under coverage of the permit (minimum once a week) and an updated logbook is required to be kept on site for the duration of the construction activities. The Construction Site Log Book is an appendix taken from the *New York Standards and Specifications for Erosion and Sediment Control* (Blue Book).

Initially the stormwater practices will require regular maintenance until the permanent vegetation is established. Vegetation should be inspected every 30 days and after every major storm event until established, after which inspections should take place on a quarterly basis and after every large storm event. Damaged areas should be immediately re-seeded and re-mulched. The floor of the basin will be planted with a seed mixture that contains plants that are tolerant of occasional flooding. The seed mixtures contain several plant species that vary slightly in their needs for survival. It is expected that not all of the species will survive within each basin due to variations within each basin such as water, nutrients, and light. During the initial year of planting, the plants may require watering to germinate and establish. Note that several seedings may be required during the first year to completely establish vegetation within the basin. After the initial year of establishment, the basin does not need to be watered. A natural selection process

will occur over the first few years, such that the species within the seed mixture most suitable to the conditions will survive.

## 5.2 Long Term Maintenance Plan

The Putnam Valley Volunteer Fire Department will be responsible for the maintenance of the permanent erosion control and stormwater facilities. Initially the stormwater facilities will require an increased maintenance and inspection schedule until all portions of the site are stable. Each spring the paved areas should be cleaned to remove the winter's accumulation of traction sand. After this is completed, all drain inlets sumps and the sediment basin should be cleaned. All pipes should be checked for debris and blockages and cleaned as required. During the cleaning process, the drain inlets and pipes should be inspected for structural integrity and overall condition; repairs and/or replacement will be made as required. The storage tank shall be pump when needed and inspected quarterly by the Putnam Valley Volunteer Fire Department.

Once the desired vegetative cover is established in the basins, only limited maintenance is required. The stormwater practices and outlet structures should be inspected after major storm events and semi-annually. During the inspections, the following should be checked:

- Evidence of clogging of outlet structure.
- Erosion of the flow path through the stormwater practice.
- Subsidence, erosion, cracking or tree growth on the embankment/berm.
- Condition of the emergency spillway.
- Accumulation of sediment around the outlet structure.
- Adequacy of upstream/downstream channel erosion control measures.
- Erosion of the stormwater practice bed and banks.
- Sources of erosion in the contributory drainage, which should be stabilized.

Access to the stormwater practices will be through stabilized basin access. The accesses are proposed to be graded to final grades and seeded and mulched in accordance with the Erosion & Sedimentation Control. The graded access, and the side slopes and berms of the practice should be mowed annually to prevent the establishment of woody plants within the accesses, or berms. The bottoms of the stormwater practice should not be mowed. During the mowing operations, debris and litter should be removed from all parts of the practice.

# APPENDIX A

**Pre-Development Computer Data**



Subcat Reach Pond Link

**Routing Diagram for PVFS Pre-Development**

Prepared by Insite Engineering, Surveying and Landscape Architecture, P.C., Printed 1/20/2020

## Summary for Subcatchment 1.0S:

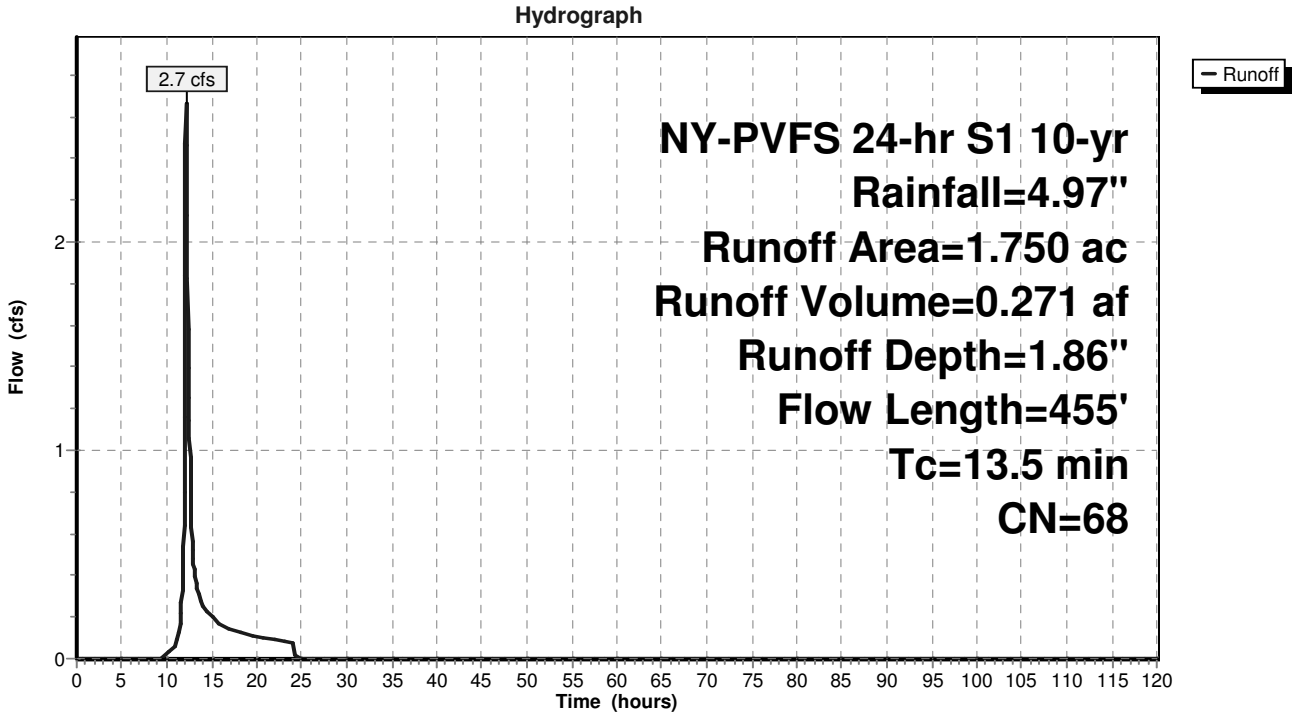
Runoff = 2.7 cfs @ 12.15 hrs, Volume= 0.271 af, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 10-yr Rainfall=4.97"

| Area (ac) | CN | Description |
|---|---|---|
| 0.200 | 58 | Meadow, non-grazed, HSG B |
| 1.350 | 71 | Meadow, non-grazed, HSG C |
| 0.200 | 55 | Woods, Good, HSG B |
| 1.750 | 68 | Weighted Average |
| 1.750 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.6 | 100 | 0.0110 | 0.16 | | **Sheet Flow,** Range n= 0.130 P2= 3.50" |
| 2.9 | 355 | 0.0870 | 2.06 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 13.5 | 455 | Total | | | |

## Subcatchment 1.0S:



## Summary for Subcatchment 2.0S:

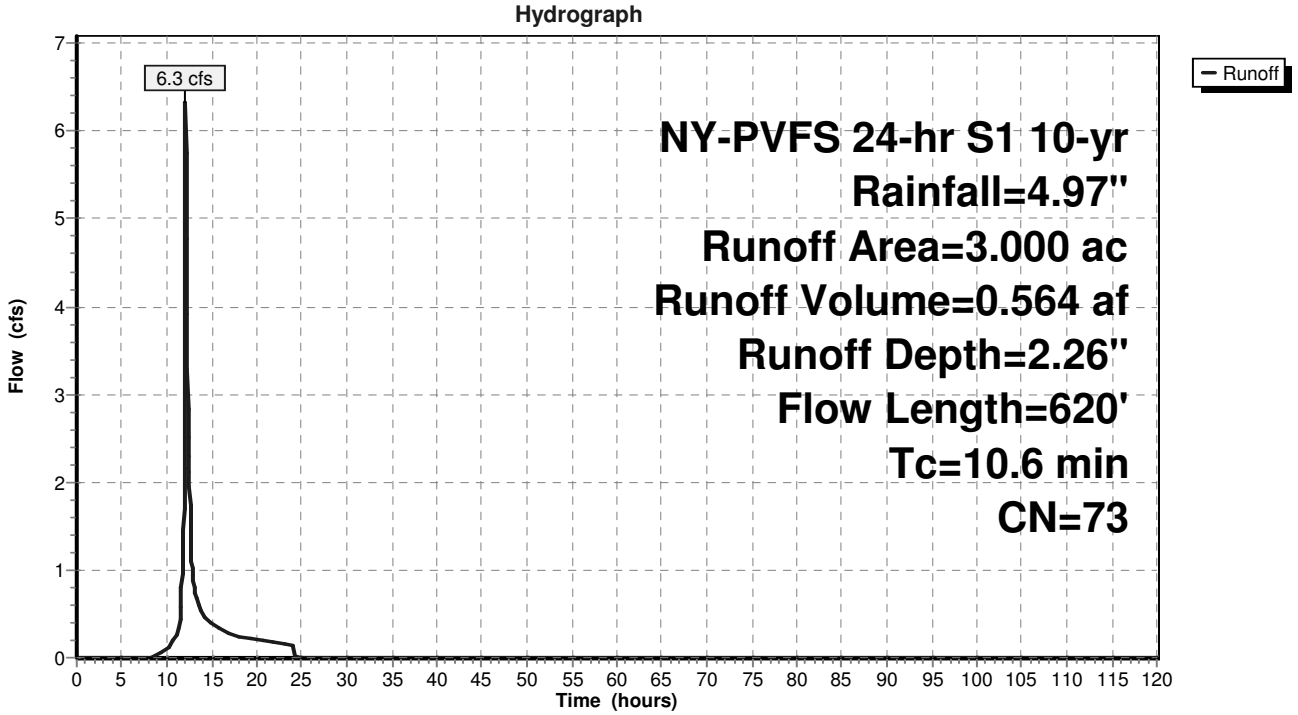
Runoff = 6.3 cfs @ 12.11 hrs, Volume= 0.564 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 10-yr Rainfall=4.97"

| Area (ac) | CN | Description |
|---|---|---|
| 1.650 | 70 | Woods, Good, HSG C |
| 0.450 | 73 | Woods, Fair, HSG C |
| 0.900 | 79 | 50-75% Grass cover, Fair, HSG C |
| 3.000 | 73 | Weighted Average |
| 3.000 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.8 | 100 | 0.0500 | 0.29 | | **Sheet Flow,** Range n= 0.130 P2= 3.50" |
| 2.6 | 190 | 0.0300 | 1.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.2 | 330 | 0.2600 | 2.55 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 10.6 | 620 | Total | | | |

## Subcatchment 2.0S:



## Summary for Subcatchment 1.0S:

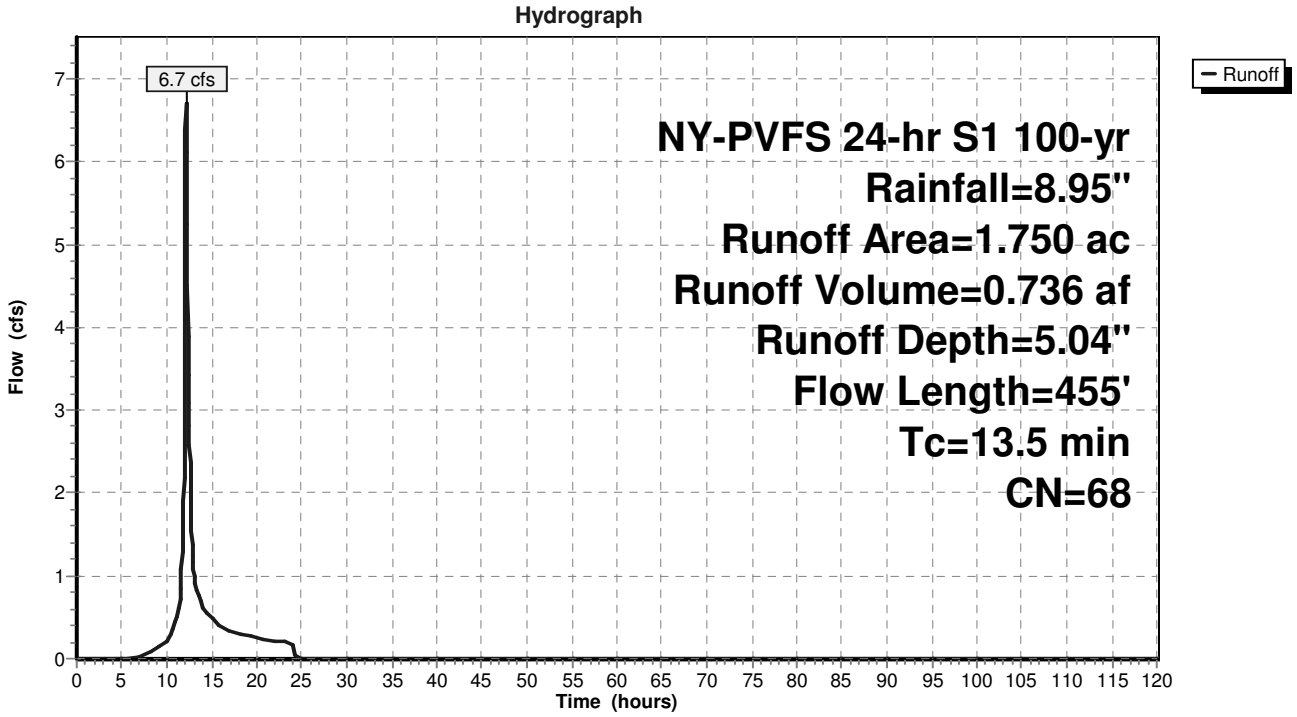
Runoff = 6.7 cfs @ 12.14 hrs, Volume= 0.736 af, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 100-yr Rainfall=8.95"

| Area (ac) | CN | Description |
|---|---|---|
| 0.200 | 58 | Meadow, non-grazed, HSG B |
| 1.350 | 71 | Meadow, non-grazed, HSG C |
| 0.200 | 55 | Woods, Good, HSG B |
| 1.750 | 68 | Weighted Average |
| 1.750 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.6 | 100 | 0.0110 | 0.16 | | **Sheet Flow,** Range n= 0.130 P2= 3.50" |
| 2.9 | 355 | 0.0870 | 2.06 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 13.5 | 455 | Total | | | |

## Subcatchment 1.0S:



## Summary for Subcatchment 2.0S:

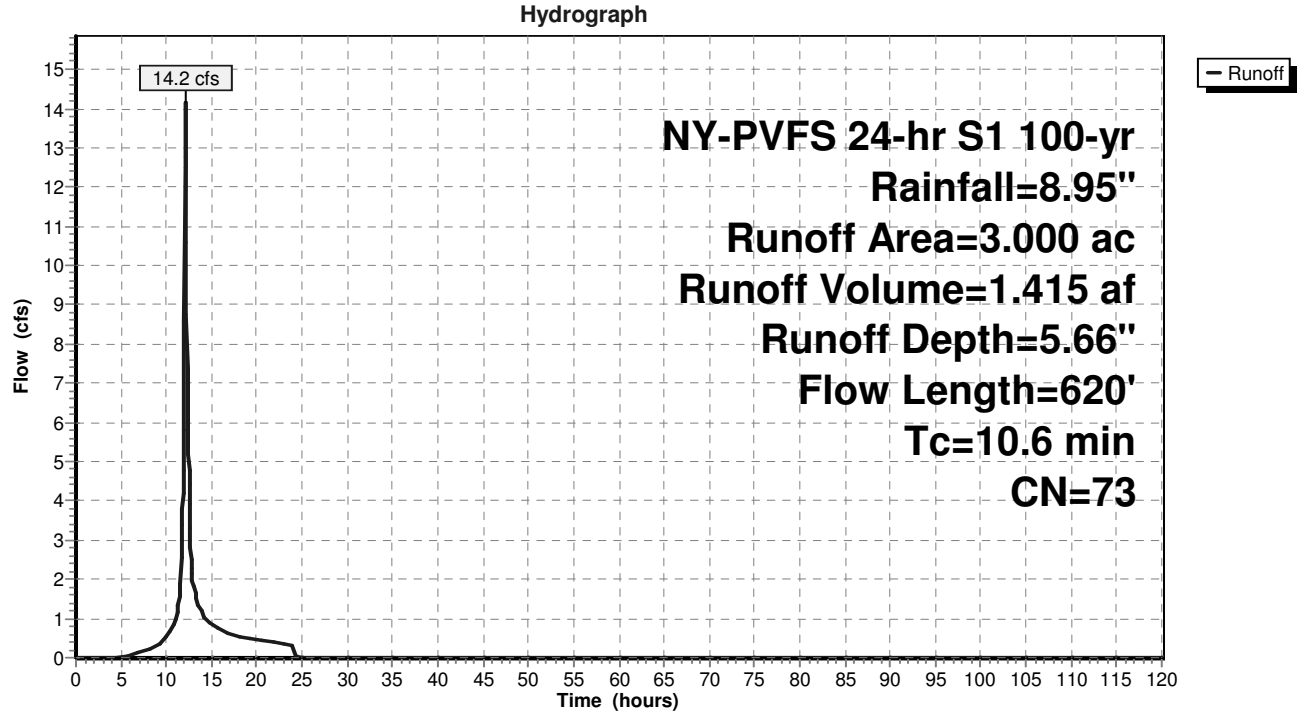
Runoff = 14.2 cfs @ 12.10 hrs, Volume= 1.415 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 100-yr Rainfall=8.95"

| Area (ac) | CN | Description |
|---|---|---|
| 1.650 | 70 | Woods, Good, HSG C |
| 0.450 | 73 | Woods, Fair, HSG C |
| 0.900 | 79 | 50-75% Grass cover, Fair, HSG C |
| 3.000 | 73 | Weighted Average |
| 3.000 | | 100.00% Pervious Area |

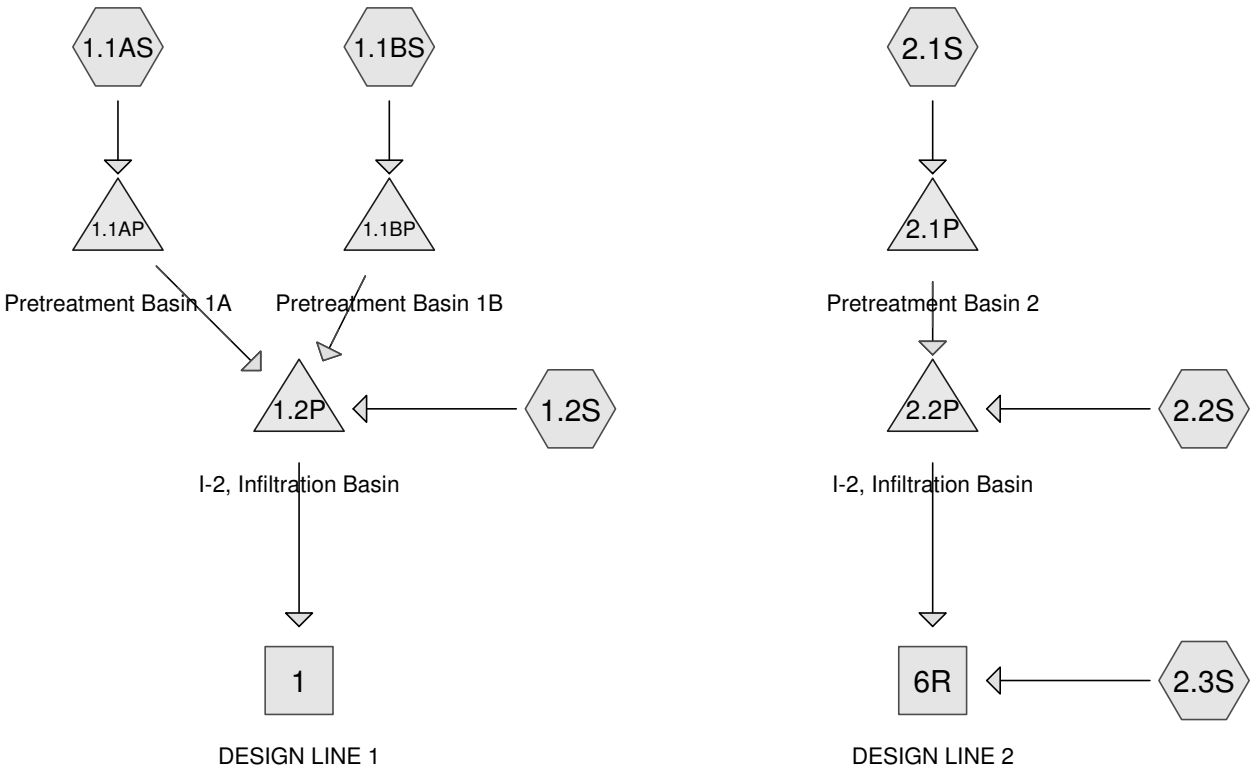
| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.8 | 100 | 0.0500 | 0.29 | | **Sheet Flow,** Range n= 0.130 P2= 3.50" |
| 2.6 | 190 | 0.0300 | 1.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.2 | 330 | 0.2600 | 2.55 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 10.6 | 620 | Total | | | |

## Subcatchment 2.0S:



# APPENDIX B

**Post Development Computer Data**




Subcat Reach Pond Link

**Routing Diagram for PVFS Post-Development**

Prepared by Insite Engineering, Surveying and Landscape Architecture, P.C., Printed 1/20/2020

## Summary for Subcatchment 1.1AS:

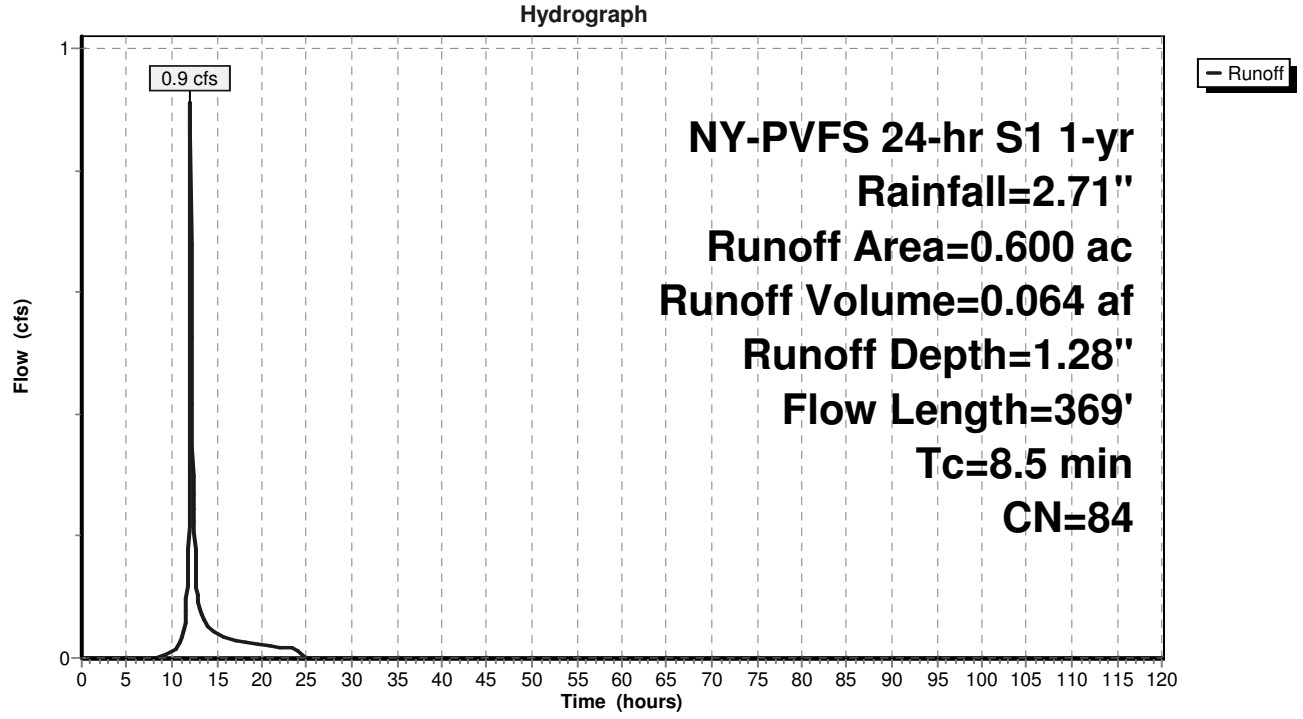
Runoff = 0.9 cfs @ 12.07 hrs, Volume= 0.064 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 1-yr Rainfall=2.71"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 61 | >75% Grass cover, Good, HSG B |
| 0.200 | 74 | >75% Grass cover, Good, HSG C |
| 0.300 | 98 | Paved parking & roofs |
| 0.600 | 84 | Weighted Average |
| 0.300 | | 50.00% Pervious Area |
| 0.300 | | 50.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.7 | 100 | 0.0470 | 0.25 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 1.0 | 96 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 173 | 0.0300 | 3.52 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 8.5 | 369 | Total | | | |

## Subcatchment 1.1AS:



## Summary for Subcatchment 1.1BS:

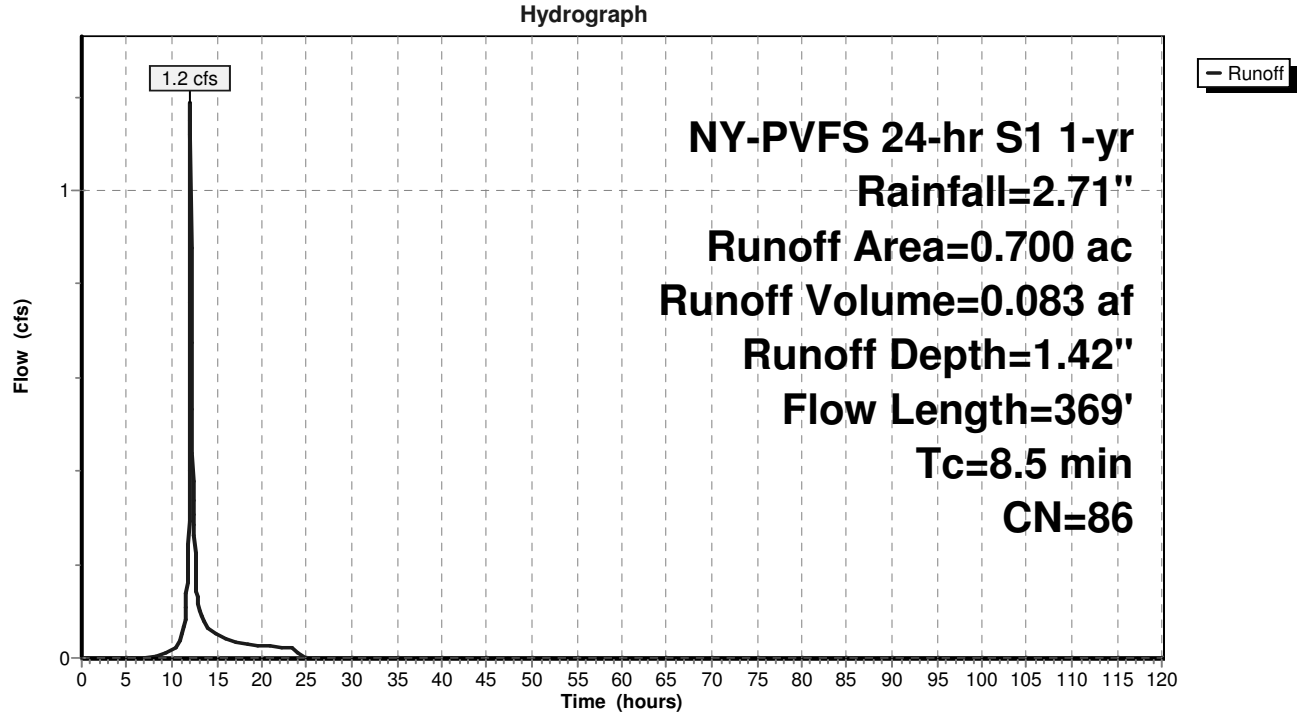
Runoff = 1.2 cfs @ 12.07 hrs, Volume= 0.083 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 1-yr Rainfall=2.71"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 61 | >75% Grass cover, Good, HSG B |
| 0.200 | 74 | >75% Grass cover, Good, HSG C |
| 0.400 | 98 | Paved parking & roofs |
| 0.700 | 86 | Weighted Average |
| 0.300 | | 42.86% Pervious Area |
| 0.400 | | 57.14% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.7 | 100 | 0.0470 | 0.25 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 1.0 | 96 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 173 | 0.0300 | 3.52 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 8.5 | 369 | Total | | | |

