

MRC/FIBERIGHT PROCESSING FACILITY  
LIST OF DELIVERABLES

**Deliverable #23:**

23. *Provide updated site plan and stormwater hydrology calculations to address equipment location changes.*

ATTACHMENT 18

**STORMWATER AND EROSION AND SEDIMENTATION CONTROL**

Applications must include evidence that affirmatively demonstrate that there will be no unreasonable adverse effect on surface water quality, including evidence that:

- (a) The applicant will comply with all applicable stormwater management standards of 06-096 CMR 500, if the proposed facility is in the direct watershed of "waterbodies most at risk from new development"; and

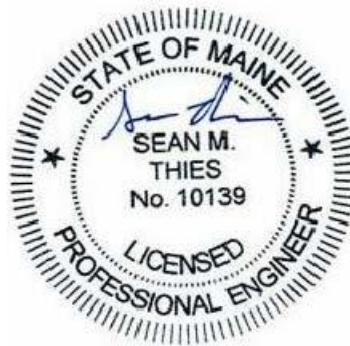
***The proposed project is not located within the direct watershed of a waterbody most at risk from new development.***

***Included in this section are the Basic Standard and General Standard submissions of the MDEP Chapter 500 Stormwater Law. These Standards address erosion and sedimentation control and stormwater quality consistent with the submission requirements of Chapter 400, Section 4.H and 4.J.***

***Refer to Attachment 12 for the preliminary findings of the geotechnical investigations that have been done to date, along with boring logs, which indicate that the soils are suitable for the proposed development.***

- (b) A waste water discharge license has been obtained or will be obtained, if required by 38 M.R.S.A. §413.

***The proposed project does not require a waste water discharge license.***



## ATTACHMENT 18A

### BASIC STANDARD SUBMISSIONS

An Erosion and Sedimentation Plan has been prepared for the MRC/Fiberight Processing Facility. The erosion control notes in this plan address permanent stabilization measures, seeding, and mulching rates, as well as the timing of installation. Construction and installation details are also provided for the project. Additional descriptions and specifications are provided in this section. The locations of silt fence and other erosion control devices have been shown on Sheet C101.

An Inspection and Maintenance Plan has also been included. This plan includes a list of measures to be inspected and maintained, as well as the frequency and responsible parties to implement the plan.

A Housekeeping Plan has also been included. This plan provides controls to address spill prevention and possible events that could result in discharges on the site.

## EROSION AND SEDIMENTATION CONTROL

- 1. Pollution Prevention:** The proposed project includes the construction of a solid waste processing facility in Hampden, Maine. The facility will include an administration building, processing facility building, parking areas, and truck maneuvering area. All disturbed areas, with the exception of the buildings, and parking/maneuvering areas, will be stabilized with vegetation or riprap. Proposed downgradient wooded areas will be protected with the use of silt fence or additional control devices if necessary during construction.
- 2. Sediment Barriers:** Prior to construction, sediment barriers will be installed downgradient of all disturbed areas. Sediment barriers will include silt fence, bark mulch berms, or additional measures which may become necessary.

Sediment barriers will also be installed adjacent to any significant natural drainage channel, not otherwise protected. All installed sediment barriers will be maintained until disturbed areas are permanently stabilized.

- 3. Temporary Stabilization:** Disturbed areas, which have lost natural vegetation cover, and will not be worked for more than seven days, will be temporarily stabilized. Areas within 75 feet of a wetland or waterbody will be stabilized within 48 hours of the initial disturbance or prior to any significant storm event, whichever comes first.

Temporary stabilization will include mulch or other non-erodible material such as erosion control mesh mats. In some instances, temporary stabilization may include temporary mulch and seeding, based on the time until the area will be worked or permanently stabilized.

- 4. Removal of Temporary Sediment Control Measures:** After permanent stabilization of disturbed areas has been completed, temporary measures, such as silt fence, will be removed within 30 days. Any accumulated sediments will be removed and any disturbed areas permanently stabilized.
- 5. Permanent Stabilization:** Once proposed construction is completed all disturbed areas, not otherwise permanently stabilized, will be permanently stabilized with vegetation, seeding, or permanent mulch.

Vegetation plantings and seeding will include species which are suitable for the conditions of the area. Seeded areas will be protected with temporary mulch or erosion control blankets.

Concentrated flows will not be allowed on newly seeded areas until an adequate catch of vegetation is established. It may be necessary to reseed and mulch again if germination is sparse, plant coverage is spotty, or topsoil erosion is evident. For seeded areas, permanent stabilization means a 90% cover of healthy plants with no evidence of washing or rilling of the topsoil.

Other permanent measures associated with the project include the following:

- A. Permanent Mulch: Permanent mulching means total coverage of exposed area with an approved mulch material. Erosion control mix may be used as mulch for permanent stabilization according to the approved application rates and limitations.
  - B. Permanent Riprap: Permanent riprap means that slopes and ditches stabilized with riprap have an appropriate backing of well-graded gravel or approved geotextile to prevent soil movement from behind the riprap. Properly sized angular stones will be utilized.
  - C. Permanent Ditches, Channels, and Swales: Permanent stabilization means the channel is stabilized with a 90% cover of healthy vegetation or with a well-graded riprap lining. There must be no evidence of slumping of the channel lining, undercutting of the channel banks, or down-cutting of the channel.
6. **Winter Construction**: At this time, no earthwork is expected during the Winter months. If unexpected Winter construction occurs, additional provisions will be made to protect disturbed areas from runoff. "Winter construction" includes the time between November 1 and April 15.
  7. **Stormwater Channels**: Ditches, swales, and open stormwater channels are planned as part of this project. They will be stabilized with either vegetation or riprap depending on the situation to prevent soil erosion.
  8. **Roads**: The proposed entrance driveway will be treated by various BMPs.
  9. **Culverts**: Culverts utilized in this project will be protected on both ends and the outlet pool to prevent scour.
  10. **Parking Areas**: The proposed project includes parking areas graded to collect runoff in the various proposed BMPs.
  11. **Additional Requirements**: No additional requirements are proposed at this time.

## INSPECTION AND MAINTENANCE

### Maintenance Plan

The Owner and their Contractor will be responsible for maintenance of stormwater and erosion and sedimentation control measures during the construction of the facility. The Owner will be responsible for post construction maintenance of the site, and the devices that provide treatment for the stormwater from the site as well as erosion and sedimentation control measures on the site.

A Pre- and Post-Construction Maintenance Plan for the stormwater management system is included in this section. Any questions regarding the design and maintenance of the Stormwater Management and Erosion and Sedimentation Control Systems should be directed to:

Sean Thies, P.E.  
CES, Inc.  
P.O. Box 639  
Brewer, ME 04412

## MAINTENANCE PLAN OF STORMWATER MANAGEMENT SYSTEM

The Maine Department of Environmental Protection's (MDEP) Stormwater Management for Maine: Best Management Practices latest edition, and the MDEP's Chapter 500: Stormwater Management were used as guidelines in the development of this Maintenance Plan. General maintenance requirements are listed below.

### A. DURING CONSTRUCTION

The general contractor will be responsible for the inspection and maintenance of all stormwater management system components during construction.

**Inspection:** Inspection of disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site will be performed at least once a week as well as before and after a storm event, and prior to completing permanent stabilization measures. Inspections shall be conducted by a person with knowledge of erosion and stormwater control, including the standards and conditions in the permit.

**Maintenance:** All erosion control measures will be kept in effective operating condition until areas are permanently stabilized. If BMPs need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation will be completed within seven calendar days and prior to any rainfall event.

**Documentation:** A log shall be kept summarizing the inspections and any corrective action taken. A copy of the log is provided at the end of this section, and is titled, *Construction Inspection Log*.

### B. POST-CONSTRUCTION

The Owner will be responsible for the inspection and maintenance of all stormwater management system components associated with the proposed project.

#### Inspection and Corrective Action

1. **Vegetated Areas:** Inspections and maintenance of vegetated areas will be performed early in the growing season or after significant rainfall to identify any erosion problems. Areas where erosion is evident will be covered with an appropriate lining, or erosive flows will be diverted to an area able to handle the flows. Any bare areas or areas with sparse growth will be replanted.
2. **Stormwater Underdrain Soil Filters:** Maintenance of the underdrain soil filters built for the treatment of stormwater will at a minimum include the items listed below.
  - a. Soil Filter Inspection: The soil filter should be inspected after every major storm in the first few months to ensure proper function. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining within 48 hours; and that, after storms that fill the system to overflow, it drains in no less than 24 hours. If the system drains too fast, the orifice on the underdrain outlet may need to be modified.

- b. Soil Filter Replacement: The top several inches of the filter shall be replaced with fresh material when water ponds on the surface of the bed for more than 72 hours. The removed sediments should be disposed in an acceptable manner.
- c. Sediment Removal: Sediment and plant debris should be removed from the pretreatment structure at least annually.
- d. Mowing: Filters with grass cover should be mowed no more than two times per growing season to maintain grass heights less than 12-inches.
- e. Fertilization: Fertilization of the underdrained filter area should be avoided unless absolutely necessary to establish vegetation.
- f. Harvesting and Weeding: Harvesting and pruning of excessive growth will need to be done occasionally. Weeding to control unwanted or invasive plants may also be necessary. Add new mulch as necessary for bioretention cell.
- g. Roadway: Sweeping of the roadways may be necessary to remove and legally dispose of any accumulated sediments.

### **C. DOCUMENTATION**

A log shall be kept summarizing the inspections, maintenance, and any corrective action taken. A copy of the log is provided at the end of this section, and is titled, BMP Inspection Log.



## HOUSEKEEPING

The following performance standards are proposed for the project.

1. **Spill Prevention:** Controls must be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.
2. **Groundwater Protection:** During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An “infiltration area” is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.
3. **Fugitive Sediment and Dust:** Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control. Operations during wet months that experience tracking of mud off the site onto public roads should provide for sweeping of road areas at least once a week and prior to significant storm events. Where chronic mud tracking occurs, a stabilized construction entrance should be provided. Operations during dry months, that experience fugitive dust problems, should wet down the access roads once a week or more frequently as needed.
4. **Debris and Other Materials:** Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.
5. **Trench or Foundation De-Watering:** Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoidance measures shall be implemented to prevent water from flowing over disturbed areas of the site. Equivalent measures may be taken if approved by the department.
6. **Non-Stormwater Discharges:** Identify and prevent contamination by non-stormwater discharges.
7. **Additional Requirements:** Additional requirements may be applied on a site-specific basis.

**ATTACHMENT 18B**  
**STORMWATER QUALITY CONTROL NARRATIVE**

## ATTACHMENT 18B

### STORMWATER QUALITY CONTROL NARRATIVE

The proposed development will be located on a parcel of land in Hampden approximately 90 acres in size. The existing site of the development is undeveloped and covered mainly by woodland. Shaw Brook is classified as an Urban Impaired Stream and is located to the west of the proposed parcel. Runoff from the site generally drains to a large forested wetland area to the south of the parcel before eventually discharging to the Penobscot River. Runoff from the proposed parcel does not discharge to Shaw Brook. The proposed development includes the construction of a 144,000 square foot processing building, a 9,800 square foot administrative building, scales and scale shack, and associated parking and maneuvering areas. The Chapter 500 Stormwater Management Standards require this project to meet basic, general, and flooding standards. Basic standards as outlined in Attachment 18A include: erosion and sedimentation control; inspection; and maintenance and housekeeping; respectively.

General standards require a minimum of 95% of the impervious area and 80% of the developed area associated with a project to receive treatment measures. This project proposes to treat the new development by utilizing a combination of three vegetated underdrained soil filters (VUDSF) and a roofline drip edge filter per the Maine Department of Environmental Protection’s (MDEP) Stormwater BMP Manual. Treating approximately 271,645 square feet of impervious area and 379,338 square feet of developed area is 99.6% of the proposed project impervious area and 89.58% of the proposed project developed area. The following charts summarize the impervious and developed area proposed to be permitted by the project, as well as the treatment structure, area treated, and relationship with the total developed and impervious areas for the project.

PROJECT AREA	IMPERVIOUS AREA	DEVELOPED AREA
Proposed Site Area	272,694 SF	423,444 SF
<b>Total</b>	<b>272,694 SF</b>	<b>423,444 SF</b>

TREATMENT METHOD	IMPERVIOUS AREA TREATED	DEVELOPED AREA TREATED
VUDSF 1	99,409 SF	146,338 SF
VUDSF 2	50,574 SF	59,924 SF
VUDSF 3	56,218 SF	104,804 SF
Roof Dripline Filter	65,444 SF	68,272 SF
<b>Total Area Treated</b>	<b>271,645 SF</b>	<b>379,338 SF</b>
<b>Percent Treated of Areas</b>	<b>99.6%</b>	<b>89.58%</b>

A description of the treatment systems are as follows.

**1. Underdrained Soil Filter 1:**

Impervious Area: 99,409 SF  
 Landscaped Area: 46,929SF

Chapter 500 sizing is based on 1" × the impervious area + 0.4" × the landscape area.  
 99,409 SF x 1" = 8,284 CF of Required Storage  
 46,929 SF x 0.4" = 1,565 CF of Required Storage  
 9,848 CF of Required Storage. 9,851 CF was provided by design.

Surface Area of filter is based on 5% x impervious area + 2% x landscape are.  
 99,409 SF x .05 = 4,970  
 46,929 SF x .02 = 939  
 5,909 SF of Required Filter Area. 5,925 SF was provided by design.

**2. Underdrained Soil Filter 2:**

Impervious Area: 50,574 SF  
 Landscaped Area: 9,350 SF

Chapter 500 sizing is based on 1" × the impervious area + 0.4" × the landscape area.  
 50,574 SF x 1" = 4,215 CF of Required Storage  
 9,350 SF x 0.4" = 312 CF of Required Storage  
 4,527 CF of Required Storage. 8,134 CF was provided by design.

Surface Area of filter is based on 5% x impervious area + 2% x landscape are.  
 50,574 SF x .05 = 2,529  
 9,350 SF x .02 = 187  
 2,716 SF of Required Filter Area. 2,750 SF was provided by design.

**3. Underdrained Soil Filter 3:**

Impervious Area: 56,218 SF  
 Landscaped Area: 48,568 SF

Chapter 500 sizing is based on 1" × the impervious area + 0.4" × the landscape area.  
 56,218 SF x 1" = 4,685 CF of Required Storage  
 48,586 SF x 0.4" = 1,620 CF of Required Storage  
 6,305 CF of Required Storage. 7,578 CF was provided by design.

Surface Area of filter is based on 5% x impervious area + 2% x landscape are.  
 56,218 SF x .05 = 2,811  
 48,586 SF x .02 = 972  
 3,783 SF of Required Filter Area. 3,791 SF was provided by design.

**4. Roof Dripline Filter:** A roof dripline will be constructed along most of the southern edge of the proposed building. The size of the dripline was determined by the requirement that storage was needed to meet the flooding standards. At 40% porosity, the minimum crushed rock treatment storage area required is 5.5-feet wide by 5-feet deep. This is what was provided by design.

The proposed stormwater quality control devices have been designed according to the standards outlined in the *Stormwater Management for Maine, Volume III BMP Manual*, January 2006 and revised April 2007. Construction and maintenance will be according to standards outlined in this manual.

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## ATTACHMENT 21

### FLOODING STORMWATER MANAGEMENT QUANTITY REPORT

As shown on the included Flood Insurance Map, the Fiberight facility is not located in, or within ¼ mile, of the 100 year flood plain.

Consistent with Department regulations, a 25-year, 24-hour storm event was modeled to determine the necessary detention and outlet sizing requirements. Stormwater modeling was completed using HydroCAD software. Included in this Attachment are the HydroCAD software results for the 2-year, 10-year, and 25-year storm events, the Pre and Post Stormwater Hydrology Plans, and a narrative describing the pre and post hydrology calculations. The Proposed Site Plan included in Attachment 12 outlines the proposed development. The pre and post development conditions for the project are described below. The following narratives, calculations, and plans address the requirements of Chapter 400.4.M.2(b-i).

#### PRE DEVELOPMENT/EXISTING CONDITIONS

The proposed development will be located on a parcel of land in Hampden approximately 90 acres in size. The parcel is undeveloped and covered mainly by woodland. Shaw Brook is classified as an Urban Impaired Stream and is located approximately 3,000 feet to the west of the existing parcel. Runoff from the site generally drains to a large forested wetland area to the south of the parcel before eventually draining to the Penobscot River. Runoff from the proposed parcel does not drain to Shaw Brook. Similarly, in the post development conditions, the runoff will not drain to Shaw Brook.

#### PRE DEVELOPMENT DRAINAGE

The attached predevelopment hydrology plan shows four drainage areas for the portion of the site studied. The area south of the development was not studied as this portion of the site is not proposed to be developed as part of this application. All four subareas are comprised mostly of wooded areas and all drain toward the south.

#### POST DEVELOPMENT/PROPOSED CONDITIONS

The proposed development includes the construction of a 144,000 square foot processing building, a 9,800 square foot administrative building, scales and scale house, and associated parking and maneuvering areas. The proposed development will be built over a portion of previously undeveloped land and will add approximately 9.7 acres of developed area to the existing site. The development will be treated with a combination of three vegetated underdrained soil filters and a roofline drip edge filter. All of these treatment measures discharge toward the south and west ends of the site before re-joining the pre-development flow paths.

#### POST DEVELOPMENT DRAINAGE

The attached post developed hydrology plan shows eight drainage areas. **Subarea 1** includes the wooded area north of the proposed development and drains southerly to a proposed grassed swale along the north side of the driveway. The grass swale delivers stormwater runoff

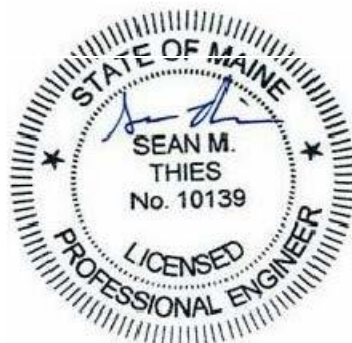
from the wooded area to a culvert under the driveway where it discharges near the outlet for VUDSF #3. **Subarea 2** includes the employee parking, Administrative Building, and portions of the Process Building, driveway, and access road. Stormwater from this area will flow toward a grassed swale to the west of the Administrative Building which will discharge to a vegetated underdrained soil filter for treatment. **Subareas 3a and 3b** include most of the southern half of the Process Building roof. Stormwater from the roof will drain to the south and be captured in a roofline drip edge filter for treatment prior to discharging offsite. **Subareas 4a and 4b** includes the scales, and portions of the northern half of the Process Building roof, driveway, and tank area. Stormwater from this area will flow toward the grassed area between the driveway and the building where it will be collected in a vegetated underdrained soil filter prior to discharging offsite. **Subarea 5** includes a mostly wooded area to the northeast of the proposed development. Stormwater from this area generally drains toward the south before being diverted around the driveway and maneuvering areas by a vegetated ditch prior to joining a wetland area to the east of the site. **Subarea 6** includes the truck maneuvering areas for the loading/unloading area. This area is predominantly paved and stormwater will flow toward the south where it will be collected in a vegetated underdrained soil filter prior to being discharged offsite. **Subarea 7** includes the wooded area to the south of the facility. Stormwater will generally sheet flow to the southwest toward the existing forested wetland area as it did prior to the development. **Subarea 8** includes the wooded area to the southwest of the facility. Stormwater will generally sheet flow to the southwest toward the existing forested wetland area as it did prior to the development.

A comparison of pre and post development flows for the project at the analysis point follows.

24 HOUR, TYPE III DURATION STORM			
	2 YEAR PRE/POST (CFS)	10 YEAR PRE/POST (CFS)	25 YEAR PRE/POST (CFS)
Summation Point 1	6.98/5.85	15.20/14.72	19.63/17.37
Summation Point 2	3.85/3.64	8.39/7.06	10.83/8.90

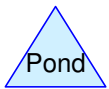
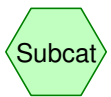
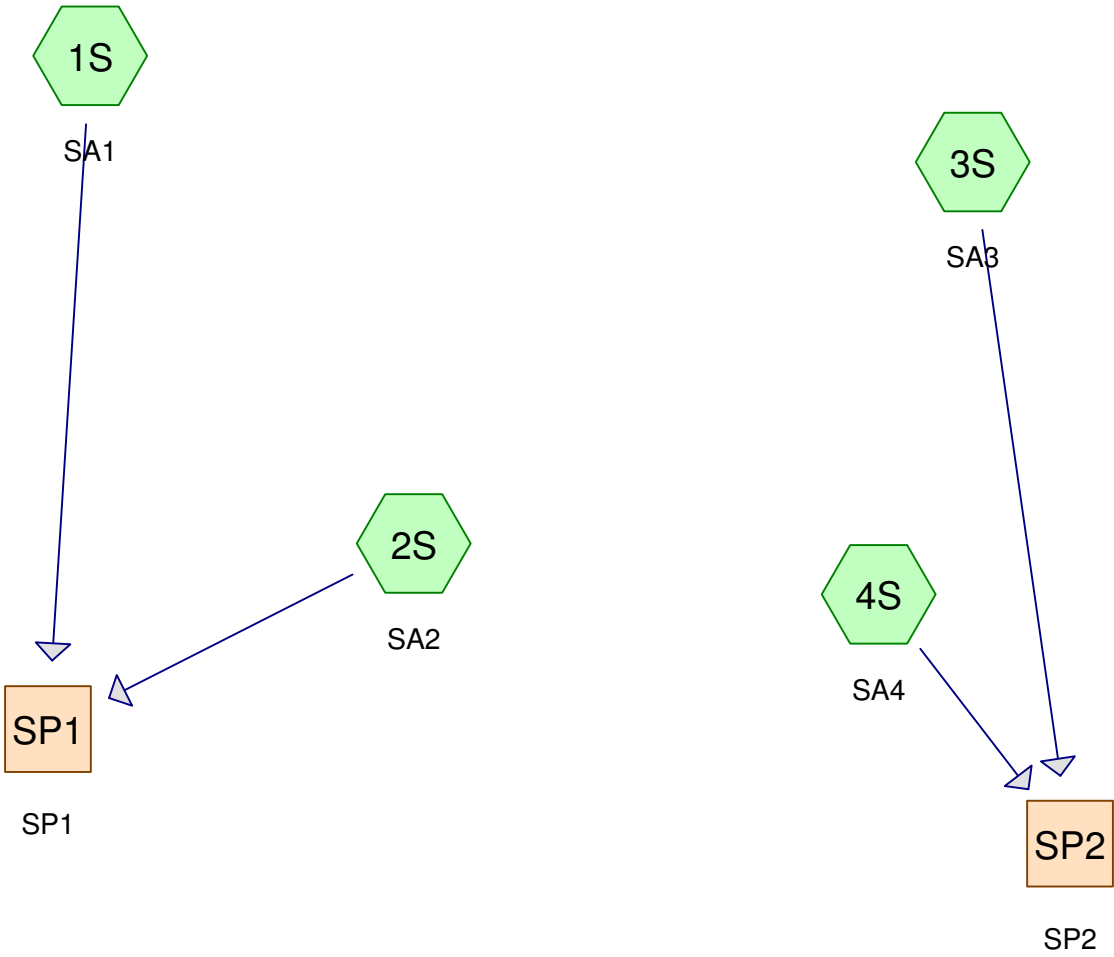
### POST DEVELOPMENT ANALYSIS

The results of the analysis for this site indicate that there is a reduction in runoff from both summation points, and that all of the stormwater treatment measures are sized adequately to handle storm water runoff from 2, 10, and 25-year storm events. Accordingly, there are no anticipated adverse impacts to the down-gradient areas, and as a result the development will have no unreasonable effect on run-on, run-off, and/or infiltration relationships on-site or on adjacent properties.



**PRE DEVELOPMENT - 2 YEAR**





# PreDevelopment

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## Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.944	78	Meadow, non-grazed, HSG D (2S, 3S, 4S)
21.931	79	Woods, Fair, HSG D (1S, 2S, 3S, 4S)
<b>23.875</b>	<b>79</b>	<b>TOTAL AREA</b>

# PreDevelopment

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## Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
23.875	HSG D	1S, 2S, 3S, 4S
0.000	Other	
<b>23.875</b>		<b>TOTAL AREA</b>

## PreDevelopment

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### Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.944	0.000	1.944	Meadow, non-grazed	2S, 3S, 4S
0.000	0.000	0.000	21.931	0.000	21.931	Woods, Fair	1S, 2S, 3S, 4S
<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>23.875</b>	<b>0.000</b>	<b>23.875</b>	<b>TOTAL AREA</b>	

**PreDevelopment**

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Type III 24-hr 2 Year Rainfall=2.70"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: SA1** Runoff Area=80,512 sf 0.00% Impervious Runoff Depth>0.89"  
Flow Length=407' Tc=20.3 min CN=79 Runoff=1.35 cfs 0.137 af

**Subcatchment 2S: SA2** Runoff Area=605,980 sf 0.00% Impervious Runoff Depth>0.87"  
Flow Length=1,600' Tc=53.0 min CN=79 Runoff=6.44 cfs 1.013 af

**Subcatchment 3S: SA3** Runoff Area=266,020 sf 0.00% Impervious Runoff Depth>0.87"  
Flow Length=966' Tc=52.3 min CN=79 Runoff=2.85 cfs 0.445 af

**Subcatchment 4S: SA4** Runoff Area=87,465 sf 0.00% Impervious Runoff Depth>0.88"  
Flow Length=767' Tc=38.4 min CN=79 Runoff=1.11 cfs 0.147 af

**Reach SP1: SP1** Inflow=6.98 cfs 1.150 af  
Outflow=6.98 cfs 1.150 af

**Reach SP2: SP2** Inflow=3.85 cfs 0.592 af  
Outflow=3.85 cfs 0.592 af

**Total Runoff Area = 23.875 ac Runoff Volume = 1.742 af Average Runoff Depth = 0.88"**  
**100.00% Pervious = 23.875 ac 0.00% Impervious = 0.000 ac**

**PreDevelopment**

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Type III 24-hr 2 Year Rainfall=2.70"

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**Summary for Subcatchment 1S: SA1**

Runoff = 1.35 cfs @ 12.30 hrs, Volume= 0.137 af, Depth&gt; 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
80,512	79	Woods, Fair, HSG D
80,512		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		<b>Sheet Flow, SF 1-1</b> Woods: Light underbrush n= 0.400 P2= 2.70"
2.2	130	0.0400	1.00		<b>Shallow Concentrated Flow, SCF 1-1</b> Woodland Kv= 5.0 fps
1.9	177	0.0500	1.57		<b>Shallow Concentrated Flow, SCF 1-2</b> Short Grass Pasture Kv= 7.0 fps
20.3	407	Total			

**Summary for Subcatchment 2S: SA2**

Runoff = 6.44 cfs @ 12.77 hrs, Volume= 1.013 af, Depth&gt; 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
31,497	78	Meadow, non-grazed, HSG D
574,483	79	Woods, Fair, HSG D
605,980	79	Weighted Average
605,980		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		<b>Sheet Flow, SF 2-1</b> Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 2-1</b> Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		<b>Shallow Concentrated Flow, SCF 2-2</b> Short Grass Pasture Kv= 7.0 fps
14.7	625	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 2-3</b> Woodland Kv= 5.0 fps
53.0	1,600	Total			

**PreDevelopment**

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Type III 24-hr 2 Year Rainfall=2.70"

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**Summary for Subcatchment 3S: SA3**

Runoff = 2.85 cfs @ 12.75 hrs, Volume= 0.445 af, Depth&gt; 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
37,610	78	Meadow, non-grazed, HSG D
228,410	79	Woods, Fair, HSG D
266,020	79	Weighted Average
266,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		<b>Sheet Flow, SF 3-1</b>
					Woods: Light underbrush n= 0.400 P2= 2.70"
28.9	866	0.0100	0.50		<b>Shallow Concentrated Flow, SCF 3-1</b>
					Woodland Kv= 5.0 fps
52.3	966	Total			

**Summary for Subcatchment 4S: SA4**

Runoff = 1.11 cfs @ 12.57 hrs, Volume= 0.147 af, Depth&gt; 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
15,577	78	Meadow, non-grazed, HSG D
71,888	79	Woods, Fair, HSG D
87,465	79	Weighted Average
87,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		<b>Sheet Flow, SF 4-1</b>
					Woods: Light underbrush n= 0.400 P2= 2.70"
22.2	667	0.0100	0.50		<b>Shallow Concentrated Flow, SCF 4-1</b>
					Woodland Kv= 5.0 fps
38.4	767	Total			

**Summary for Reach SP1: SP1**

Inflow Area = 15.760 ac, 0.00% Impervious, Inflow Depth &gt; 0.88" for 2 Year event

Inflow = 6.98 cfs @ 12.73 hrs, Volume= 1.150 af

Outflow = 6.98 cfs @ 12.73 hrs, Volume= 1.150 af, Atten= 0%, Lag= 0.0 min

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Type III 24-hr 2 Year Rainfall=2.70"

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

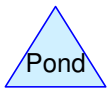
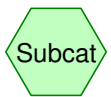
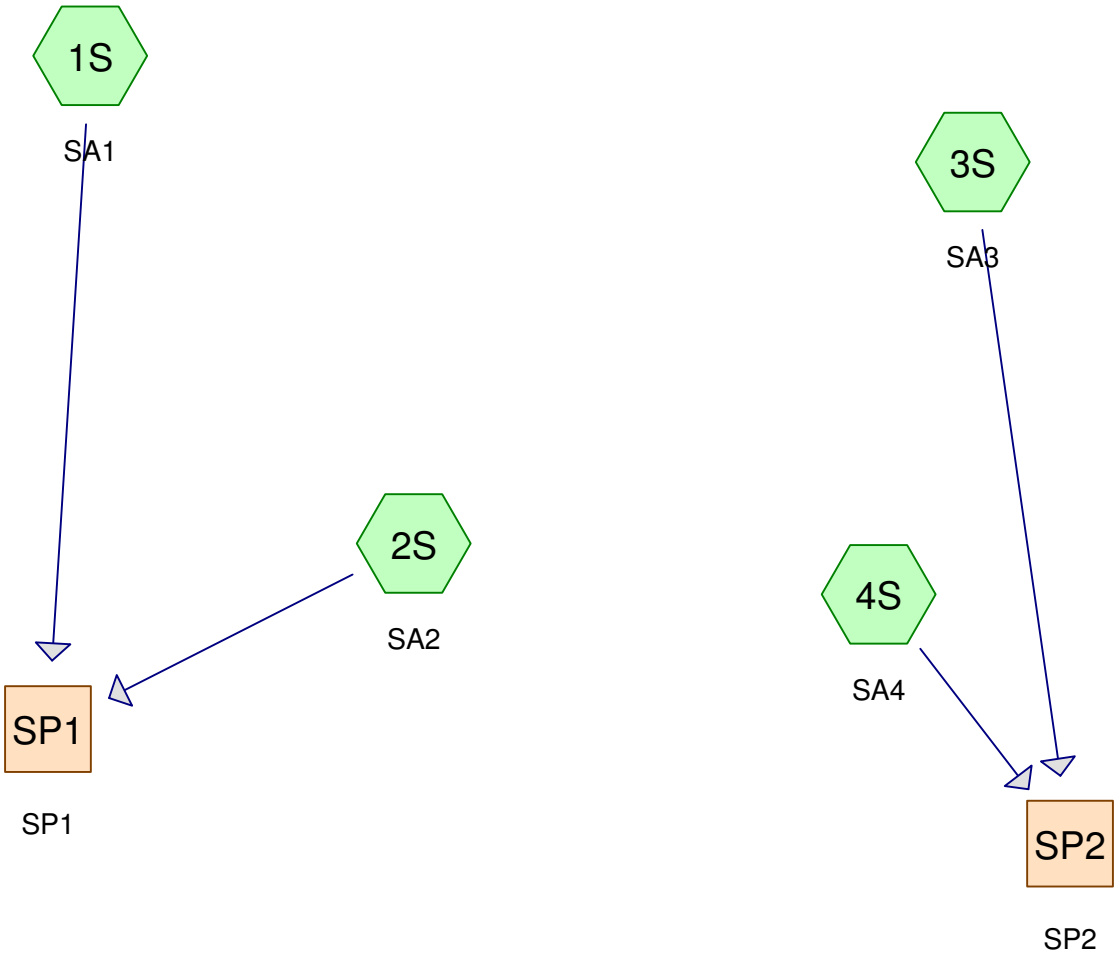
**Summary for Reach SP2: SP2**

Inflow Area = 8.115 ac, 0.00% Impervious, Inflow Depth > 0.88" for 2 Year event  
Inflow = 3.85 cfs @ 12.70 hrs, Volume= 0.592 af  
Outflow = 3.85 cfs @ 12.70 hrs, Volume= 0.592 af, Atten= 0%, Lag= 0.0 min

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



PRE DEVELOPMENT - 10 YEAR



# PreDevelopment

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## Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.944	78	Meadow, non-grazed, HSG D (2S, 3S, 4S)
21.931	79	Woods, Fair, HSG D (1S, 2S, 3S, 4S)
<b>23.875</b>	<b>79</b>	<b>TOTAL AREA</b>

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## Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
23.875	HSG D	1S, 2S, 3S, 4S
0.000	Other	
<b>23.875</b>		<b>TOTAL AREA</b>

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### Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.944	0.000	1.944	Meadow, non-grazed	2S, 3S, 4S
0.000	0.000	0.000	21.931	0.000	21.931	Woods, Fair	1S, 2S, 3S, 4S
<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>23.875</b>	<b>0.000</b>	<b>23.875</b>	<b>TOTAL AREA</b>	

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Type III 24-hr 10 Year Rainfall=4.10"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: SA1** Runoff Area=80,512 sf 0.00% Impervious Runoff Depth>1.89"  
Flow Length=407' Tc=20.3 min CN=79 Runoff=2.95 cfs 0.291 af

**Subcatchment 2S: SA2** Runoff Area=605,980 sf 0.00% Impervious Runoff Depth>1.87"  
Flow Length=1,600' Tc=53.0 min CN=79 Runoff=14.01 cfs 2.163 af

**Subcatchment 3S: SA3** Runoff Area=266,020 sf 0.00% Impervious Runoff Depth>1.87"  
Flow Length=966' Tc=52.3 min CN=79 Runoff=6.21 cfs 0.950 af

**Subcatchment 4S: SA4** Runoff Area=87,465 sf 0.00% Impervious Runoff Depth>1.88"  
Flow Length=767' Tc=38.4 min CN=79 Runoff=2.41 cfs 0.314 af

**Reach SP1: SP1** Inflow=15.20 cfs 2.454 af  
Outflow=15.20 cfs 2.454 af

**Reach SP2: SP2** Inflow=8.39 cfs 1.264 af  
Outflow=8.39 cfs 1.264 af

**Total Runoff Area = 23.875 ac Runoff Volume = 3.718 af Average Runoff Depth = 1.87"**  
**100.00% Pervious = 23.875 ac 0.00% Impervious = 0.000 ac**

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Type III 24-hr 10 Year Rainfall=4.10"

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**Summary for Subcatchment 1S: SA1**

Runoff = 2.95 cfs @ 12.29 hrs, Volume= 0.291 af, Depth&gt; 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
80,512	79	Woods, Fair, HSG D
80,512		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		<b>Sheet Flow, SF 1-1</b> Woods: Light underbrush n= 0.400 P2= 2.70"
2.2	130	0.0400	1.00		<b>Shallow Concentrated Flow, SCF 1-1</b> Woodland Kv= 5.0 fps
1.9	177	0.0500	1.57		<b>Shallow Concentrated Flow, SCF 1-2</b> Short Grass Pasture Kv= 7.0 fps
20.3	407	Total			

**Summary for Subcatchment 2S: SA2**

Runoff = 14.01 cfs @ 12.74 hrs, Volume= 2.163 af, Depth&gt; 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
31,497	78	Meadow, non-grazed, HSG D
574,483	79	Woods, Fair, HSG D
605,980	79	Weighted Average
605,980		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		<b>Sheet Flow, SF 2-1</b> Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 2-1</b> Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		<b>Shallow Concentrated Flow, SCF 2-2</b> Short Grass Pasture Kv= 7.0 fps
14.7	625	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 2-3</b> Woodland Kv= 5.0 fps
53.0	1,600	Total			

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Type III 24-hr 10 Year Rainfall=4.10"

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**Summary for Subcatchment 3S: SA3**

Runoff = 6.21 cfs @ 12.73 hrs, Volume= 0.950 af, Depth&gt; 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
37,610	78	Meadow, non-grazed, HSG D
228,410	79	Woods, Fair, HSG D
266,020	79	Weighted Average
266,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		<b>Sheet Flow, SF 3-1</b>
					Woods: Light underbrush n= 0.400 P2= 2.70"
28.9	866	0.0100	0.50		<b>Shallow Concentrated Flow, SCF 3-1</b>
					Woodland Kv= 5.0 fps
52.3	966	Total			

**Summary for Subcatchment 4S: SA4**

Runoff = 2.41 cfs @ 12.54 hrs, Volume= 0.314 af, Depth&gt; 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
15,577	78	Meadow, non-grazed, HSG D
71,888	79	Woods, Fair, HSG D
87,465	79	Weighted Average
87,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		<b>Sheet Flow, SF 4-1</b>
					Woods: Light underbrush n= 0.400 P2= 2.70"
22.2	667	0.0100	0.50		<b>Shallow Concentrated Flow, SCF 4-1</b>
					Woodland Kv= 5.0 fps
38.4	767	Total			

**Summary for Reach SP1: SP1**

Inflow Area = 15.760 ac, 0.00% Impervious, Inflow Depth &gt; 1.87" for 10 Year event

Inflow = 15.20 cfs @ 12.69 hrs, Volume= 2.454 af

Outflow = 15.20 cfs @ 12.69 hrs, Volume= 2.454 af, Atten= 0%, Lag= 0.0 min



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Type III 24-hr 10 Year Rainfall=4.10"

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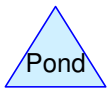
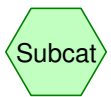
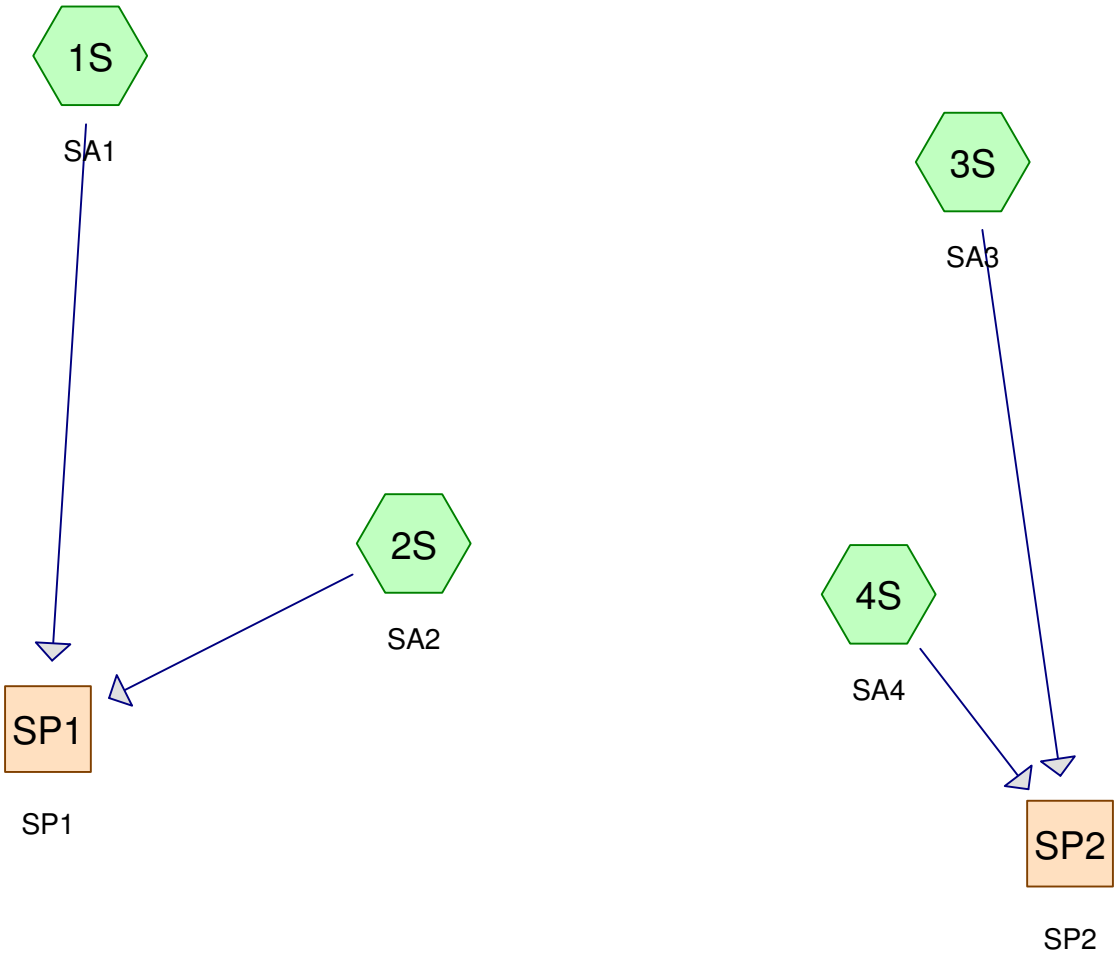
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach SP2: SP2**

Inflow Area = 8.115 ac, 0.00% Impervious, Inflow Depth > 1.87" for 10 Year event  
Inflow = 8.39 cfs @ 12.67 hrs, Volume= 1.264 af  
Outflow = 8.39 cfs @ 12.67 hrs, Volume= 1.264 af, Atten= 0%, Lag= 0.0 min

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

**PRE DEVELOPMENT - 25 YEAR**



# PreDevelopment

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## Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.944	78	Meadow, non-grazed, HSG D (2S, 3S, 4S)
21.931	79	Woods, Fair, HSG D (1S, 2S, 3S, 4S)
<b>23.875</b>	<b>79</b>	<b>TOTAL AREA</b>

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## Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
23.875	HSG D	1S, 2S, 3S, 4S
0.000	Other	
<b>23.875</b>		<b>TOTAL AREA</b>

## PreDevelopment

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### Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.944	0.000	1.944	Meadow, non-grazed	2S, 3S, 4S
0.000	0.000	0.000	21.931	0.000	21.931	Woods, Fair	1S, 2S, 3S, 4S
<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>23.875</b>	<b>0.000</b>	<b>23.875</b>	<b>TOTAL AREA</b>	

**PreDevelopment**

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Type III 24-hr 25 Year Rainfall=4.80"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: SA1**

Runoff Area=80,512 sf 0.00% Impervious Runoff Depth>2.44"  
Flow Length=407' Tc=20.3 min CN=79 Runoff=3.80 cfs 0.376 af

**Subcatchment 2S: SA2**

Runoff Area=605,980 sf 0.00% Impervious Runoff Depth>2.41"  
Flow Length=1,600' Tc=53.0 min CN=79 Runoff=18.10 cfs 2.795 af

**Subcatchment 3S: SA3**

Runoff Area=266,020 sf 0.00% Impervious Runoff Depth>2.41"  
Flow Length=966' Tc=52.3 min CN=79 Runoff=8.02 cfs 1.227 af

**Subcatchment 4S: SA4**

Runoff Area=87,465 sf 0.00% Impervious Runoff Depth>2.42"  
Flow Length=767' Tc=38.4 min CN=79 Runoff=3.11 cfs 0.406 af

**Reach SP1: SP1**

Inflow=19.63 cfs 3.171 af  
Outflow=19.63 cfs 3.171 af

**Reach SP2: SP2**

Inflow=10.83 cfs 1.633 af  
Outflow=10.83 cfs 1.633 af

**Total Runoff Area = 23.875 ac Runoff Volume = 4.804 af Average Runoff Depth = 2.41"**  
**100.00% Pervious = 23.875 ac 0.00% Impervious = 0.000 ac**

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Type III 24-hr 25 Year Rainfall=4.80"

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**Summary for Subcatchment 1S: SA1**

Runoff = 3.80 cfs @ 12.28 hrs, Volume= 0.376 af, Depth&gt; 2.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
80,512	79	Woods, Fair, HSG D
80,512		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		<b>Sheet Flow, SF 1-1</b> Woods: Light underbrush n= 0.400 P2= 2.70"
2.2	130	0.0400	1.00		<b>Shallow Concentrated Flow, SCF 1-1</b> Woodland Kv= 5.0 fps
1.9	177	0.0500	1.57		<b>Shallow Concentrated Flow, SCF 1-2</b> Short Grass Pasture Kv= 7.0 fps
20.3	407	Total			

**Summary for Subcatchment 2S: SA2**

Runoff = 18.10 cfs @ 12.73 hrs, Volume= 2.795 af, Depth&gt; 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
31,497	78	Meadow, non-grazed, HSG D
574,483	79	Woods, Fair, HSG D
605,980	79	Weighted Average
605,980		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		<b>Sheet Flow, SF 2-1</b> Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 2-1</b> Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		<b>Shallow Concentrated Flow, SCF 2-2</b> Short Grass Pasture Kv= 7.0 fps
14.7	625	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 2-3</b> Woodland Kv= 5.0 fps
53.0	1,600	Total			



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Type III 24-hr 25 Year Rainfall=4.80"

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**Summary for Subcatchment 3S: SA3**

Runoff = 8.02 cfs @ 12.72 hrs, Volume= 1.227 af, Depth&gt; 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
37,610	78	Meadow, non-grazed, HSG D
228,410	79	Woods, Fair, HSG D
266,020	79	Weighted Average
266,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		<b>Sheet Flow, SF 3-1</b>
					Woods: Light underbrush n= 0.400 P2= 2.70"
28.9	866	0.0100	0.50		<b>Shallow Concentrated Flow, SCF 3-1</b>
					Woodland Kv= 5.0 fps
52.3	966	Total			

**Summary for Subcatchment 4S: SA4**

Runoff = 3.11 cfs @ 12.53 hrs, Volume= 0.406 af, Depth&gt; 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
15,577	78	Meadow, non-grazed, HSG D
71,888	79	Woods, Fair, HSG D
87,465	79	Weighted Average
87,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		<b>Sheet Flow, SF 4-1</b>
					Woods: Light underbrush n= 0.400 P2= 2.70"
22.2	667	0.0100	0.50		<b>Shallow Concentrated Flow, SCF 4-1</b>
					Woodland Kv= 5.0 fps
38.4	767	Total			

**Summary for Reach SP1: SP1**

Inflow Area = 15.760 ac, 0.00% Impervious, Inflow Depth &gt; 2.41" for 25 Year event

Inflow = 19.63 cfs @ 12.68 hrs, Volume= 3.171 af

Outflow = 19.63 cfs @ 12.68 hrs, Volume= 3.171 af, Atten= 0%, Lag= 0.0 min

**PreDevelopment**

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*Type III 24-hr 25 Year Rainfall=4.80"*

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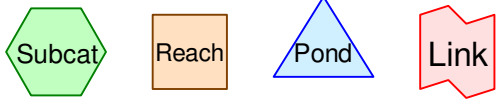
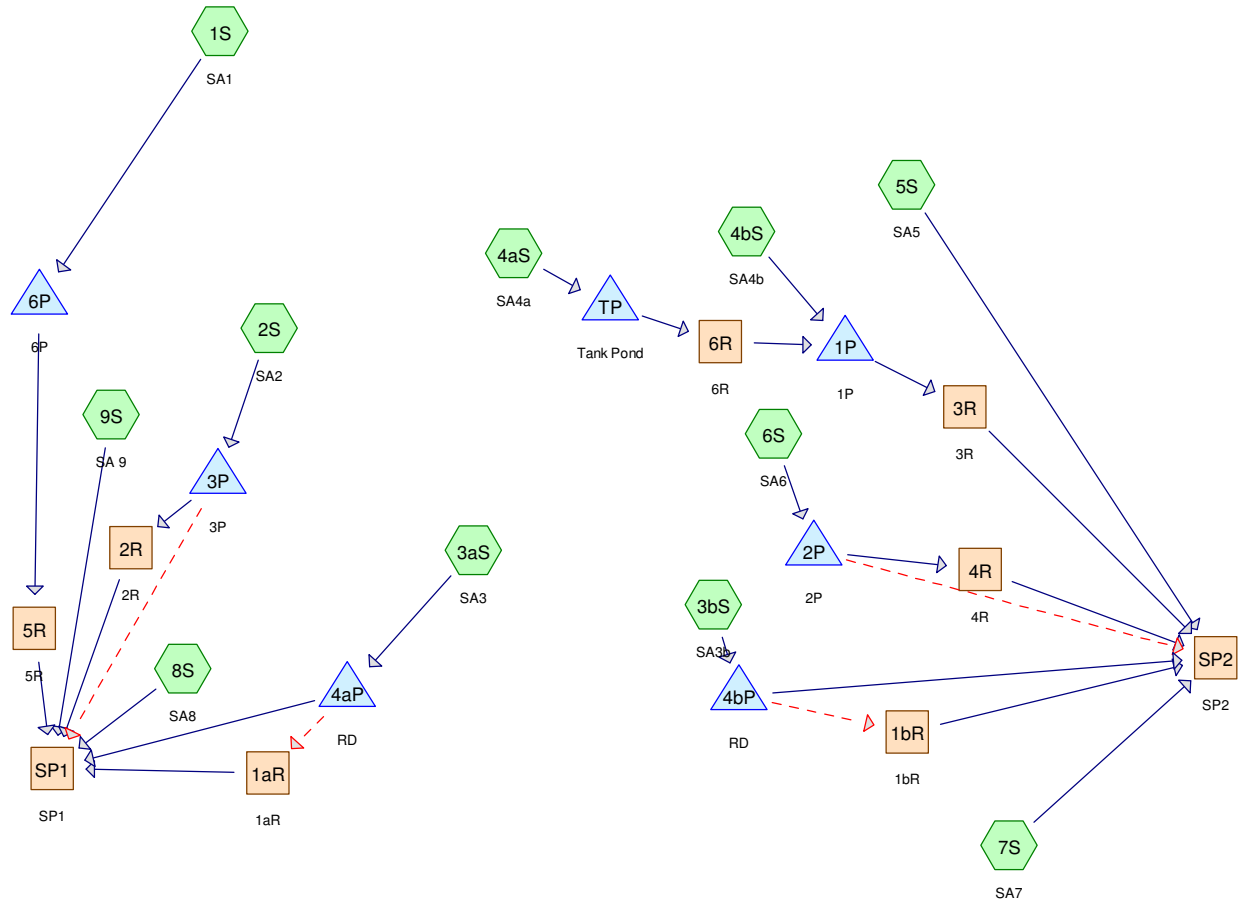
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach SP2: SP2**