## Subcatchment 1.1BS:



## Summary for Subcatchment 1.2S:

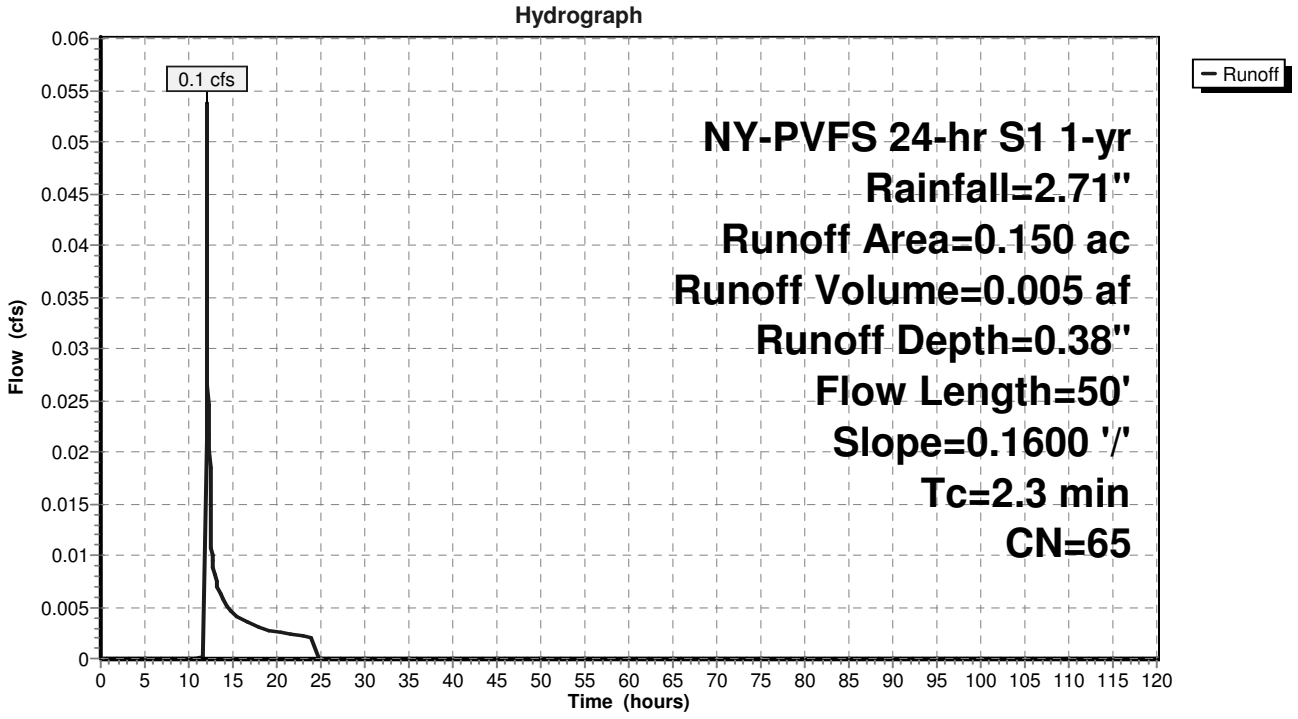
Runoff = 0.1 cfs @ 12.01 hrs, Volume= 0.005 af, Depth= 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 1-yr Rainfall=2.71"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 61 | >75% Grass cover, Good, HSG B |
| 0.050 | 74 | >75% Grass cover, Good, HSG C |
| 0.150 | 65 | Weighted Average |
| 0.150 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.3 | 50 | 0.1600 | 0.36 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |

## Subcatchment 1.2S:



## Summary for Subcatchment 2.1S:

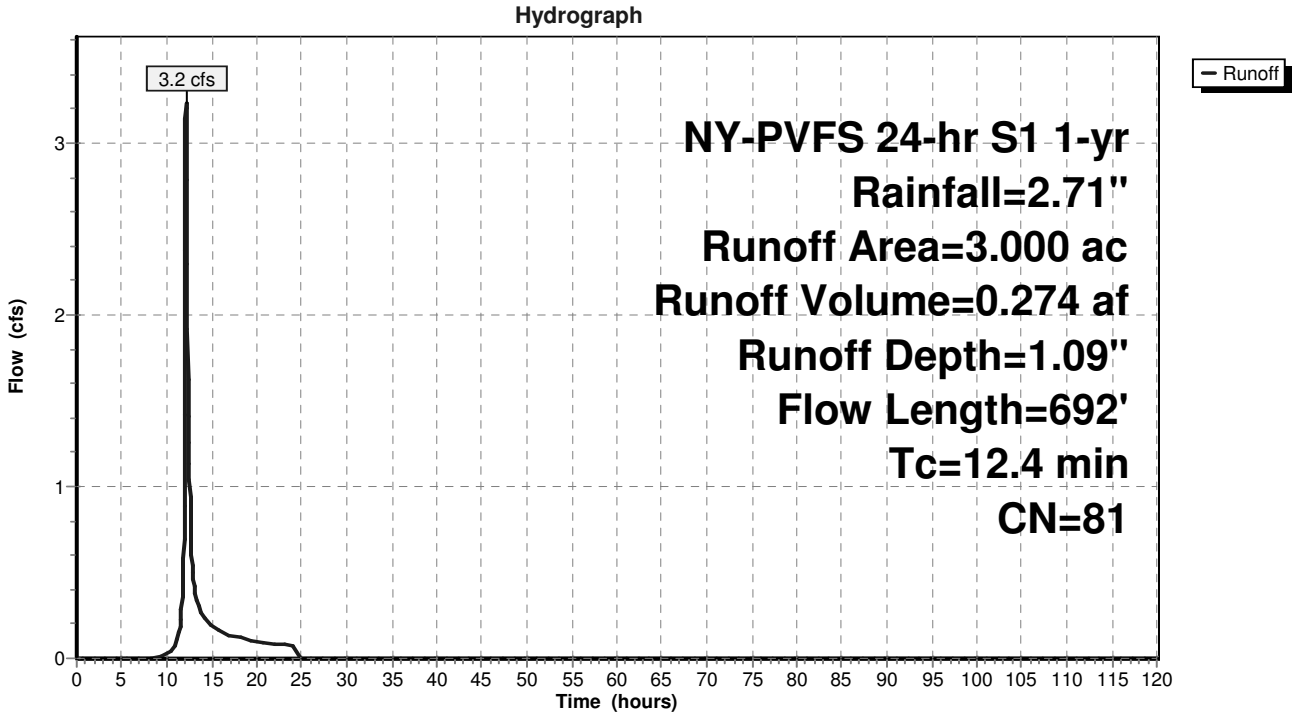
Runoff = 3.2 cfs @ 12.13 hrs, Volume= 0.274 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 1-yr Rainfall=2.71"

| Area (ac) | CN | Description |
|---|---|---|
| 1.000 | 98 | Paved parking & roofs |
| 1.600 | 74 | >75% Grass cover, Good, HSG C |
| 0.400 | 70 | Woods, Good, HSG C |
| 3.000 | 81 | Weighted Average |
| 2.000 | | 66.67% Pervious Area |
| 1.000 | | 33.33% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.9 | 100 | 0.0350 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50" |
| 0.1 | 36 | 0.1600 | 6.00 | | **Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps |
| 0.9 | 296 | 0.1500 | 5.76 | 8.64 | **Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.050 |
| 0.4 | 140 | 0.1500 | 5.76 | 8.64 | **Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.050 |
| 0.1 | 120 | 0.1000 | 15.54 | 12.21 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 |
| 12.4 | 692 | Total | | | |

## Subcatchment 2.1S:



## Summary for Subcatchment 2.2S:

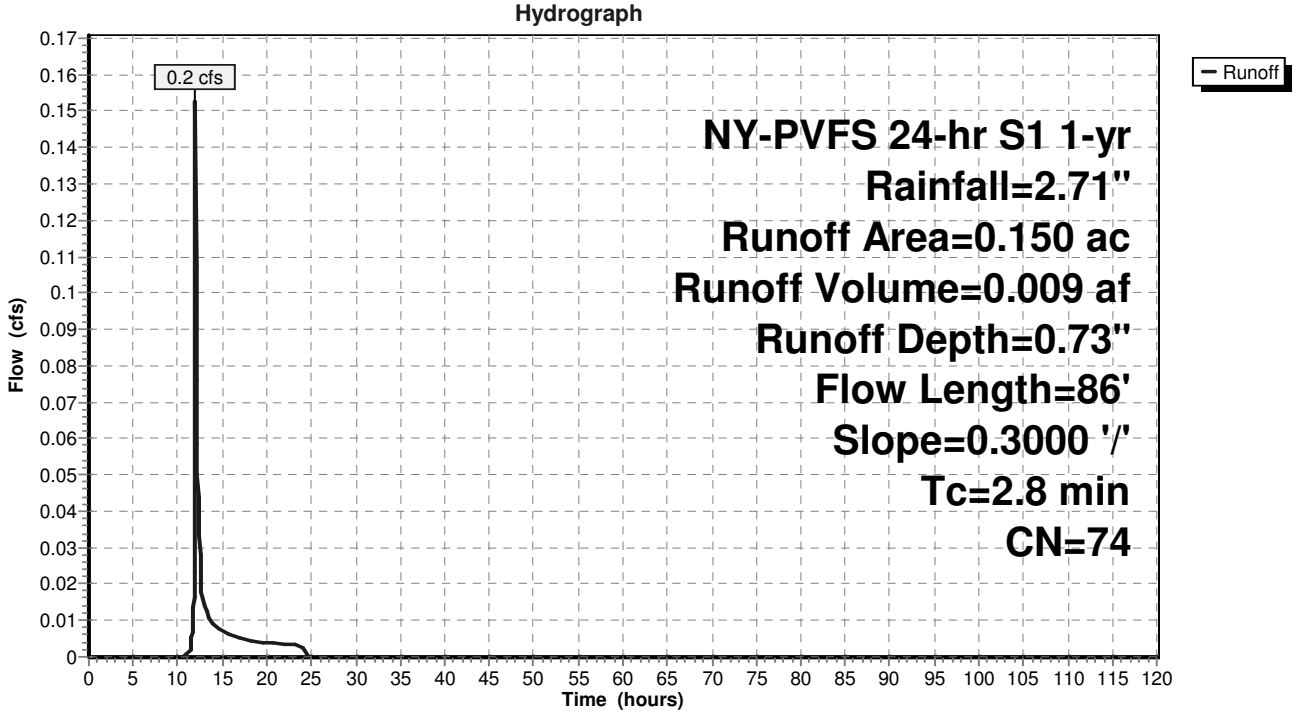
Runoff = 0.2 cfs @ 12.00 hrs, Volume= 0.009 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 1-yr Rainfall=2.71"

| Area (ac) | CN | Description |
|---|---|---|
| 0.150 | 74 | >75% Grass cover, Good, HSG C |
| 0.150 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.8 | 86 | 0.3000 | 0.51 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |

## Subcatchment 2.2S:



## Summary for Subcatchment 2.3S:

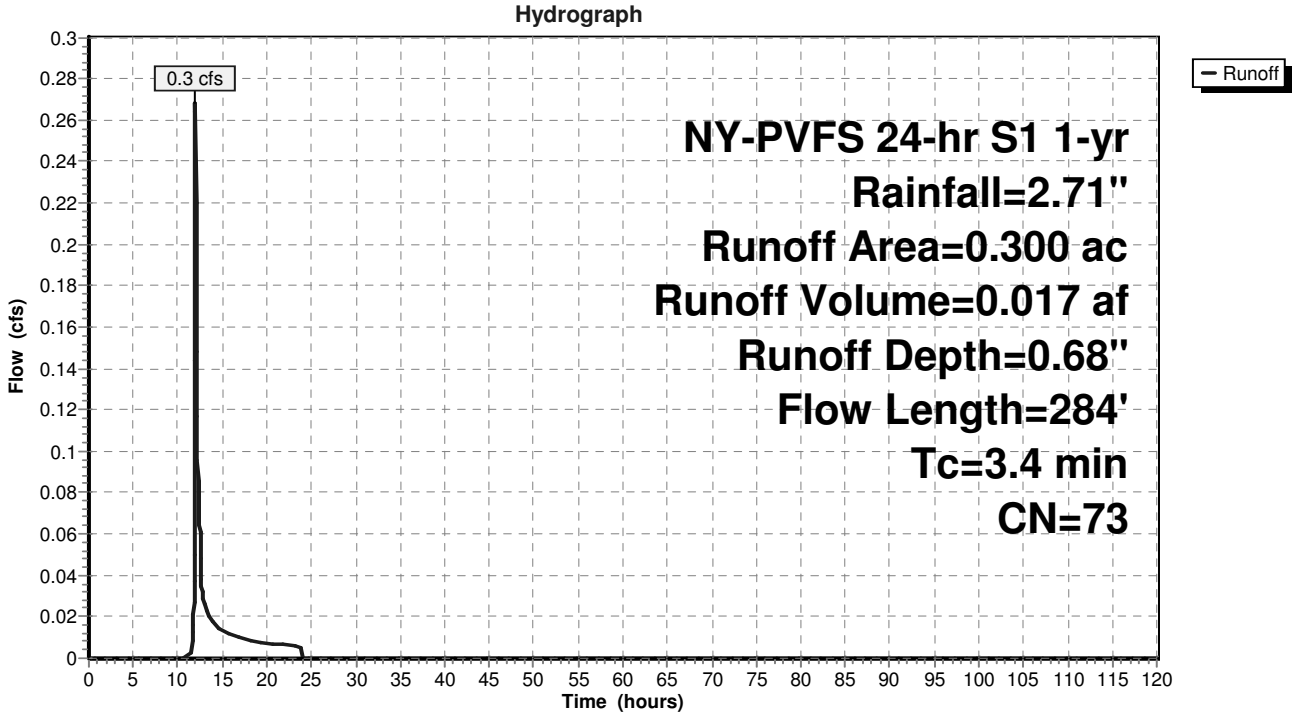
Runoff = 0.3 cfs @ 12.01 hrs, Volume= 0.017 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 1-yr Rainfall=2.71"

| Area (ac) | CN | Description |
|---|---|---|
| 0.200 | 74 | >75% Grass cover, Good, HSG C |
| 0.100 | 72 | Woods/grass comb., Good, HSG C |
| 0.300 | 73 | Weighted Average |
| 0.300 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | 100 | 0.3500 | 0.56 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 0.4 | 184 | 0.3200 | 8.49 | | **Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps |
| 3.4 | 284 | Total | | | |

## Subcatchment 2.3S:

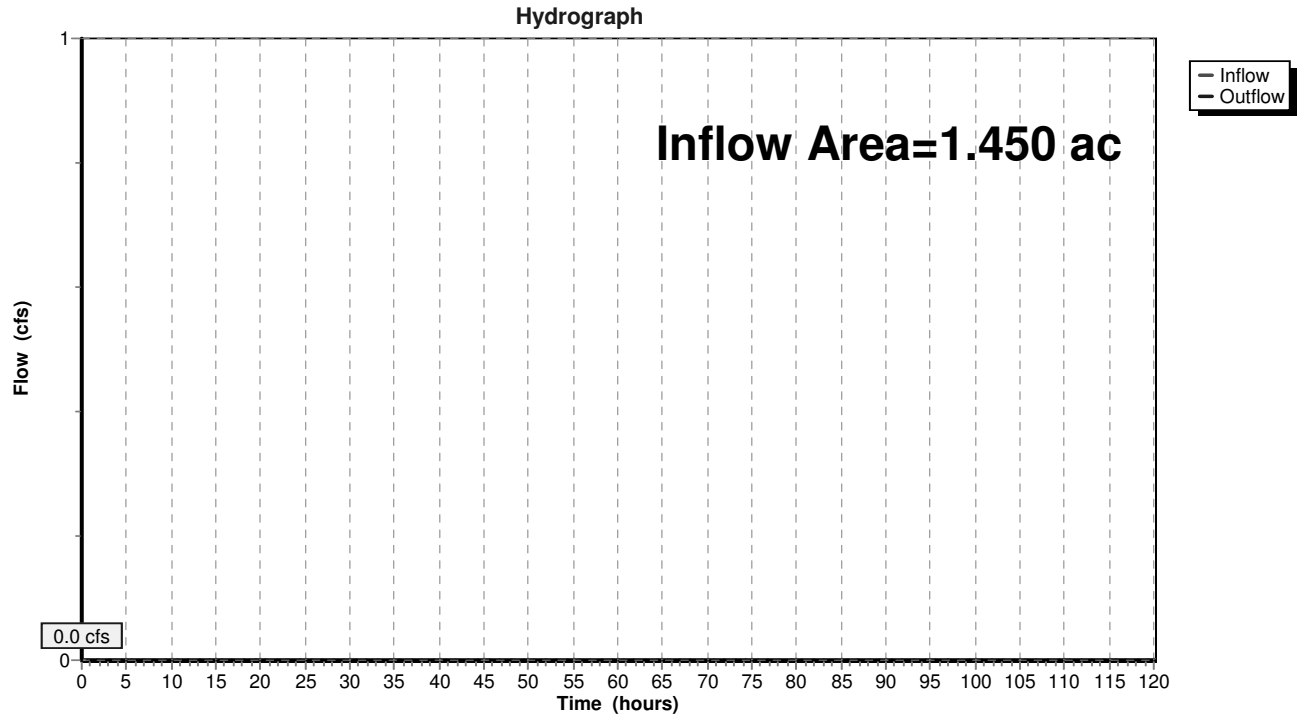


## Summary for Reach 1: DESIGN LINE 1

Inflow Area = 1.450 ac, 48.28% Impervious, Inflow Depth = 0.00" for 1-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3

## Reach 1: DESIGN LINE 1

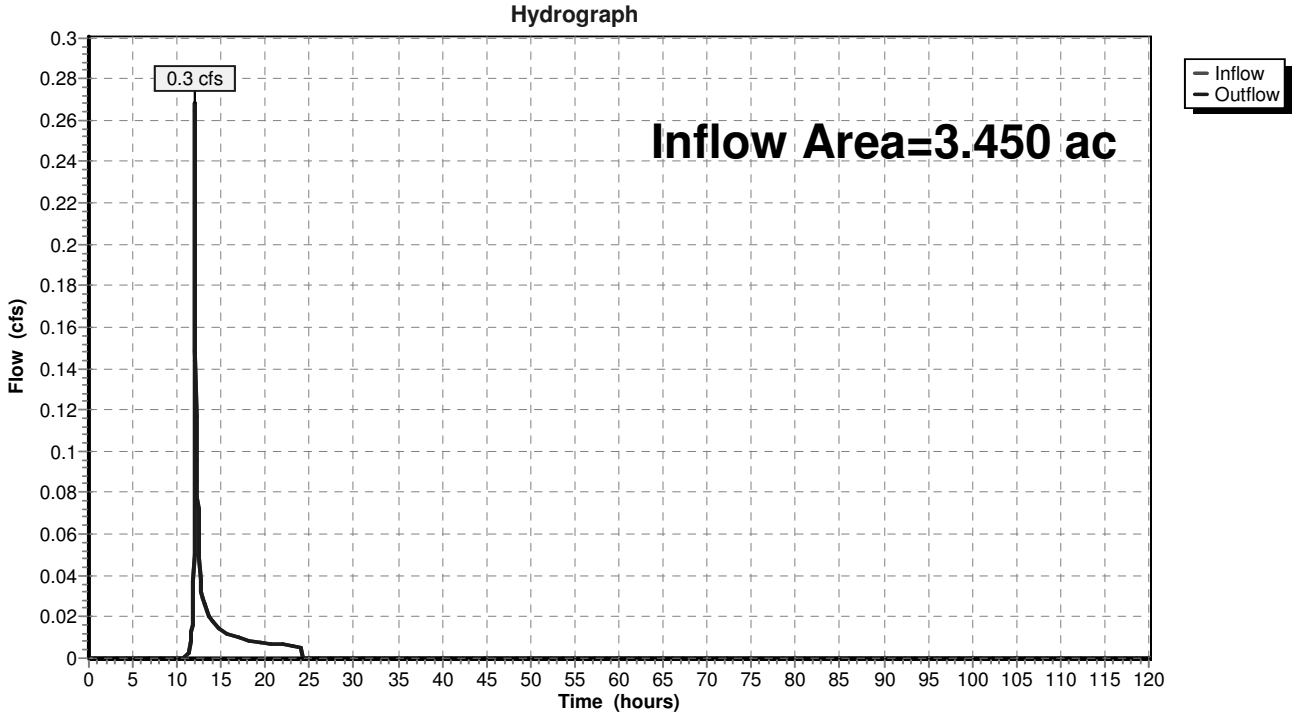


## Summary for Reach 6R: DESIGN LINE 2

Inflow Area = 3.450 ac, 28.99% Impervious, Inflow Depth = 0.06" for 1-yr event
Inflow = 0.3 cfs @ 12.01 hrs, Volume= 0.017 af
Outflow = 0.3 cfs @ 12.01 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3

## Reach 6R: DESIGN LINE 2



## Summary for Pond 1.1AP: Pretreatment Basin 1A

Inflow Area = 0.600 ac, 50.00% Impervious, Inflow Depth = 1.28" for 1-yr event
Inflow = 0.9 cfs @ 12.07 hrs, Volume= 0.064 af
Outflow = 0.1 cfs @ 13.81 hrs, Volume= 0.064 af, Atten= 94%, Lag= 104.3 min
Primary = 0.0 cfs @ 13.81 hrs, Volume= 0.058 af
Secondary = 0.0 cfs @ 13.81 hrs, Volume= 0.006 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 473.21' @ 13.81 hrs Surf.Area= 1,284 sf Storage= 1,618 cf

Plug-Flow detention time= 930.8 min calculated for 0.064 af (100% of inflow)
Center-of-Mass det. time= 930.6 min ( 1,785.7 - 855.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 471.00' | 2,800 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

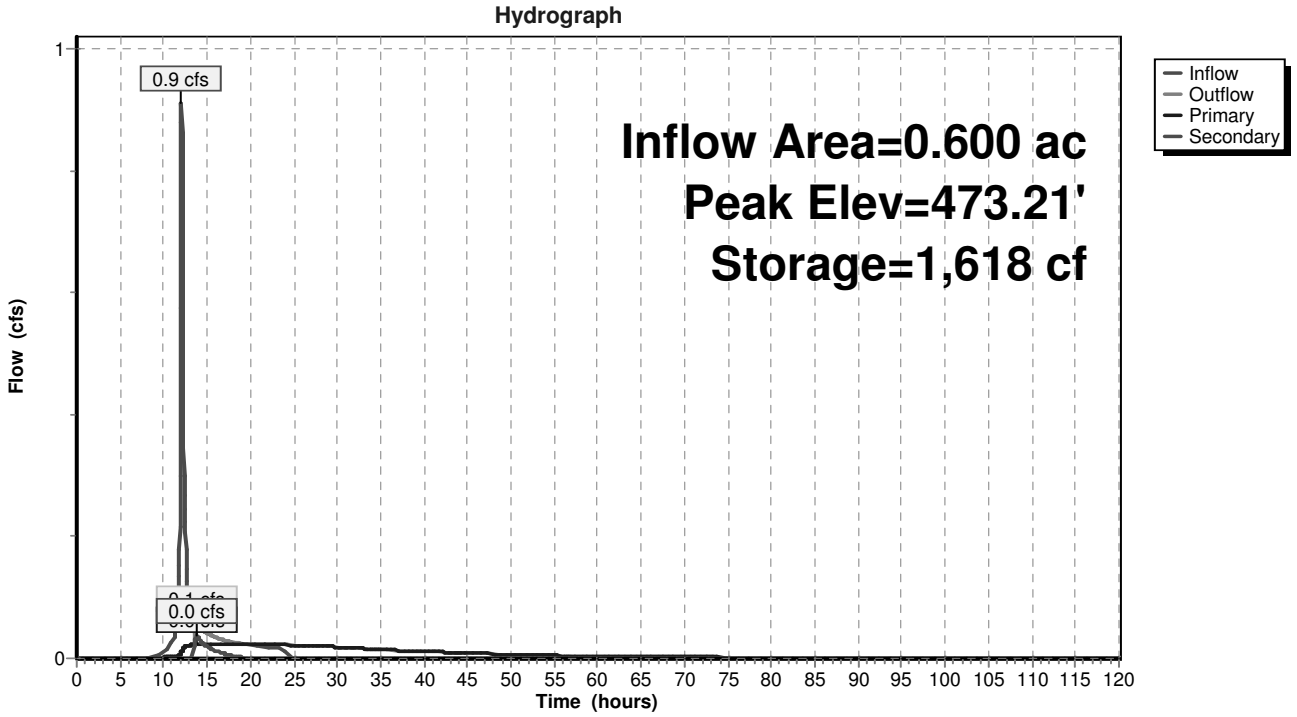
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 471.00 | 250 | 0 | 0 |
| 472.00 | 650 | 450 | 450 |
| 474.00 | 1,700 | 2,350 | 2,800 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 473.20' | **20.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 471.00' | **6.0" Round Culvert**<br>L= 30.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 471.00' / 470.50' S= 0.0167 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.20 sf |
| #3 | Device 2 | 471.00' | **0.3" Vert. Orifice/Grate X 2.00 columns**<br>X 4 rows with 6.0" cc spacing C= 0.600 |

**Primary OutFlow** Max=0.0 cfs @ 13.81 hrs HW=473.21' TW=470.02' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.0 cfs of 1.2 cfs potential flow)
└**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 5.67 fps)

**Secondary OutFlow** Max=0.0 cfs @ 13.81 hrs HW=473.21' TW=470.02' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.0 cfs @ 0.22 fps)