Inflow Area = 8.115 ac, 0.00% Impervious, Inflow Depth > 2.41" for 25 Year event  
Inflow = 10.83 cfs @ 12.66 hrs, Volume= 1.633 af  
Outflow = 10.83 cfs @ 12.66 hrs, Volume= 1.633 af, Atten= 0%, Lag= 0.0 min

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

**POST DEVELOPMENT - 2 YEAR**



**Routing Diagram for PostDevelopment-20151210**  
 Prepared by CES, Inc, Printed 12/10/2015  
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**PostDevelopment-20151210**

Type III 24-hr 2 Year Rainfall=2.70"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1S: SA1</b>	Runoff Area=402,743 sf 0.00% Impervious Runoff Depth>0.88" Flow Length=1,165' Tc=41.9 min CN=79 Runoff=4.88 cfs 0.677 af
<b>Subcatchment 2S: SA2</b>	Runoff Area=104,782 sf 53.65% Impervious Runoff Depth>1.60" Flow Length=520' Tc=12.5 min CN=90 Runoff=3.87 cfs 0.321 af
<b>Subcatchment 3aS: SA3</b>	Runoff Area=38,427 sf 95.86% Impervious Runoff Depth>2.23" Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=2.55 cfs 0.164 af
<b>Subcatchment 3bS: SA3b</b>	Runoff Area=29,845 sf 95.86% Impervious Runoff Depth>2.23" Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=1.98 cfs 0.127 af
<b>Subcatchment 4aS: SA4a</b>	Runoff Area=73,744 sf 70.78% Impervious Runoff Depth>1.86" Flow Length=90' Slope=0.0110 '/' Tc=1.5 min CN=93 Runoff=4.17 cfs 0.262 af
<b>Subcatchment 4bS: SA4b</b>	Runoff Area=72,594 sf 65.03% Impervious Runoff Depth>1.77" Flow Length=150' Tc=1.7 min CN=92 Runoff=3.94 cfs 0.246 af
<b>Subcatchment 5S: SA5</b>	Runoff Area=136,118 sf 0.00% Impervious Runoff Depth>0.88" Flow Length=750' Tc=34.0 min CN=79 Runoff=1.83 cfs 0.230 af
<b>Subcatchment 6S: SA6</b>	Runoff Area=59,924 sf 84.40% Impervious Runoff Depth>2.04" Flow Length=260' Tc=1.9 min CN=95 Runoff=3.62 cfs 0.234 af
<b>Subcatchment 7S: SA7</b>	Runoff Area=60,331 sf 5.02% Impervious Runoff Depth>0.94" Flow Length=180' Tc=20.1 min CN=80 Runoff=1.09 cfs 0.109 af
<b>Subcatchment 8S: SA8</b>	Runoff Area=47,172 sf 0.00% Impervious Runoff Depth>0.89" Flow Length=190' Tc=19.2 min CN=79 Runoff=0.81 cfs 0.080 af
<b>Subcatchment 9S: SA 9</b>	Runoff Area=14,300 sf 0.00% Impervious Runoff Depth>0.94" Flow Length=290' Tc=12.8 min CN=80 Runoff=0.31 cfs 0.026 af
<b>Reach 1aR: 1aR</b>	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.00 cfs 0.000 af
<b>Reach 1bR: 1bR</b>	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.00 cfs 0.000 af
<b>Reach 2R: 2R</b>	Avg. Flow Depth=0.11' Max Vel=0.07 fps Inflow=0.34 cfs 0.144 af n=0.400 L=50.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=0.34 cfs 0.140 af
<b>Reach 3R: 3R</b>	Avg. Flow Depth=0.12' Max Vel=0.07 fps Inflow=0.40 cfs 0.206 af n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=0.39 cfs 0.188 af
<b>Reach 4R: 4R</b>	Avg. Flow Depth=0.07' Max Vel=0.05 fps Inflow=0.11 cfs 0.103 af n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=0.11 cfs 0.092 af

**PostDevelopment-20151210**

*Type III 24-hr 2 Year Rainfall=2.70"*

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**Reach 5R: 5R** Avg. Flow Depth=0.27' Max Vel=0.26 fps Inflow=4.88 cfs 0.677 af  
n=0.400 L=100.0' S=0.0500 '/' Capacity=84.52 cfs Outflow=4.76 cfs 0.669 af

**Reach 6R: 6R** Avg. Flow Depth=0.07' Max Vel=1.28 fps Inflow=0.43 cfs 0.203 af  
n=0.030 L=70.0' S=0.0430 '/' Capacity=156.46 cfs Outflow=0.43 cfs 0.202 af

**Reach SP1: SP1** Inflow=5.85 cfs 1.077 af  
Outflow=5.85 cfs 1.077 af

**Reach SP2: SP2** Inflow=3.64 cfs 0.744 af  
Outflow=3.64 cfs 0.744 af

**Pond 1P: 1P** Peak Elev=143.12' Storage=11,210 cf Inflow=4.19 cfs 0.448 af  
Outflow=0.40 cfs 0.206 af

**Pond 2P: 2P** Peak Elev=138.34' Storage=6,374 cf Inflow=3.62 cfs 0.234 af  
Primary=0.11 cfs 0.103 af Secondary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.103 af

**Pond 3P: 3P** Peak Elev=139.05' Storage=8,287 cf Inflow=3.87 cfs 0.321 af  
Primary=0.34 cfs 0.144 af Secondary=0.00 cfs 0.000 af Outflow=0.34 cfs 0.144 af

**Pond 4aP: RD** Peak Elev=141.27' Storage=1,415 cf Inflow=2.55 cfs 0.164 af  
Primary=0.87 cfs 0.162 af Secondary=0.00 cfs 0.000 af Outflow=0.87 cfs 0.162 af

**Pond 4bP: RD** Peak Elev=140.86' Storage=898 cf Inflow=1.98 cfs 0.127 af  
Primary=0.81 cfs 0.126 af Secondary=0.00 cfs 0.000 af Outflow=0.81 cfs 0.126 af

**Pond 6P: 6P** Peak Elev=144.01' Storage=29 cf Inflow=4.88 cfs 0.677 af  
18.0" Round Culvert n=0.013 L=500.0' S=0.0050 '/' Outflow=4.88 cfs 0.677 af

**Pond TP: Tank Pond** Peak Elev=144.59' Storage=6,395 cf Inflow=4.17 cfs 0.262 af  
6.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=0.43 cfs 0.203 af

**Total Runoff Area = 23.875 ac Runoff Volume = 2.475 af Average Runoff Depth = 1.24"**  
**73.59% Pervious = 17.569 ac 26.41% Impervious = 6.306 ac**

**Summary for Subcatchment 1S: SA1**

Runoff = 4.88 cfs @ 12.62 hrs, Volume= 0.677 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
24,192	78	Meadow, non-grazed, HSG D
362,489	79	Woods, Fair, HSG D
16,062	80	>75% Grass cover, Good, HSG D
402,743	79	Weighted Average
402,743		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		<b>Sheet Flow, SF 1-1</b>
					Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 1-1</b>
					Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		<b>Shallow Concentrated Flow, SCF 1-2</b>
					Short Grass Pasture Kv= 7.0 fps
1.6	70	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 1-3</b>
					Woodland Kv= 5.0 fps
2.0	120	0.0200	0.99		<b>Shallow Concentrated Flow, SCF 1-4</b>
					Short Grass Pasture Kv= 7.0 fps
41.9	1,165	Total			

**Summary for Subcatchment 2S: SA2**

Runoff = 3.87 cfs @ 12.17 hrs, Volume= 0.321 af, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
56,218	98	Impervious, HSG D
48,564	80	>75% Grass cover, Good, HSG D
104,782	90	Weighted Average
48,564		46.35% Pervious Area
56,218		53.65% Impervious Area

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Type III 24-hr 2 Year Rainfall=2.70"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0200	1.05		<b>Sheet Flow, SF 2-1</b> Smooth surfaces n= 0.011 P2= 2.70"
10.3	60	0.0200	0.10		<b>Sheet Flow, SF 2-2</b> Grass: Dense n= 0.240 P2= 2.70"
0.5	30	0.0200	0.99		<b>Sheet Flow, SF 2-3</b> Smooth surfaces n= 0.011 P2= 2.70"
0.6	110	0.0200	2.87		<b>Shallow Concentrated Flow, SCF 2-1</b> Paved Kv= 20.3 fps
0.5	280	0.0140	9.46	529.89	<b>Trap/Vee/Rect Channel Flow, CF 2-1</b> Bot.W=2.00' D=4.00' Z= 3.0 '/' Top.W=26.00' n= 0.030 Stream, clean & straight
12.5	520	Total			

**Summary for Subcatchment 3aS: SA3**

Runoff = 2.55 cfs @ 12.01 hrs, Volume= 0.164 af, Depth> 2.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
36,835	98	Impervious, HSG D
* 1,592	66	Roof Dripline
38,427	97	Weighted Average
1,592		4.14% Pervious Area
36,835		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		<b>Sheet Flow, SF 3-1</b> Smooth surfaces n= 0.011 P2= 2.70"

**Summary for Subcatchment 3bS: SA3b**

Runoff = 1.98 cfs @ 12.01 hrs, Volume= 0.127 af, Depth> 2.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
28,609	98	Impervious, HSG D
* 1,236	66	Roof Dripline
29,845	97	Weighted Average
1,236		4.14% Pervious Area
28,609		95.86% Impervious Area



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Type III 24-hr 2 Year Rainfall=2.70"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		<b>Sheet Flow, SF 3-1</b> Smooth surfaces n= 0.011 P2= 2.70"

**Summary for Subcatchment 4aS: SA4a**

Runoff = 4.17 cfs @ 12.02 hrs, Volume= 0.262 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
* 52,199	98	Impervious, HSG D
21,545	80	>75% Grass cover, Good, HSG D
73,744	93	Weighted Average
21,545		29.22% Pervious Area
52,199		70.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	90	0.0110	0.97		<b>Sheet Flow, SF 4a-1</b> Smooth surfaces n= 0.011 P2= 2.70"

**Summary for Subcatchment 4bS: SA4b**

Runoff = 3.94 cfs @ 12.03 hrs, Volume= 0.246 af, Depth> 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
25,384	80	>75% Grass cover, Good, HSG D
* 47,210	98	Impervious, HSG D
72,594	92	Weighted Average
25,384		34.97% Pervious Area
47,210		65.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	140	0.0200	1.35		<b>Sheet Flow, SF 4b-1</b> Smooth surfaces n= 0.011 P2= 2.70"
0.0	10	0.1000	4.74		<b>Shallow Concentrated Flow, SCF 4b-1</b> Grassed Waterway Kv= 15.0 fps
1.7	150	Total			

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Type III 24-hr 2 Year Rainfall=2.70"

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**Summary for Subcatchment 5S: SA5**

Runoff = 1.83 cfs @ 12.50 hrs, Volume= 0.230 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
11,975	80	>75% Grass cover, Good, HSG D
36,307	78	Meadow, non-grazed, HSG D
87,836	79	Woods, Fair, HSG D
136,118	79	Weighted Average
136,118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		<b>Sheet Flow, SF 5-1</b> Woods: Light underbrush n= 0.400 P2= 2.70"
7.0	210	0.0100	0.50		<b>Shallow Concentrated Flow, SCF 5-1</b> Woodland Kv= 5.0 fps
2.4	100	0.0100	0.70		<b>Shallow Concentrated Flow, SCF 5-2</b> Short Grass Pasture Kv= 7.0 fps
8.4	340	0.0180	0.67		<b>Shallow Concentrated Flow, SCF 5-3</b> Woodland Kv= 5.0 fps
34.0	750	Total			

**Summary for Subcatchment 6S: SA6**

Runoff = 3.62 cfs @ 12.03 hrs, Volume= 0.234 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
9,350	80	>75% Grass cover, Good, HSG D
50,574	98	Impervious, HSG D
59,924	95	Weighted Average
9,350		15.60% Pervious Area
50,574		84.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	90	0.0330	1.51		<b>Sheet Flow, SF 6-1</b> Smooth surfaces n= 0.011 P2= 2.70"
0.9	170	0.0240	3.14		<b>Shallow Concentrated Flow, SCF 6-1</b> Paved Kv= 20.3 fps
1.9	260	Total			

**Summary for Subcatchment 7S: SA7**

Runoff = 1.09 cfs @ 12.30 hrs, Volume= 0.109 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
* 3,031	98	Impervious, HSG D
50,265	79	Woods, Fair, HSG D
7,035	80	>75% Grass cover, Good, HSG D
60,331	80	Weighted Average
57,300		94.98% Pervious Area
3,031		5.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		<b>Sheet Flow, SF 7-1</b> Grass: Dense n= 0.240 P2= 2.70"
14.2	60	0.0250	0.07		<b>Sheet Flow, SF 7-2</b> Woods: Light underbrush n= 0.400 P2= 2.70"
2.0	80	0.0170	0.65		<b>Shallow Concentrated Flow, SCF 7-1</b> Woodland Kv= 5.0 fps
20.1	180	Total			

**Summary for Subcatchment 8S: SA8**

Runoff = 0.81 cfs @ 12.28 hrs, Volume= 0.080 af, Depth> 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
40,395	79	Woods, Fair, HSG D
6,777	80	>75% Grass cover, Good, HSG D
47,172	79	Weighted Average
47,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		<b>Sheet Flow, SF 8-1</b> Grass: Dense n= 0.240 P2= 2.70"
13.2	60	0.0300	0.08		<b>Sheet Flow, SF 8-2</b> Woods: Light underbrush n= 0.400 P2= 2.70"
2.1	90	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 8-1</b> Woodland Kv= 5.0 fps
19.2	190	Total			

**Summary for Subcatchment 9S: SA 9**

Runoff = 0.31 cfs @ 12.19 hrs, Volume= 0.026 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
12,287	80	>75% Grass cover, Good, HSG D
2,013	79	Woods, Fair, HSG D
14,300	80	Weighted Average
14,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.0500	0.15		<b>Sheet Flow, SF 9-1</b>
					Grass: Dense n= 0.240 P2= 2.70"
1.6	160	0.0600	1.71		<b>Shallow Concentrated Flow, SCF 9-1</b>
					Short Grass Pasture Kv= 7.0 fps
0.4	30	0.0500	1.12		<b>Shallow Concentrated Flow, SCF 9-2</b>
					Woodland Kv= 5.0 fps
12.8	290	Total			

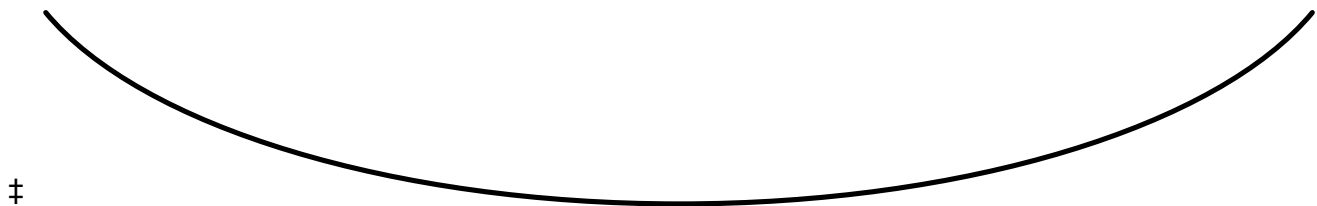
**Summary for Reach 1aR: 1aR**

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs  
 Average Depth at Peak Storage= 0.00'  
 Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush  
 Length= 100.0' Slope= 0.0200 ''  
 Inlet Invert= 0.00', Outlet Invert= -2.00'



Summary for Reach 1bR: 1bR

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



Summary for Reach 2R: 2R

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 0.72" for 2 Year event
Inflow = 0.34 cfs @ 13.71 hrs, Volume= 0.144 af
Outflow = 0.34 cfs @ 14.10 hrs, Volume= 0.140 af, Atten= 2%, Lag= 23.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.07 fps, Min. Travel Time= 12.5 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 18.3 min

Peak Storage= 254 cf @ 13.89 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.50'



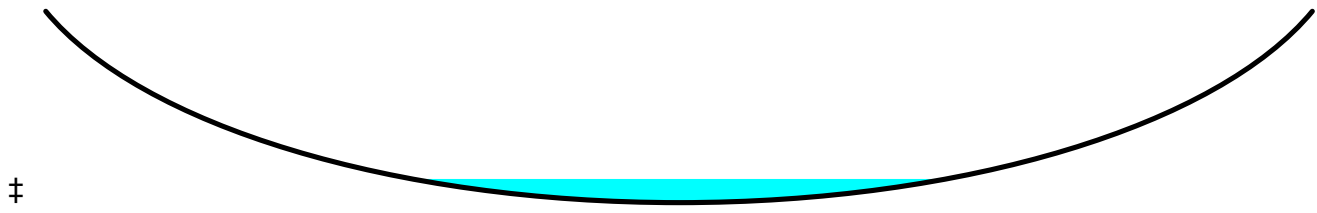
Summary for Reach 3R: 3R

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 0.73" for 2 Year event
Inflow = 0.40 cfs @ 16.15 hrs, Volume= 0.206 af
Outflow = 0.39 cfs @ 16.89 hrs, Volume= 0.188 af, Atten= 1%, Lag= 44.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.07 fps, Min. Travel Time= 23.9 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 35.3 min

Peak Storage= 566 cf @ 16.49 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'



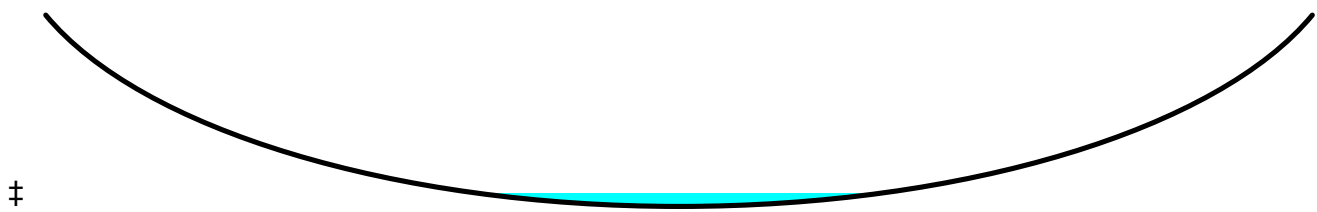
Summary for Reach 4R: 4R

Inflow Area = 1.376 ac, 84.40% Impervious, Inflow Depth > 0.89" for 2 Year event
Inflow = 0.11 cfs @ 15.65 hrs, Volume= 0.103 af
Outflow = 0.11 cfs @ 16.68 hrs, Volume= 0.092 af, Atten= 0%, Lag= 61.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.05 fps, Min. Travel Time= 35.4 min
Avg. Velocity = 0.04 fps, Avg. Travel Time= 41.5 min

Peak Storage= 233 cf @ 16.08 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'



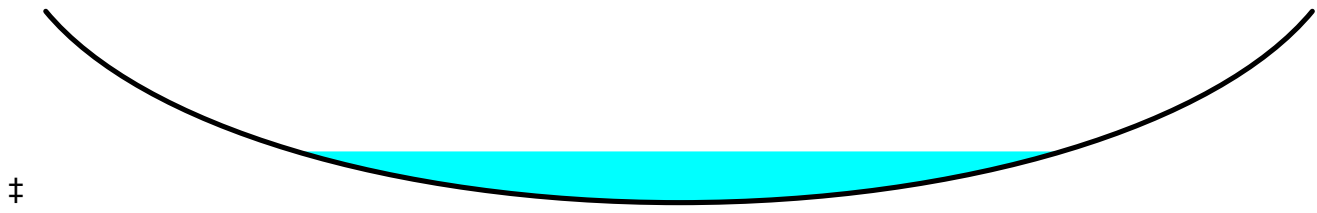
Summary for Reach 5R: 5R

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 0.88" for 2 Year event
Inflow = 4.88 cfs @ 12.62 hrs, Volume= 0.677 af
Outflow = 4.76 cfs @ 12.80 hrs, Volume= 0.669 af, Atten= 3%, Lag= 11.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.26 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 12.6 min

Peak Storage= 1,820 cf @ 12.70 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 84.52 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0500 '/'
Inlet Invert= 0.00', Outlet Invert= -5.00'



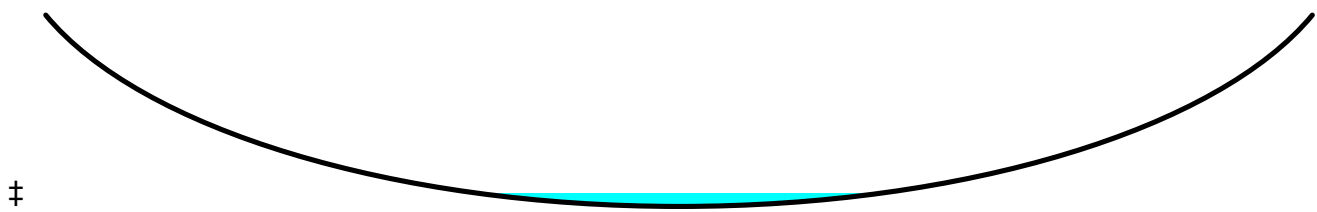
Summary for Reach 6R: 6R

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 1.44" for 2 Year event
Inflow = 0.43 cfs @ 12.69 hrs, Volume= 0.203 af
Outflow = 0.43 cfs @ 12.72 hrs, Volume= 0.202 af, Atten= 0%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.28 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.83 fps, Avg. Travel Time= 1.4 min

Peak Storage= 24 cf @ 12.70 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 156.46 cfs

30.00' x 1.00' deep Parabolic Channel, n= 0.030 Short grass
Length= 70.0' Slope= 0.0430 '/'
Inlet Invert= 0.00', Outlet Invert= -3.01'



**Summary for Reach SP1: SP1**

Inflow Area = 13.945 ac, 15.32% Impervious, Inflow Depth > 0.93" for 2 Year event  
 Inflow = 5.85 cfs @ 12.77 hrs, Volume= 1.077 af  
 Outflow = 5.85 cfs @ 12.77 hrs, Volume= 1.077 af, Atten= 0%, Lag= 0.0 min

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

**Summary for Reach SP2: SP2**

Inflow Area = 9.930 ac, 41.99% Impervious, Inflow Depth > 0.90" for 2 Year event  
 Inflow = 3.64 cfs @ 12.41 hrs, Volume= 0.744 af  
 Outflow = 3.64 cfs @ 12.41 hrs, Volume= 0.744 af, Atten= 0%, Lag= 0.0 min

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

**Summary for Pond 1P: 1P**

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 1.60" for 2 Year event  
 Inflow = 4.19 cfs @ 12.03 hrs, Volume= 0.448 af  
 Outflow = 0.40 cfs @ 16.15 hrs, Volume= 0.206 af, Atten= 90%, Lag= 247.0 min  
 Primary = 0.40 cfs @ 16.15 hrs, Volume= 0.206 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 143.12' @ 16.15 hrs Surf.Area= 10,474 sf Storage= 11,210 cf

Plug-Flow detention time= 230.9 min calculated for 0.206 af (46% of inflow)  
 Center-of-Mass det. time= 106.9 min ( 937.0 - 830.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	141.95'	20,937 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
141.95	5,925	0	0
142.00	8,752	367	367
143.00	10,374	9,563	9,930
143.50	10,782	5,289	15,219
144.00	12,092	5,719	20,937

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	<b>12.0" Round Culvert</b> L= 200.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 139.00' / 137.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	141.95'	<b>0.598 in/hr Exfiltration over Surface area</b>
#3	Device 1	143.00'	<b>22.0" W x 5.0" H Vert. Orifice/Grate</b> C= 0.600



**Primary OutFlow** Max=0.40 cfs @ 16.15 hrs HW=143.12' (Free Discharge)

- ↑ 1=Culvert (Passes 0.40 cfs of 5.22 cfs potential flow)
  - ↑ 2=Exfiltration (Exfiltration Controls 0.14 cfs)
    - ↑ 3=Orifice/Grate (Orifice Controls 0.25 cfs @ 1.12 fps)

**Summary for Pond 2P: 2P**

Inflow Area = 1.376 ac, 84.40% Impervious, Inflow Depth > 2.04" for 2 Year event  
 Inflow = 3.62 cfs @ 12.03 hrs, Volume= 0.234 af  
 Outflow = 0.11 cfs @ 15.65 hrs, Volume= 0.103 af, Atten= 97%, Lag= 217.3 min  
 Primary = 0.11 cfs @ 15.65 hrs, Volume= 0.103 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 138.34' @ 15.65 hrs Surf.Area= 7,911 sf Storage= 6,374 cf

Plug-Flow detention time= 189.4 min calculated for 0.102 af (44% of inflow)  
 Center-of-Mass det. time= 94.9 min ( 849.0 - 754.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	137.45'	17,331 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.45	2,716	0	0
137.50	6,701	235	235
138.00	7,413	3,529	3,764
139.00	8,876	8,145	11,908
139.60	9,200	5,423	17,331

Device	Routing	Invert	Outlet Devices
#1	Primary	134.50'	<b>12.0" Round Culvert</b> L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.50' / 133.50' S= 0.0100 ' /' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.45'	<b>0.598 in/hr Exfiltration over Surface area</b>
#3	Device 1	139.00'	<b>20.0" W x 4.0" H Vert. Orifice/Grate</b> C= 0.600
#4	Secondary	139.50'	<b>15.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

**Primary OutFlow** Max=0.11 cfs @ 15.65 hrs HW=138.34' (Free Discharge)

- ↑ 1=Culvert (Passes 0.11 cfs of 5.93 cfs potential flow)
  - ↑ 2=Exfiltration (Exfiltration Controls 0.11 cfs)
    - ↑ 3=Orifice/Grate ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=137.45' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond 3P: 3P**

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 1.60" for 2 Year event  
 Inflow = 3.87 cfs @ 12.17 hrs, Volume= 0.321 af  
 Outflow = 0.34 cfs @ 13.71 hrs, Volume= 0.144 af, Atten= 91%, Lag= 92.2 min  
 Primary = 0.34 cfs @ 13.71 hrs, Volume= 0.144 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 139.05' @ 13.71 hrs Surf.Area= 8,237 sf Storage= 8,287 cf

Plug-Flow detention time= 181.2 min calculated for 0.144 af (45% of inflow)  
 Center-of-Mass det. time= 96.0 min ( 881.5 - 785.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	137.95'	12,139 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.95	3,791	0	0
138.00	7,013	270	270
139.00	8,142	7,578	7,848
139.50	9,024	4,292	12,139

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	<b>12.0" Round Culvert</b> L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0100 ' /' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.95'	<b>0.598 in/hr Exfiltration over Surface area</b>
#3	Device 1	139.00'	<b>21.4" Horiz. Orifice/Grate-NFCO R-4342 Beehive Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	139.45'	<b>15.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

**Primary OutFlow** Max=0.34 cfs @ 13.71 hrs HW=139.05' (Free Discharge)  
 ↑ **1=Culvert** (Passes 0.34 cfs of 6.09 cfs potential flow)  
 ↑ **2=Exfiltration** (Exfiltration Controls 0.11 cfs)  
 ↑ **3=Orifice/Grate-NFCO R-4342 Beehive Grate** (Weir Controls 0.23 cfs @ 0.76 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=137.95' (Free Discharge)  
 ↑ **4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Summary for Pond 4aP: RD**

Inflow Area = 0.882 ac, 95.86% Impervious, Inflow Depth > 2.23" for 2 Year event  
 Inflow = 2.55 cfs @ 12.01 hrs, Volume= 0.164 af  
 Outflow = 0.87 cfs @ 12.22 hrs, Volume= 0.162 af, Atten= 66%, Lag= 12.8 min  
 Primary = 0.87 cfs @ 12.22 hrs, Volume= 0.162 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 141.27' @ 12.22 hrs Surf.Area= 1,557 sf Storage= 1,415 cf

Plug-Flow detention time= 20.8 min calculated for 0.162 af (99% of inflow)  
 Center-of-Mass det. time= 16.6 min ( 758.7 - 742.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	3,114 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 7,785 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,557	0	0
140.00	1,557	1,557	1,557
141.00	1,557	1,557	3,114
142.00	1,557	1,557	4,671
143.00	1,557	1,557	6,228
144.00	1,557	1,557	7,785

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	<b>6.0" Round Culvert</b> L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	<b>503.0' long x 5.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

**Primary OutFlow** Max=0.87 cfs @ 12.22 hrs HW=141.27' (Free Discharge)  
 ↑**1=Culvert** (Barrel Controls 0.87 cfs @ 4.45 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=139.00' (Free Discharge)  
 ↑**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Summary for Pond 4bP: RD**

Inflow Area = 0.685 ac, 95.86% Impervious, Inflow Depth > 2.23" for 2 Year event  
 Inflow = 1.98 cfs @ 12.01 hrs, Volume= 0.127 af  
 Outflow = 0.81 cfs @ 12.16 hrs, Volume= 0.126 af, Atten= 59%, Lag= 9.0 min  
 Primary = 0.81 cfs @ 12.16 hrs, Volume= 0.126 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

**PostDevelopment-20151210**

Type III 24-hr 2 Year Rainfall=2.70"

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Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 140.86' @ 12.16 hrs Surf.Area= 1,210 sf Storage= 898 cf

Plug-Flow detention time= 16.3 min calculated for 0.126 af (99% of inflow)  
 Center-of-Mass det. time= 12.6 min ( 754.7 - 742.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	2,420 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 6,050 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,210	0	0
140.00	1,210	1,210	1,210
141.00	1,210	1,210	2,420
142.00	1,210	1,210	3,630
143.00	1,210	1,210	4,840
144.00	1,210	1,210	6,050

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	<b>6.0" Round Culvert</b> L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	<b>503.0' long x 5.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

**Primary OutFlow** Max=0.81 cfs @ 12.16 hrs HW=140.85' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.81 cfs @ 4.10 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=139.00' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Summary for Pond 6P: 6P**

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 0.88" for 2 Year event  
 Inflow = 4.88 cfs @ 12.62 hrs, Volume= 0.677 af  
 Outflow = 4.88 cfs @ 12.62 hrs, Volume= 0.677 af, Atten= 0%, Lag= 0.1 min  
 Primary = 4.88 cfs @ 12.62 hrs, Volume= 0.677 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 144.01' @ 12.62 hrs Surf.Area= 3,984 sf Storage= 29 cf

Plug-Flow detention time= 0.1 min calculated for 0.677 af (100% of inflow)  
 Center-of-Mass det. time= 0.1 min ( 840.8 - 840.7 )

**PostDevelopment-20151210**

Type III 24-hr 2 Year Rainfall=2.70"

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Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	7,720 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	3,972	0	0
145.50	6,321	7,720	7,720

Device	Routing	Invert	Outlet Devices
#1	Primary	140.00'	<b>18.0" Round Culvert</b> L= 500.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 140.00' / 137.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

**Primary OutFlow** Max=9.87 cfs @ 12.62 hrs HW=144.01' (Free Discharge)↑**1=Culvert** (Barrel Controls 9.87 cfs @ 5.58 fps)**Summary for Pond TP: Tank Pond**

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 1.86" for 2 Year event  
 Inflow = 4.17 cfs @ 12.02 hrs, Volume= 0.262 af  
 Outflow = 0.43 cfs @ 12.69 hrs, Volume= 0.203 af, Atten= 90%, Lag= 40.1 min  
 Primary = 0.43 cfs @ 12.69 hrs, Volume= 0.203 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 144.59' @ 12.69 hrs Surf.Area= 11,551 sf Storage= 6,395 cf

Plug-Flow detention time= 197.2 min calculated for 0.203 af (77% of inflow)  
 Center-of-Mass det. time= 139.6 min ( 903.5 - 763.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	25,049 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	10,153	0	0
146.00	14,896	25,049	25,049

Device	Routing	Invert	Outlet Devices
#1	Primary	144.00'	<b>6.0" Round Culvert</b> L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 144.00' / 143.70' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

**Primary OutFlow** Max=0.43 cfs @ 12.69 hrs HW=144.59' (Free Discharge)↑**1=Culvert** (Inlet Controls 0.43 cfs @ 2.21 fps)

**POST DEVELOPMENT - 10 YEAR**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1S: SA1</b>	Runoff Area=402,743 sf 0.00% Impervious Runoff Depth>1.87" Flow Length=1,165' Tc=41.9 min CN=79 Runoff=10.61 cfs 1.444 af
<b>Subcatchment 2S: SA2</b>	Runoff Area=104,782 sf 53.65% Impervious Runoff Depth>2.84" Flow Length=520' Tc=12.5 min CN=90 Runoff=6.70 cfs 0.569 af
<b>Subcatchment 3aS: SA3</b>	Runoff Area=38,427 sf 95.86% Impervious Runoff Depth>3.52" Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=3.96 cfs 0.259 af
<b>Subcatchment 3bS: SA3b</b>	Runoff Area=29,845 sf 95.86% Impervious Runoff Depth>3.52" Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=3.07 cfs 0.201 af
<b>Subcatchment 4aS: SA4a</b>	Runoff Area=73,744 sf 70.78% Impervious Runoff Depth>3.14" Flow Length=90' Slope=0.0110 '/' Tc=1.5 min CN=93 Runoff=6.84 cfs 0.443 af
<b>Subcatchment 4bS: SA4b</b>	Runoff Area=72,594 sf 65.03% Impervious Runoff Depth>3.04" Flow Length=150' Tc=1.7 min CN=92 Runoff=6.56 cfs 0.422 af
<b>Subcatchment 5S: SA5</b>	Runoff Area=136,118 sf 0.00% Impervious Runoff Depth>1.88" Flow Length=750' Tc=34.0 min CN=79 Runoff=3.98 cfs 0.489 af
<b>Subcatchment 6S: SA6</b>	Runoff Area=59,924 sf 84.40% Impervious Runoff Depth>3.33" Flow Length=260' Tc=1.9 min CN=95 Runoff=5.75 cfs 0.382 af
<b>Subcatchment 7S: SA7</b>	Runoff Area=60,331 sf 5.02% Impervious Runoff Depth>1.97" Flow Length=180' Tc=20.1 min CN=80 Runoff=2.31 cfs 0.227 af
<b>Subcatchment 8S: SA8</b>	Runoff Area=47,172 sf 0.00% Impervious Runoff Depth>1.89" Flow Length=190' Tc=19.2 min CN=79 Runoff=1.77 cfs 0.171 af
<b>Subcatchment 9S: SA 9</b>	Runoff Area=14,300 sf 0.00% Impervious Runoff Depth>1.97" Flow Length=290' Tc=12.8 min CN=80 Runoff=0.65 cfs 0.054 af
<b>Reach 1aR: 1aR</b>	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.00 cfs 0.000 af
<b>Reach 1bR: 1bR</b>	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.00 cfs 0.000 af
<b>Reach 2R: 2R</b>	Avg. Flow Depth=0.31' Max Vel=0.13 fps Inflow=3.28 cfs 0.387 af n=0.400 L=50.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=3.05 cfs 0.382 af
<b>Reach 3R: 3R</b>	Avg. Flow Depth=0.19' Max Vel=0.09 fps Inflow=1.02 cfs 0.514 af n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=1.01 cfs 0.489 af
<b>Reach 4R: 4R</b>	Avg. Flow Depth=0.07' Max Vel=0.05 fps Inflow=0.12 cfs 0.122 af n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=0.12 cfs 0.110 af

**PostDevelopment-20151210**

*Type III 24-hr 10 Year Rainfall=4.10"*

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**Reach 5R: 5R** Avg. Flow Depth=0.37' Max Vel=0.33 fps Inflow=9.97 cfs 1.444 af  
n=0.400 L=100.0' S=0.0500 '/' Capacity=84.52 cfs Outflow=9.95 cfs 1.433 af

**Reach 6R: 6R** Avg. Flow Depth=0.08' Max Vel=1.44 fps Inflow=0.63 cfs 0.351 af  
n=0.030 L=70.0' S=0.0430 '/' Capacity=156.46 cfs Outflow=0.63 cfs 0.350 af

**Reach SP1: SP1** Inflow=14.72 cfs 2.296 af  
Outflow=14.72 cfs 2.296 af

**Reach SP2: SP2** Inflow=7.06 cfs 1.515 af  
Outflow=7.06 cfs 1.515 af

**Pond 1P: 1P** Peak Elev=143.28' Storage=12,860 cf Inflow=7.01 cfs 0.772 af  
Outflow=1.02 cfs 0.514 af

**Pond 2P: 2P** Peak Elev=138.98' Storage=11,691 cf Inflow=5.75 cfs 0.382 af  
Primary=0.12 cfs 0.122 af Secondary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.122 af

**Pond 3P: 3P** Peak Elev=139.31' Storage=10,457 cf Inflow=6.70 cfs 0.569 af  
Primary=3.28 cfs 0.387 af Secondary=0.00 cfs 0.000 af Outflow=3.28 cfs 0.387 af

**Pond 4aP: RD** Peak Elev=143.18' Storage=2,602 cf Inflow=3.96 cfs 0.259 af  
Primary=1.14 cfs 0.257 af Secondary=0.00 cfs 0.000 af Outflow=1.14 cfs 0.257 af

**Pond 4bP: RD** Peak Elev=142.49' Storage=1,689 cf Inflow=3.07 cfs 0.201 af  
Primary=1.05 cfs 0.200 af Secondary=0.00 cfs 0.000 af Outflow=1.05 cfs 0.200 af

**Pond 6P: 6P** Peak Elev=144.11' Storage=463 cf Inflow=10.61 cfs 1.444 af  
18.0" Round Culvert n=0.013 L=500.0' S=0.0050 '/' Outflow=9.97 cfs 1.444 af

**Pond TP: Tank Pond** Peak Elev=144.96' Storage=10,886 cf Inflow=6.84 cfs 0.443 af  
6.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=0.63 cfs 0.351 af

**Total Runoff Area = 23.875 ac Runoff Volume = 4.660 af Average Runoff Depth = 2.34"**  
**73.59% Pervious = 17.569 ac 26.41% Impervious = 6.306 ac**



**Summary for Subcatchment 1S: SA1**

Runoff = 10.61 cfs @ 12.59 hrs, Volume= 1.444 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
24,192	78	Meadow, non-grazed, HSG D
362,489	79	Woods, Fair, HSG D
16,062	80	>75% Grass cover, Good, HSG D
402,743	79	Weighted Average
402,743		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		<b>Sheet Flow, SF 1-1</b>
					Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 1-1</b>
					Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		<b>Shallow Concentrated Flow, SCF 1-2</b>
					Short Grass Pasture Kv= 7.0 fps
1.6	70	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 1-3</b>
					Woodland Kv= 5.0 fps
2.0	120	0.0200	0.99		<b>Shallow Concentrated Flow, SCF 1-4</b>
					Short Grass Pasture Kv= 7.0 fps
41.9	1,165	Total			

**Summary for Subcatchment 2S: SA2**

Runoff = 6.70 cfs @ 12.17 hrs, Volume= 0.569 af, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
56,218	98	Impervious, HSG D
48,564	80	>75% Grass cover, Good, HSG D
104,782	90	Weighted Average
48,564		46.35% Pervious Area
56,218		53.65% Impervious Area

**PostDevelopment-20151210**

Type III 24-hr 10 Year Rainfall=4.10"

Prepared by CES, Inc

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0200	1.05		<b>Sheet Flow, SF 2-1</b> Smooth surfaces n= 0.011 P2= 2.70"
10.3	60	0.0200	0.10		<b>Sheet Flow, SF 2-2</b> Grass: Dense n= 0.240 P2= 2.70"
0.5	30	0.0200	0.99		<b>Sheet Flow, SF 2-3</b> Smooth surfaces n= 0.011 P2= 2.70"
0.6	110	0.0200	2.87		<b>Shallow Concentrated Flow, SCF 2-1</b> Paved Kv= 20.3 fps
0.5	280	0.0140	9.46	529.89	<b>Trap/Vee/Rect Channel Flow, CF 2-1</b> Bot.W=2.00' D=4.00' Z= 3.0 '/' Top.W=26.00' n= 0.030 Stream, clean & straight
12.5	520	Total			

**Summary for Subcatchment 3aS: SA3**

Runoff = 3.96 cfs @ 12.01 hrs, Volume= 0.259 af, Depth> 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
36,835	98	Impervious, HSG D
* 1,592	66	Roof Dripline
38,427	97	Weighted Average
1,592		4.14% Pervious Area
36,835		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		<b>Sheet Flow, SF 3-1</b> Smooth surfaces n= 0.011 P2= 2.70"

**Summary for Subcatchment 3bS: SA3b**

Runoff = 3.07 cfs @ 12.01 hrs, Volume= 0.201 af, Depth> 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
28,609	98	Impervious, HSG D
* 1,236	66	Roof Dripline
29,845	97	Weighted Average
1,236		4.14% Pervious Area
28,609		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		<b>Sheet Flow, SF 3-1</b> Smooth surfaces n= 0.011 P2= 2.70"

**Summary for Subcatchment 4aS: SA4a**

Runoff = 6.84 cfs @ 12.02 hrs, Volume= 0.443 af, Depth> 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
* 52,199	98	Impervious, HSG D
21,545	80	>75% Grass cover, Good, HSG D
73,744	93	Weighted Average
21,545		29.22% Pervious Area
52,199		70.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	90	0.0110	0.97		<b>Sheet Flow, SF 4a-1</b> Smooth surfaces n= 0.011 P2= 2.70"

**Summary for Subcatchment 4bS: SA4b**

Runoff = 6.56 cfs @ 12.03 hrs, Volume= 0.422 af, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
25,384	80	>75% Grass cover, Good, HSG D
* 47,210	98	Impervious, HSG D
72,594	92	Weighted Average
25,384		34.97% Pervious Area
47,210		65.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	140	0.0200	1.35		<b>Sheet Flow, SF 4b-1</b> Smooth surfaces n= 0.011 P2= 2.70"
0.0	10	0.1000	4.74		<b>Shallow Concentrated Flow, SCF 4b-1</b> Grassed Waterway Kv= 15.0 fps
1.7	150	Total			

**Summary for Subcatchment 5S: SA5**

Runoff = 3.98 cfs @ 12.48 hrs, Volume= 0.489 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
11,975	80	>75% Grass cover, Good, HSG D
36,307	78	Meadow, non-grazed, HSG D
87,836	79	Woods, Fair, HSG D
136,118	79	Weighted Average
136,118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		<b>Sheet Flow, SF 5-1</b> Woods: Light underbrush n= 0.400 P2= 2.70"
7.0	210	0.0100	0.50		<b>Shallow Concentrated Flow, SCF 5-1</b> Woodland Kv= 5.0 fps
2.4	100	0.0100	0.70		<b>Shallow Concentrated Flow, SCF 5-2</b> Short Grass Pasture Kv= 7.0 fps
8.4	340	0.0180	0.67		<b>Shallow Concentrated Flow, SCF 5-3</b> Woodland Kv= 5.0 fps
34.0	750	Total			

**Summary for Subcatchment 6S: SA6**

Runoff = 5.75 cfs @ 12.03 hrs, Volume= 0.382 af, Depth> 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
9,350	80	>75% Grass cover, Good, HSG D
50,574	98	Impervious, HSG D
59,924	95	Weighted Average
9,350		15.60% Pervious Area
50,574		84.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	90	0.0330	1.51		<b>Sheet Flow, SF 6-1</b> Smooth surfaces n= 0.011 P2= 2.70"
0.9	170	0.0240	3.14		<b>Shallow Concentrated Flow, SCF 6-1</b> Paved Kv= 20.3 fps
1.9	260	Total			

**Summary for Subcatchment 7S: SA7**

Runoff = 2.31 cfs @ 12.28 hrs, Volume= 0.227 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
* 3,031	98	Impervious, HSG D
50,265	79	Woods, Fair, HSG D
7,035	80	>75% Grass cover, Good, HSG D
60,331	80	Weighted Average
57,300		94.98% Pervious Area
3,031		5.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		<b>Sheet Flow, SF 7-1</b> Grass: Dense n= 0.240 P2= 2.70"
14.2	60	0.0250	0.07		<b>Sheet Flow, SF 7-2</b> Woods: Light underbrush n= 0.400 P2= 2.70"
2.0	80	0.0170	0.65		<b>Shallow Concentrated Flow, SCF 7-1</b> Woodland Kv= 5.0 fps
20.1	180	Total			

**Summary for Subcatchment 8S: SA8**

Runoff = 1.77 cfs @ 12.27 hrs, Volume= 0.171 af, Depth> 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
40,395	79	Woods, Fair, HSG D
6,777	80	>75% Grass cover, Good, HSG D
47,172	79	Weighted Average
47,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		<b>Sheet Flow, SF 8-1</b> Grass: Dense n= 0.240 P2= 2.70"
13.2	60	0.0300	0.08		<b>Sheet Flow, SF 8-2</b> Woods: Light underbrush n= 0.400 P2= 2.70"
2.1	90	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 8-1</b> Woodland Kv= 5.0 fps
19.2	190	Total			

**Summary for Subcatchment 9S: SA 9**

Runoff = 0.65 cfs @ 12.18 hrs, Volume= 0.054 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
12,287	80	>75% Grass cover, Good, HSG D
2,013	79	Woods, Fair, HSG D
14,300	80	Weighted Average
14,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.0500	0.15		<b>Sheet Flow, SF 9-1</b>
					Grass: Dense n= 0.240 P2= 2.70"
1.6	160	0.0600	1.71		<b>Shallow Concentrated Flow, SCF 9-1</b>
					Short Grass Pasture Kv= 7.0 fps
0.4	30	0.0500	1.12		<b>Shallow Concentrated Flow, SCF 9-2</b>
					Woodland Kv= 5.0 fps
12.8	290	Total			

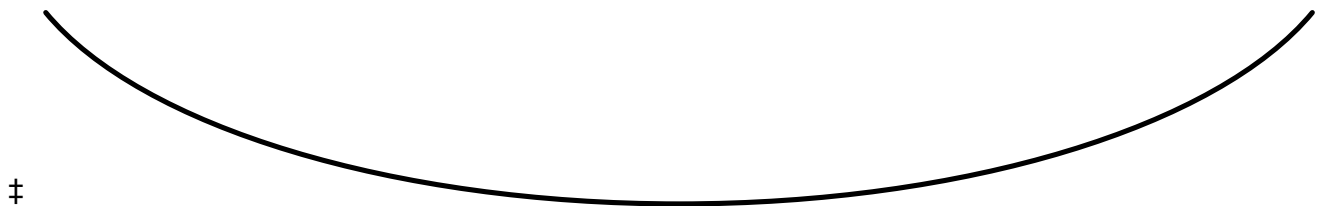
**Summary for Reach 1aR: 1aR**

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs  
 Average Depth at Peak Storage= 0.00'  
 Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush  
 Length= 100.0' Slope= 0.0200 ''  
 Inlet Invert= 0.00', Outlet Invert= -2.00'



Summary for Reach 1bR: 1bR

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



Summary for Reach 2R: 2R

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 1.93" for 10 Year event
Inflow = 3.28 cfs @ 12.43 hrs, Volume= 0.387 af
Outflow = 3.05 cfs @ 12.64 hrs, Volume= 0.382 af, Atten= 7%, Lag= 12.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.13 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 15.5 min

Peak Storage= 1,168 cf @ 12.54 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.50'



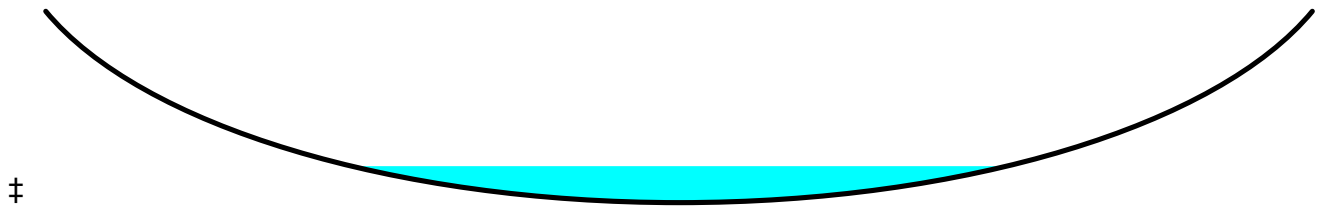
Summary for Reach 3R: 3R

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 1.83" for 10 Year event
Inflow = 1.02 cfs @ 13.53 hrs, Volume= 0.514 af
Outflow = 1.01 cfs @ 14.11 hrs, Volume= 0.489 af, Atten= 1%, Lag= 34.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.09 fps, Min. Travel Time= 17.9 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 27.3 min

Peak Storage= 1,083 cf @ 13.81 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'