## Pond 1.1AP: Pretreatment Basin 1A



## Summary for Pond 1.1BP: Pretreatment Basin 1B

Inflow Area = 0.700 ac, 57.14% Impervious, Inflow Depth = 1.42" for 1-yr event
Inflow = 1.2 cfs @ 12.07 hrs, Volume= 0.083 af
Outflow = 0.1 cfs @ 13.49 hrs, Volume= 0.083 af, Atten= 93%, Lag= 85.3 min
Primary = 0.0 cfs @ 13.49 hrs, Volume= 0.070 af
Secondary = 0.1 cfs @ 13.49 hrs, Volume= 0.013 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 473.11' @ 13.49 hrs Surf.Area= 1,533 sf Storage= 2,128 cf

Plug-Flow detention time= 1,256.3 min calculated for 0.083 af (100% of inflow)
Center-of-Mass det. time= 1,255.3 min ( 2,101.6 - 846.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 471.00' | 3,700 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

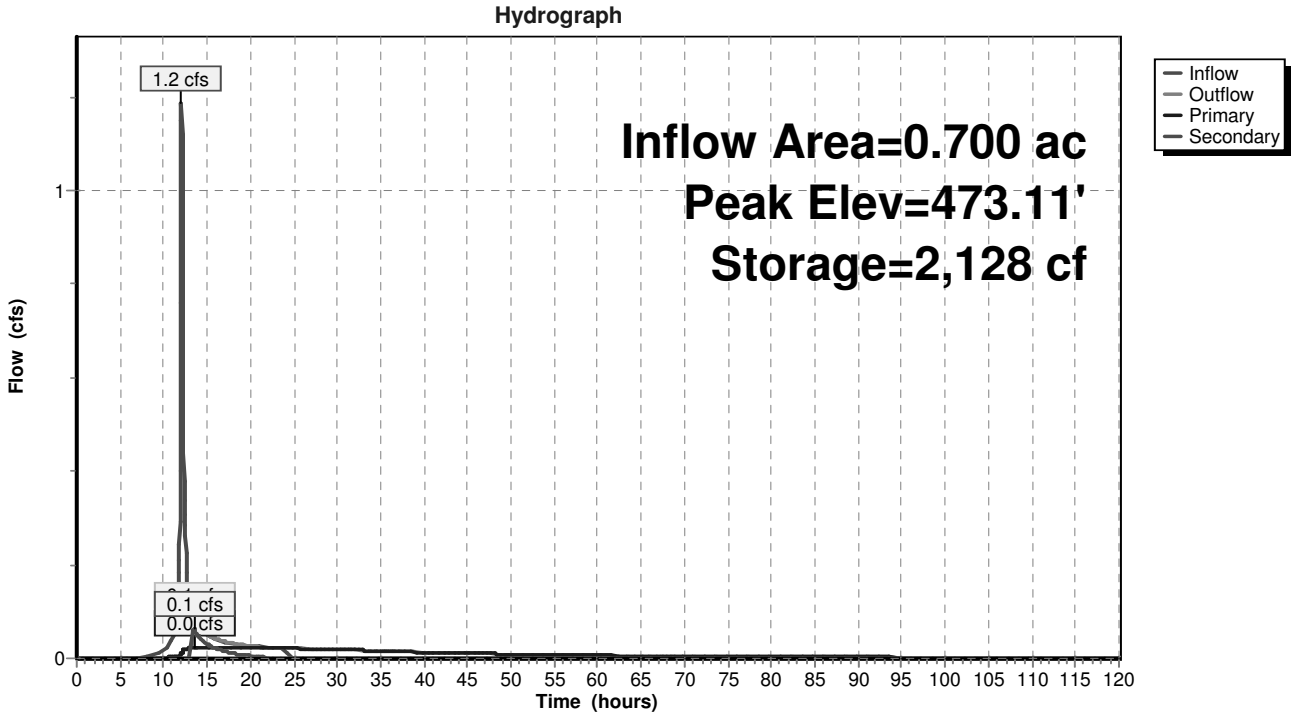
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 471.00 | 550 | 0 | 0 |
| 472.00 | 950 | 750 | 750 |
| 474.00 | 2,000 | 2,950 | 3,700 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 473.10' | **25.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 471.00' | **6.0" Round Culvert**<br>L= 30.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 471.00' / 470.50' S= 0.0167 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.20 sf |
| #3 | Device 2 | 471.00' | **0.3" Vert. Orifice/Grate X 2.00 columns**<br>X 4 rows with 6.0" cc spacing C= 0.600 |

**Primary OutFlow** Max=0.0 cfs @ 13.49 hrs HW=473.11' TW=470.01' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.0 cfs of 1.2 cfs potential flow)
└─**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 5.46 fps)

**Secondary OutFlow** Max=0.1 cfs @ 13.49 hrs HW=473.11' TW=470.01' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.1 cfs @ 0.25 fps)

## Pond 1.1BP: Pretreatment Basin 1B



## Summary for Pond 1.2P: I-2, Infiltration Basin

Inflow Area = 1.450 ac, 48.28% Impervious, Inflow Depth > 1.25" for 1-yr event
Inflow = 0.1 cfs @ 13.77 hrs, Volume= 0.151 af
Outflow = 0.1 cfs @ 13.82 hrs, Volume= 0.151 af, Atten= 1%, Lag= 3.1 min
Discarded = 0.1 cfs @ 13.82 hrs, Volume= 0.151 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 470.02' @ 13.82 hrs Surf.Area= 1,208 sf Storage= 20 cf

Plug-Flow detention time= 2.4 min calculated for 0.151 af (100% of inflow)
Center-of-Mass det. time= 2.4 min ( 1,933.7 - 1,931.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 470.00' | 9,100 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

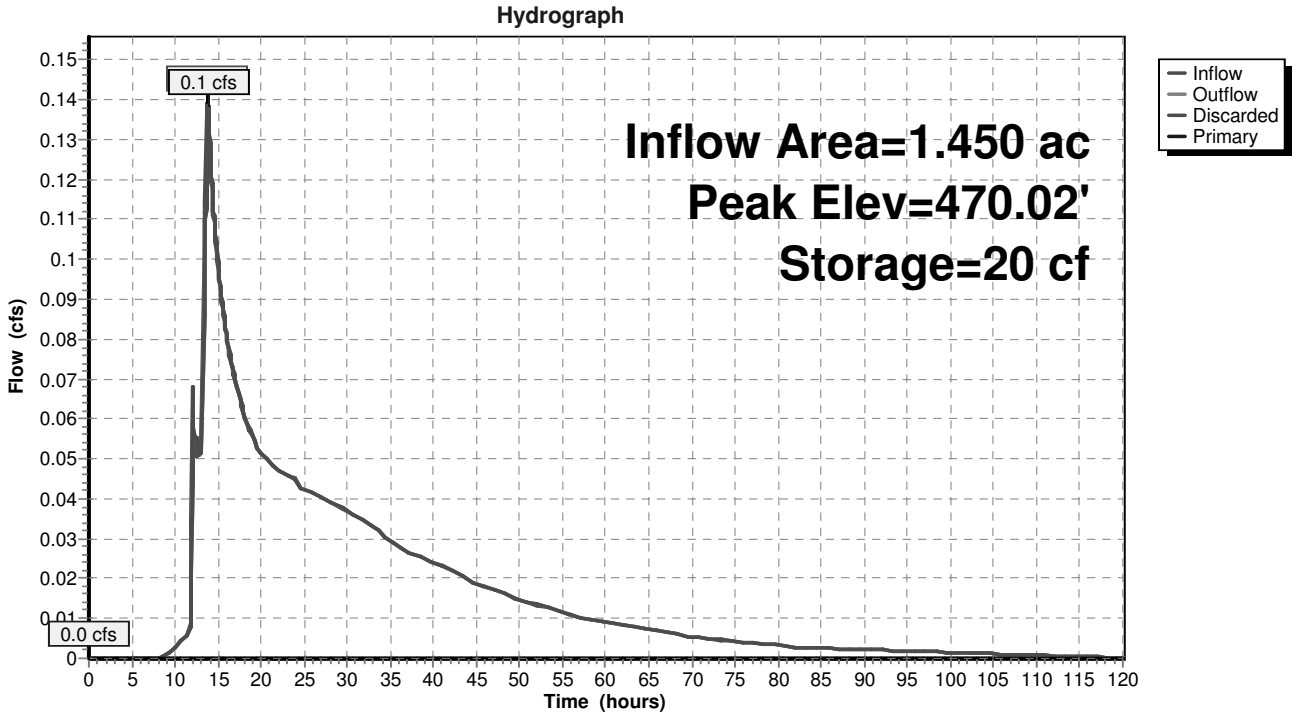
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 470.00 | 1,200 | 0 | 0 |
| 472.00 | 2,200 | 3,400 | 3,400 |
| 474.00 | 3,500 | 5,700 | 9,100 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 469.00' | **15.0" Round Culvert**<br>L= 57.0' CMP, end-section conforming to fill, Ke= 0.500<br>Inlet / Outlet Invert= 469.00' / 468.50' S= 0.0088 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.23 sf |
| #2 | Discarded | 470.00' | **6.000 in/hr Exfiltration over Surface area** Phase-In= 0.02' |
| #3 | Device 1 | 472.10' | **2.3' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.1 cfs @ 13.82 hrs HW=470.02' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.1 cfs)

**Primary OutFlow** Max=0.0 cfs @ 0.00 hrs HW=470.00' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.0 cfs of 3.4 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** ( Controls 0.0 cfs)

## Pond 1.2P: I-2, Infiltration Basin



## Summary for Pond 2.1P: Pretreatment Basin 2

Inflow Area = 3.000 ac, 33.33% Impervious, Inflow Depth = 1.09" for 1-yr event
Inflow = 3.2 cfs @ 12.13 hrs, Volume= 0.274 af
Outflow = 0.3 cfs @ 13.53 hrs, Volume= 0.253 af, Atten= 91%, Lag= 84.1 min
Primary = 0.3 cfs @ 13.53 hrs, Volume= 0.253 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 410.08' @ 13.53 hrs Surf.Area= 3,117 sf Storage= 6,523 cf
Flood Elev= 412.00' Surf.Area= 3,200 sf Storage= 9,435 cf

Plug-Flow detention time= 1,455.4 min calculated for 0.253 af (93% of inflow)
Center-of-Mass det. time= 1,416.5 min ( 2,287.5 - 871.1 )

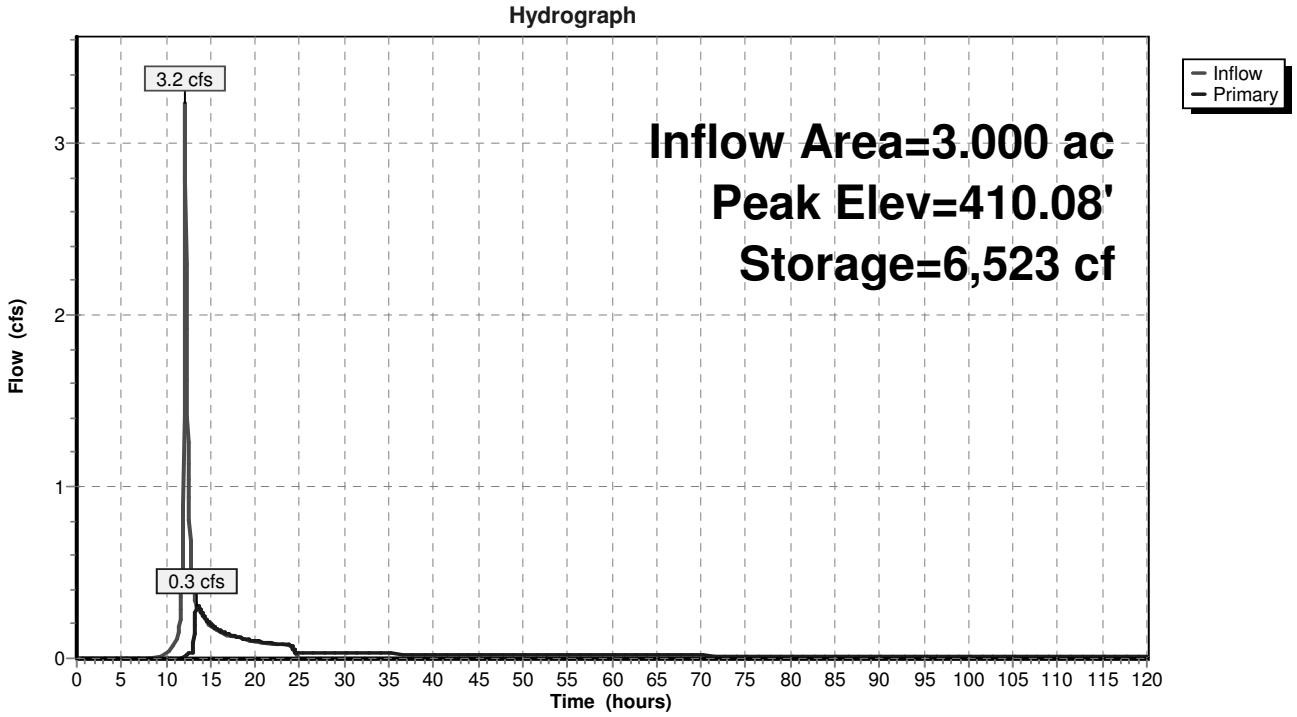
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 407.00' | 9,435 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 407.00 | 1,150 | 0 | 0 |
| 408.00 | 1,730 | 1,440 | 1,440 |
| 410.00 | 3,110 | 4,840 | 6,280 |
| 411.00 | 3,200 | 3,155 | 9,435 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 406.50' | **12.0" Round Culvert**<br>L= 30.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 406.50' / 406.00' S= 0.0167 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.79 sf |
| #2 | Primary | 410.00' | **4.5' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |
| #3 | Device 1 | 407.00' | **0.3" Vert. Orifice/Grate X 2.00 columns**<br>X 4 rows with 6.0" cc spacing C= 0.600 |

**Primary OutFlow** Max=0.3 cfs @ 13.53 hrs HW=410.08' TW=404.46' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.0 cfs of 6.6 cfs potential flow)
  - **3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 7.27 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 0.3 cfs @ 0.78 fps)

## Pond 2.1P: Pretreatment Basin 2



## Summary for Pond 2.2P: I-2, Infiltration Basin

Inflow Area = 3.150 ac, 31.75% Impervious, Inflow Depth > 1.00" for 1-yr event
Inflow = 0.3 cfs @ 13.53 hrs, Volume= 0.263 af
Outflow = 0.2 cfs @ 15.69 hrs, Volume= 0.263 af, Atten= 44%, Lag= 130.1 min
Discarded = 0.2 cfs @ 15.69 hrs, Volume= 0.263 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 405.15' @ 15.69 hrs Surf.Area= 958 sf Storage= 813 cf
Flood Elev= 409.10' Surf.Area= 3,244 sf Storage= 8,490 cf

Plug-Flow detention time= 27.7 min calculated for 0.263 af (100% of inflow)
Center-of-Mass det. time= 27.3 min ( 2,266.3 - 2,239.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 404.00' | 11,750 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

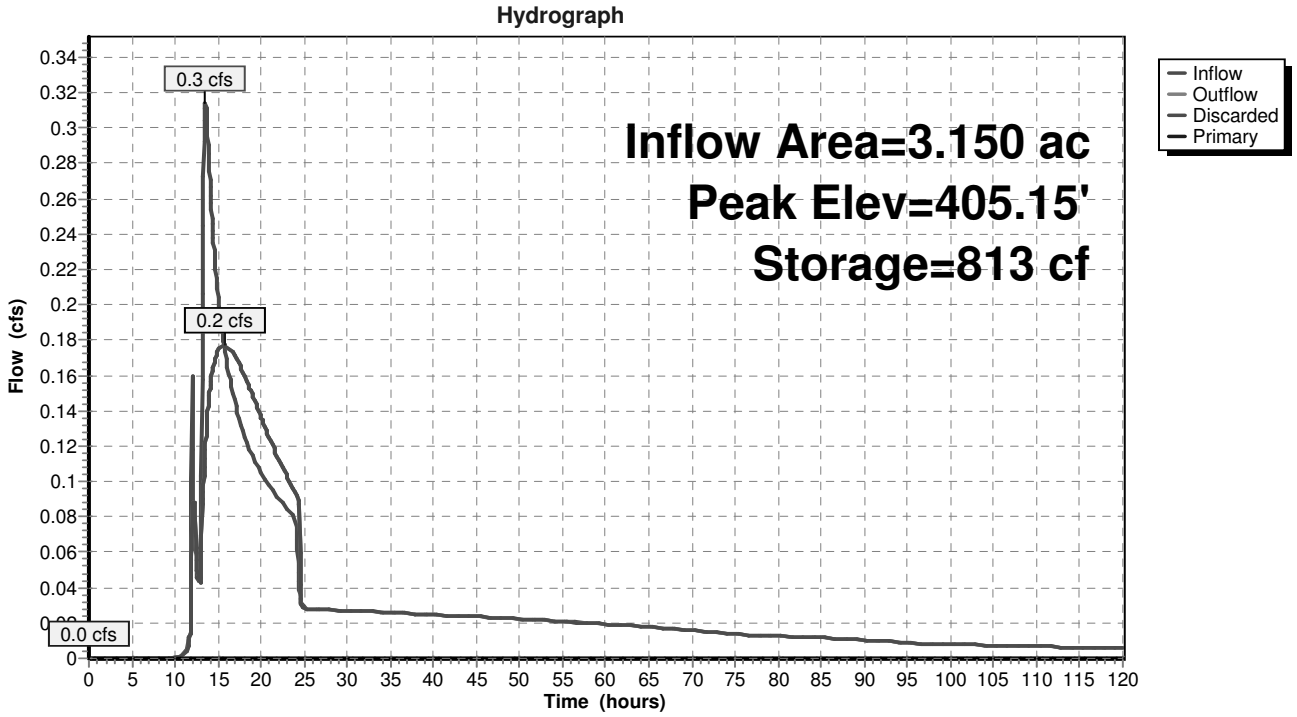
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 404.00 | 450 | 0 | 0 |
| 406.00 | 1,330 | 1,780 | 1,780 |
| 408.00 | 2,320 | 3,650 | 5,430 |
| 410.00 | 4,000 | 6,320 | 11,750 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 403.00' | **18.0" Round Culvert**<br>L= 31.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 403.00' / 402.50' S= 0.0161 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.77 sf |
| #2 | Discarded | 404.00' | **8.000 in/hr Exfiltration over Surface area** Phase-In= 0.03' |
| #3 | Device 1 | 408.00' | **3.6' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.2 cfs @ 15.69 hrs HW=405.15' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.2 cfs)

**Primary OutFlow** Max=0.0 cfs @ 0.00 hrs HW=404.00' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Passes 0.0 cfs of 4.3 cfs potential flow)
↑**3=Broad-Crested Rectangular Weir** ( Controls 0.0 cfs)

## Pond 2.2P: I-2, Infiltration Basin



## Summary for Subcatchment 1.1AS:

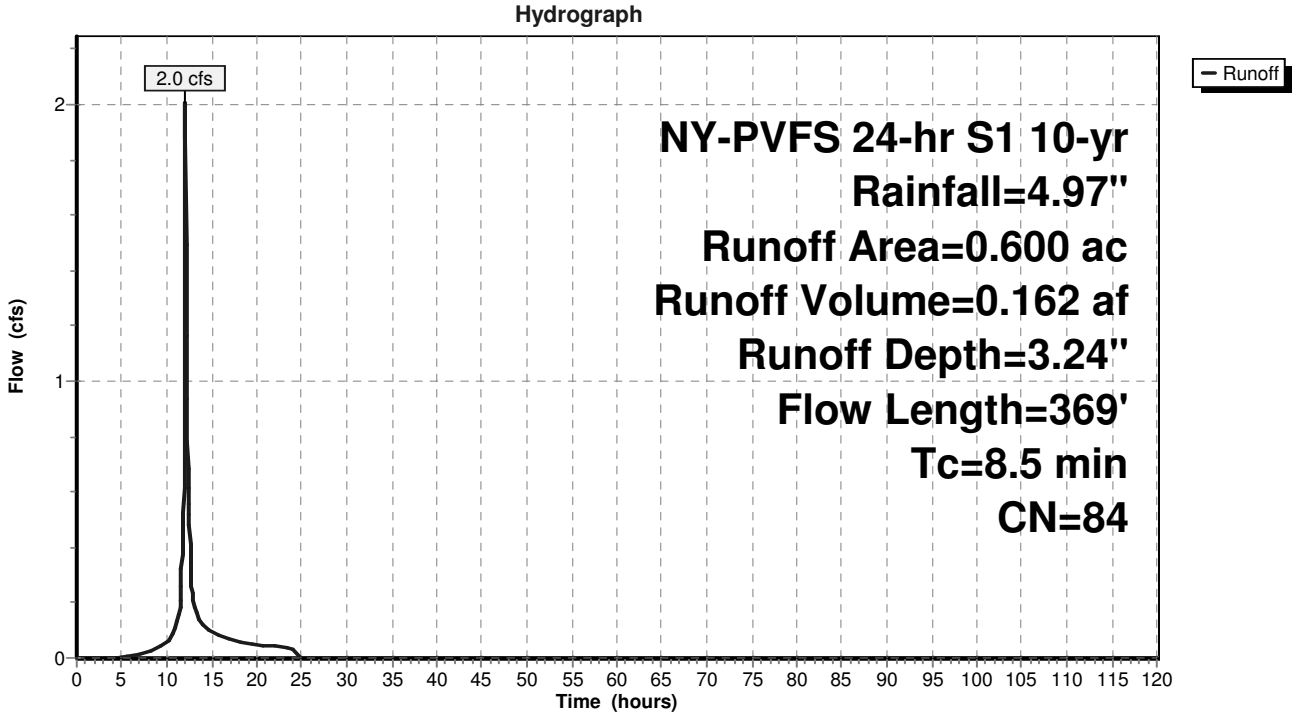
Runoff = 2.0 cfs @ 12.07 hrs, Volume= 0.162 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 10-yr Rainfall=4.97"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 61 | >75% Grass cover, Good, HSG B |
| 0.200 | 74 | >75% Grass cover, Good, HSG C |
| 0.300 | 98 | Paved parking & roofs |
| 0.600 | 84 | Weighted Average |
| 0.300 | | 50.00% Pervious Area |
| 0.300 | | 50.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.7 | 100 | 0.0470 | 0.25 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 1.0 | 96 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 173 | 0.0300 | 3.52 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 8.5 | 369 | Total | | | |

## Subcatchment 1.1AS:



## Summary for Subcatchment 1.1BS:

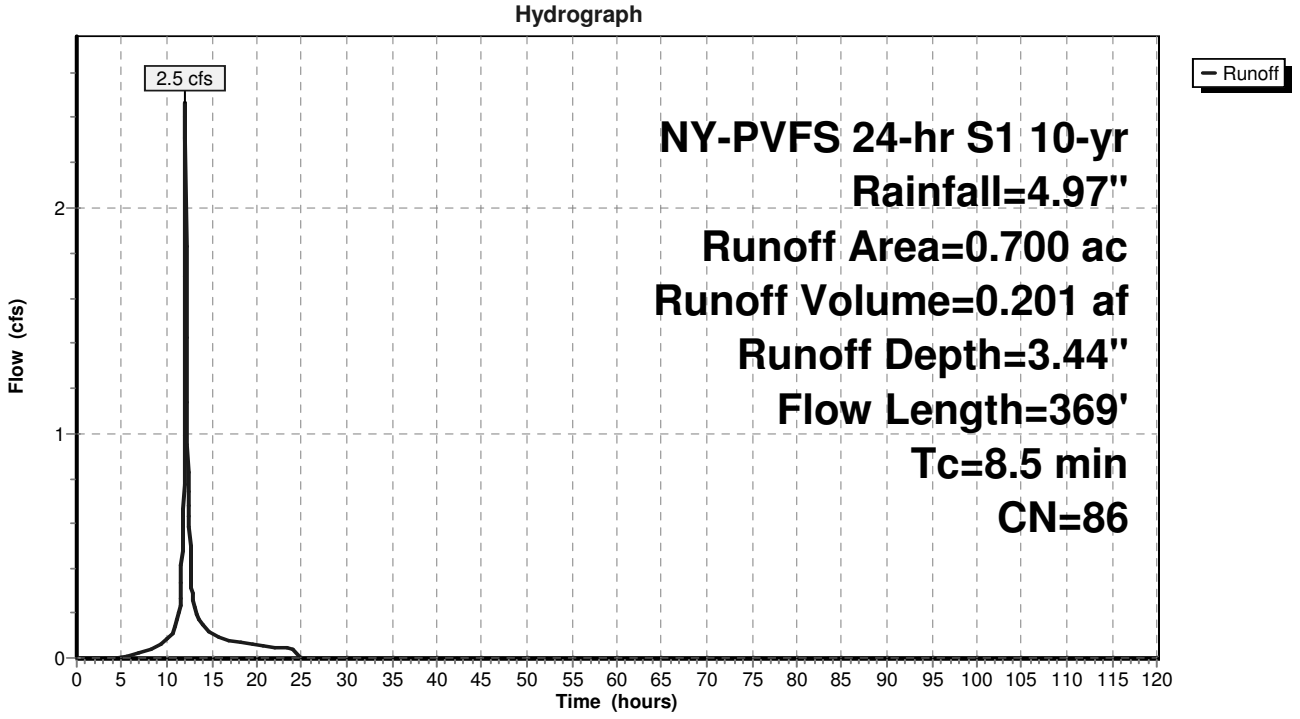
Runoff = 2.5 cfs @ 12.07 hrs, Volume= 0.201 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 10-yr Rainfall=4.97"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 61 | >75% Grass cover, Good, HSG B |
| 0.200 | 74 | >75% Grass cover, Good, HSG C |
| 0.400 | 98 | Paved parking & roofs |
| 0.700 | 86 | Weighted Average |
| 0.300 | | 42.86% Pervious Area |
| 0.400 | | 57.14% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.7 | 100 | 0.0470 | 0.25 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 1.0 | 96 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 173 | 0.0300 | 3.52 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 8.5 | 369 | Total | | | |

## Subcatchment 1.1BS:



## Summary for Subcatchment 1.2S:

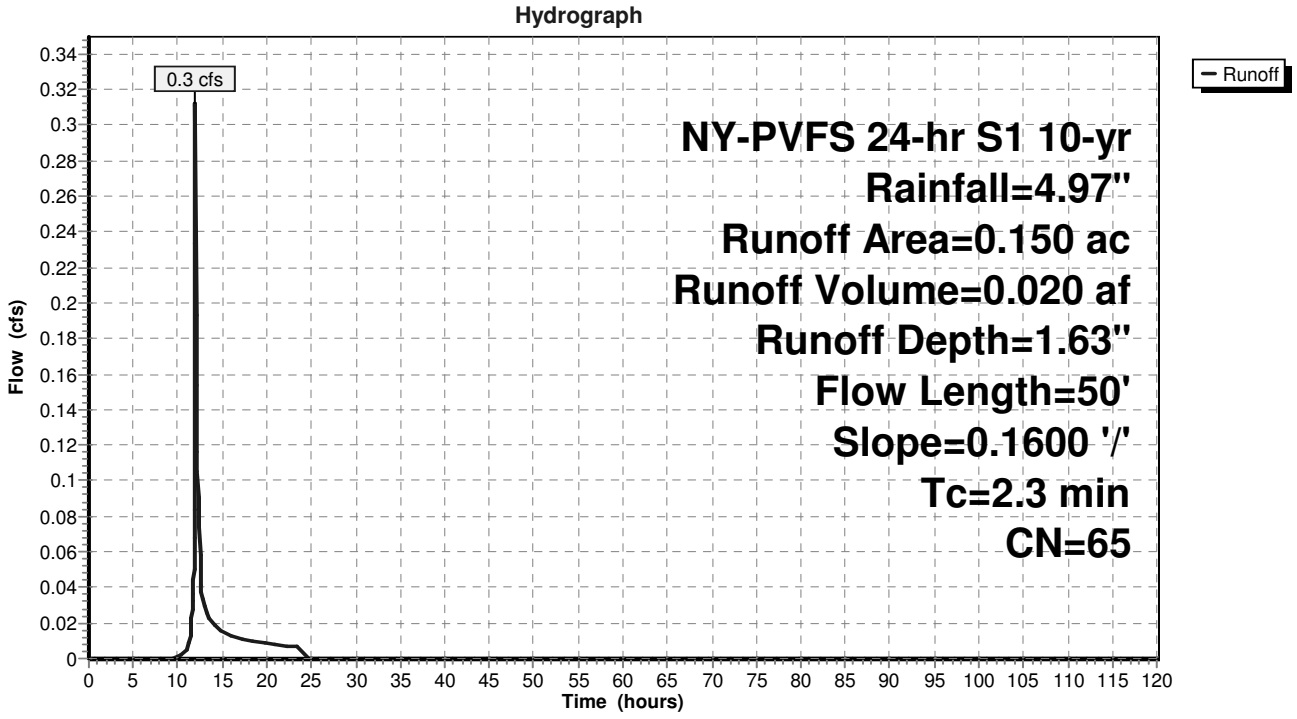
Runoff = 0.3 cfs @ 11.99 hrs, Volume= 0.020 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 10-yr Rainfall=4.97"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 61 | >75% Grass cover, Good, HSG B |
| 0.050 | 74 | >75% Grass cover, Good, HSG C |
| 0.150 | 65 | Weighted Average |
| 0.150 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.3 | 50 | 0.1600 | 0.36 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |

## Subcatchment 1.2S:



## Summary for Subcatchment 2.1S:

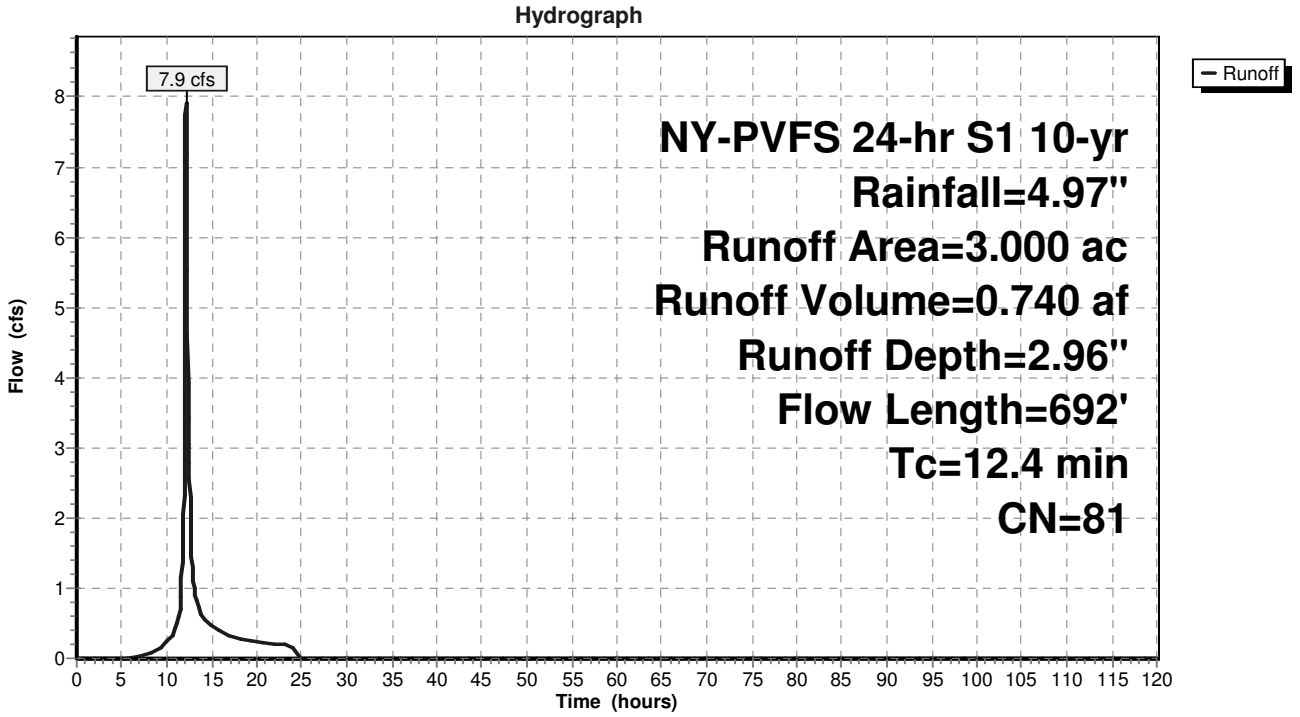
Runoff = 7.9 cfs @ 12.12 hrs, Volume= 0.740 af, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 10-yr Rainfall=4.97"

| Area (ac) | CN | Description |
|---|---|---|
| 1.000 | 98 | Paved parking & roofs |
| 1.600 | 74 | >75% Grass cover, Good, HSG C |
| 0.400 | 70 | Woods, Good, HSG C |
| 3.000 | 81 | Weighted Average |
| 2.000 | | 66.67% Pervious Area |
| 1.000 | | 33.33% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.9 | 100 | 0.0350 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50" |
| 0.1 | 36 | 0.1600 | 6.00 | | **Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps |
| 0.9 | 296 | 0.1500 | 5.76 | 8.64 | **Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.050 |
| 0.4 | 140 | 0.1500 | 5.76 | 8.64 | **Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.050 |
| 0.1 | 120 | 0.1000 | 15.54 | 12.21 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 |
| 12.4 | 692 | Total | | | |

## Subcatchment 2.1S:



## Summary for Subcatchment 2.2S:

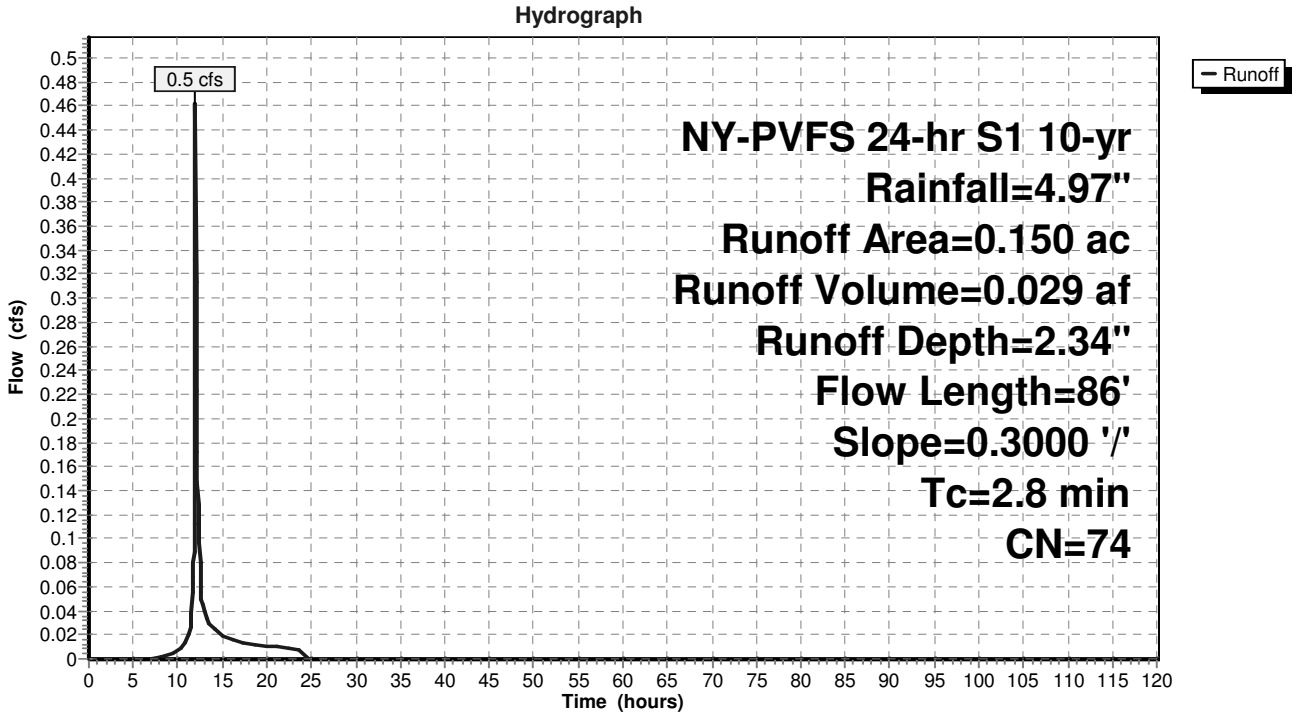
Runoff = 0.5 cfs @ 12.00 hrs, Volume= 0.029 af, Depth= 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 10-yr Rainfall=4.97"

| Area (ac) | CN | Description |
|---|---|---|
| 0.150 | 74 | >75% Grass cover, Good, HSG C |
| 0.150 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.8 | 86 | 0.3000 | 0.51 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |

## Subcatchment 2.2S:



## Summary for Subcatchment 2.3S:

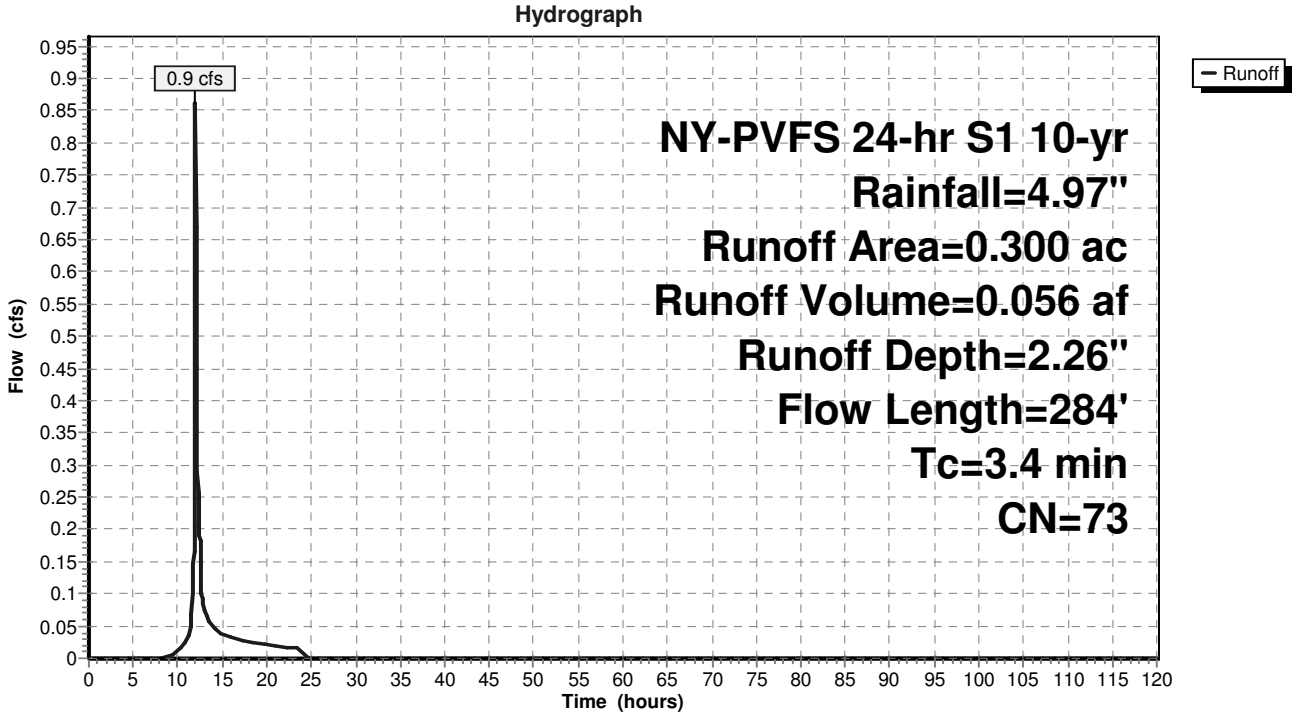
Runoff = 0.9 cfs @ 12.01 hrs, Volume= 0.056 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 10-yr Rainfall=4.97"

| Area (ac) | CN | Description |
|---|---|---|
| 0.200 | 74 | >75% Grass cover, Good, HSG C |
| 0.100 | 72 | Woods/grass comb., Good, HSG C |
| 0.300 | 73 | Weighted Average |
| 0.300 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | 100 | 0.3500 | 0.56 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 0.4 | 184 | 0.3200 | 8.49 | | **Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps |
| 3.4 | 284 | Total | | | |

## Subcatchment 2.3S:

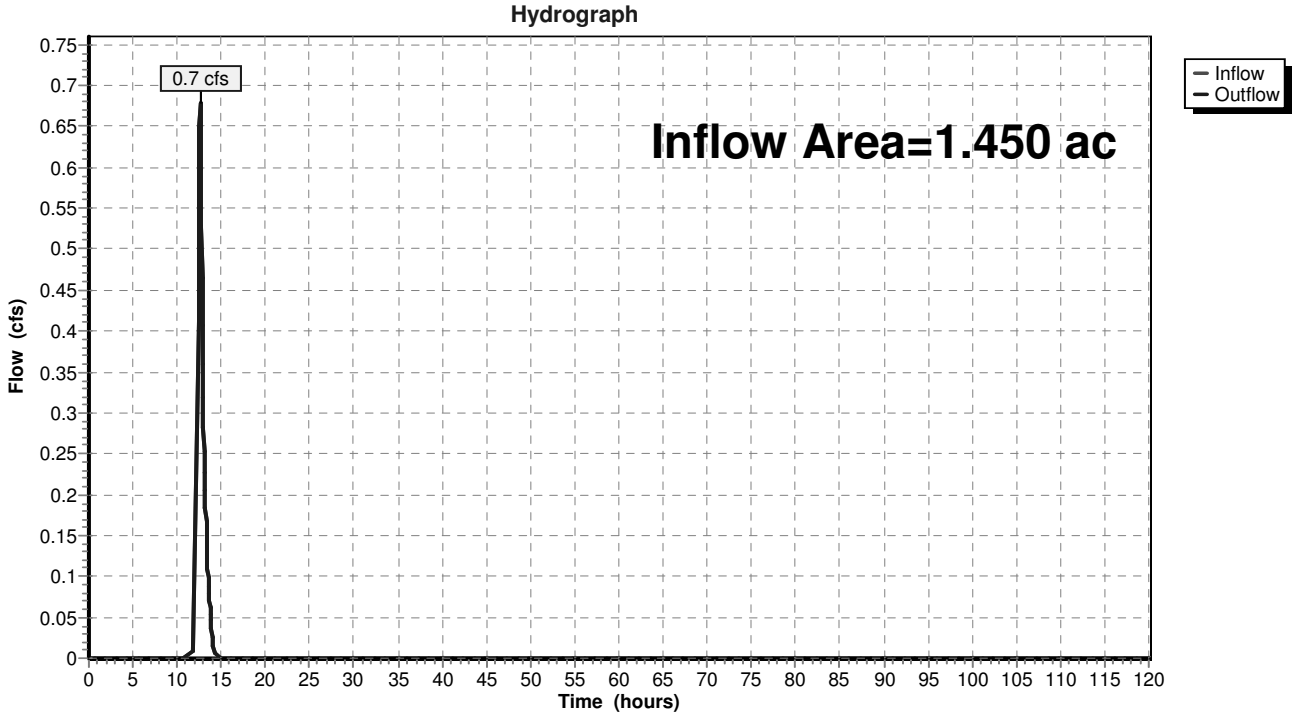


## Summary for Reach 1: DESIGN LINE 1

Inflow Area = 1.450 ac, 48.28% Impervious, Inflow Depth = 0.29" for 10-yr event
Inflow = 0.7 cfs @ 12.60 hrs, Volume= 0.034 af
Outflow = 0.7 cfs @ 12.60 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3

## Reach 1: DESIGN LINE 1

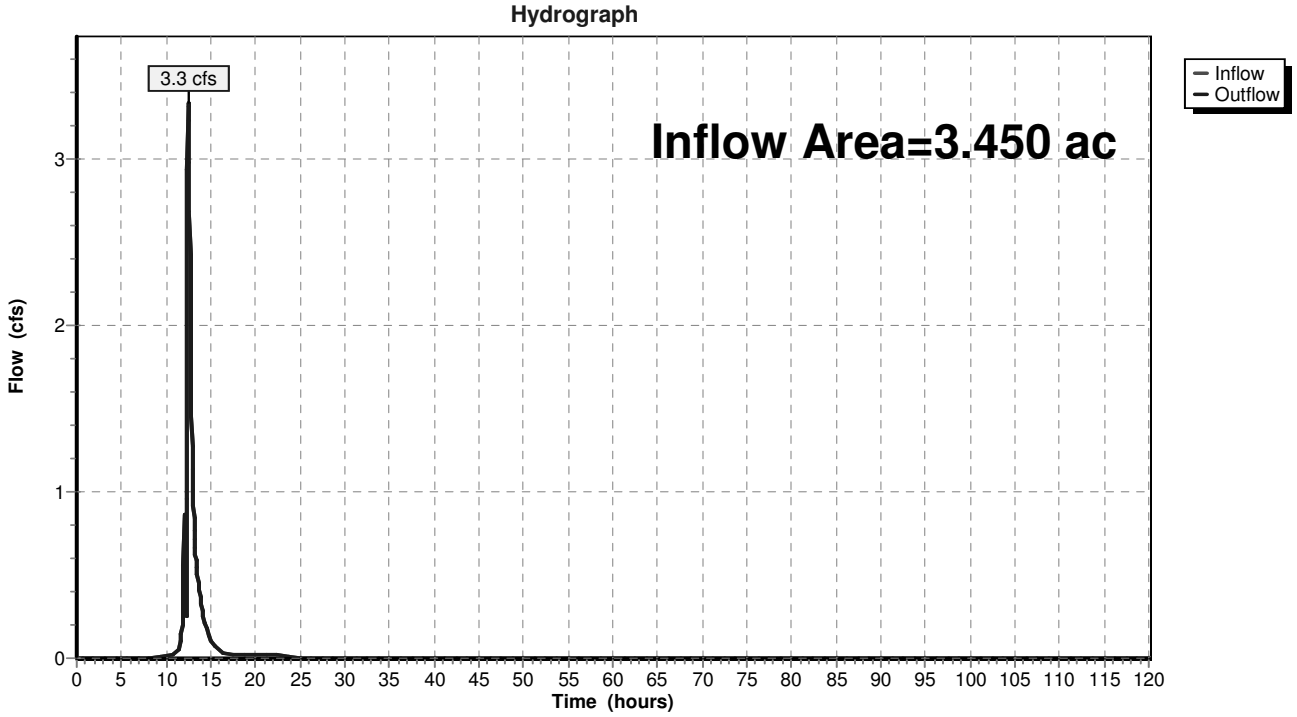


## Summary for Reach 6R: DESIGN LINE 2

Inflow Area = 3.450 ac, 28.99% Impervious, Inflow Depth = 0.79" for 10-yr event
Inflow = 3.3 cfs @ 12.47 hrs, Volume= 0.226 af
Outflow = 3.3 cfs @ 12.47 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3

## Reach 6R: DESIGN LINE 2



## Summary for Pond 1.1AP: Pretreatment Basin 1A

Inflow Area = 0.600 ac, 50.00% Impervious, Inflow Depth = 3.24" for 10-yr event
Inflow = 2.0 cfs @ 12.07 hrs, Volume= 0.162 af
Outflow = 2.0 cfs @ 12.08 hrs, Volume= 0.162 af, Atten= 3%, Lag= 0.9 min
Primary = 0.0 cfs @ 12.08 hrs, Volume= 0.061 af
Secondary = 1.9 cfs @ 12.08 hrs, Volume= 0.101 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 473.31' @ 12.08 hrs Surf.Area= 1,340 sf Storage= 1,758 cf

Plug-Flow detention time= 398.0 min calculated for 0.162 af (100% of inflow)
Center-of-Mass det. time= 397.7 min ( 1,225.8 - 828.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 471.00' | 2,800 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

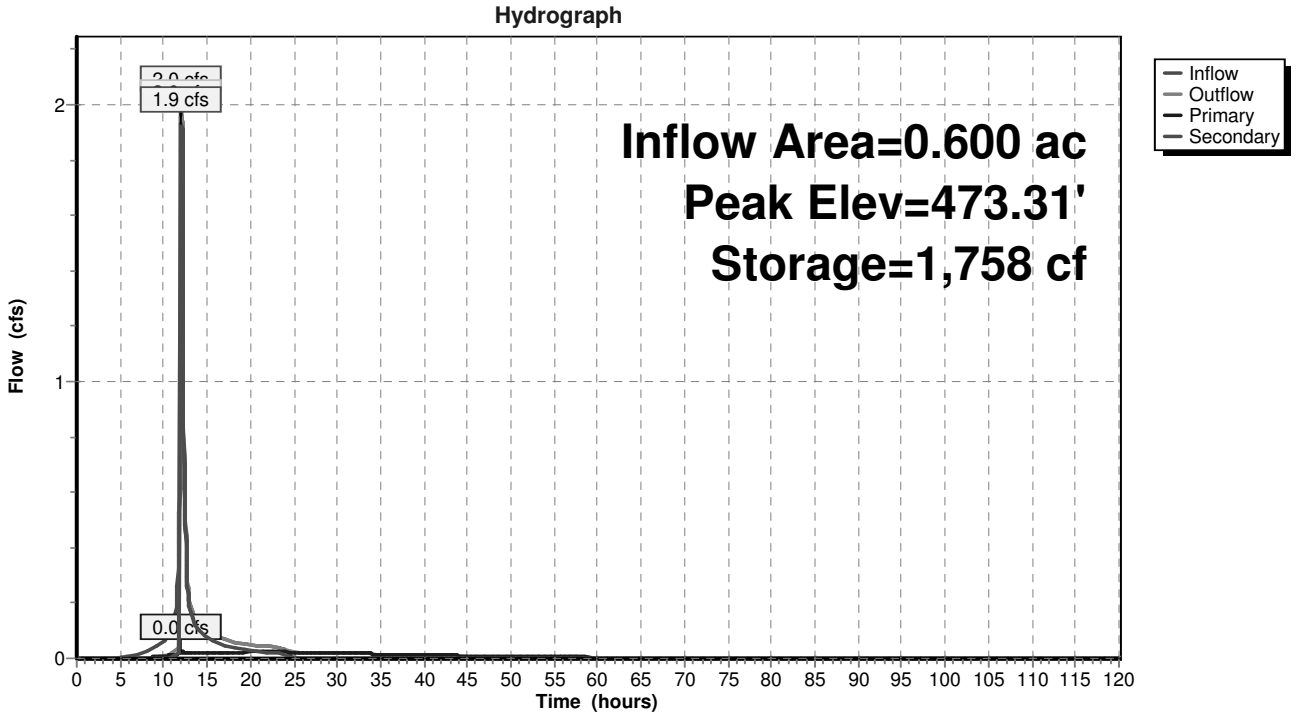
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 471.00 | 250 | 0 | 0 |
| 472.00 | 650 | 450 | 450 |
| 474.00 | 1,700 | 2,350 | 2,800 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 473.20' | **20.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 471.00' | **6.0" Round Culvert**<br>L= 30.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 471.00' / 470.50' S= 0.0167 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.20 sf |
| #3 | Device 2 | 471.00' | **0.3" Vert. Orifice/Grate X 2.00 columns**<br>X 4 rows with 6.0" cc spacing C= 0.600 |

**Primary OutFlow** Max=0.0 cfs @ 12.08 hrs HW=473.31' TW=470.73' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 0.0 cfs of 1.3 cfs potential flow)
↑—**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 5.89 fps)

**Secondary OutFlow** Max=1.9 cfs @ 12.08 hrs HW=473.31' TW=470.81' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.9 cfs @ 0.84 fps)

## Pond 1.1AP: Pretreatment Basin 1A



## Summary for Pond 1.1BP: Pretreatment Basin 1B

Inflow Area = 0.700 ac, 57.14% Impervious, Inflow Depth = 3.44" for 10-yr event
Inflow = 2.5 cfs @ 12.07 hrs, Volume= 0.201 af
Outflow = 2.4 cfs @ 12.08 hrs, Volume= 0.200 af, Atten= 3%, Lag= 0.7 min
Primary = 0.0 cfs @ 12.08 hrs, Volume= 0.072 af
Secondary = 2.4 cfs @ 12.08 hrs, Volume= 0.129 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 473.21' @ 12.08 hrs Surf.Area= 1,587 sf Storage= 2,289 cf

Plug-Flow detention time= 538.5 min calculated for 0.200 af (100% of inflow)
Center-of-Mass det. time= 540.2 min ( 1,360.5 - 820.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 471.00' | 3,700 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