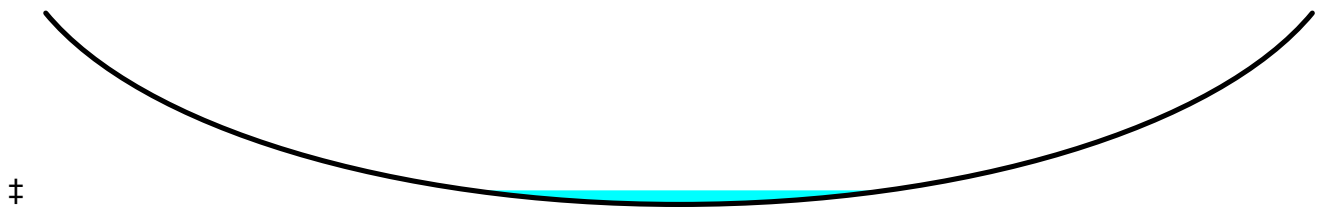
Summary for Reach 4R: 4R

Inflow Area = 1.376 ac, 84.40% Impervious, Inflow Depth > 1.06" for 10 Year event
Inflow = 0.12 cfs @ 16.86 hrs, Volume= 0.122 af
Outflow = 0.12 cfs @ 17.83 hrs, Volume= 0.110 af, Atten= 0%, Lag= 58.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.05 fps, Min. Travel Time= 34.3 min
Avg. Velocity = 0.04 fps, Avg. Travel Time= 38.4 min

Peak Storage= 252 cf @ 17.26 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'





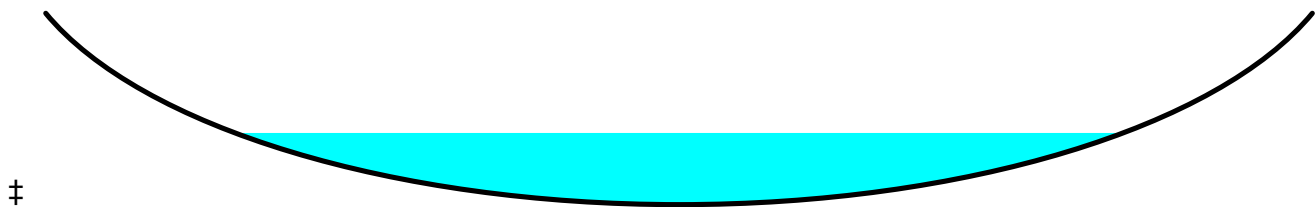
Summary for Reach 5R: 5R

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 1.87" for 10 Year event
Inflow = 9.97 cfs @ 12.71 hrs, Volume= 1.444 af
Outflow = 9.95 cfs @ 12.86 hrs, Volume= 1.433 af, Atten= 0%, Lag= 8.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.33 fps, Min. Travel Time= 5.1 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 10.7 min

Peak Storage= 3,033 cf @ 12.77 hrs
Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 84.52 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0500 '/'
Inlet Invert= 0.00', Outlet Invert= -5.00'



Summary for Reach 6R: 6R

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 2.49" for 10 Year event
Inflow = 0.63 cfs @ 12.79 hrs, Volume= 0.351 af
Outflow = 0.63 cfs @ 12.82 hrs, Volume= 0.350 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.44 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 1.2 min

Peak Storage= 31 cf @ 12.80 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 156.46 cfs

30.00' x 1.00' deep Parabolic Channel, n= 0.030 Short grass
Length= 70.0' Slope= 0.0430 '/'
Inlet Invert= 0.00', Outlet Invert= -3.01'



**Summary for Reach SP1: SP1**

Inflow Area = 13.945 ac, 15.32% Impervious, Inflow Depth > 1.98" for 10 Year event  
 Inflow = 14.72 cfs @ 12.66 hrs, Volume= 2.296 af  
 Outflow = 14.72 cfs @ 12.66 hrs, Volume= 2.296 af, Atten= 0%, Lag= 0.0 min

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

**Summary for Reach SP2: SP2**

Inflow Area = 9.930 ac, 41.99% Impervious, Inflow Depth > 1.83" for 10 Year event  
 Inflow = 7.06 cfs @ 12.39 hrs, Volume= 1.515 af  
 Outflow = 7.06 cfs @ 12.39 hrs, Volume= 1.515 af, Atten= 0%, Lag= 0.0 min

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

**Summary for Pond 1P: 1P**

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 2.76" for 10 Year event  
 Inflow = 7.01 cfs @ 12.03 hrs, Volume= 0.772 af  
 Outflow = 1.02 cfs @ 13.53 hrs, Volume= 0.514 af, Atten= 86%, Lag= 90.3 min  
 Primary = 1.02 cfs @ 13.53 hrs, Volume= 0.514 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 143.28' @ 13.53 hrs Surf.Area= 10,602 sf Storage= 12,860 cf

Plug-Flow detention time= 175.9 min calculated for 0.512 af (66% of inflow)  
 Center-of-Mass det. time= 80.8 min ( 906.7 - 825.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	141.95'	20,937 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
141.95	5,925	0	0
142.00	8,752	367	367
143.00	10,374	9,563	9,930
143.50	10,782	5,289	15,219
144.00	12,092	5,719	20,937

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	<b>12.0" Round Culvert</b> L= 200.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 139.00' / 137.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	141.95'	<b>0.598 in/hr Exfiltration over Surface area</b>
#3	Device 1	143.00'	<b>22.0" W x 5.0" H Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=1.02 cfs @ 13.53 hrs HW=143.28' (Free Discharge)

- ↑ 1=Culvert (Passes 1.02 cfs of 5.30 cfs potential flow)
  - ↑ 2=Exfiltration (Exfiltration Controls 0.15 cfs)
    - ↑ 3=Orifice/Grate (Orifice Controls 0.87 cfs @ 1.70 fps)

**Summary for Pond 2P: 2P**

Inflow Area = 1.376 ac, 84.40% Impervious, Inflow Depth > 3.33" for 10 Year event  
 Inflow = 5.75 cfs @ 12.03 hrs, Volume= 0.382 af  
 Outflow = 0.12 cfs @ 16.86 hrs, Volume= 0.122 af, Atten= 98%, Lag= 289.4 min  
 Primary = 0.12 cfs @ 16.86 hrs, Volume= 0.122 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 138.98' @ 16.86 hrs Surf.Area= 8,840 sf Storage= 11,691 cf

Plug-Flow detention time= 203.5 min calculated for 0.121 af (32% of inflow)  
 Center-of-Mass det. time= 77.4 min ( 822.6 - 745.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	137.45'	17,331 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.45	2,716	0	0
137.50	6,701	235	235
138.00	7,413	3,529	3,764
139.00	8,876	8,145	11,908
139.60	9,200	5,423	17,331

Device	Routing	Invert	Outlet Devices
#1	Primary	134.50'	<b>12.0" Round Culvert</b> L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.50' / 133.50' S= 0.0100 ' / Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.45'	<b>0.598 in/hr Exfiltration over Surface area</b>
#3	Device 1	139.00'	<b>20.0" W x 4.0" H Vert. Orifice/Grate</b> C= 0.600
#4	Secondary	139.50'	<b>15.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

**Primary OutFlow** Max=0.12 cfs @ 16.86 hrs HW=138.98' (Free Discharge)

- ↑ 1=Culvert (Passes 0.12 cfs of 6.40 cfs potential flow)
  - ↑ 2=Exfiltration (Exfiltration Controls 0.12 cfs)
    - ↑ 3=Orifice/Grate ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=137.45' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond 3P: 3P**

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 2.84" for 10 Year event  
 Inflow = 6.70 cfs @ 12.17 hrs, Volume= 0.569 af  
 Outflow = 3.28 cfs @ 12.43 hrs, Volume= 0.387 af, Atten= 51%, Lag= 15.9 min  
 Primary = 3.28 cfs @ 12.43 hrs, Volume= 0.387 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 139.31' @ 12.43 hrs Surf.Area= 8,689 sf Storage= 10,457 cf

Plug-Flow detention time= 117.0 min calculated for 0.386 af (68% of inflow)  
 Center-of-Mass det. time= 50.3 min ( 822.2 - 771.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	137.95'	12,139 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.95	3,791	0	0
138.00	7,013	270	270
139.00	8,142	7,578	7,848
139.50	9,024	4,292	12,139

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	<b>12.0" Round Culvert</b> L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.95'	<b>0.598 in/hr Exfiltration over Surface area</b>
#3	Device 1	139.00'	<b>21.4" Horiz. Orifice/Grate-NFCO R-4342 Beehive Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	139.45'	<b>15.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

**Primary OutFlow** Max=3.27 cfs @ 12.43 hrs HW=139.31' (Free Discharge)

- ↑ **1=Culvert** (Passes 3.27 cfs of 6.28 cfs potential flow)
- ↑ **2=Exfiltration** (Exfiltration Controls 0.12 cfs)
- ↑ **3=Orifice/Grate-NFCO R-4342 Beehive Grate** (Weir Controls 3.15 cfs @ 1.82 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=137.95' (Free Discharge)

- ↑ **4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Summary for Pond 4aP: RD**

Inflow Area = 0.882 ac, 95.86% Impervious, Inflow Depth > 3.52" for 10 Year event  
 Inflow = 3.96 cfs @ 12.01 hrs, Volume= 0.259 af  
 Outflow = 1.14 cfs @ 12.29 hrs, Volume= 0.257 af, Atten= 71%, Lag= 16.8 min  
 Primary = 1.14 cfs @ 12.29 hrs, Volume= 0.257 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 143.18' @ 12.29 hrs Surf.Area= 1,557 sf Storage= 2,602 cf

Plug-Flow detention time= 23.5 min calculated for 0.256 af (99% of inflow)  
 Center-of-Mass det. time= 20.0 min ( 756.3 - 736.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	3,114 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 7,785 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,557	0	0
140.00	1,557	1,557	1,557
141.00	1,557	1,557	3,114
142.00	1,557	1,557	4,671
143.00	1,557	1,557	6,228
144.00	1,557	1,557	7,785

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	<b>6.0" Round Culvert</b> L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 ' /' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	<b>503.0' long x 5.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

**Primary OutFlow** Max=1.13 cfs @ 12.29 hrs HW=143.17' (Free Discharge)

↑**1=Culvert** (Barrel Controls 1.13 cfs @ 5.78 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=139.00' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Summary for Pond 4bP: RD**

Inflow Area = 0.685 ac, 95.86% Impervious, Inflow Depth > 3.52" for 10 Year event  
 Inflow = 3.07 cfs @ 12.01 hrs, Volume= 0.201 af  
 Outflow = 1.05 cfs @ 12.22 hrs, Volume= 0.200 af, Atten= 66%, Lag= 12.7 min  
 Primary = 1.05 cfs @ 12.22 hrs, Volume= 0.200 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

**PostDevelopment-20151210**

Type III 24-hr 10 Year Rainfall=4.10"

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Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 142.49' @ 12.22 hrs Surf.Area= 1,210 sf Storage= 1,689 cf

Plug-Flow detention time= 17.7 min calculated for 0.199 af (99% of inflow)  
 Center-of-Mass det. time= 14.6 min ( 750.9 - 736.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	2,420 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 6,050 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,210	0	0
140.00	1,210	1,210	1,210
141.00	1,210	1,210	2,420
142.00	1,210	1,210	3,630
143.00	1,210	1,210	4,840
144.00	1,210	1,210	6,050

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	<b>6.0" Round Culvert</b> L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	<b>503.0' long x 5.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

**Primary OutFlow** Max=1.05 cfs @ 12.22 hrs HW=142.49' (Free Discharge)

↑**1=Culvert** (Barrel Controls 1.05 cfs @ 5.34 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=139.00' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Summary for Pond 6P: 6P**

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 1.87" for 10 Year event  
 Inflow = 10.61 cfs @ 12.59 hrs, Volume= 1.444 af  
 Outflow = 9.97 cfs @ 12.71 hrs, Volume= 1.444 af, Atten= 6%, Lag= 7.3 min  
 Primary = 9.97 cfs @ 12.71 hrs, Volume= 1.444 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 144.11' @ 12.71 hrs Surf.Area= 4,151 sf Storage= 463 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 0.2 min ( 824.7 - 824.5 )

**PostDevelopment-20151210**

Type III 24-hr 10 Year Rainfall=4.10"

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Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	7,720 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	3,972	0	0
145.50	6,321	7,720	7,720

Device	Routing	Invert	Outlet Devices
#1	Primary	140.00'	<b>18.0" Round Culvert</b> L= 500.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 140.00' / 137.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

**Primary OutFlow** Max=9.97 cfs @ 12.71 hrs HW=144.11' (Free Discharge)  
 ↑**1=Culvert** (Barrel Controls 9.97 cfs @ 5.64 fps)

**Summary for Pond TP: Tank Pond**

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 3.14" for 10 Year event  
 Inflow = 6.84 cfs @ 12.02 hrs, Volume= 0.443 af  
 Outflow = 0.63 cfs @ 12.79 hrs, Volume= 0.351 af, Atten= 91%, Lag= 46.2 min  
 Primary = 0.63 cfs @ 12.79 hrs, Volume= 0.351 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 144.96' @ 12.79 hrs Surf.Area= 12,438 sf Storage= 10,886 cf

Plug-Flow detention time= 211.5 min calculated for 0.351 af (79% of inflow)  
 Center-of-Mass det. time= 156.5 min ( 908.8 - 752.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	25,049 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	10,153	0	0
146.00	14,896	25,049	25,049

Device	Routing	Invert	Outlet Devices
#1	Primary	144.00'	<b>6.0" Round Culvert</b> L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 144.00' / 143.70' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

**Primary OutFlow** Max=0.63 cfs @ 12.79 hrs HW=144.96' (Free Discharge)  
 ↑**1=Culvert** (Inlet Controls 0.63 cfs @ 3.21 fps)

POST DEVELOPMENT - 25 YEAR



**PostDevelopment-20151210**

Type III 24-hr 25 Year Rainfall=4.80"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1S: SA1</b>	Runoff Area=402,743 sf 0.00% Impervious Runoff Depth>2.42" Flow Length=1,165' Tc=41.9 min CN=79 Runoff=13.69 cfs 1.865 af
<b>Subcatchment 2S: SA2</b>	Runoff Area=104,782 sf 53.65% Impervious Runoff Depth>3.47" Flow Length=520' Tc=12.5 min CN=90 Runoff=8.12 cfs 0.696 af
<b>Subcatchment 3aS: SA3</b>	Runoff Area=38,427 sf 95.86% Impervious Runoff Depth>4.16" Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=4.66 cfs 0.306 af
<b>Subcatchment 3bS: SA3b</b>	Runoff Area=29,845 sf 95.86% Impervious Runoff Depth>4.16" Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=3.62 cfs 0.237 af
<b>Subcatchment 4aS: SA4a</b>	Runoff Area=73,744 sf 70.78% Impervious Runoff Depth>3.78" Flow Length=90' Slope=0.0110 '/' Tc=1.5 min CN=93 Runoff=8.16 cfs 0.534 af
<b>Subcatchment 4bS: SA4b</b>	Runoff Area=72,594 sf 65.03% Impervious Runoff Depth>3.68" Flow Length=150' Tc=1.7 min CN=92 Runoff=7.86 cfs 0.512 af
<b>Subcatchment 5S: SA5</b>	Runoff Area=136,118 sf 0.00% Impervious Runoff Depth>2.43" Flow Length=750' Tc=34.0 min CN=79 Runoff=5.13 cfs 0.632 af
<b>Subcatchment 6S: SA6</b>	Runoff Area=59,924 sf 84.40% Impervious Runoff Depth>3.98" Flow Length=260' Tc=1.9 min CN=95 Runoff=6.81 cfs 0.456 af
<b>Subcatchment 7S: SA7</b>	Runoff Area=60,331 sf 5.02% Impervious Runoff Depth>2.53" Flow Length=180' Tc=20.1 min CN=80 Runoff=2.96 cfs 0.292 af
<b>Subcatchment 8S: SA8</b>	Runoff Area=47,172 sf 0.00% Impervious Runoff Depth>2.44" Flow Length=190' Tc=19.2 min CN=79 Runoff=2.28 cfs 0.220 af
<b>Subcatchment 9S: SA 9</b>	Runoff Area=14,300 sf 0.00% Impervious Runoff Depth>2.53" Flow Length=290' Tc=12.8 min CN=80 Runoff=0.83 cfs 0.069 af
<b>Reach 1aR: 1aR</b>	Avg. Flow Depth=0.02' Max Vel=0.03 fps Inflow=0.50 cfs 0.003 af n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.04 cfs 0.003 af
<b>Reach 1bR: 1bR</b>	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.00 cfs 0.000 af
<b>Reach 2R: 2R</b>	Avg. Flow Depth=0.39' Max Vel=0.15 fps Inflow=5.12 cfs 0.513 af n=0.400 L=50.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=4.78 cfs 0.508 af
<b>Reach 3R: 3R</b>	Avg. Flow Depth=0.22' Max Vel=0.10 fps Inflow=1.55 cfs 0.662 af n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=1.48 cfs 0.634 af
<b>Reach 4R: 4R</b>	Avg. Flow Depth=0.11' Max Vel=0.06 fps Inflow=0.32 cfs 0.183 af n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=0.31 cfs 0.172 af

**PostDevelopment-20151210**

*Type III 24-hr 25 Year Rainfall=4.80"*

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**Reach 5R: 5R** Avg. Flow Depth=0.38' Max Vel=0.34 fps Inflow=10.69 cfs 1.865 af  
n=0.400 L=100.0' S=0.0500 '/ Capacity=84.52 cfs Outflow=10.67 cfs 1.852 af

**Reach 6R: 6R** Avg. Flow Depth=0.08' Max Vel=1.49 fps Inflow=0.71 cfs 0.417 af  
n=0.030 L=70.0' S=0.0430 '/ Capacity=156.46 cfs Outflow=0.71 cfs 0.416 af

**Reach SP1: SP1** Inflow=17.37 cfs 2.954 af  
Outflow=17.37 cfs 2.954 af

**Reach SP2: SP2** Inflow=8.90 cfs 1.966 af  
Outflow=8.90 cfs 1.966 af

**Pond 1P: 1P** Peak Elev=143.38' Storage=13,983 cf Inflow=8.38 cfs 0.928 af  
Outflow=1.55 cfs 0.662 af

**Pond 2P: 2P** Peak Elev=139.11' Storage=12,896 cf Inflow=6.81 cfs 0.456 af  
Primary=0.32 cfs 0.183 af Secondary=0.00 cfs 0.000 af Outflow=0.32 cfs 0.183 af

**Pond 3P: 3P** Peak Elev=139.42' Storage=11,427 cf Inflow=8.12 cfs 0.696 af  
Primary=5.12 cfs 0.513 af Secondary=0.00 cfs 0.000 af Outflow=5.12 cfs 0.513 af

**Pond 4aP: RD** Peak Elev=144.00' Storage=3,114 cf Inflow=4.66 cfs 0.306 af  
Primary=1.23 cfs 0.300 af Secondary=0.50 cfs 0.003 af Outflow=1.73 cfs 0.304 af

**Pond 4bP: RD** Peak Elev=143.39' Storage=2,123 cf Inflow=3.62 cfs 0.237 af  
Primary=1.16 cfs 0.236 af Secondary=0.00 cfs 0.000 af Outflow=1.16 cfs 0.236 af

**Pond 6P: 6P** Peak Elev=144.88' Storage=4,099 cf Inflow=13.69 cfs 1.865 af  
18.0" Round Culvert n=0.013 L=500.0' S=0.0050 '/ Outflow=10.69 cfs 1.865 af

**Pond TP: Tank Pond** Peak Elev=145.14' Storage=13,175 cf Inflow=8.16 cfs 0.534 af  
6.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/ Outflow=0.71 cfs 0.417 af

**Total Runoff Area = 23.875 ac Runoff Volume = 5.820 af Average Runoff Depth = 2.93"**  
**73.59% Pervious = 17.569 ac 26.41% Impervious = 6.306 ac**

**Summary for Subcatchment 1S: SA1**

Runoff = 13.69 cfs @ 12.58 hrs, Volume= 1.865 af, Depth> 2.42"

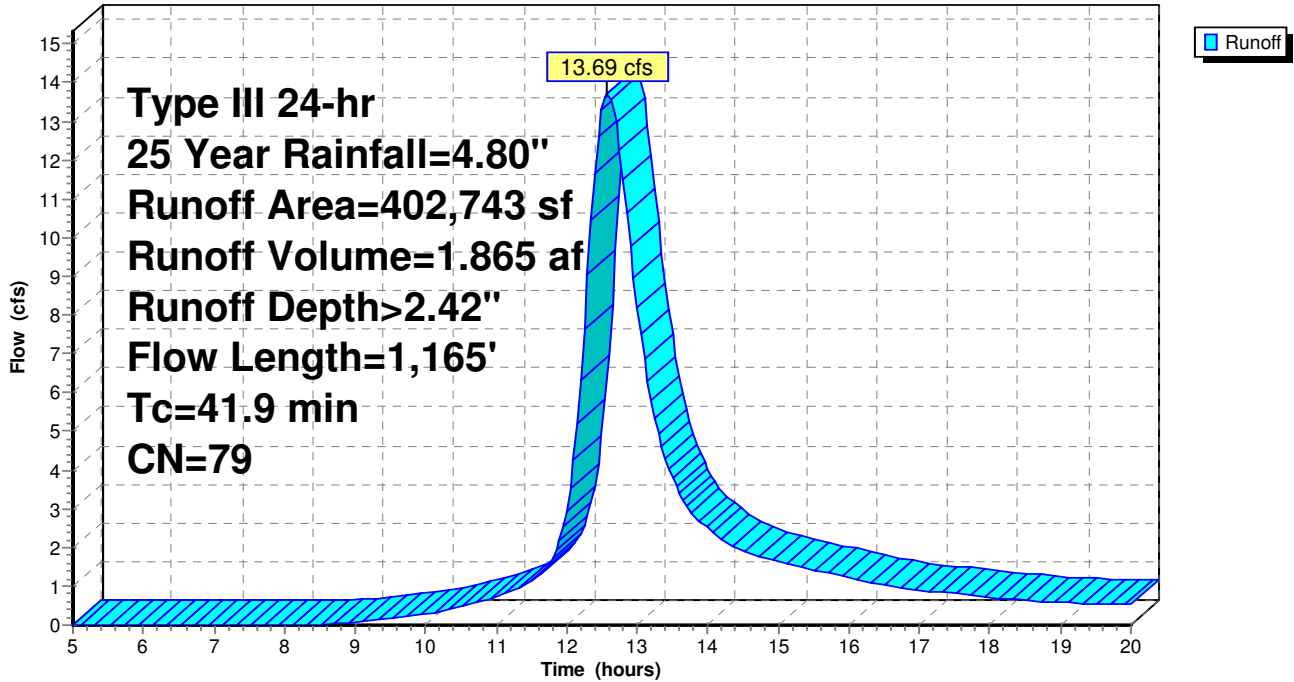
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
24,192	78	Meadow, non-grazed, HSG D
362,489	79	Woods, Fair, HSG D
16,062	80	>75% Grass cover, Good, HSG D
402,743	79	Weighted Average
402,743		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		<b>Sheet Flow, SF 1-1</b> Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 1-1</b> Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		<b>Shallow Concentrated Flow, SCF 1-2</b> Short Grass Pasture Kv= 7.0 fps
1.6	70	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 1-3</b> Woodland Kv= 5.0 fps
2.0	120	0.0200	0.99		<b>Shallow Concentrated Flow, SCF 1-4</b> Short Grass Pasture Kv= 7.0 fps
41.9	1,165	Total			

### Subcatchment 1S: SA1

Hydrograph



**Summary for Subcatchment 2S: SA2**

Runoff = 8.12 cfs @ 12.17 hrs, Volume= 0.696 af, Depth> 3.47"

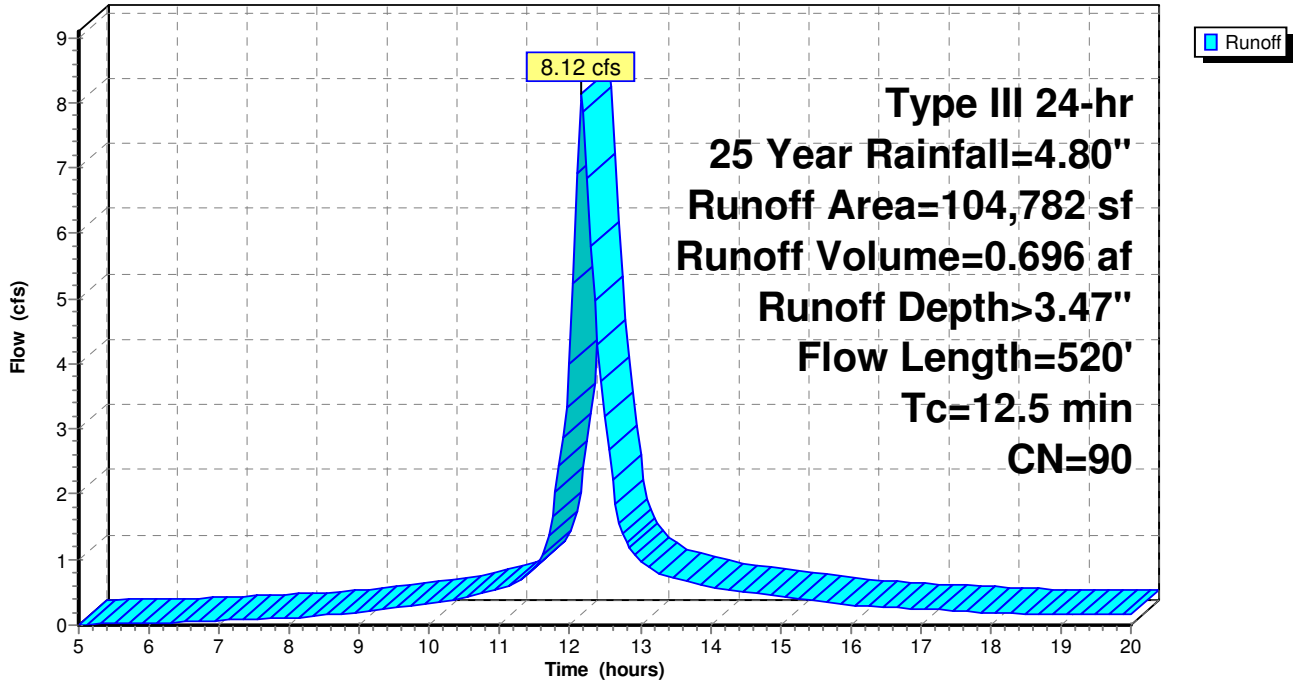
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
56,218	98	Impervious, HSG D
48,564	80	>75% Grass cover, Good, HSG D
104,782	90	Weighted Average
48,564		46.35% Pervious Area
56,218		53.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0200	1.05		<b>Sheet Flow, SF 2-1</b> Smooth surfaces n= 0.011 P2= 2.70"
10.3	60	0.0200	0.10		<b>Sheet Flow, SF 2-2</b> Grass: Dense n= 0.240 P2= 2.70"
0.5	30	0.0200	0.99		<b>Sheet Flow, SF 2-3</b> Smooth surfaces n= 0.011 P2= 2.70"
0.6	110	0.0200	2.87		<b>Shallow Concentrated Flow, SCF 2-1</b> Paved Kv= 20.3 fps
0.5	280	0.0140	9.46	529.89	<b>Trap/Vee/Rect Channel Flow, CF 2-1</b> Bot.W=2.00' D=4.00' Z= 3.0 '/' Top.W=26.00' n= 0.030 Stream, clean & straight
12.5	520	Total			

Subcatchment 2S: SA2

Hydrograph



**Summary for Subcatchment 3aS: SA3**

Runoff = 4.66 cfs @ 12.01 hrs, Volume= 0.306 af, Depth> 4.16"

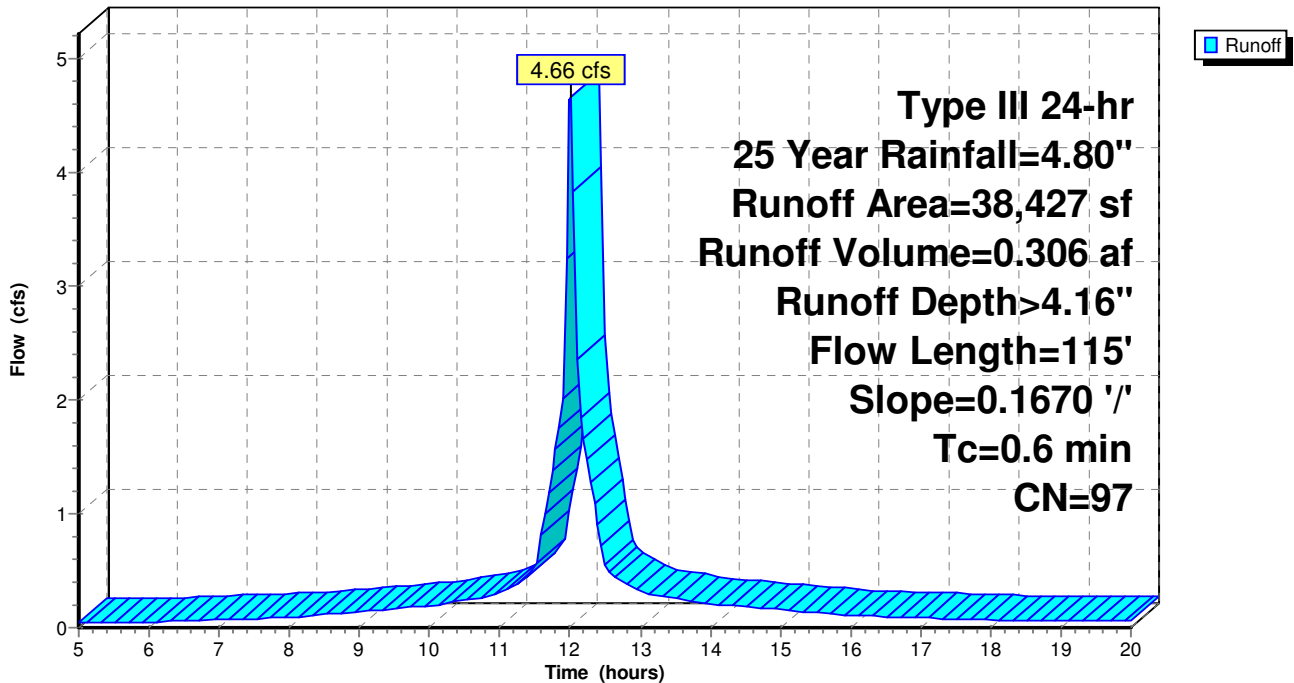
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
36,835	98	Impervious, HSG D
* 1,592	66	Roof Dripline
38,427	97	Weighted Average
1,592		4.14% Pervious Area
36,835		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		<b>Sheet Flow, SF 3-1</b> Smooth surfaces n= 0.011 P2= 2.70"

**Subcatchment 3aS: SA3**

Hydrograph



**Summary for Subcatchment 3bS: SA3b**

Runoff = 3.62 cfs @ 12.01 hrs, Volume= 0.237 af, Depth> 4.16"

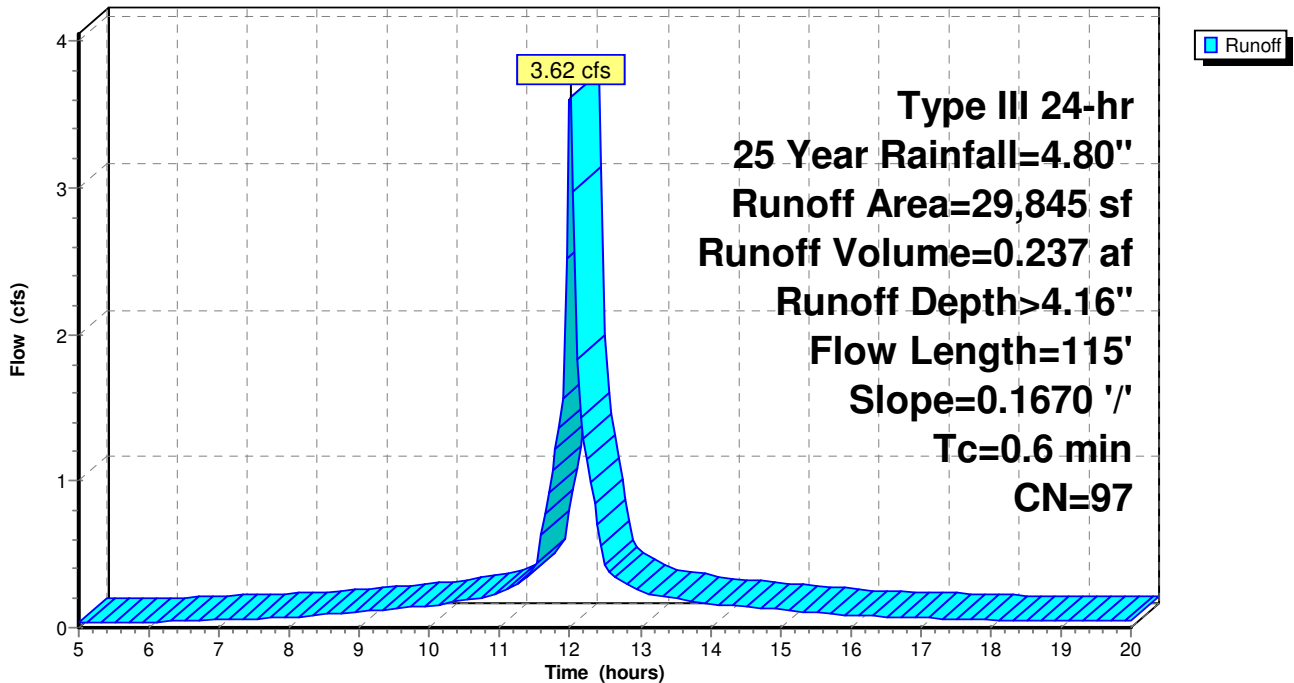
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
28,609	98	Impervious, HSG D
* 1,236	66	Roof Dripline
29,845	97	Weighted Average
1,236		4.14% Pervious Area
28,609		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		Sheet Flow, SF 3-1
Smooth surfaces n= 0.011 P2= 2.70"					

**Subcatchment 3bS: SA3b**

Hydrograph





**Summary for Subcatchment 4aS: SA4a**

Runoff = 8.16 cfs @ 12.02 hrs, Volume= 0.534 af, Depth> 3.78"

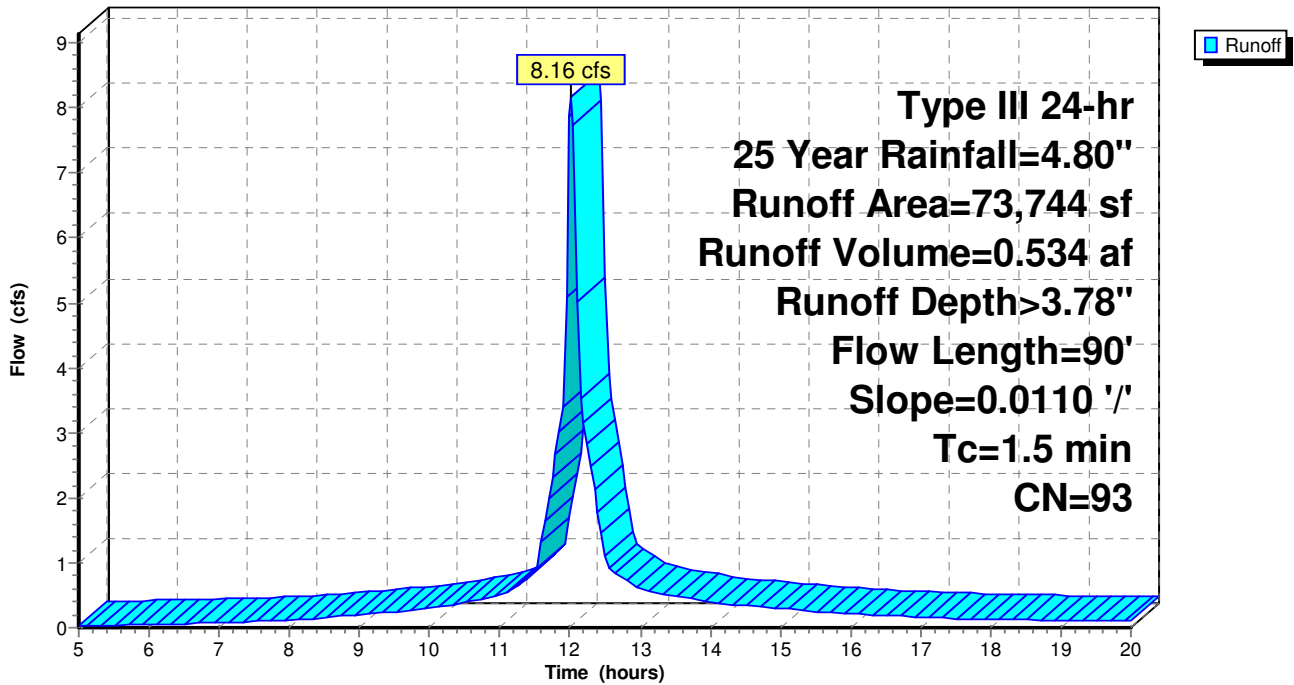
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

	Area (sf)	CN	Description
*	52,199	98	Impervious, HSG D
	21,545	80	>75% Grass cover, Good, HSG D
	73,744	93	Weighted Average
	21,545		29.22% Pervious Area
	52,199		70.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	90	0.0110	0.97		<b>Sheet Flow, SF 4a-1</b> Smooth surfaces n= 0.011 P2= 2.70"

**Subcatchment 4aS: SA4a**

Hydrograph



**Summary for Subcatchment 4bS: SA4b**

Runoff = 7.86 cfs @ 12.03 hrs, Volume= 0.512 af, Depth> 3.68"

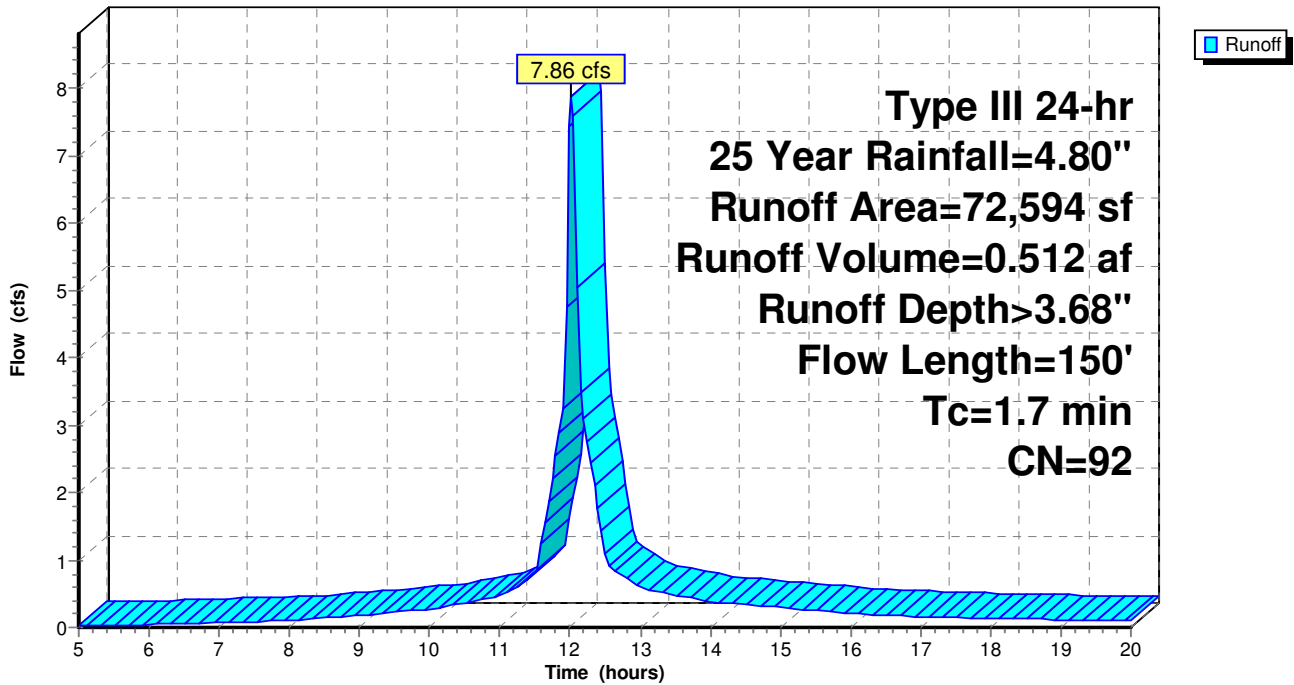
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
25,384	80	>75% Grass cover, Good, HSG D
* 47,210	98	Impervious, HSG D
72,594	92	Weighted Average
25,384		34.97% Pervious Area
47,210		65.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	140	0.0200	1.35		<b>Sheet Flow, SF 4b-1</b>
					Smooth surfaces n= 0.011 P2= 2.70"
0.0	10	0.1000	4.74		<b>Shallow Concentrated Flow, SCF 4b-1</b>
					Grassed Waterway Kv= 15.0 fps
1.7	150	Total			

**Subcatchment 4bS: SA4b**

Hydrograph



**Summary for Subcatchment 5S: SA5**

Runoff = 5.13 cfs @ 12.48 hrs, Volume= 0.632 af, Depth> 2.43"

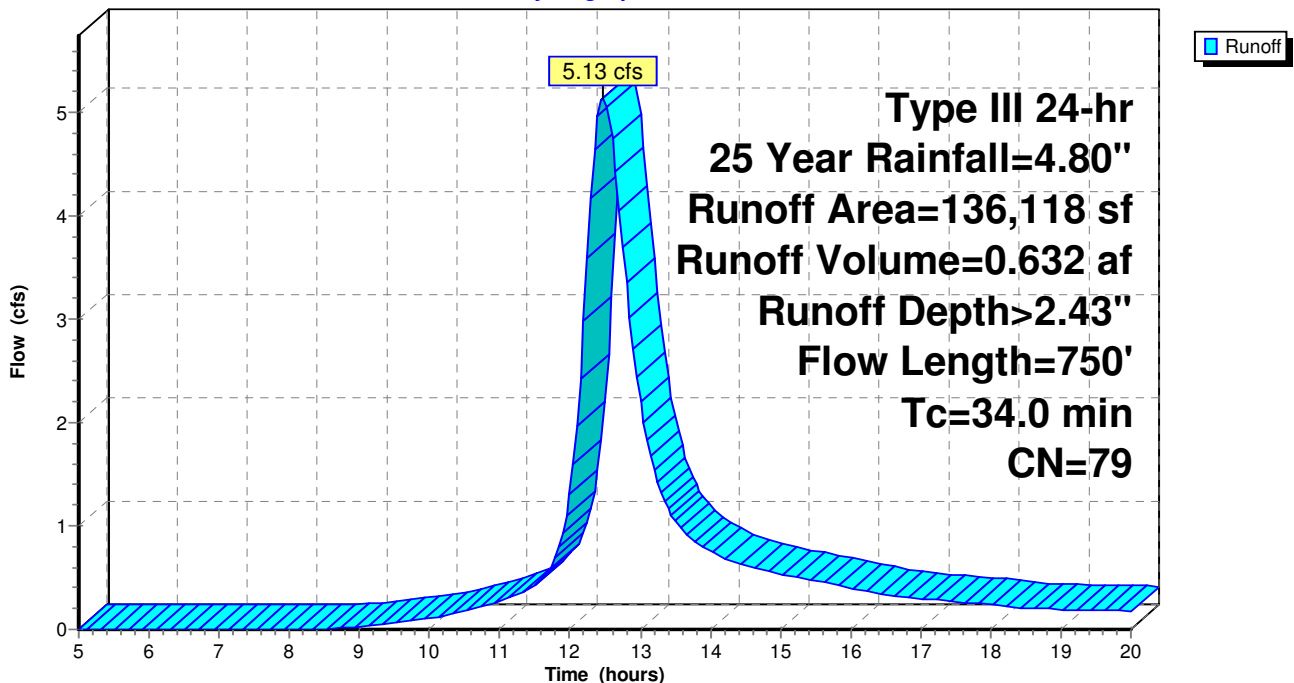
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
11,975	80	>75% Grass cover, Good, HSG D
36,307	78	Meadow, non-grazed, HSG D
87,836	79	Woods, Fair, HSG D
136,118	79	Weighted Average
136,118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		<b>Sheet Flow, SF 5-1</b> Woods: Light underbrush n= 0.400 P2= 2.70"
7.0	210	0.0100	0.50		<b>Shallow Concentrated Flow, SCF 5-1</b> Woodland Kv= 5.0 fps
2.4	100	0.0100	0.70		<b>Shallow Concentrated Flow, SCF 5-2</b> Short Grass Pasture Kv= 7.0 fps
8.4	340	0.0180	0.67		<b>Shallow Concentrated Flow, SCF 5-3</b> Woodland Kv= 5.0 fps
34.0	750	Total			

**Subcatchment 5S: SA5**

Hydrograph



**Summary for Subcatchment 6S: SA6**

Runoff = 6.81 cfs @ 12.03 hrs, Volume= 0.456 af, Depth> 3.98"

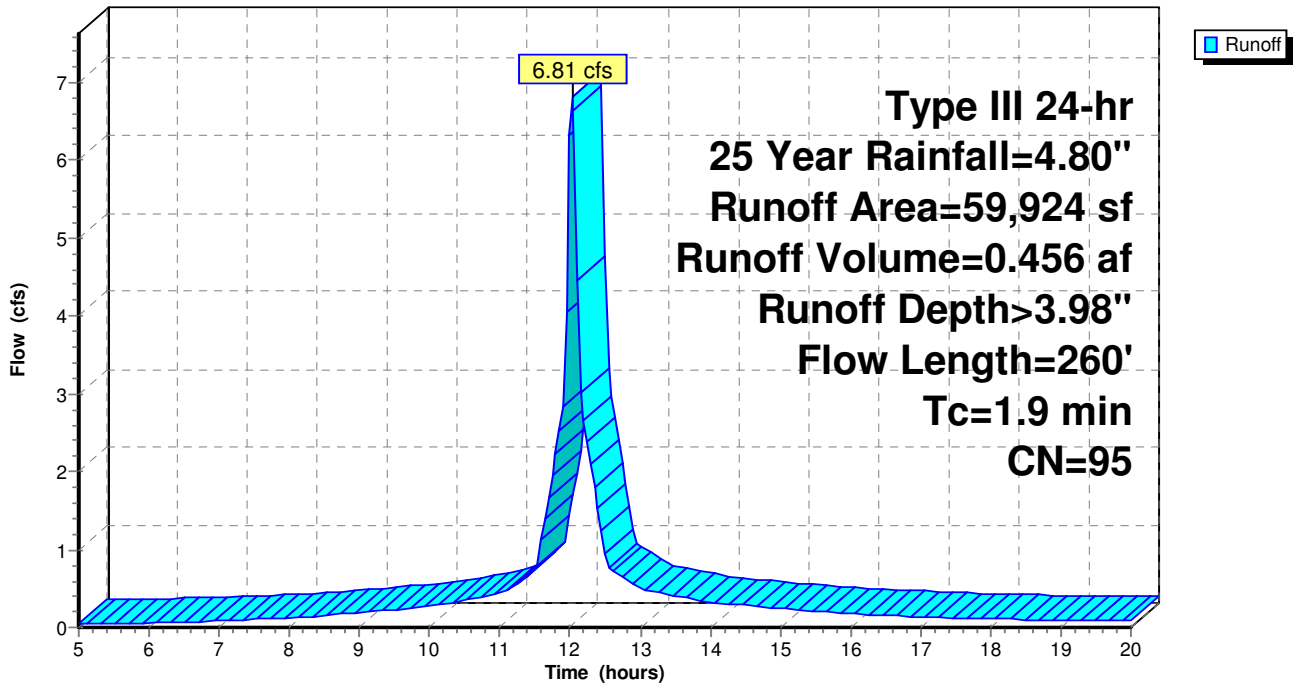
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
9,350	80	>75% Grass cover, Good, HSG D
50,574	98	Impervious, HSG D
59,924	95	Weighted Average
9,350		15.60% Pervious Area
50,574		84.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	90	0.0330	1.51		<b>Sheet Flow, SF 6-1</b>
					Smooth surfaces n= 0.011 P2= 2.70"
0.9	170	0.0240	3.14		<b>Shallow Concentrated Flow, SCF 6-1</b>
					Paved Kv= 20.3 fps
1.9	260	Total			

**Subcatchment 6S: SA6**

Hydrograph



**Summary for Subcatchment 7S: SA7**

Runoff = 2.96 cfs @ 12.28 hrs, Volume= 0.292 af, Depth> 2.53"

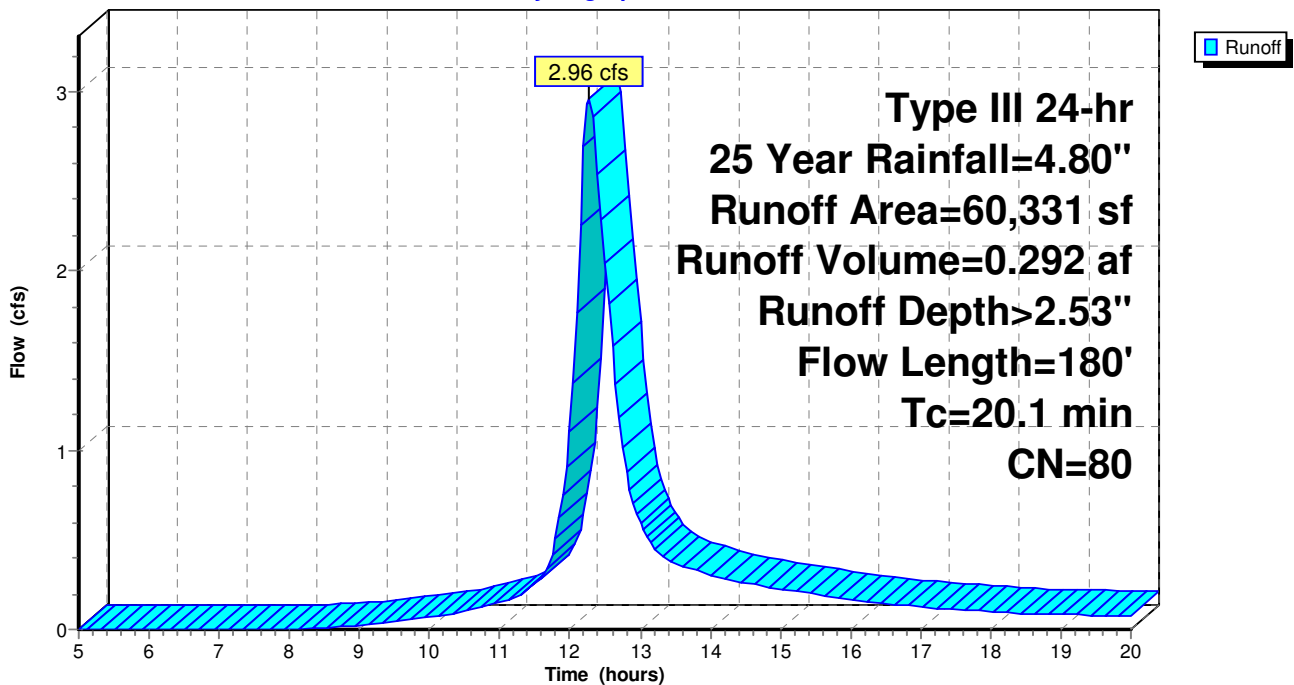
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
* 3,031	98	Impervious, HSG D
50,265	79	Woods, Fair, HSG D
7,035	80	>75% Grass cover, Good, HSG D
60,331	80	Weighted Average
57,300		94.98% Pervious Area
3,031		5.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		<b>Sheet Flow, SF 7-1</b> Grass: Dense n= 0.240 P2= 2.70"
14.2	60	0.0250	0.07		<b>Sheet Flow, SF 7-2</b> Woods: Light underbrush n= 0.400 P2= 2.70"
2.0	80	0.0170	0.65		<b>Shallow Concentrated Flow, SCF 7-1</b> Woodland Kv= 5.0 fps
20.1	180	Total			