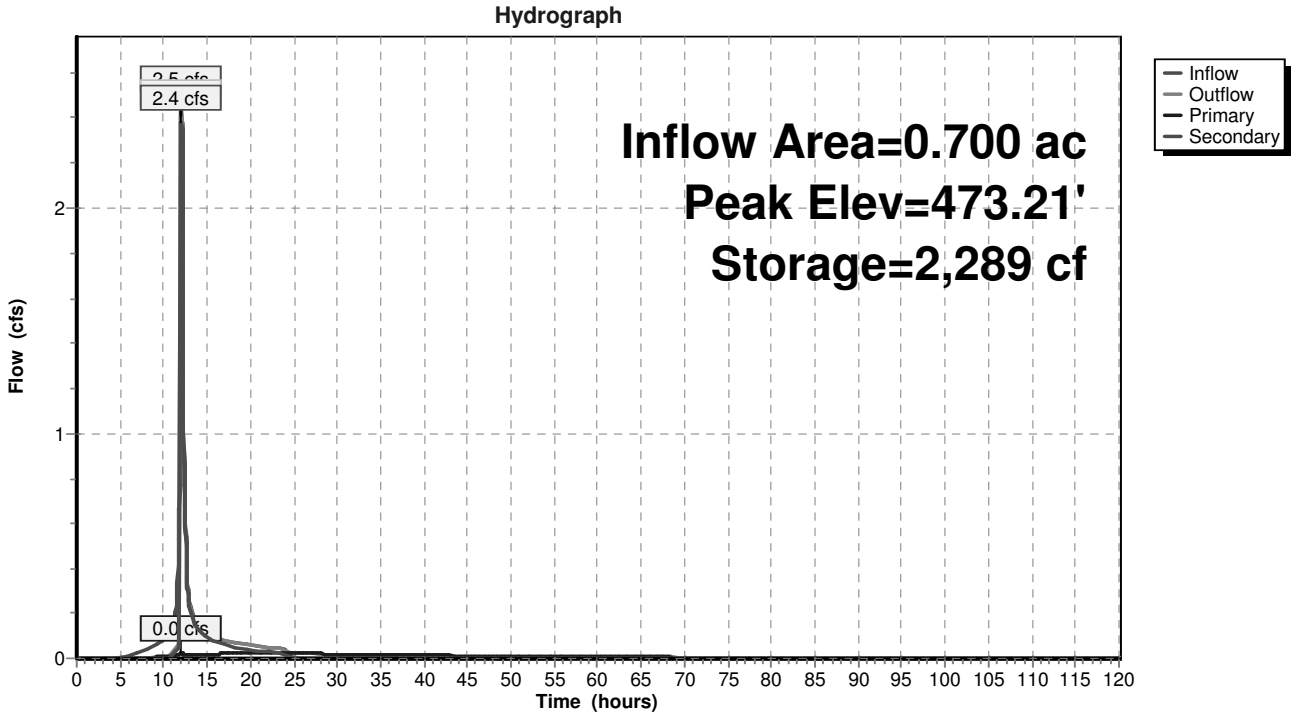
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 471.00 | 550 | 0 | 0 |
| 472.00 | 950 | 750 | 750 |
| 474.00 | 2,000 | 2,950 | 3,700 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 473.10' | **25.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 471.00' | **6.0" Round Culvert**<br>L= 30.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 471.00' / 470.50' S= 0.0167 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.20 sf |
| #3 | Device 2 | 471.00' | **0.3" Vert. Orifice/Grate X 2.00 columns**<br>X 4 rows with 6.0" cc spacing C= 0.600 |

**Primary OutFlow** Max=0.0 cfs @ 12.08 hrs HW=473.21' TW=470.73' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 0.0 cfs of 1.2 cfs potential flow)
↑—**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 5.68 fps)

**Secondary OutFlow** Max=2.3 cfs @ 12.08 hrs HW=473.21' TW=470.78' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.3 cfs @ 0.83 fps)

## Pond 1.1BP: Pretreatment Basin 1B



## Summary for Pond 1.2P: I-2, Infiltration Basin

Inflow Area = 1.450 ac, 48.28% Impervious, Inflow Depth = 3.17" for 10-yr event
Inflow = 4.5 cfs @ 12.08 hrs, Volume= 0.383 af
Outflow = 1.0 cfs @ 12.60 hrs, Volume= 0.383 af, Atten= 78%, Lag= 31.4 min
Discarded = 0.3 cfs @ 12.60 hrs, Volume= 0.349 af
Primary = 0.7 cfs @ 12.60 hrs, Volume= 0.034 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 472.32' @ 12.60 hrs Surf.Area= 2,410 sf Storage= 4,143 cf

Plug-Flow detention time= 91.3 min calculated for 0.383 af (100% of inflow)
Center-of-Mass det. time= 91.2 min ( 1,369.4 - 1,278.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 470.00' | 9,100 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

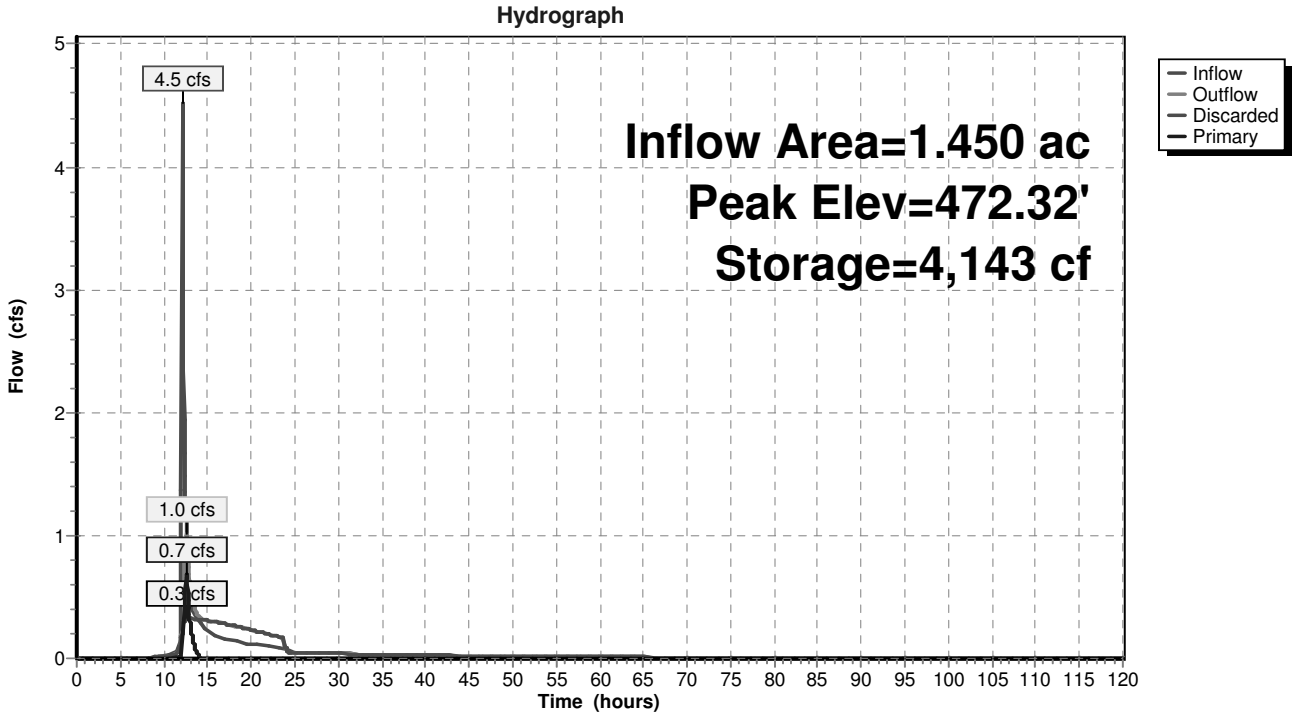
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 470.00 | 1,200 | 0 | 0 |
| 472.00 | 2,200 | 3,400 | 3,400 |
| 474.00 | 3,500 | 5,700 | 9,100 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 469.00' | **15.0" Round Culvert**<br>L= 57.0' CMP, end-section conforming to fill, Ke= 0.500<br>Inlet / Outlet Invert= 469.00' / 468.50' S= 0.0088 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.23 sf |
| #2 | Discarded | 470.00' | **6.000 in/hr Exfiltration over Surface area** Phase-In= 0.02' |
| #3 | Device 1 | 472.10' | **2.3' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.3 cfs @ 12.60 hrs HW=472.32' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.3 cfs)

**Primary OutFlow** Max=0.7 cfs @ 12.60 hrs HW=472.32' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.7 cfs of 9.7 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.7 cfs @ 1.33 fps)

## Pond 1.2P: I-2, Infiltration Basin



## Summary for Pond 2.1P: Pretreatment Basin 2

Inflow Area = 3.000 ac, 33.33% Impervious, Inflow Depth = 2.96" for 10-yr event
Inflow = 7.9 cfs @ 12.12 hrs, Volume= 0.740 af
Outflow = 7.0 cfs @ 12.19 hrs, Volume= 0.719 af, Atten= 11%, Lag= 4.2 min
Primary = 7.0 cfs @ 12.19 hrs, Volume= 0.719 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 410.63' @ 12.19 hrs Surf.Area= 3,167 sf Storage= 8,255 cf
Flood Elev= 412.00' Surf.Area= 3,200 sf Storage= 9,435 cf

Plug-Flow detention time= 536.0 min calculated for 0.719 af (97% of inflow)
Center-of-Mass det. time= 519.9 min ( 1,362.4 - 842.4 )

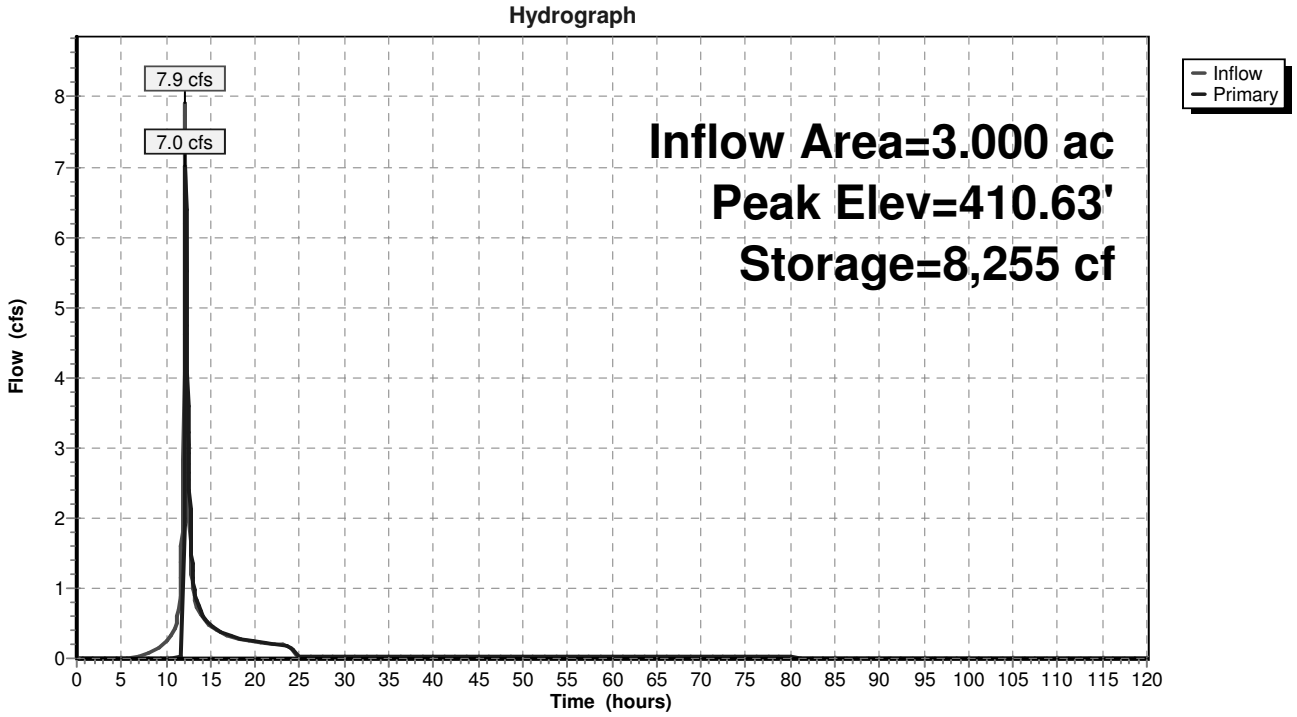
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 407.00' | 9,435 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 407.00 | 1,150 | 0 | 0 |
| 408.00 | 1,730 | 1,440 | 1,440 |
| 410.00 | 3,110 | 4,840 | 6,280 |
| 411.00 | 3,200 | 3,155 | 9,435 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 406.50' | **12.0" Round Culvert**<br>L= 30.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 406.50' / 406.00' S= 0.0167 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.79 sf |
| #2 | Primary | 410.00' | **4.5' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |
| #3 | Device 1 | 407.00' | **0.3" Vert. Orifice/Grate X 2.00 columns**<br>X 4 rows with 6.0" cc spacing C= 0.600 |

**Primary OutFlow** Max=7.0 cfs @ 12.19 hrs HW=410.63' TW=406.82' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.0 cfs of 7.2 cfs potential flow)
  - **3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 8.11 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 6.9 cfs @ 2.46 fps)

## Pond 2.1P: Pretreatment Basin 2



## Summary for Pond 2.2P: I-2, Infiltration Basin

Inflow Area = 3.150 ac, 31.75% Impervious, Inflow Depth > 2.85" for 10-yr event
Inflow = 7.2 cfs @ 12.19 hrs, Volume= 0.749 af
Outflow = 3.6 cfs @ 12.47 hrs, Volume= 0.749 af, Atten= 49%, Lag= 16.5 min
Discarded = 0.5 cfs @ 12.47 hrs, Volume= 0.579 af
Primary = 3.2 cfs @ 12.47 hrs, Volume= 0.169 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 408.44' @ 12.47 hrs Surf.Area= 2,693 sf Storage= 6,544 cf
Flood Elev= 409.10' Surf.Area= 3,244 sf Storage= 8,490 cf

Plug-Flow detention time= 108.2 min calculated for 0.748 af (100% of inflow)
Center-of-Mass det. time= 108.0 min ( 1,450.6 - 1,342.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 404.00' | 11,750 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

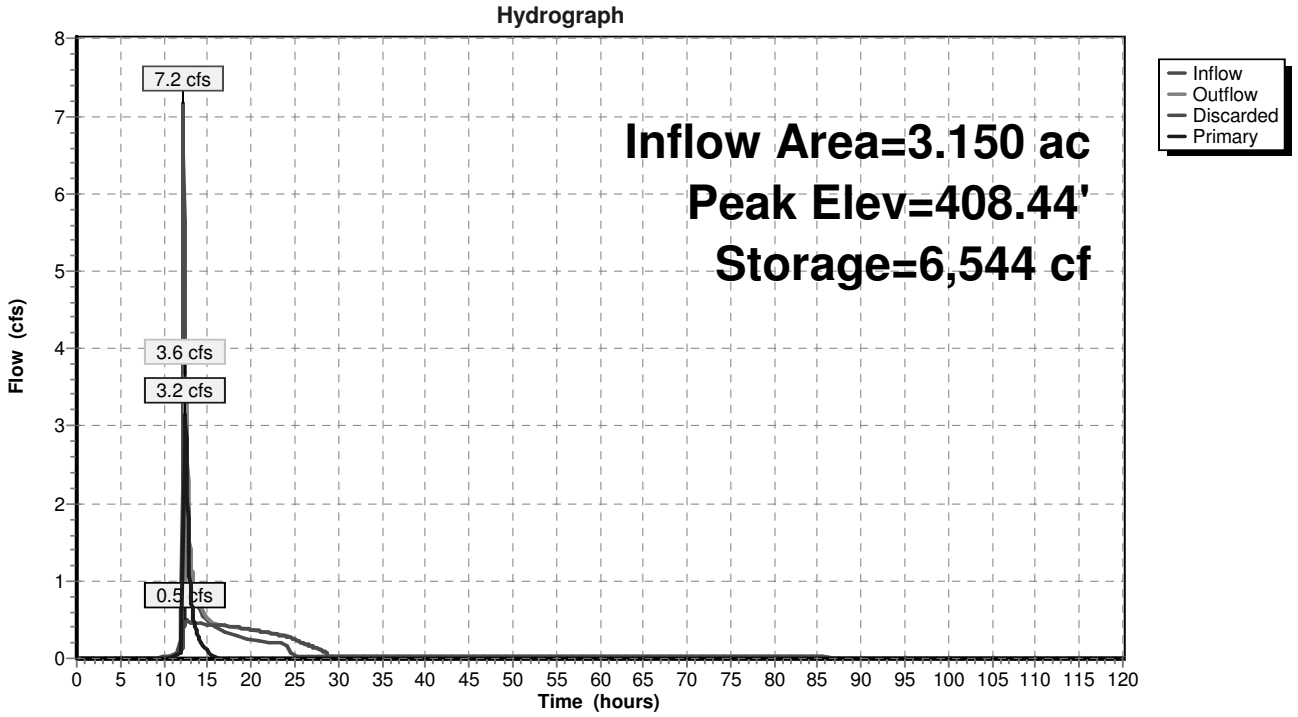
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 404.00 | 450 | 0 | 0 |
| 406.00 | 1,330 | 1,780 | 1,780 |
| 408.00 | 2,320 | 3,650 | 5,430 |
| 410.00 | 4,000 | 6,320 | 11,750 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 403.00' | **18.0" Round Culvert**<br>L= 31.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 403.00' / 402.50' S= 0.0161 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.77 sf |
| #2 | Discarded | 404.00' | **8.000 in/hr Exfiltration over Surface area** Phase-In= 0.03' |
| #3 | Device 1 | 408.00' | **3.6' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.5 cfs @ 12.47 hrs HW=408.44' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.5 cfs)

**Primary OutFlow** Max=3.1 cfs @ 12.47 hrs HW=408.44' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 3.1 cfs of 18.4 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 3.1 cfs @ 1.96 fps)

## Pond 2.2P: I-2, Infiltration Basin



## Summary for Subcatchment 1.1AS:

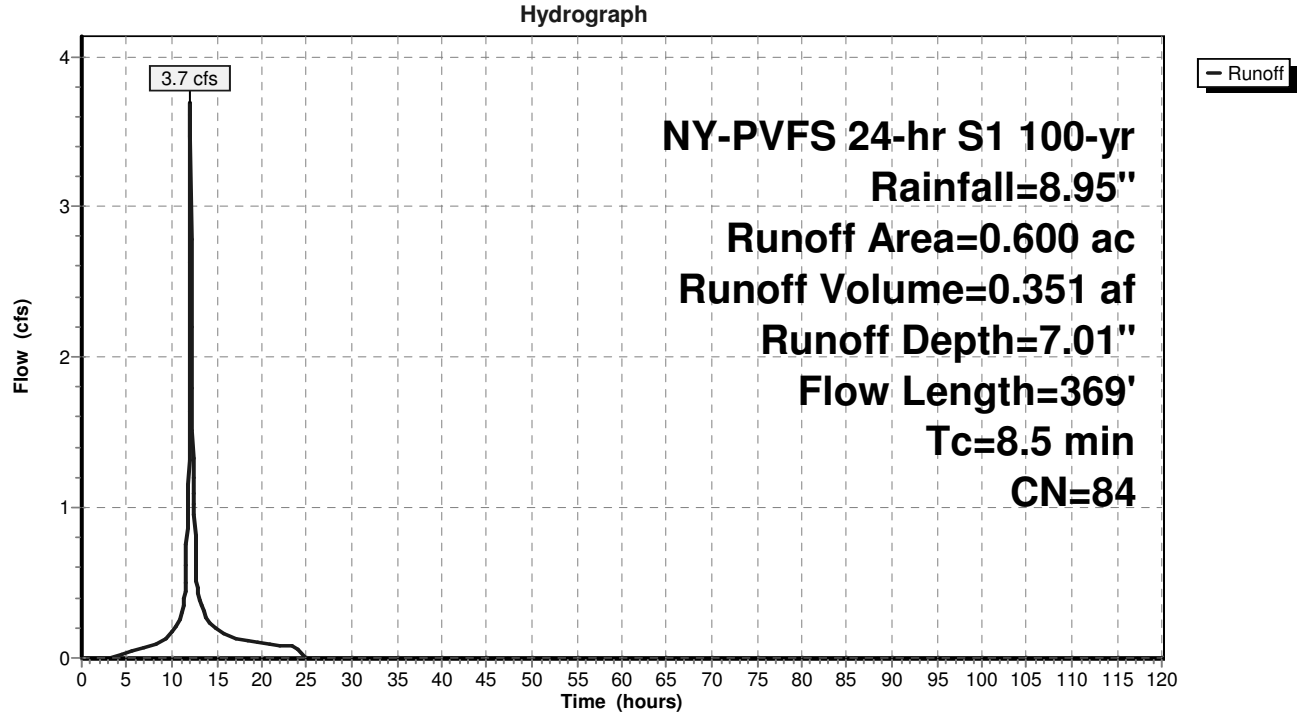
Runoff = 3.7 cfs @ 12.07 hrs, Volume= 0.351 af, Depth= 7.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 100-yr Rainfall=8.95"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 61 | >75% Grass cover, Good, HSG B |
| 0.200 | 74 | >75% Grass cover, Good, HSG C |
| 0.300 | 98 | Paved parking & roofs |
| 0.600 | 84 | Weighted Average |
| 0.300 | | 50.00% Pervious Area |
| 0.300 | | 50.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.7 | 100 | 0.0470 | 0.25 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 1.0 | 96 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 173 | 0.0300 | 3.52 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 8.5 | 369 | Total | | | |

## Subcatchment 1.1AS:



## Summary for Subcatchment 1.1BS:

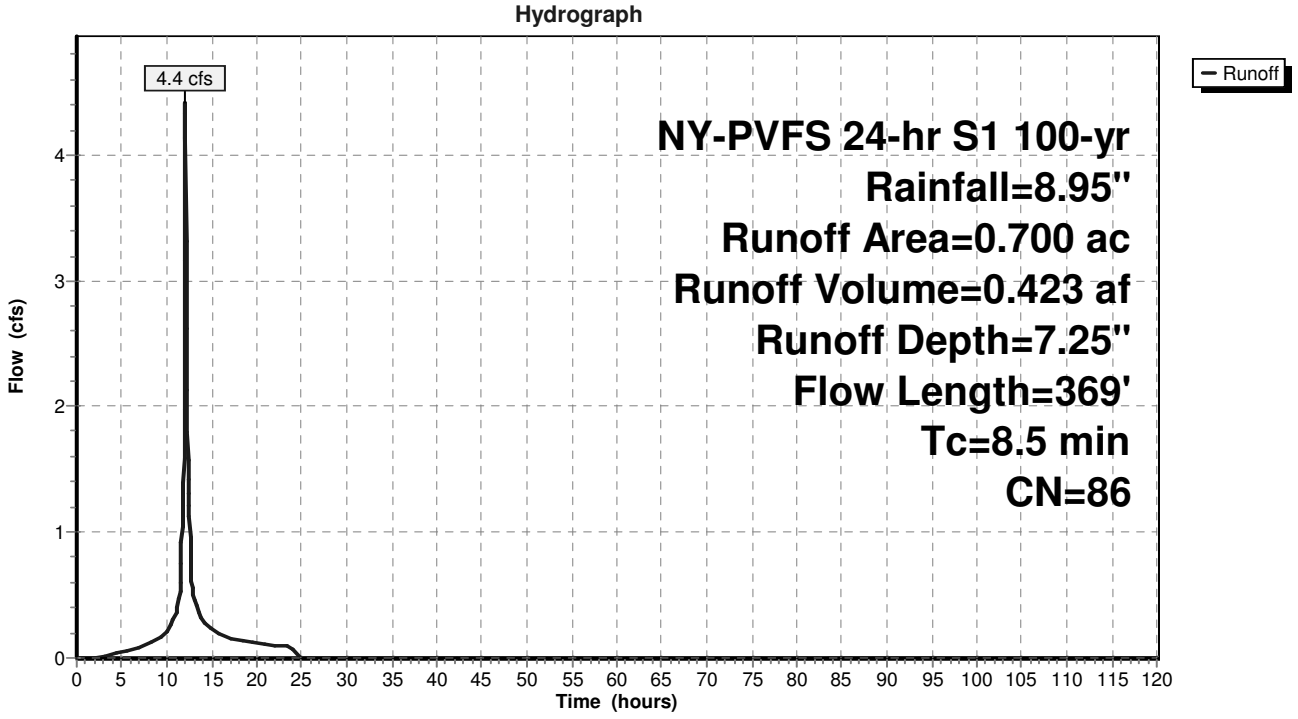
Runoff = 4.4 cfs @ 12.07 hrs, Volume= 0.423 af, Depth= 7.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 100-yr Rainfall=8.95"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 61 | >75% Grass cover, Good, HSG B |
| 0.200 | 74 | >75% Grass cover, Good, HSG C |
| 0.400 | 98 | Paved parking & roofs |
| 0.700 | 86 | Weighted Average |
| 0.300 | | 42.86% Pervious Area |
| 0.400 | | 57.14% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.7 | 100 | 0.0470 | 0.25 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 1.0 | 96 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 173 | 0.0300 | 3.52 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 8.5 | 369 | Total | | | |

## Subcatchment 1.1BS:



## Summary for Subcatchment 1.2S:

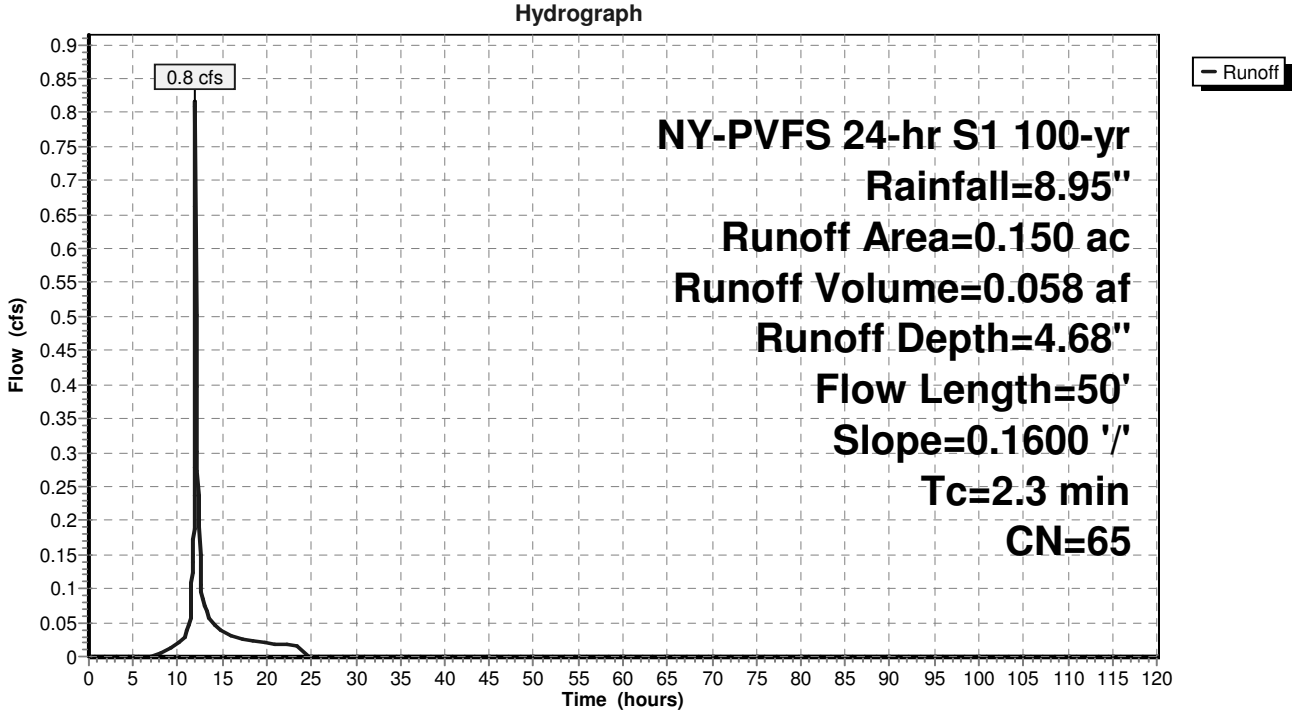
Runoff = 0.8 cfs @ 11.99 hrs, Volume= 0.058 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 100-yr Rainfall=8.95"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 61 | >75% Grass cover, Good, HSG B |
| 0.050 | 74 | >75% Grass cover, Good, HSG C |
| 0.150 | 65 | Weighted Average |
| 0.150 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.3 | 50 | 0.1600 | 0.36 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |

## Subcatchment 1.2S:



## Summary for Subcatchment 2.1S:

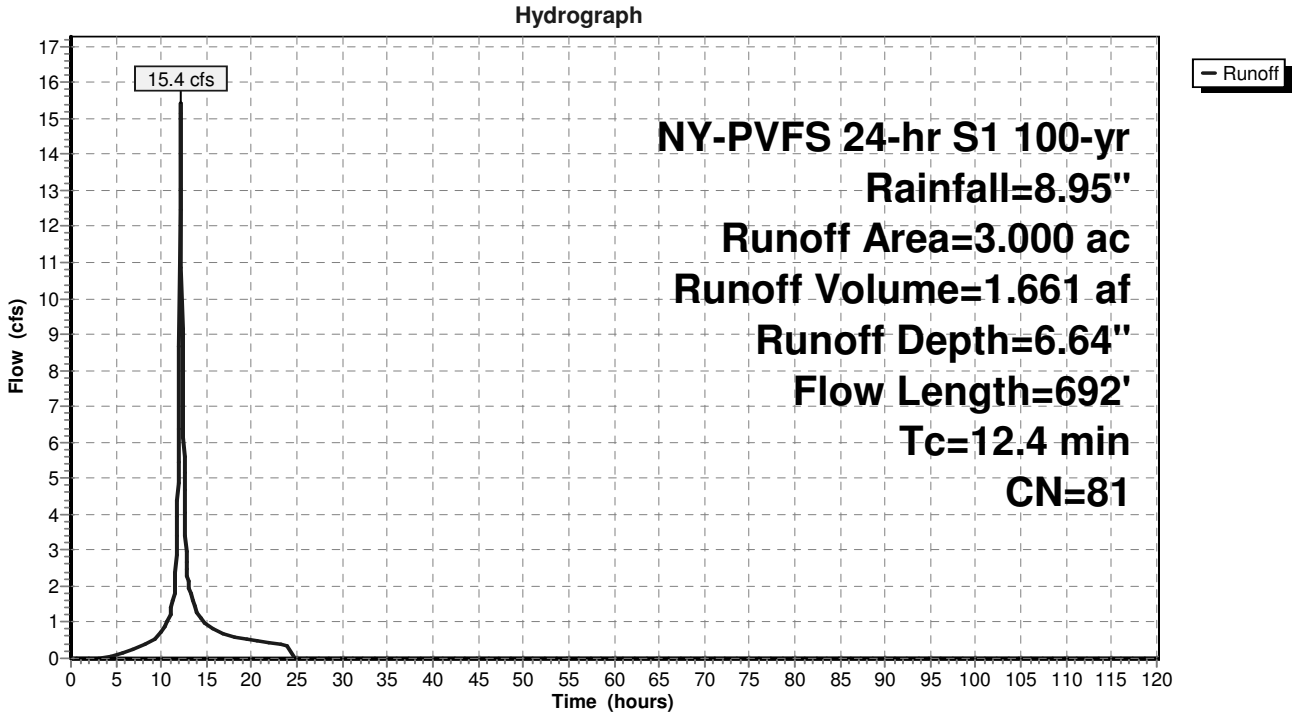
Runoff = 15.4 cfs @ 12.12 hrs, Volume= 1.661 af, Depth= 6.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 100-yr Rainfall=8.95"

| Area (ac) | CN | Description |
|---|---|---|
| 1.000 | 98 | Paved parking & roofs |
| 1.600 | 74 | >75% Grass cover, Good, HSG C |
| 0.400 | 70 | Woods, Good, HSG C |
| 3.000 | 81 | Weighted Average |
| 2.000 | | 66.67% Pervious Area |
| 1.000 | | 33.33% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.9 | 100 | 0.0350 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50" |
| 0.1 | 36 | 0.1600 | 6.00 | | **Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps |
| 0.9 | 296 | 0.1500 | 5.76 | 8.64 | **Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.050 |
| 0.4 | 140 | 0.1500 | 5.76 | 8.64 | **Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.050 |
| 0.1 | 120 | 0.1000 | 15.54 | 12.21 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 |
| 12.4 | 692 | Total | | | |

## Subcatchment 2.1S:



## Summary for Subcatchment 2.2S:

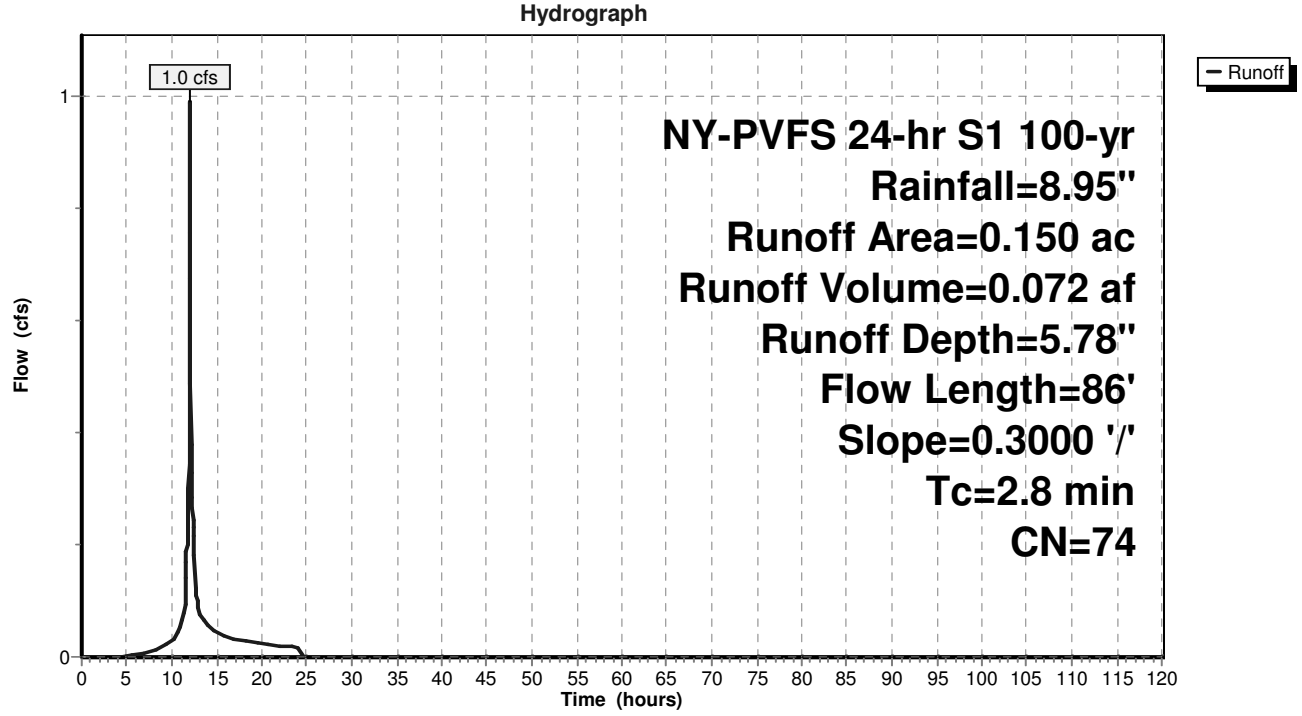
Runoff = 1.0 cfs @ 12.00 hrs, Volume= 0.072 af, Depth= 5.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 100-yr Rainfall=8.95"

| Area (ac) | CN | Description |
|---|---|---|
| 0.150 | 74 | >75% Grass cover, Good, HSG C |
| 0.150 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.8 | 86 | 0.3000 | 0.51 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |

## Subcatchment 2.2S:



## Summary for Subcatchment 2.3S:

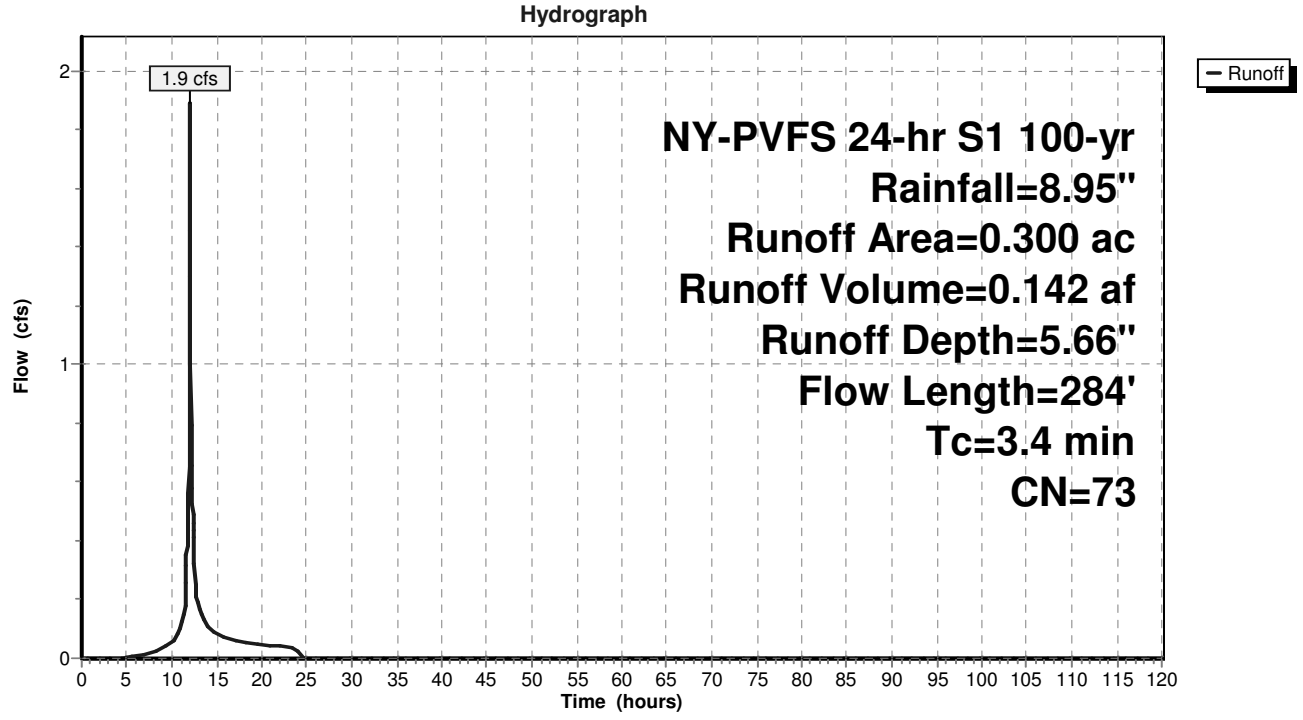
Runoff = 1.9 cfs @ 12.00 hrs, Volume= 0.142 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY-PVFS 24-hr S1 100-yr Rainfall=8.95"

| Area (ac) | CN | Description |
|---|---|---|
| 0.200 | 74 | >75% Grass cover, Good, HSG C |
| 0.100 | 72 | Woods/grass comb., Good, HSG C |
| 0.300 | 73 | Weighted Average |
| 0.300 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | 100 | 0.3500 | 0.56 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 0.4 | 184 | 0.3200 | 8.49 | | **Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps |
| 3.4 | 284 | Total | | | |

## Subcatchment 2.3S:

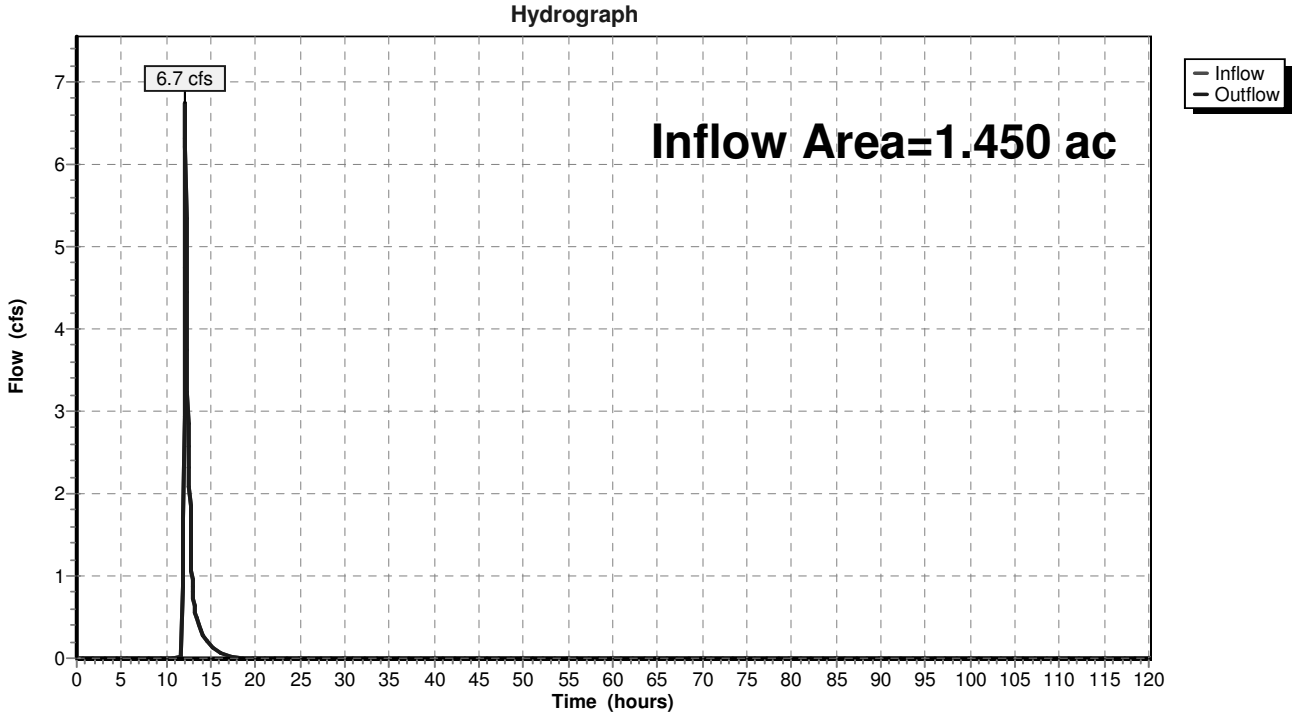


## Summary for Reach 1: DESIGN LINE 1

Inflow Area = 1.450 ac, 48.28% Impervious, Inflow Depth = 2.84" for 100-yr event
Inflow = 6.7 cfs @ 12.15 hrs, Volume= 0.343 af
Outflow = 6.7 cfs @ 12.15 hrs, Volume= 0.343 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3

## Reach 1: DESIGN LINE 1

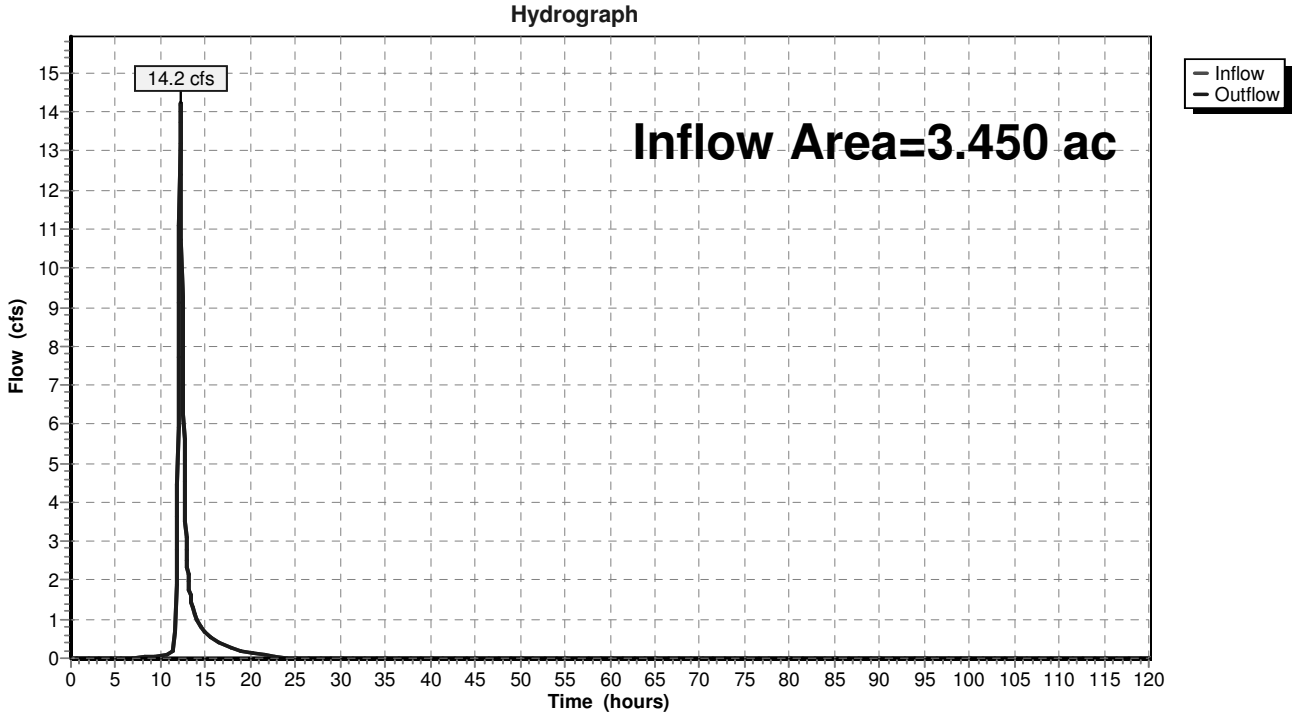


## Summary for Reach 6R: DESIGN LINE 2

Inflow Area = 3.450 ac, 28.99% Impervious, Inflow Depth = 3.80" for 100-yr event
Inflow = 14.2 cfs @ 12.21 hrs, Volume= 1.091 af
Outflow = 14.2 cfs @ 12.21 hrs, Volume= 1.091 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3

## Reach 6R: DESIGN LINE 2



## Summary for Pond 1.1AP: Pretreatment Basin 1A

Inflow Area = 0.600 ac, 50.00% Impervious, Inflow Depth = 7.01" for 100-yr event
Inflow = 3.7 cfs @ 12.07 hrs, Volume= 0.351 af
Outflow = 3.6 cfs @ 12.09 hrs, Volume= 0.351 af, Atten= 2%, Lag= 1.2 min
Primary = 0.0 cfs @ 11.28 hrs, Volume= 0.065 af
Secondary = 3.6 cfs @ 12.09 hrs, Volume= 0.286 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 473.37' @ 12.09 hrs Surf.Area= 1,371 sf Storage= 1,838 cf

Plug-Flow detention time= 203.0 min calculated for 0.351 af (100% of inflow)
Center-of-Mass det. time= 202.7 min ( 1,006.0 - 803.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 471.00' | 2,800 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

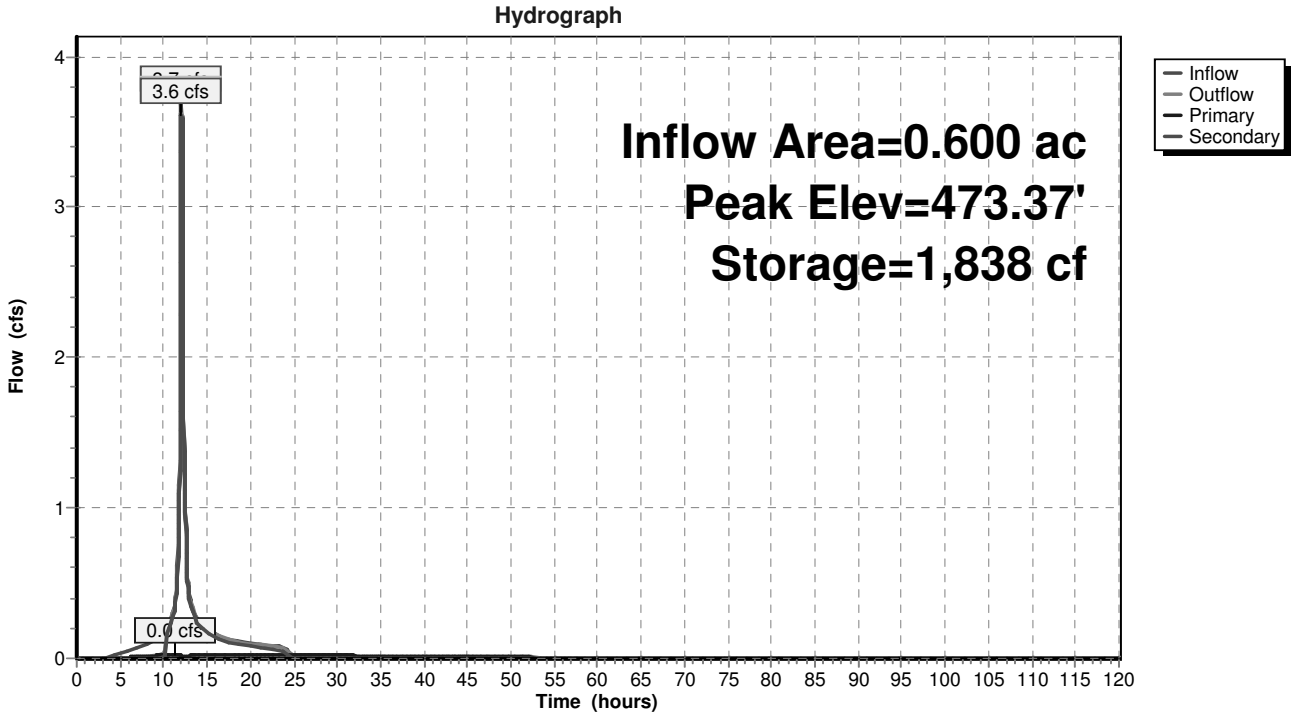
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 471.00 | 250 | 0 | 0 |
| 472.00 | 650 | 450 | 450 |
| 474.00 | 1,700 | 2,350 | 2,800 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 473.20' | **20.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 471.00' | **6.0" Round Culvert**<br>L= 30.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 471.00' / 470.50' S= 0.0167 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.20 sf |
| #3 | Device 2 | 471.00' | **0.3" Vert. Orifice/Grate X 2.00 columns**<br>X 4 rows with 6.0" cc spacing C= 0.600 |

**Primary OutFlow** Max=0.0 cfs @ 11.28 hrs HW=473.24' TW=470.99' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.0 cfs of 1.3 cfs potential flow)
└─**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 5.73 fps)

**Secondary OutFlow** Max=3.5 cfs @ 12.09 hrs HW=473.37' TW=472.95' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 3.5 cfs @ 1.03 fps)

## Pond 1.1AP: Pretreatment Basin 1A



## Summary for Pond 1.1BP: Pretreatment Basin 1B

Inflow Area = 0.700 ac, 57.14% Impervious, Inflow Depth = 7.25" for 100-yr event
Inflow = 4.4 cfs @ 12.07 hrs, Volume= 0.423 af
Outflow = 4.3 cfs @ 12.09 hrs, Volume= 0.423 af, Atten= 2%, Lag= 1.1 min
Primary = 0.0 cfs @ 11.28 hrs, Volume= 0.075 af
Secondary = 4.3 cfs @ 12.09 hrs, Volume= 0.348 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 473.27' @ 12.09 hrs Surf.Area= 1,616 sf Storage= 2,378 cf

Plug-Flow detention time= 274.6 min calculated for 0.423 af (100% of inflow)
Center-of-Mass det. time= 276.5 min ( 1,073.2 - 796.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 471.00' | 3,700 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

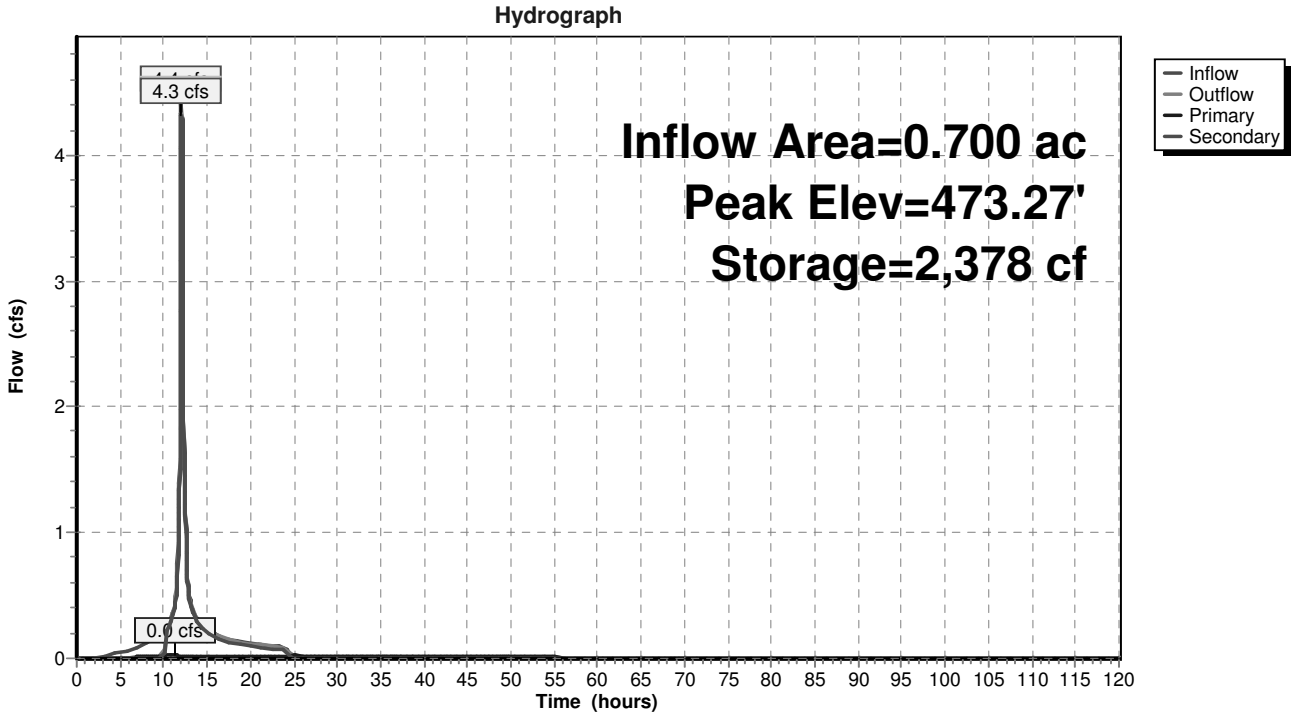
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 471.00 | 550 | 0 | 0 |
| 472.00 | 950 | 750 | 750 |
| 474.00 | 2,000 | 2,950 | 3,700 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 473.10' | **25.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 471.00' | **6.0" Round Culvert**<br>L= 30.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 471.00' / 470.50' S= 0.0167 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.20 sf |
| #3 | Device 2 | 471.00' | **0.3" Vert. Orifice/Grate X 2.00 columns**<br>X 4 rows with 6.0" cc spacing C= 0.600 |