**Subcatchment 7S: SA7**

Hydrograph



**Summary for Subcatchment 8S: SA8**

Runoff = 2.28 cfs @ 12.27 hrs, Volume= 0.220 af, Depth> 2.44"

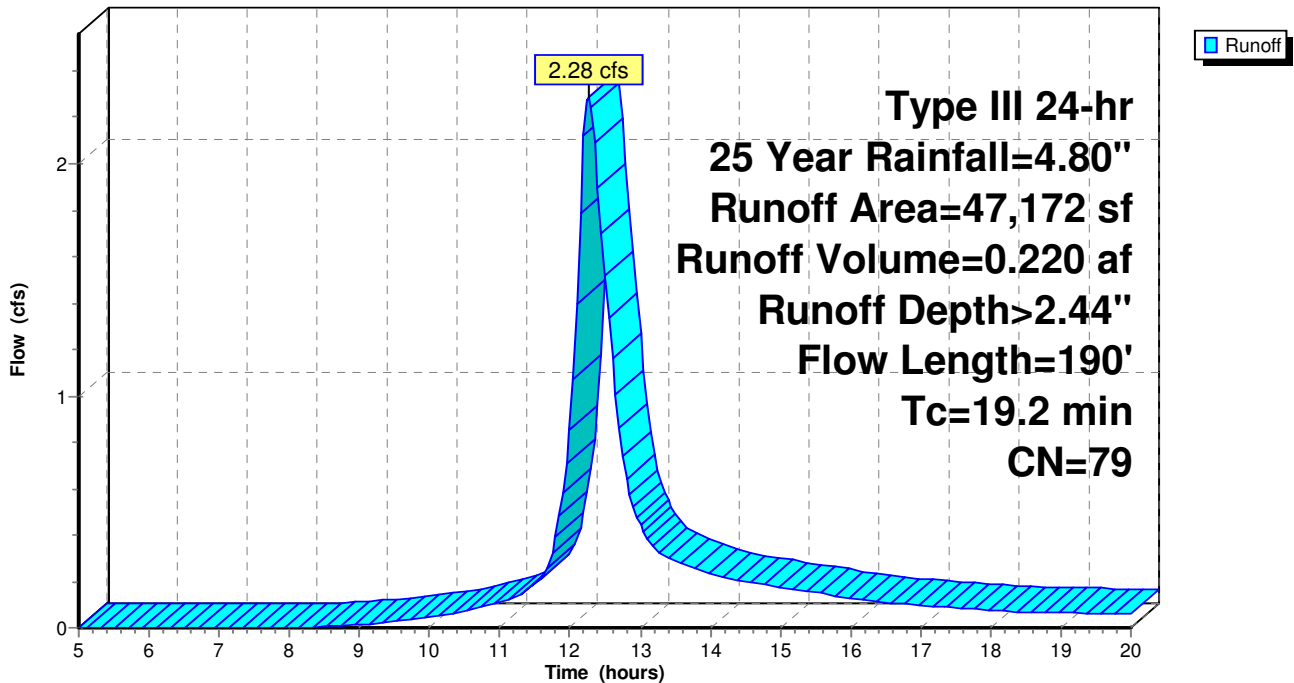
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
40,395	79	Woods, Fair, HSG D
6,777	80	>75% Grass cover, Good, HSG D
47,172	79	Weighted Average
47,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		<b>Sheet Flow, SF 8-1</b>
					Grass: Dense n= 0.240 P2= 2.70"
13.2	60	0.0300	0.08		<b>Sheet Flow, SF 8-2</b>
					Woods: Light underbrush n= 0.400 P2= 2.70"
2.1	90	0.0200	0.71		<b>Shallow Concentrated Flow, SCF 8-1</b>
					Woodland Kv= 5.0 fps
19.2	190	Total			

**Subcatchment 8S: SA8**

Hydrograph



**Summary for Subcatchment 9S: SA 9**

Runoff = 0.83 cfs @ 12.18 hrs, Volume= 0.069 af, Depth> 2.53"

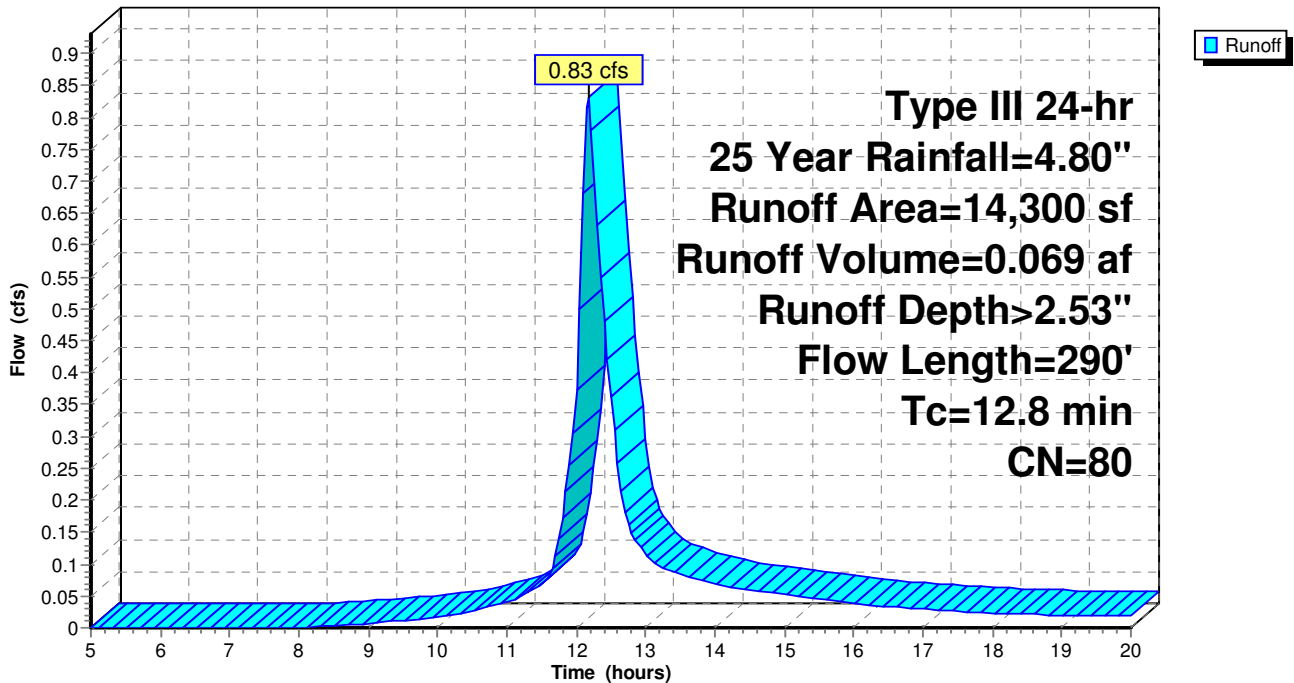
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
12,287	80	>75% Grass cover, Good, HSG D
2,013	79	Woods, Fair, HSG D
14,300	80	Weighted Average
14,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.0500	0.15		<b>Sheet Flow, SF 9-1</b>
					Grass: Dense n= 0.240 P2= 2.70"
1.6	160	0.0600	1.71		<b>Shallow Concentrated Flow, SCF 9-1</b>
					Short Grass Pasture Kv= 7.0 fps
0.4	30	0.0500	1.12		<b>Shallow Concentrated Flow, SCF 9-2</b>
					Woodland Kv= 5.0 fps
12.8	290	Total			

**Subcatchment 9S: SA 9**

Hydrograph



### Summary for Reach 1aR: 1aR

Inflow = 0.50 cfs @ 12.21 hrs, Volume= 0.003 af  
 Outflow = 0.04 cfs @ 13.15 hrs, Volume= 0.003 af, Atten= 92%, Lag= 57.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.03 fps, Min. Travel Time= 48.6 min  
 Avg. Velocity = 0.02 fps, Avg. Travel Time= 82.7 min

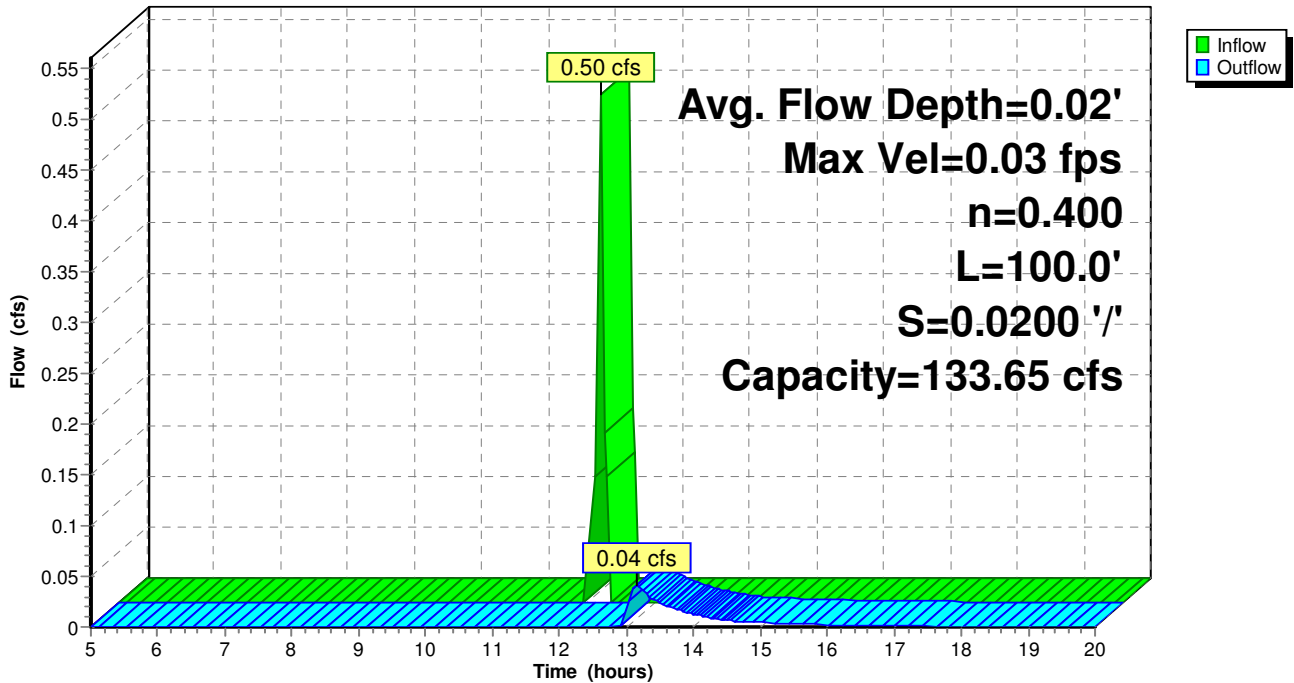
Peak Storage= 123 cf @ 12.34 hrs  
 Average Depth at Peak Storage= 0.02'  
 Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush  
 Length= 100.0' Slope= 0.0200 '/'  
 Inlet Invert= 0.00', Outlet Invert= -2.00'



### Reach 1aR: 1aR

Hydrograph





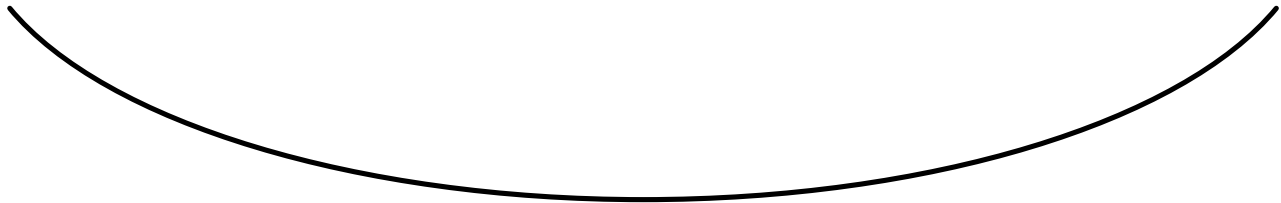
### Summary for Reach 1bR: 1bR

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

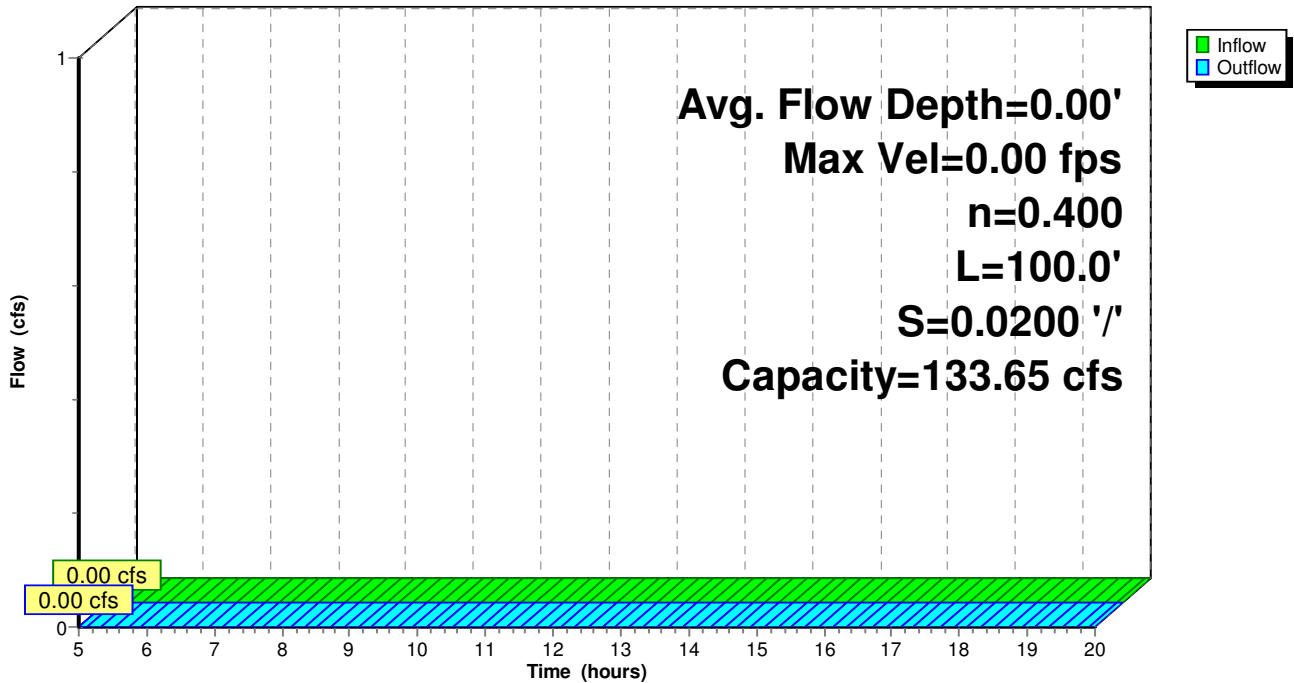
Peak Storage= 0 cf @ 5.00 hrs  
 Average Depth at Peak Storage= 0.00'  
 Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush  
 Length= 100.0' Slope= 0.0200 '/'  
 Inlet Invert= 0.00', Outlet Invert= -2.00'



### Reach 1bR: 1bR

#### Hydrograph



### Summary for Reach 2R: 2R

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 2.56" for 25 Year event  
 Inflow = 5.12 cfs @ 12.35 hrs, Volume= 0.513 af  
 Outflow = 4.78 cfs @ 12.53 hrs, Volume= 0.508 af, Atten= 7%, Lag= 11.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.15 fps, Min. Travel Time= 5.6 min  
 Avg. Velocity = 0.06 fps, Avg. Travel Time= 14.4 min

Peak Storage= 1,596 cf @ 12.44 hrs  
 Average Depth at Peak Storage= 0.39'  
 Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

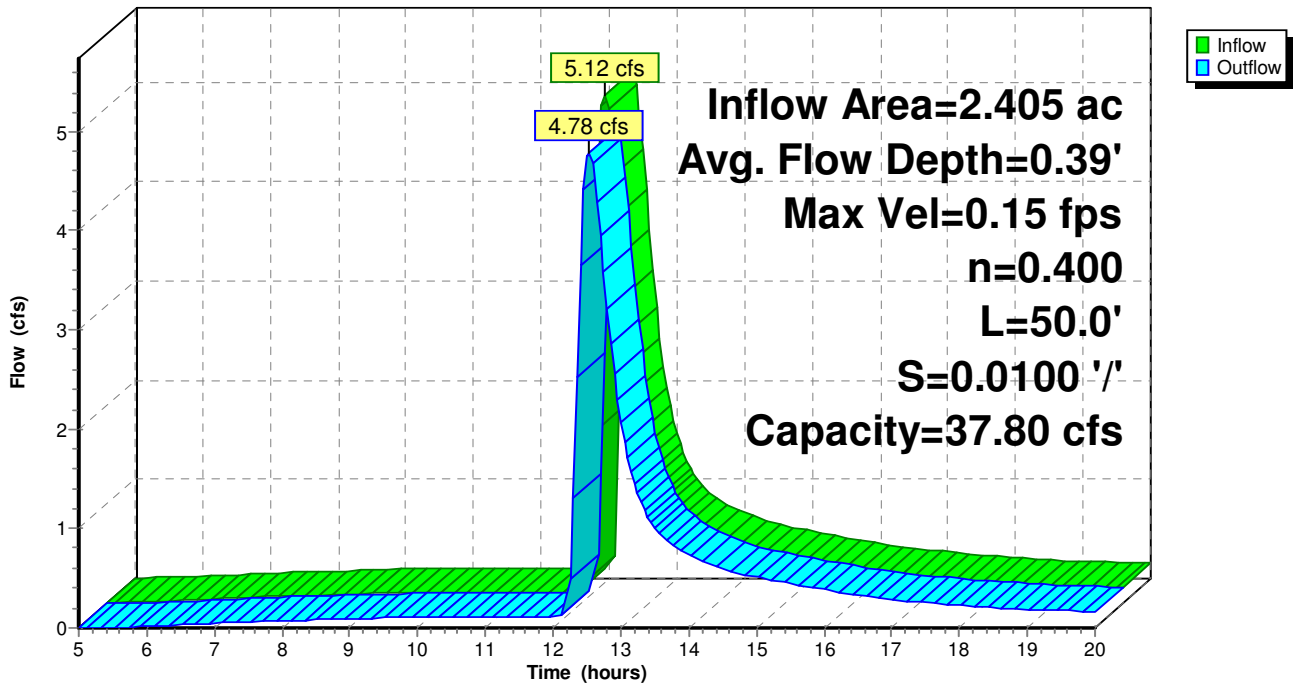
200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush  
 Length= 50.0' Slope= 0.0100 '/'  
 Inlet Invert= 0.00', Outlet Invert= -0.50'



‡

### Reach 2R: 2R

#### Hydrograph



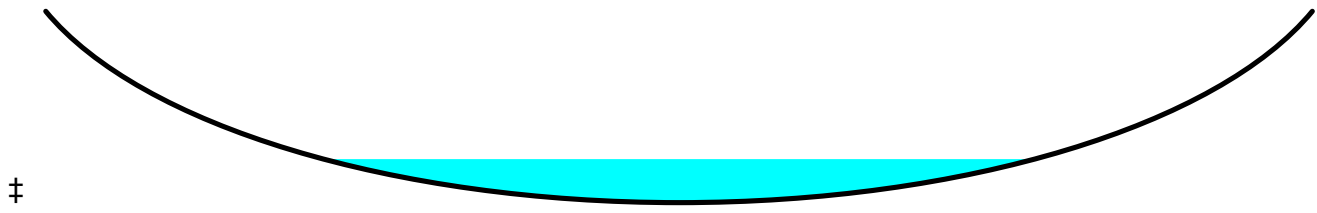
### Summary for Reach 3R: 3R

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 2.36" for 25 Year event  
 Inflow = 1.55 cfs @ 12.62 hrs, Volume= 0.662 af  
 Outflow = 1.48 cfs @ 13.26 hrs, Volume= 0.634 af, Atten= 5%, Lag= 38.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.10 fps, Min. Travel Time= 15.9 min  
 Avg. Velocity = 0.07 fps, Avg. Travel Time= 25.3 min

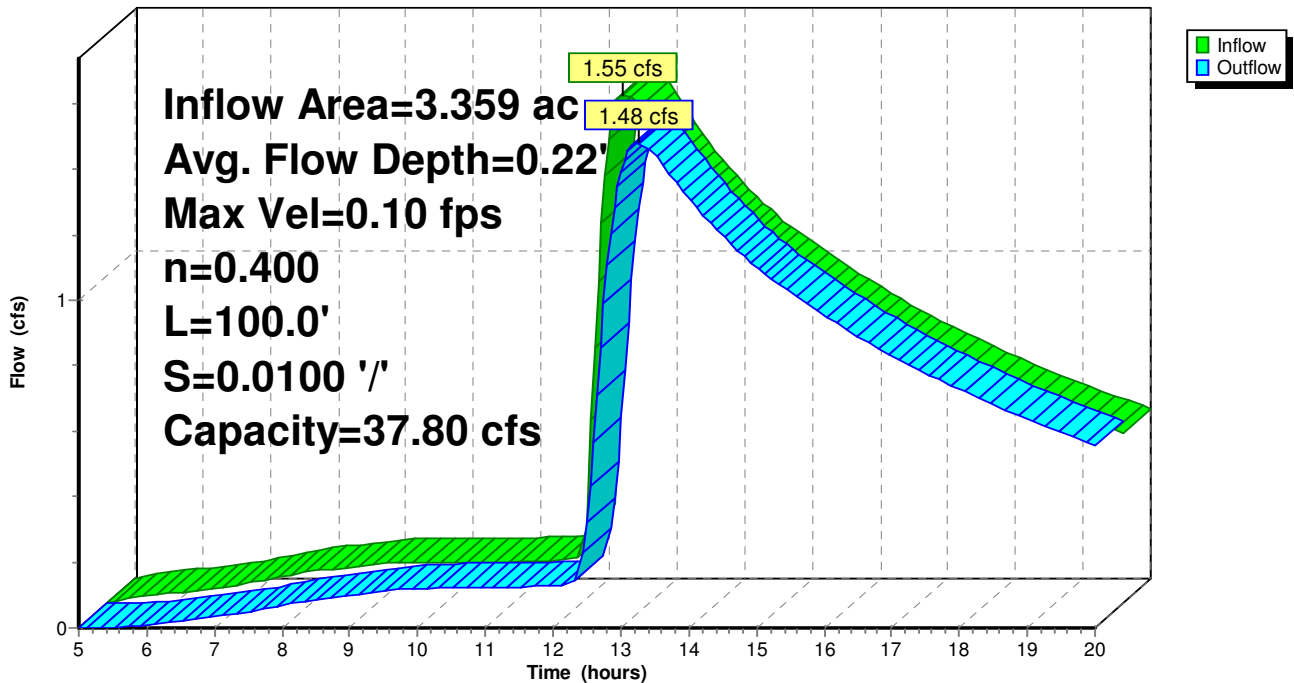
Peak Storage= 1,417 cf @ 12.99 hrs  
 Average Depth at Peak Storage= 0.22'  
 Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush  
 Length= 100.0' Slope= 0.0100 '/'  
 Inlet Invert= 0.00', Outlet Invert= -1.00'