**Primary OutFlow** Max=0.0 cfs @ 11.28 hrs HW=473.13' TW=470.99' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.0 cfs of 1.2 cfs potential flow)
└─**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 5.51 fps)

**Secondary OutFlow** Max=4.2 cfs @ 12.09 hrs HW=473.27' TW=472.94' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 4.2 cfs @ 1.02 fps)

## Pond 1.1BP: Pretreatment Basin 1B



## Summary for Pond 1.2P: I-2, Infiltration Basin

Inflow Area = 1.450 ac, 48.28% Impervious, Inflow Depth = 6.89" for 100-yr event
Inflow = 8.4 cfs @ 12.08 hrs, Volume= 0.832 af
Outflow = 7.1 cfs @ 12.15 hrs, Volume= 0.832 af, Atten= 15%, Lag= 3.8 min
Discarded = 0.4 cfs @ 12.15 hrs, Volume= 0.489 af
Primary = 6.7 cfs @ 12.15 hrs, Volume= 0.343 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 473.02' @ 12.15 hrs Surf.Area= 2,864 sf Storage= 5,987 cf

Plug-Flow detention time= 79.3 min calculated for 0.832 af (100% of inflow)
Center-of-Mass det. time= 79.3 min ( 1,108.7 - 1,029.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 470.00' | 9,100 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

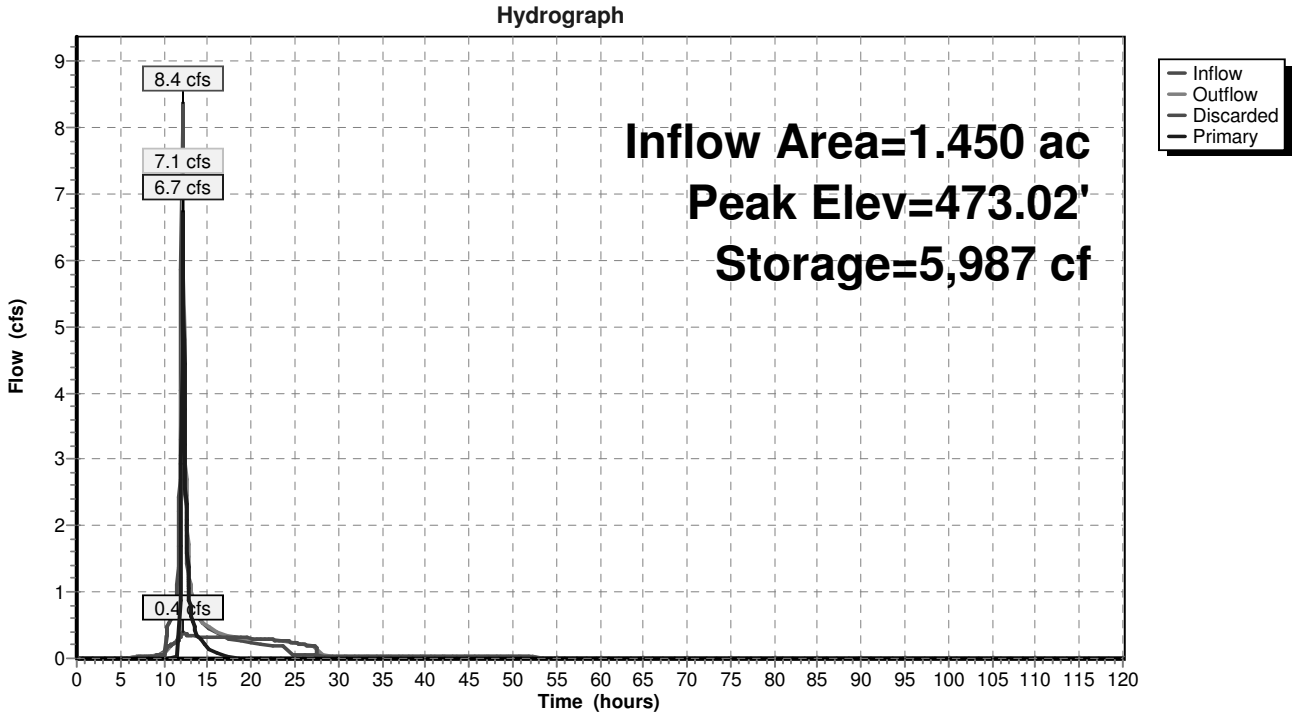
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 470.00 | 1,200 | 0 | 0 |
| 472.00 | 2,200 | 3,400 | 3,400 |
| 474.00 | 3,500 | 5,700 | 9,100 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 469.00' | **15.0" Round Culvert**<br>L= 57.0' CMP, end-section conforming to fill, Ke= 0.500<br>Inlet / Outlet Invert= 469.00' / 468.50' S= 0.0088 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.23 sf |
| #2 | Discarded | 470.00' | **6.000 in/hr Exfiltration over Surface area** Phase-In= 0.02' |
| #3 | Device 1 | 472.10' | **2.3' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.4 cfs @ 12.15 hrs HW=473.02' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.4 cfs)

**Primary OutFlow** Max=6.7 cfs @ 12.15 hrs HW=473.02' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 6.7 cfs of 10.9 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 6.7 cfs @ 3.18 fps)

## Pond 1.2P: I-2, Infiltration Basin



## Summary for Pond 2.1P: Pretreatment Basin 2

Inflow Area = 3.000 ac, 33.33% Impervious, Inflow Depth = 6.64" for 100-yr event
Inflow = 15.4 cfs @ 12.12 hrs, Volume= 1.661 af
Outflow = 14.6 cfs @ 12.17 hrs, Volume= 1.640 af, Atten= 5%, Lag= 2.6 min
Primary = 14.6 cfs @ 12.17 hrs, Volume= 1.640 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 410.99' @ 12.17 hrs Surf.Area= 3,199 sf Storage= 9,389 cf
Flood Elev= 412.00' Surf.Area= 3,200 sf Storage= 9,435 cf

Plug-Flow detention time= 254.2 min calculated for 1.640 af (99% of inflow)
Center-of-Mass det. time= 246.6 min ( 1,063.0 - 816.4 )

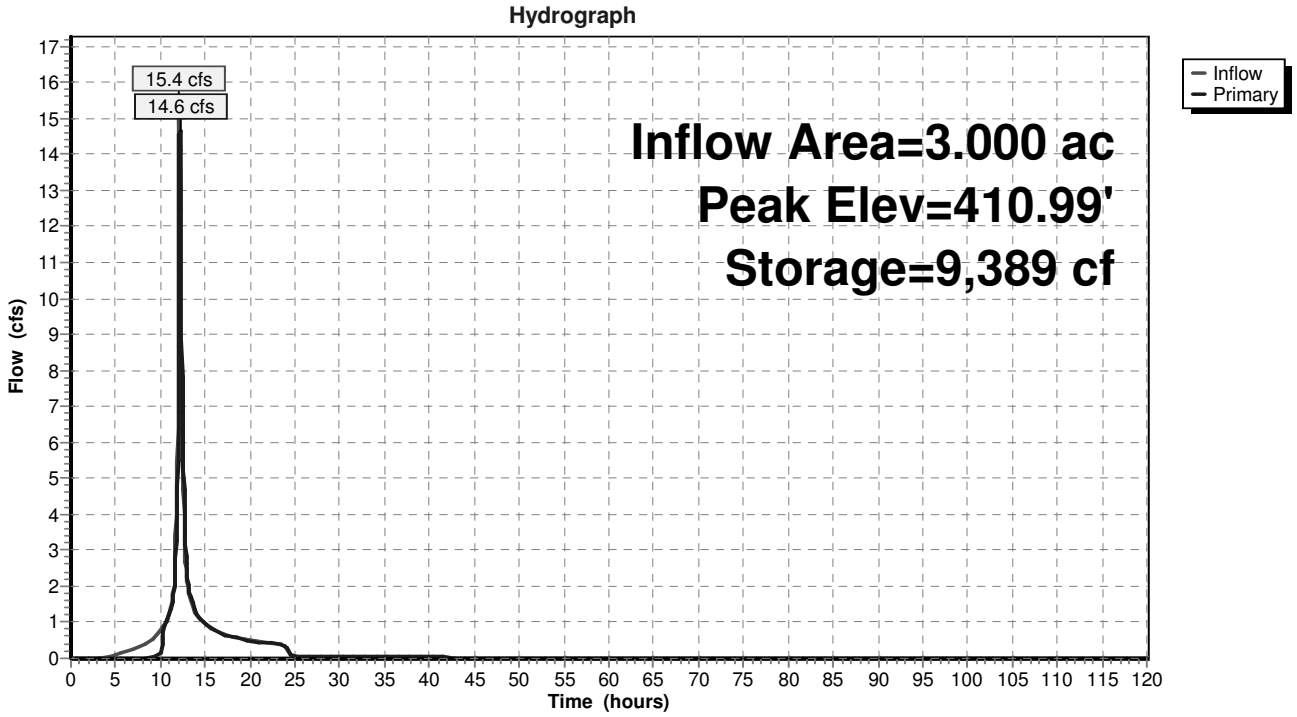
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 407.00' | 9,435 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 407.00 | 1,150 | 0 | 0 |
| 408.00 | 1,730 | 1,440 | 1,440 |
| 410.00 | 3,110 | 4,840 | 6,280 |
| 411.00 | 3,200 | 3,155 | 9,435 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 406.50' | **12.0" Round Culvert**<br>L= 30.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 406.50' / 406.00' S= 0.0167 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.79 sf |
| #2 | Primary | 410.00' | **4.5' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |
| #3 | Device 1 | 407.00' | **0.3" Vert. Orifice/Grate X 2.00 columns**<br>X 4 rows with 6.0" cc spacing C= 0.600 |

**Primary OutFlow** Max=14.4 cfs @ 12.17 hrs HW=410.98' TW=409.04' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.0 cfs of 5.3 cfs potential flow)
  - **3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 6.69 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 14.4 cfs @ 3.28 fps)

## Pond 2.1P: Pretreatment Basin 2



## Summary for Pond 2.2P: I-2, Infiltration Basin

Inflow Area = 3.150 ac, 31.75% Impervious, Inflow Depth > 6.52" for 100-yr event
Inflow = 15.0 cfs @ 12.16 hrs, Volume= 1.713 af
Outflow = 14.2 cfs @ 12.21 hrs, Volume= 1.713 af, Atten= 5%, Lag= 2.9 min
Discarded = 0.6 cfs @ 12.21 hrs, Volume= 0.763 af
Primary = 13.6 cfs @ 12.21 hrs, Volume= 0.950 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 409.09' @ 12.21 hrs Surf.Area= 3,236 sf Storage= 8,458 cf
Flood Elev= 409.10' Surf.Area= 3,244 sf Storage= 8,490 cf

Plug-Flow detention time= 72.5 min calculated for 1.712 af (100% of inflow)
Center-of-Mass det. time= 72.4 min ( 1,125.4 - 1,053.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 404.00' | 11,750 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

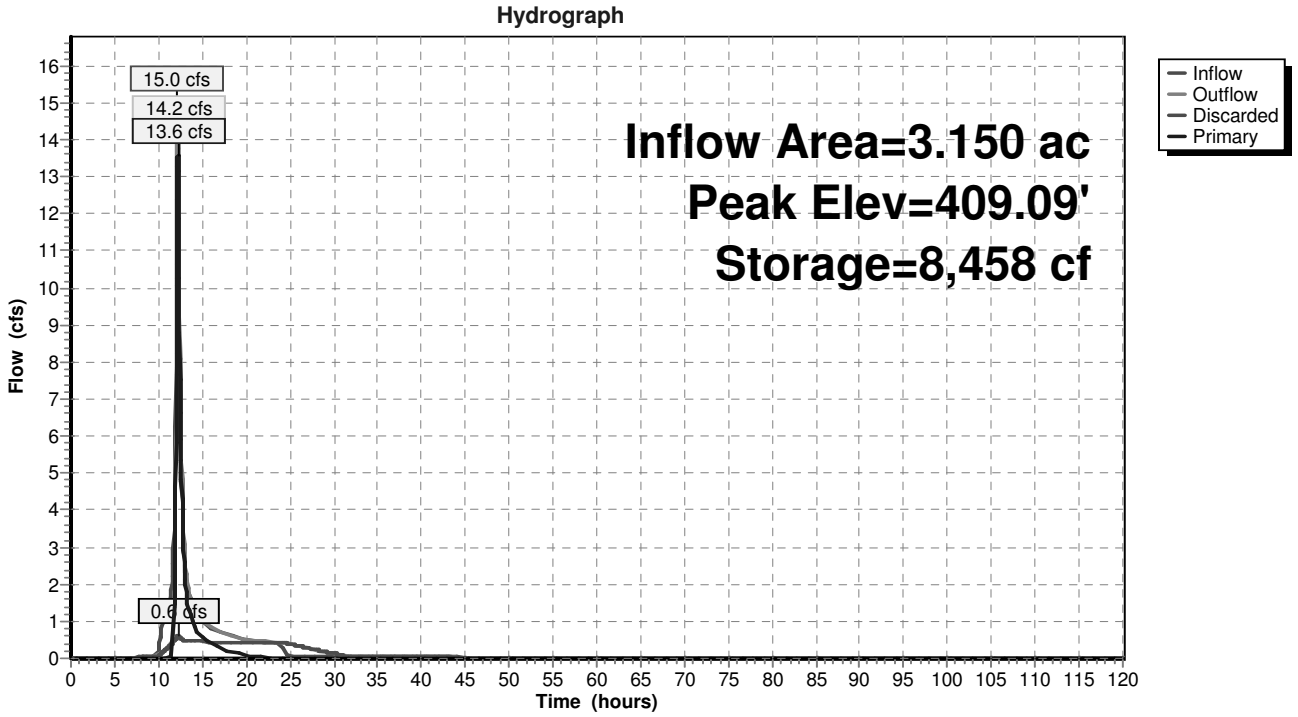
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 404.00 | 450 | 0 | 0 |
| 406.00 | 1,330 | 1,780 | 1,780 |
| 408.00 | 2,320 | 3,650 | 5,430 |
| 410.00 | 4,000 | 6,320 | 11,750 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 403.00' | **18.0" Round Culvert**<br>L= 31.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 403.00' / 402.50' S= 0.0161 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.77 sf |
| #2 | Discarded | 404.00' | **8.000 in/hr Exfiltration over Surface area** Phase-In= 0.03' |
| #3 | Device 1 | 408.00' | **3.6' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.6 cfs @ 12.21 hrs HW=409.08' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.6 cfs)

**Primary OutFlow** Max=13.5 cfs @ 12.21 hrs HW=409.08' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 13.5 cfs of 19.6 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 13.5 cfs @ 3.45 fps)

## Pond 2.2P: I-2, Infiltration Basin



# APPENDIX C

## $WQ_v$ Volume & Peak Flow Calculations

## WQv Flow Calculation Worksheet - Subcatchment 1.1S + 1.2S

Project: Putnam Valley Fire Station
Project #: 09105.100
Date: 1/20/2020

INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

*The following calculation determines the water quality flow rate for the 90% Water Quality Event using the Small Storm Hydrology Method specified in Appendix B of the New York State Stormwater Management Design Manual.*

**Subcatchment ID: 1.1 + 1.2**

1.Water Quality Volume $= WQ_v = \frac{P * R_v * A}{12}$

| | | | |
|---|---|---|---|
| P = WQv 24-hour Rainfall Amount | = | 1.4 | in. |
| A = Subcatchment Area | = | 1.5 | AC |
| Ai= Impervious Area within Subcatchment Area | = | 0.7 | AC |
| I = Ai/A | = | 46.7 | % |
| Rv = 0.05 + 0.009 (I%) | = | 0.47 | |
| WQv = Water Quality Volume | = | 3,583 | CF |

**Subcatchment ID: 1.1A**

1.Water Quality Volume $= WQ_v = \frac{P * R_v * A}{12}$

| | | | |
|---|---|---|---|
| P = WQv 24-hour Rainfall Amount | = | 1.4 | in. |
| A = Subcatchment Area | = | 0.6 | AC |
| Ai= Impervious Area within Subcatchment Area | = | 0.3 | AC |
| I = Ai/A | = | 50.0 | % |
| Rv = 0.05 + 0.009 (I%) | = | 0.50 | |
| WQv = Water Quality Volume | = | 1,525 | CF |

**Subcatchment ID: 1.1B**

1.Water Quality Volume $= WQ_v = \frac{P * R_v * A}{12}$

| | | | |
|---|---|---|---|
| P = WQv 24-hour Rainfall Amount | = | 1.4 | in. |
| A = Subcatchment Area | = | 0.7 | AC |
| Ai= Impervious Area within Subcatchment Area | = | 0.4 | AC |
| I = Ai/A | = | 57.1 | % |
| Rv = 0.05 + 0.009 (I%) | = | 0.56 | |
| WQv = Water Quality Volume | = | 1,992 | CF |

## WQv Flow Calculation Worksheet - Subcatchment 2.1S + 2.2S

Project: Putnam Valley Fire Station
Project #: 09105.100
Date: 1/20/2020

INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

*The following calculation determines the water quality flow rate for the 90% Water Quality Event using the Small Storm Hydrology Method specified in Appendix B of the New York State Stormwater Management Design Manual.*

**Subcatchment ID: 2.1 + 2.2**

1.Water Quality Volume $= WQ_v = \frac{P * R_v * A}{12}$

| | | |
|---|---|---|
| P = WQv 24-hour Rainfall Amount | = | 1.4 in. |
| A = Subcatchment Area | = | 3.2 AC |
| Ai= Impervious Area within Subcatchment Area | = | 1.0 AC |
| I = Ai/A | = | 31.3 % |
| Rv = 0.05 + 0.009 (I%) | = | 0.33 |
| WQv = Water Quality Volume | = | 5,367 CF |

# APPENDIX D
## NYSDEC Runoff Reduction Calculations

## RRv Calculation Worksheet - Entire Site

Project: PVFD
Project #: 09105.100
Date: 1/20/2020

INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

*1. RRv Initial = Water Quality Volume (WQv)* *0.205 ac-ft* = *8,950 c.f.*
(refer to HydroCAD Subcatchments 1.1S for Water Quality Volume)

2. *RRv Minimum* = [ (P) (Rv) (S) (Aic)] /12 where…

| | | | |
|---|---|---|---|
| P = Rainfall (in.) | = | 1.40 | in. |
| Rv = 0.05 + 0.009 (100%) | = | 0.95 | |
| S = Hydrologic Soil Group Specific Reduction Factor | = | 0.31 | |
| [HSG A = 0.55] [HSG B = 0.40] [HSG C = 0.30] [HSG D = 0.20] | | | |
| Aic = Total area of new impervious cover | = | 1.7 | Acres |
| *RRv Minimum* | = | *2,544* | *c.f.* |

3. *RRv Required* = RRv Initial - Green Infrastructure Practice (GIP) with Area Reduction

| GIP with Area Reduction Applied in Project | | |
|---|---|---|
| 5.3.1 Conservation of Natural Area | N/A | |
| 5.3.2 Sheet Flow to Riparian Buffers or Filter Strips | N/A | |
| 5.3.4 Tree Planting / Tree Box (3 trees at 100 s.f. per tree) | | c.f. |
| 5.3.5 Disconnection of Rooftop Runoff | - | |
| 5.3.6 Stream Daylighting | N/A | |
| RRv Required(=WQv-RRV by area)(Refer to HydroCAD output in this Appendix) | = 8,950 | c.f. |

4. *RRv Provided*

| GIP with Volume Reduction Applied in Project | WQv Treated (c.f.) | % of WQv Applied to *RRv Provided* | *RRv Provided (c.f.)* |
|---|---|---|---|
| 5.3.3 Vegetated Open Swales [HSG A / B = 20%] [HSG C / D = 10%] {Modified HSG C - D = 15% - 12%] | | 20% | N/A |
| 5.3.7 Rain Garden [No underdrains / Good Soils = 100%] [With underdrains / Poor Soils = 40%] | | 40% | N/A |
| 5.3.8 Green Roof [RRv provided equals volume provided in Green Roof] | | 100% | N/A |
| 5.3.9 Stormwater Planters [Infiltration Planters = 100%] [Flow Through HSG C = 45%] [Flow Though HSG D = 30%] | | 45% | N/A |
| 5.3.10 Rain Tank / Cisterns | | 100% | N/A |
| 5.3.11 Porous Pavement | | 100% | N/A |
| Infiltration Practice (Standard SMP) | 8,950 | 100% | 8950 |
| Bioretention Practice (Standard SMP) [Without Underdrains HSG A/B = 80%] [With Underdrain HSG C\D = 40%] | | 40% | N/A |
| Dry Swale (Open Channel Practice) (Standard SMP) [HSG A/B = 40%] [HSG C/D = 20%] | | 20% | N/A |
| *RRv Provided =* | | | *8,950* |

5. Summary

| | | | |
|---|---|---|---|
| RRv Initial | = | 8,950 c.f. | |
| RRv Required | = | 8,950 c.f. | |
| RRv Minimum | = | 2,544 c.f. | |
| RRv Provided | = | 8,950 c.f. | |
| WQv Required for Downstream SMP | = | 0 c.f. | (= RRv Required - RRv Provided) |

Is RRv Provided greater than or equal to RRv Minimum? Yes

# APPENDIX E

## Project and Owner Information

Site Data:

Putnam Valley Volunteer Fire Department, Inc.
Oscawana Lake Road
Town of Putnam Valley, New York

Tax Map Numbers: 72.20-01-7.12
Area: 10.3± acres

Owner Information:

Putnam Valley Volunteer Fire Department, Inc.
P.O. Box 21
Putnam Valley, NY 10579

Party Responsible for Implementation of the Stormwater Pollution Prevention Plan:

Putnam Valley Volunteer Fire Department, Inc.

Qualified Professional Responsible for Inspection of the Stormwater Pollution Prevention Plan:

Inspector to be determined at time of construction

# APPENDIX F

**NYSDEC SPDES for Construction Activities Construction Site Log Book**

**STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM**
**FOR CONSTRUCTION ACTIVITIES**

# CONSTRUCTION SITE LOG BOOK

## Table of Contents



Properly completing forms such as those contained in this document meet the inspection requirement of NYSDEC SPDES GP-0-15-002 for Construction Activities, or superceding permit. Completed forms shall be kept on site at all times and made available to authorities upon request.

## I. PRE-CONSTRUCTION MEETING DOCUMENTS

**Project Name** _____
**Permit No.** _____**Date of Authorization**_____
**Name of Operator** _____
**Prime Contractor** _____

**a. Preamble to Site Assessment and Inspections** -The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified professional[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements.

When construction starts, site inspections shall be conducted by the qualified professional at least every 7 calendar days (Construction Duration Inspections). The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified professional perform a final site inspection. The qualified professional shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 "Qualified Professional means a person knowledgeable in the principles and practice of erosion and sediment controls, such as a Certified Professional in Erosion and Sediment Control (CPESC), soil scientist, licensed engineer or someone working under the direction and supervision of a licensed engineer (person must have experience in the principles and practices of erosion and sediment control).

2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.

3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

**b. Operators Certification**

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal, State, and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law. "

**Name (please print):**_____

**Title** _____ **Date:**_____

**Address:** _____

**Phone:** _____ **Email:**_____

**Signature:**_____

## c. Qualified Professional's Credentials & Certification

"I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

**Name (please print):** _____

**Title** _____ **Date:** _____

**Address:** _____

**Phone:** _____ **Email:** _____

**Signature:** _____

**d. Contractors Certification Statement**

"I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I am aware that there are significant penalties for submitting false information, that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations."

_____

Signature of Contractor Date

_____

Print Name Title

_____

Signature of Trained Contractor Date

_____

Print Name of Trained Contractor Title

Name of Contracting Firm _____

Street Address _____

City, State, Zip _____

Telephone No. _____

A copy of this statement shall be retained as part of the Stormwater Pollution Prevention Plan (SWPPP) for a period off at least five (5) years after the subject property is stabilized.

**e. Pre-construction Site Assessment Checklist (NOTE: Provide comments below as necessary)**

1. Notice of Intent, SWPPP, and Contractors Certification:

**Yes No NA**

[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?_____
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?_____
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?_____
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

**Yes No NA**

[ ] [ ] [ ] Are construction limits clearly flagged or fenced?
[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

**Yes No NA**

[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.
[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.
[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Entrance

**Yes No NA**

[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Perimeter Sediment Controls

**Yes No NA**

[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.
[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals
[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.
[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

**Yes No NA**

[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[ ] [ ] [ ] The plan is contained in the SWPPP on page _____
[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? _____

## II. CONSTRUCTION DURATION INSPECTIONS

**a. Directions:**
**Inspection Forms will be filled out during the entire construction phase of the project.**
Required Elements:

(1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

(2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

(3) Indicate all disturbed site areas that have not undergone active site work during the previous 7-day period;

Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

(5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

(6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

**SITE PLAN/SKETCH**

_____ _____

**Inspector (print name)** **Date of Inspection**

_____ _____

**Qualified Professional (print name)** **Qualified Professional Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

**Maintaining Water Quality**

**Yes No NA**

[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions?

[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease?

[ ] [ ] [ ] All disturbance is within the limits of the approved plans.

[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

**Housekeeping**

1. General Site Conditions

**Yes No NA**

[ ] [ ] [ ] Is construction site litter and debris appropriately managed?

[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?

[ ] [ ] [ ] Is construction impacting the adjacent property?

[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing

**Yes No NA**

[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.

[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.

[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?

[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

**Runoff Control Practices**

1. Excavation Dewatering

**Yes No NA**

[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.

[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.

[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.

[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

2. Level Spreader

**Yes No NA**

[ ] [ ] [ ] Installed per plan.

[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.

[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales

**Yes No NA**

[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.

[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.

[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

**Runoff Control Practices (continued)**

4. Stone Check Dam

**Yes No NA**

[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?

5. Rock Outlet Protection

**Yes No NA**

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

**Soil Stabilization**

1. Topsoil and Spoil Stockpiles

**Yes No NA**

[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

**Yes No NA**

[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

**Sediment Control**

1. Stabilized Construction Entrance

**Yes No NA**

[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence

**Yes No NA**

[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation is ___% of design capacity.

**Sediment Control (continued)**

3. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated practices)

**Yes No NA**

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation ___% of design capacity.

4. Temporary Sediment Trap

**Yes No NA**

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.

Sediment accumulation is ___% of design capacity.

5. Temporary Sediment Basin

**Yes No NA**

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.

Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design.
Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

**CONSTRUCTION DURATION INSPECTIONS**
**b. Modifications to the SWPPP (To be completed as described below)**

The Operator shall amend the SWPPP whenever:
1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

**Modification & Reason:**

# APPENDIX G

**Stormwater Management Practice Checklists**

# Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project _____
Location: _____
Site Status: _____

Date: _____
Time: _____

Inspector: _____

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| **1. Embankment and emergency spillway (Annual, After Major Storms)** | | |
| 1. Vegetation and ground cover adequate | | |
| 2. Embankment erosion | | |
| 3. Animal burrows | | |
| 4. Unauthorized planting | | |
| 5. Cracking, bulging, or sliding of dam | | |
| a. Upstream face | | |
| b. Downstream face | | |
| c. At or beyond toe | | |
| downstream | | |
| upstream | | |
| d. Emergency spillway | | |
| 6.Pond, toe & chimney drains clear and functioning | | |
| 7.Seeps/leaks on downstream face | | |
| 8.Slope protection or riprap failure | | |
| 9. Vertical/horizontal alignment of top of dam "As-Built" | | |

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| 10. Emergency spillway clear of obstructions and debris | | |
| 11. Other (specify) | | |
| **2. Riser and principal spillway (Annual)** | | |
| Type: Reinforced concrete _____<br>Corrugated pipe _____<br>Masonry _____<br>1. Low flow orifice obstructed | | |
| 2. Low flow trash rack.<br>a. Debris removal necessary | | |
| b. Corrosion control | | |
| 3. Weir trash rack maintenance<br>a. Debris removal necessary | | |
| b. corrosion control | | |
| 4. Excessive sediment accumulation insider riser | | |
| 5. Concrete/masonry condition riser and barrels<br>a. cracks or displacement | | |
| b. Minor spalling (<1" ) | | |
| c. Major spalling (rebars exposed) | | |
| d. Joint failures | | |
| e. Water tightness | | |
| 6. Metal pipe condition | | |
| 7. Control valve<br>a. Operational/exercised | | |
| b. Chained and locked | | |
| 8. Pond drain valve<br>a. Operational/exercised | | |
| b. Chained and locked | | |
| 9. Outfall channels functioning | | |
| 10. Other (specify) | | |

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| **3. Permanent Pool (Wet Ponds) (monthly)** | | |
| 1. Undesirable vegetative growth | | |
| 2. Floating or floatable debris removal required | | |
| 3. Visible pollution | | |
| 4. Shoreline problem | | |
| 5. Other (specify) | | |
| **4. Sediment Forebays** | | |
| 1.Sedimentation noted | | |
| 2. Sediment cleanout when depth < 50% design depth | | |
| **5. Dry Pond Areas** | | |
| 1. Vegetation adequate | | |
| 2. Undesirable vegetative growth | | |
| 3. Undesirable woody vegetation | | |
| 4. Low flow channels clear of obstructions | | |
| 5. Standing water or wet spots | | |
| 6. Sediment and / or trash accumulation | | |
| 7. Other (specify) | | |
| **6. Condition of Outfalls (Annual , After Major Storms)** | | |
| 1. Riprap failures | | |
| 2. Slope erosion | | |
| 3. Storm drain pipes | | |
| 4.Endwalls / Headwalls | | |
| 5. Other (specify) | | |
| **7. Other ( Monthly)** | | |
| 1. Encroachment on pond, wetland or easement area | | |

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| 2. Complaints from residents | | |
| 3.Aesthetics<br>a. Grass growing required | | |
| b. Graffiti removal needed | | |
| c. Other (specify) | | |
| 4. Conditions of maintenance access routes. | | |
| 5. Signs of hydrocarbon build-up | | |
| 6. Any public hazards (specify) | | |
| **8. Wetland Vegetation (Annual)** | | |
| 1. Vegetation healthy and growing<br>Wetland maintaining 50% surface area coverage of wetland plants after the second growing season.<br>(If unsatisfactory, reinforcement plantings needed) | | |
| 2. Dominant wetland plants:<br>Survival of desired wetland plant species<br>Distribution according to landscaping plan? | | |
| 3. Evidence of invasive species | | |
| 4. Maintenance of adequate water depths for desired wetland plant species | | |
| 5. Harvesting of emergent plantings needed | | |
| 6. Have sediment accumulations reduced pool volume significantly or are plants “choked” with sediment | | |
| 7. Eutrophication level of the wetland. | | |
| 8. Other (specify) | | |

## Comments:

## Actions to be Taken:

# Infiltration Trench Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| **1. Debris Cleanout (Monthly)** | | |
| Trench surface clear of debris | | |
| Inflow pipes clear of debris | | |
| Overflow spillway clear of debris | | |
| Inlet area clear of debris | | |
| **2. Sediment Traps or Forebays (Annual)** | | |
| Obviously trapping sediment | | |
| Greater than 50% of storage volume remaining | | |
| **3. Dewatering (Monthly)** | | |
| Trench dewaters between storms | | |
| **4. Sediment Cleanout of Trench (Annual)** | | |
| No evidence of sedimentation in trench | | |
| Sediment accumulation doesn't yet require cleanout | | |
| **5. Inlets (Annual)** | | |

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| Good condition | | |
| No evidence of erosion | | |
| **6. Outlet/Overflow Spillway (Annual)** | | |
| Good condition, no need for repair | | |
| No evidence of erosion | | |
| **7. Aggregate Repairs (Annual)** | | |
| Surface of aggregate clean | | |
| Top layer of stone does not need replacement | | |
| Trench does not need rehabilitation | | |

## Comments:

## Actions to be Taken:

# APPENDIX H

**Collection and Conveyance System Sizing Calculations**

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**DRAINAGE SYSTEM CALCULATIONS**

Design Storm: 100-Year

PROJECT: Putnam Valley Fire Station #1

JOB NUMBER: 09105.101

BY: JWM DATE: 1-20-20

| STRUCTURE | | IMPERVIOUS AREA | | | PERVIOUS AREA | | | CA | TIME OF CONC. (min.) | | | I | Q (cfs) | | PIPE DESIGN | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | A (ac.) | C | CA | A (ac.) | C | CA | | INLET | PIPE | TOTAL | | DESIGN | CAP. | V(ft/s) | n | s (%) | L (ft) | DIA (in) |
| OS 1.2P | CB 1 | **Pipe Sized in HydroCAD** | | | | | | | | | | | | | | | | | |
| CB 1 | EX CB | **0.08** | 0.9 | 0.07 | **0.04** | 0.3 | 0.01 | 0.08 | **5** | - | 5 | **6.3** | 7.2 | 9.9 | 8.8 | **0.012** | **2.0** | **46** | **15** |
| DI 4 | DI 3 | **0.12** | 0.9 | 0.11 | **0.02** | 0.3 | 0.01 | 0.11 | **5** | - | 5 | **9.2** | 1.0 | 4.0 | 4.3 | **0.012** | **1.1** | **55** | **12** |
| DI 3 | ES 2 | **0.11** | 0.9 | 0.10 | **0.00** | 0.3 | 0.00 | 0.21 | **5** | - | 5 | **9.2** | 2.0 | 3.9 | 4.9 | **0.012** | **1.0** | **130** | **12** |
| DI 14 | DI 13 | **0.06** | 0.9 | 0.05 | **0.02** | 0.3 | 0.01 | 0.06 | **5** | - | 5 | **9.2** | 0.6 | 1.3 | 3.6 | **0.012** | **1.0** | **110** | **8** |
| DI 13 | DI 12 | **0.12** | 0.9 | 0.11 | **0.03** | 0.3 | 0.01 | 0.18 | **5** | - | 5 | **9.2** | 1.6 | 6.5 | 6.9 | **0.012** | **2.8** | **124** | **12** |
| DI 12 | DI 11 | **0.30** | 0.9 | 0.27 | **0.06** | 0.3 | 0.02 | 0.66 | **5** | - | 5 | **9.2** | 6.1 | 6.1 | 8.9 | **0.012** | **2.5** | **97** | **12** |
| DI 11 | ES 10 | **0.40** | 0.9 | 0.36 | **0.05** | 0.3 | 0.02 | 1.04 | **5** | - | 5 | **9.2** | 9.5 | 17.1 | 22.4 | **0.012** | **19.7** | **33** | **12** |
| DI 12B | DI 12A | **0.08** | 0.9 | 0.07 | **0.02** | 0.3 | 0.01 | 0.08 | **5** | - | 5 | **9.2** | 0.7 | 3.9 | 3.8 | **0.012** | **1.0** | **90** | **12** |
| DI 12A | DI 12 | **0.12** | 0.9 | 0.11 | **0.03** | 0.3 | 0.01 | 0.20 | **5** | - | 5 | **9.2** | 1.8 | 4.0 | 5.0 | **0.012** | **1.1** | **55** | **12** |
| DI 7 | ES 6 | **0.00** | 0.9 | 0.00 | **0.75** | 0.3 | 0.23 | 1.26 | **8** | - | 8 | **8.5** | 10.7 | 13.5 | 12.2 | **0.012** | **3.7** | **27** | **15** |
| DI 6A | ES 5 | **0.00** | 0.9 | 0.00 | **0.52** | 0.3 | 0.16 | 1.42 | **11** | - | 11 | **7.8** | 11.0 | 13.1 | 12.0 | **0.012** | **3.5** | **51** | **15** |
| OS2.2P | ES 13 | **Pipe Sized in HydroCAD** | | | | | | | | | | | | | | | | | |
| DI 16 | ES 15 | **0.50** | 0.9 | 0.45 | **4.50** | 0.3 | 1.35 | 1.80 | **5** | - | 5 | **9.2** | 16.6 | 16.9 | 10.9 | **0.012** | **2.2** | **183** | **18** |

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**EXISTING OSCAWANA LAKE ROAD**
**DRAINAGE SYSTEM CALCULATIONS**
Design Storm: 25-Year

PROJECT: Putnam Valley Fire Station #1
JOB NUMBER: 09105.101
BY: JWM DATE: 1-20-20

| STRUCTURE | | IMPERVIOUS AREA | | | PERVIOUS AREA | | | CA | TIME OF CONC. (min.) | | | I | Q (cfs) | | PIPE DESIGN | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM | TO | A (ac.) | C | CA | A (ac.) | C | CA | | INLET | PIPE | TOTAL | | DESIGN | CAP. | V(ft/s) | n | s (%) | L (ft) | DIA (in) |
| OS 1.2P | CB 1 | **Pipe Sized in HydroCAD** | | | | | | | | | | | | | | | | | |
| CB 1 | EX CB 1 | **0.08** | 0.9 | 0.07 | **0.04** | 0.3 | 0.01 | 0.08 | **5** | - | 5 | **7.4** | 3.3 | 9.9 | 7.3 | **0.012** | **2.0** | **46** | **15** |
| EX CB 1 | EX CB 2 | **0.52** | 0.9 | 0.47 | **0.24** | 0.3 | 0.07 | 0.62 | **5** | - | 5 | **7.4** | 7.3 | 26.0 | 12.7 | **0.012** | **5.2** | **25** | **18** |
| EX CB 2 | EX CB 3 | **0.00** | 0.9 | 0.00 | **0.15** | 0.3 | 0.05 | 0.67 | **5** | - | 5 | **7.4** | 7.7 | 20.8 | 10.9 | **0.012** | **3.3** | **90** | **18** |
| EX CB 3 | EX CB 4 | **0.05** | 0.9 | 0.05 | **0.33** | 0.3 | 0.10 | 0.81 | **5** | - | 5 | **7.4** | 8.7 | 10.8 | 6.8 | **0.012** | **0.9** | **126** | **18** |
| EX CB 4 | EX ES | **0.20** | 0.9 | 0.18 | **1.80** | 0.3 | 0.54 | 1.53 | **5** | - | 5 | **7.4** | 14.0 | 17.3 | 10.9 | **0.012** | **2.3** | **42** | **18** |

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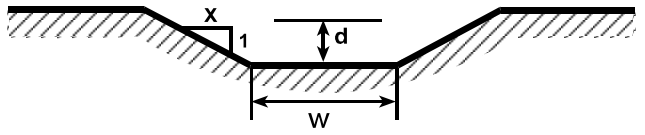



# Appendix H

## SWALE SIZING CALCULATIONS

| | |
|---|---|
| Design Storm: | 100-Year |
| Project: | Putnam Valley Fire Station |
| Job #: | 09105.101 |
| Date: | 1/20/2020 |
| By: | JWM |
| Sheet: | 1 of 1 |

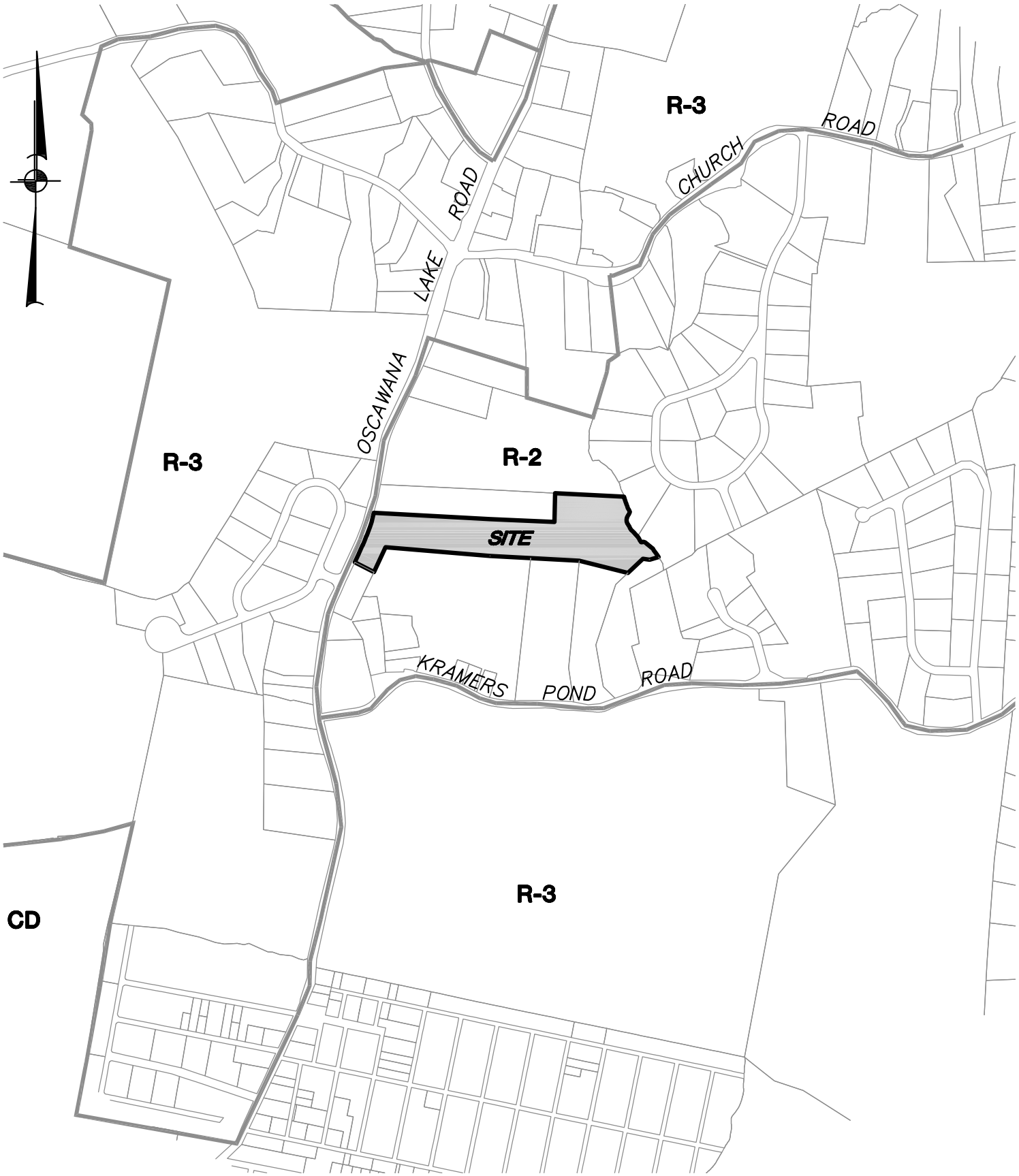
**Design Storm:** **10-yr (0.5 ft of freeboard)**

| **Swale 1.0.** | **Swale Type** | Q (cfs) | **w (ft)** | **d (ft)** | **x** | **n** | **S (%)** | A ($ft^2$) | $W_p$ (ft) | $R_h$ (ft) | V (ft/s) | Q (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | design flow | swale bottom width | depth of flow | swale side slope (x:1) | Manning's "n" | swale slope | swale area | wetted perimeter | hydraulic radius | swale velocity | swale capacity |
| Swale "A" - Min Slope | Rip Rap | **7.2** | 2.00 | 0.50 | 2.00 | 0.045 | 13.0 | 1.50 | 4.24 | 0.35 | 6.0 | **8.96** |
| Swale "A" - Max Slope | Rip Rap | **7.2** | 2.00 | 0.50 | 2.00 | 0.045 | 14.5 | 1.50 | 4.24 | 0.35 | 6.3 | **9.47** |

**Design Storm:** **10-yr (0.5 ft of freeboard)**

| **Swale 1.0.** | **Swale Type** | Q (cfs) | **w (ft)** | **d (ft)** | **x** | **n** | **S (%)** | A ($ft^2$) | $W_p$ (ft) | $R_h$ (ft) | V (ft/s) | Q (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | design flow | swale bottom width | depth of flow | swale side slope (x:1) | Manning's "n" | swale slope | swale area | wetted perimeter | hydraulic radius | swale velocity | swale capacity |
| Swale "B" - Min Slope | Rip Rap | **7.2** | 2.00 | 0.50 | 2.00 | 0.045 | 9.0 | 1.50 | 4.24 | 0.35 | 5.0 | **7.46** |
| Swale "B" - Max Slope | Rip Rap | **7.2** | 2.00 | 0.50 | 2.00 | 0.045 | 20.0 | 1.50 | 4.24 | 0.35 | 7.4 | **11.12** |

# FIGURES




PROJECT:
PUTNAM VALLEY FIRE STATION #1
OSCAWANA LAKE ROAD, TOWN OF PUTNAM VALLEY, NEW YORK

DRAWING:
LOCATION MAP

PREPARED BY:
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| | |
|---|---|
| DATE: | 9-21-16 |
| SCALE: | 1" = 800' |
| PROJECT NO.: | 09105.100 |
| FIGURE: | 1 |

## SOILS LEGEND

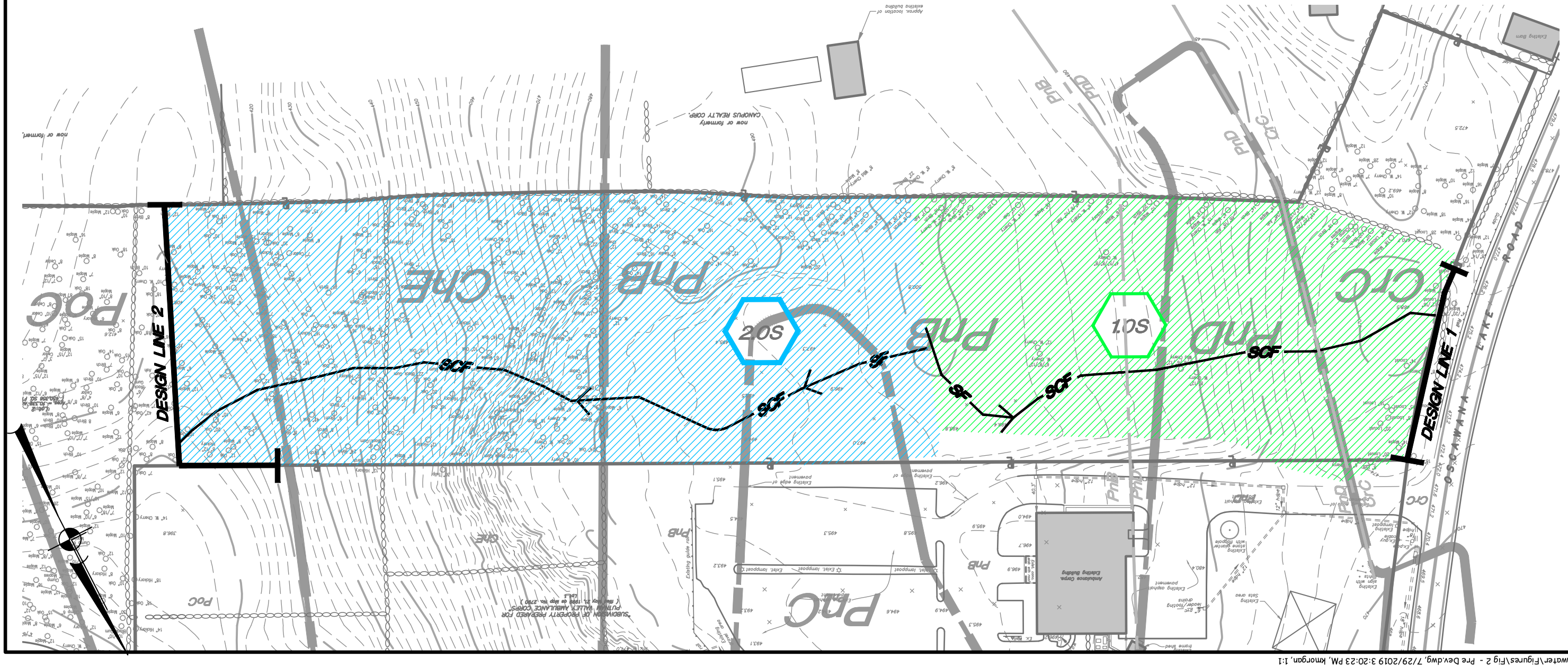
| SOILS | DESCRIPTION | HYDROLOGICAL GROUP |
|---|---|---|
| ChE | Charlton loam, 25% to 35% slopes | B |
| CrC | Charlton–Chatfield complex, rolling, very rocky | B |
| PoC | Paxton fine sandy loam, 8% to 15% slopes, very stony | C |
| PnB | Paxton fine sandy loam, 2% to 8% slopes | C |
| PnD | Paxton fine sandy loam, 15% to 25% slopes | C |

## LEGEND

1.0S — SUBCATCHMENT

SF → TIME OF CONCENTRATION SHEET FLOW

SCF → TIME OF CONCENTRATION SHALLOW CONCENTRATED FLOW

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DATE: 2-6-19
SCALE: 1" = 80'
PROJECT NO.: 09105.100
FIGURE: 2

PREPARED BY:


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PROJECT: PUTNAM VALLEY FIRE STATION #1
OSCAWANA LAKE ROAD, TOWN OF PUTNAM VALLEY, COUNTY OF PUTNAM, NEW YORK

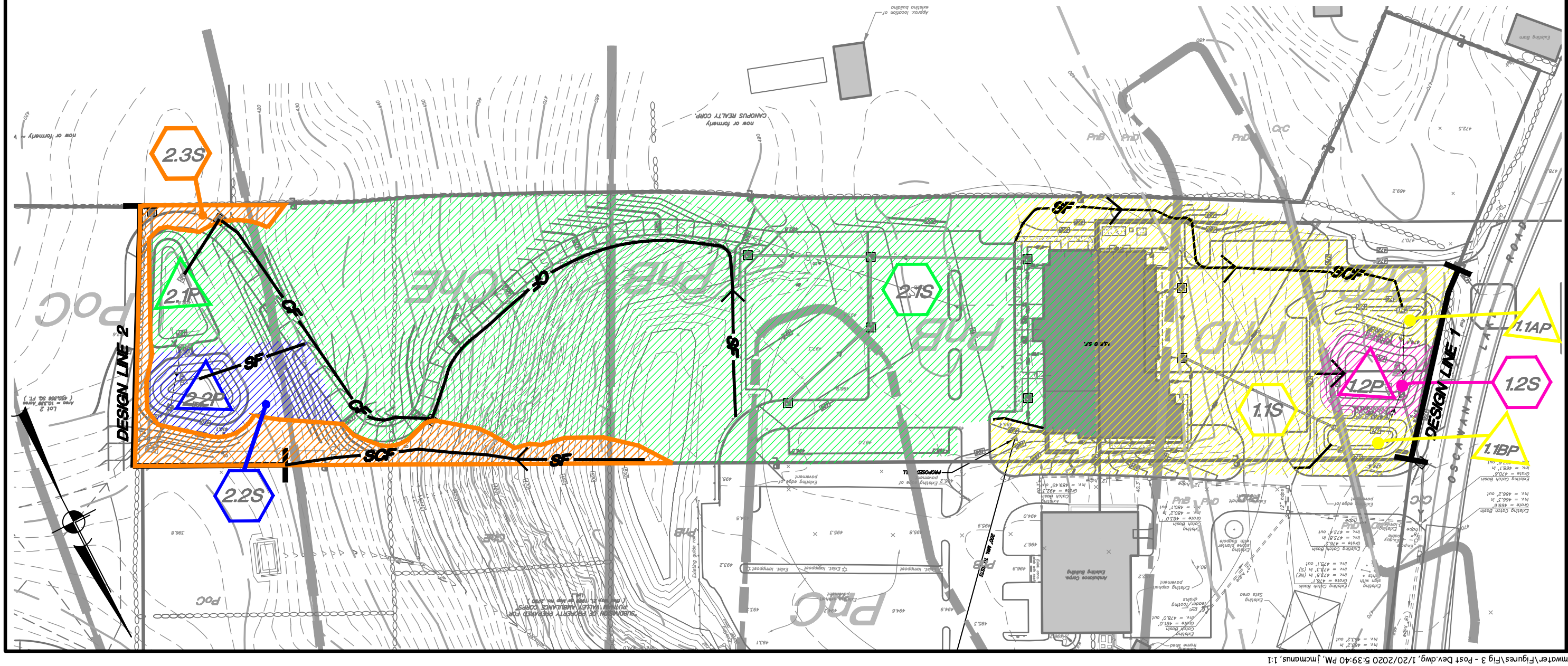
DRAWING: PRE-DEVELOPMENT DRAINAGE MAP

## SOILS LEGEND

| SOILS | DESCRIPTION | HYDROLOGICAL GROUP |
|---|---|---|
| ChE | Charlton loam, 25% to 35% slopes | B |
| CrC | Charlton–Chatfield complex, rolling, very rocky | B |
| PoC | Paxton fine sandy loam, 8% to 15% slopes, very stony | C |
| PnB | Paxton fine sandy loam, 2% to 8% slopes | C |
| PnD | Paxton fine sandy loam, 15% to 25% slopes | C |

## LEGEND

- 1.1S — SUBCATCHMENT
- 1.1P — STORMWATER MANAGEMENT PRACTICE
- SF — TIME OF CONCENTRATION SHEET FLOW
- SCF — TIME OF CONCENTRATION SHALLOW CONCENTRATED FLOW
- CF — TIME OF CONCENTRATION CHANNEL FLOW
- PF — TIME OF CONCENTRATION PIPE FLOW




DATE: 1-20-20
SCALE: 1" = 80'
PROJECT NO.: 09105.100
FIGURE: 3

PREPARED BY:

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DRAWING: POST-DEVELOPMENT DRAINAGE MAP

Z:\E\09105100\Stormwater\Figures\Fig 3 - Post Dev.dwg, 1/20/2020 5:39:40 PM, jmcmanus, 1:1