### Reach 3R: 3R

Hydrograph



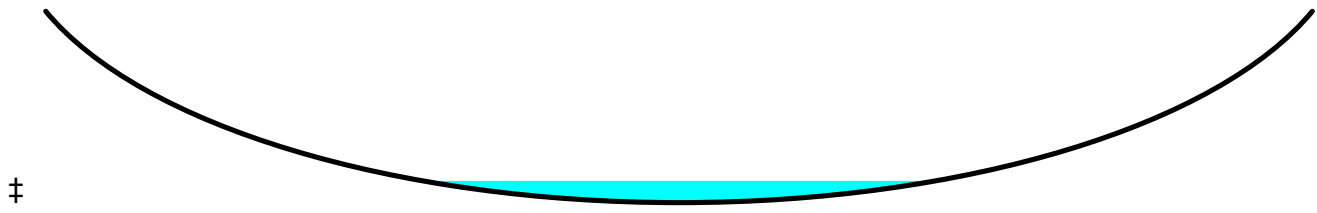
### Summary for Reach 4R: 4R

Inflow Area = 1.376 ac, 84.40% Impervious, Inflow Depth > 1.59" for 25 Year event  
 Inflow = 0.32 cfs @ 14.04 hrs, Volume= 0.183 af  
 Outflow = 0.31 cfs @ 14.90 hrs, Volume= 0.172 af, Atten= 2%, Lag= 51.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.06 fps, Min. Travel Time= 25.7 min  
 Avg. Velocity = 0.05 fps, Avg. Travel Time= 34.4 min

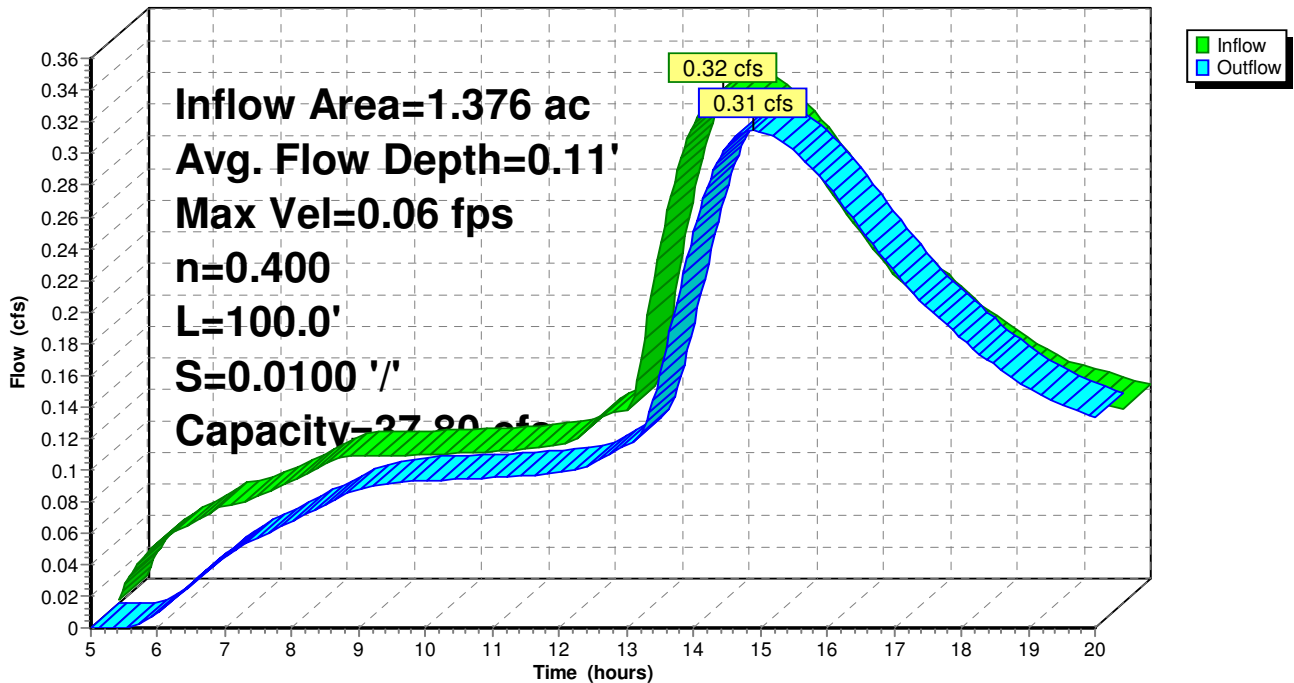
Peak Storage= 484 cf @ 14.47 hrs  
 Average Depth at Peak Storage= 0.11'  
 Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush  
 Length= 100.0' Slope= 0.0100 '/'  
 Inlet Invert= 0.00', Outlet Invert= -1.00'



### Reach 4R: 4R

#### Hydrograph



### Summary for Reach 5R: 5R

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 2.42" for 25 Year event  
Inflow = 10.69 cfs @ 12.85 hrs, Volume= 1.865 af  
Outflow = 10.67 cfs @ 12.99 hrs, Volume= 1.852 af, Atten= 0%, Lag= 8.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 0.34 fps, Min. Travel Time= 5.0 min  
Avg. Velocity = 0.16 fps, Avg. Travel Time= 10.1 min

Peak Storage= 3,182 cf @ 12.90 hrs  
Average Depth at Peak Storage= 0.38'  
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 84.52 cfs

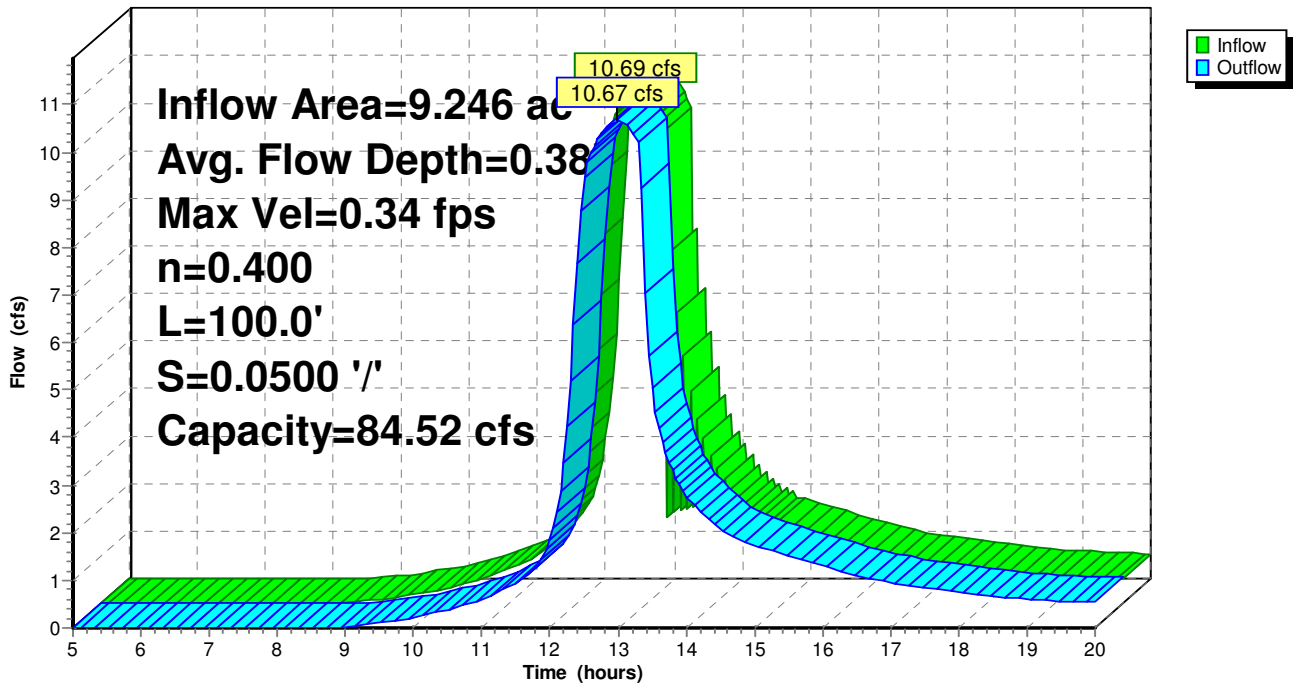
200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush  
Length= 100.0' Slope= 0.0500 '/'  
Inlet Invert= 0.00', Outlet Invert= -5.00'



‡

### Reach 5R: 5R

Hydrograph



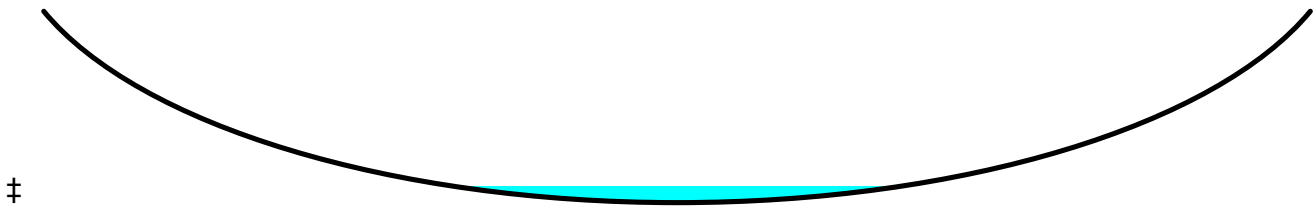
### Summary for Reach 6R: 6R

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 2.96" for 25 Year event  
 Inflow = 0.71 cfs @ 12.85 hrs, Volume= 0.417 af  
 Outflow = 0.71 cfs @ 12.87 hrs, Volume= 0.416 af, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 1.49 fps, Min. Travel Time= 0.8 min  
 Avg. Velocity = 1.03 fps, Avg. Travel Time= 1.1 min

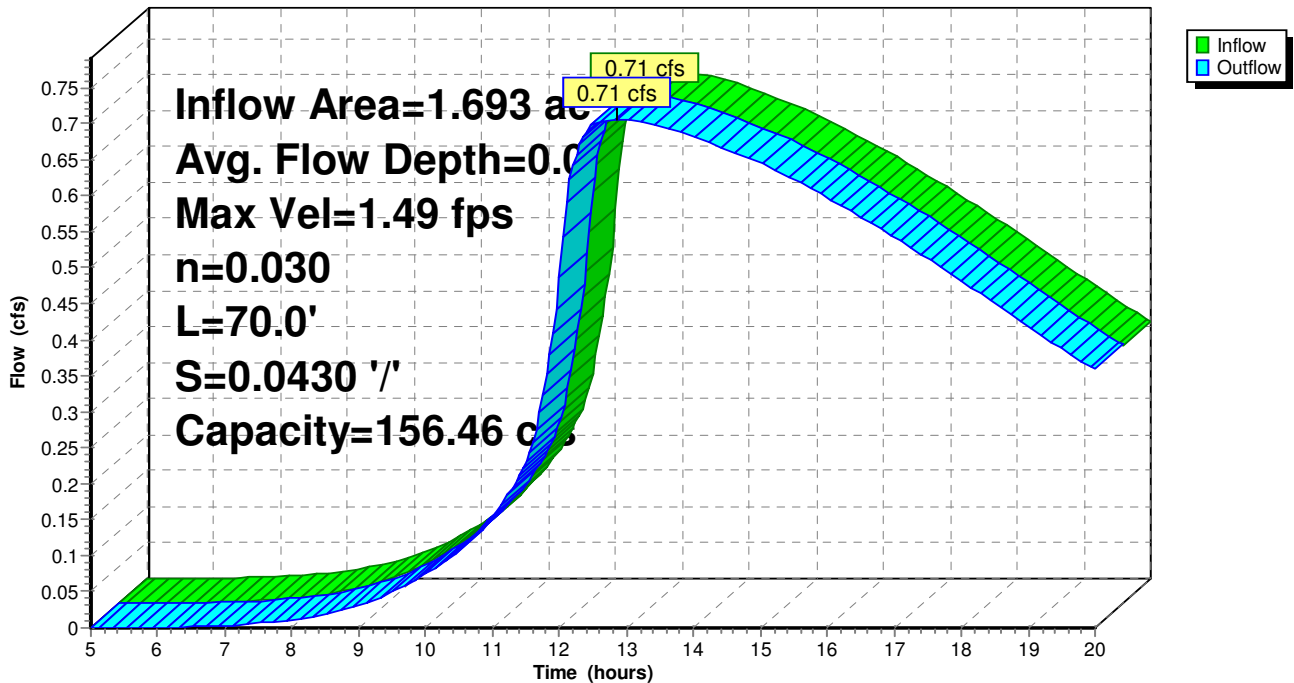
Peak Storage= 33 cf @ 12.86 hrs  
 Average Depth at Peak Storage= 0.08'  
 Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 156.46 cfs

30.00' x 1.00' deep Parabolic Channel, n= 0.030 Short grass  
 Length= 70.0' Slope= 0.0430 '/'  
 Inlet Invert= 0.00', Outlet Invert= -3.01'



### Reach 6R: 6R

#### Hydrograph



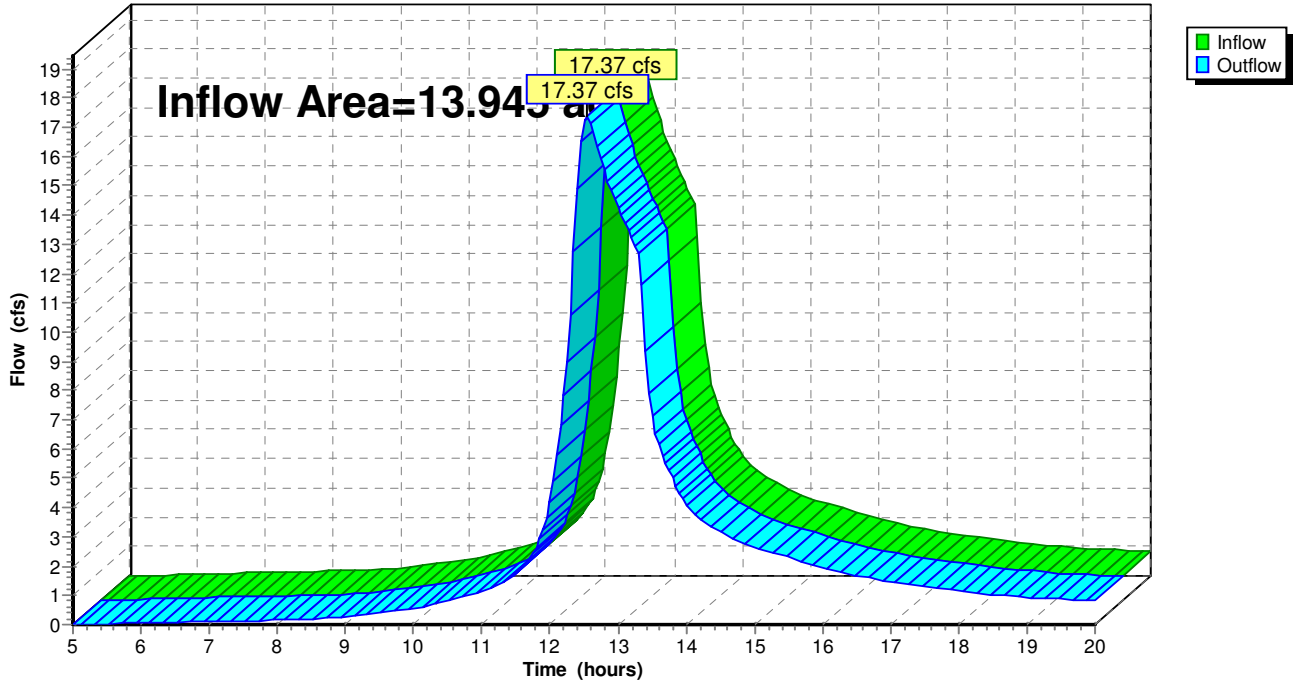
### Summary for Reach SP1: SP1

Inflow Area = 13.945 ac, 15.32% Impervious, Inflow Depth > 2.54" for 25 Year event  
Inflow = 17.37 cfs @ 12.54 hrs, Volume= 2.954 af  
Outflow = 17.37 cfs @ 12.54 hrs, Volume= 2.954 af, Atten= 0%, Lag= 0.0 min

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

### Reach SP1: SP1

Hydrograph



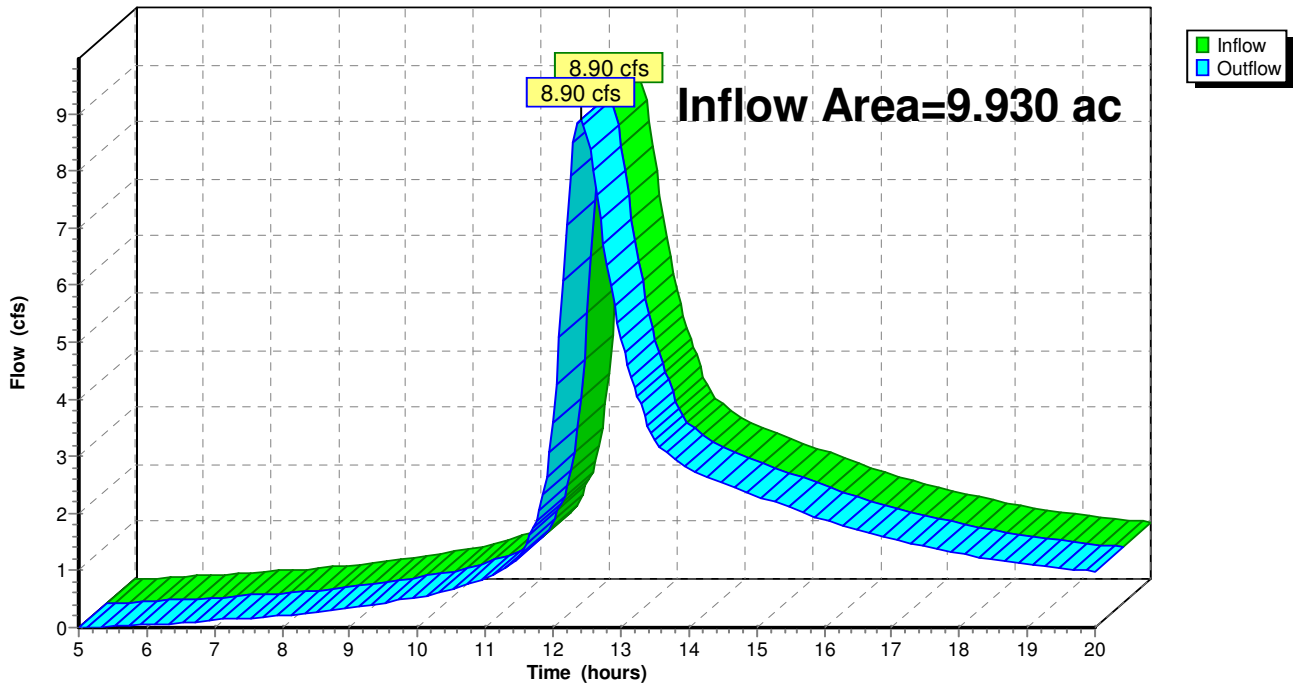
### Summary for Reach SP2: SP2

Inflow Area = 9.930 ac, 41.99% Impervious, Inflow Depth > 2.38" for 25 Year event  
Inflow = 8.90 cfs @ 12.40 hrs, Volume= 1.966 af  
Outflow = 8.90 cfs @ 12.40 hrs, Volume= 1.966 af, Atten= 0%, Lag= 0.0 min

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

### Reach SP2: SP2

Hydrograph





**Summary for Pond 1P: 1P**

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 3.31" for 25 Year event  
 Inflow = 8.38 cfs @ 12.03 hrs, Volume= 0.928 af  
 Outflow = 1.55 cfs @ 12.62 hrs, Volume= 0.662 af, Atten= 81%, Lag= 35.6 min  
 Primary = 1.55 cfs @ 12.62 hrs, Volume= 0.662 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 143.38' @ 12.62 hrs Surf.Area= 10,688 sf Storage= 13,983 cf

Plug-Flow detention time= 157.6 min calculated for 0.660 af (71% of inflow)  
 Center-of-Mass det. time= 71.3 min ( 894.7 - 823.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	141.95'	20,937 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
141.95	5,925	0	0
142.00	8,752	367	367
143.00	10,374	9,563	9,930
143.50	10,782	5,289	15,219
144.00	12,092	5,719	20,937

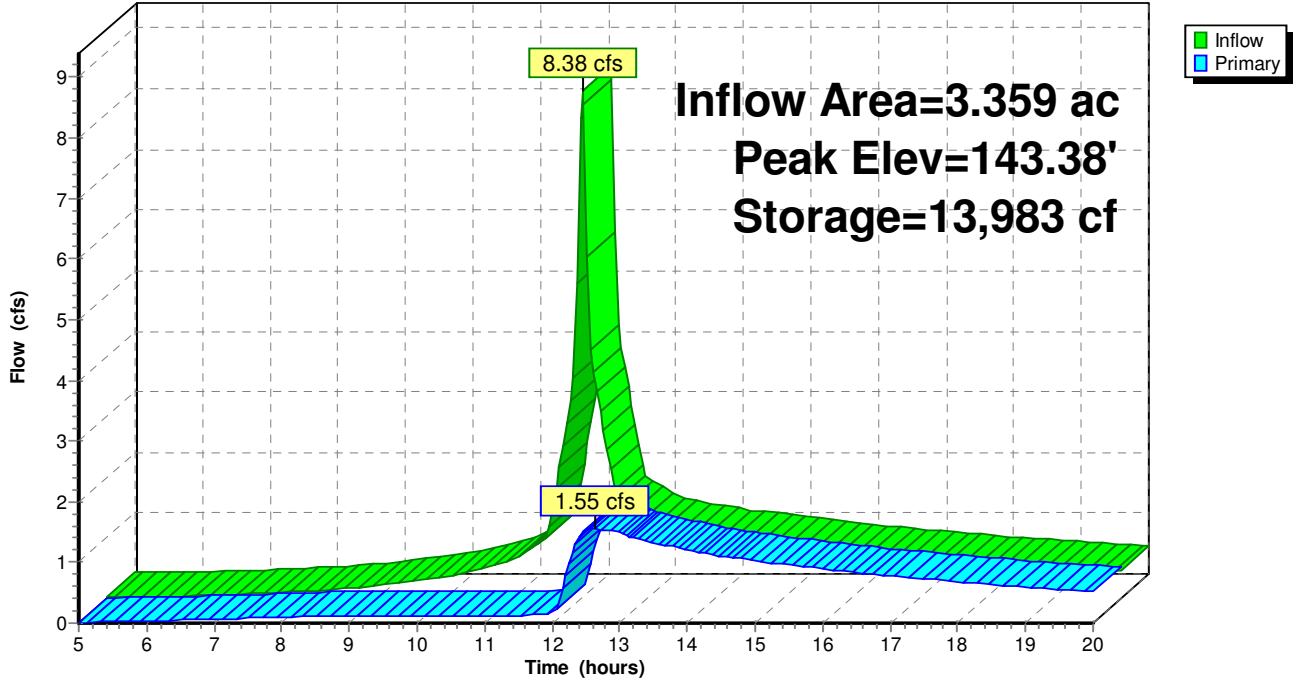
Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	<b>12.0" Round Culvert</b> L= 200.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 139.00' / 137.00' S= 0.0100 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	141.95'	<b>0.598 in/hr Exfiltration over Surface area</b>
#3	Device 1	143.00'	<b>22.0" W x 5.0" H Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=1.55 cfs @ 12.62 hrs HW=143.38' (Free Discharge)

- ↑ **1=Culvert** (Passes 1.55 cfs of 5.35 cfs potential flow)
- ↑ **2=Exfiltration** (Exfiltration Controls 0.15 cfs)
- ↑ **3=Orifice/Grate** (Orifice Controls 1.40 cfs @ 1.99 fps)

### Pond 1P: 1P

Hydrograph



**Summary for Pond 2P: 2P**

Inflow Area = 1.376 ac, 84.40% Impervious, Inflow Depth > 3.98" for 25 Year event  
 Inflow = 6.81 cfs @ 12.03 hrs, Volume= 0.456 af  
 Outflow = 0.32 cfs @ 14.04 hrs, Volume= 0.183 af, Atten= 95%, Lag= 120.4 min  
 Primary = 0.32 cfs @ 14.04 hrs, Volume= 0.183 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 139.11' @ 14.04 hrs Surf.Area= 8,936 sf Storage= 12,896 cf

Plug-Flow detention time= 206.1 min calculated for 0.182 af (40% of inflow)  
 Center-of-Mass det. time= 97.9 min ( 840.4 - 742.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	137.45'	17,331 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.45	2,716	0	0
137.50	6,701	235	235
138.00	7,413	3,529	3,764
139.00	8,876	8,145	11,908
139.60	9,200	5,423	17,331

Device	Routing	Invert	Outlet Devices
#1	Primary	134.50'	<b>12.0" Round Culvert</b> L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.50' / 133.50' S= 0.0100 ' /' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.45'	<b>0.598 in/hr Exfiltration over Surface area</b>
#3	Device 1	139.00'	<b>20.0" W x 4.0" H Vert. Orifice/Grate</b> C= 0.600
#4	Secondary	139.50'	<b>15.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

**Primary OutFlow** Max=0.32 cfs @ 14.04 hrs HW=139.11' (Free Discharge)

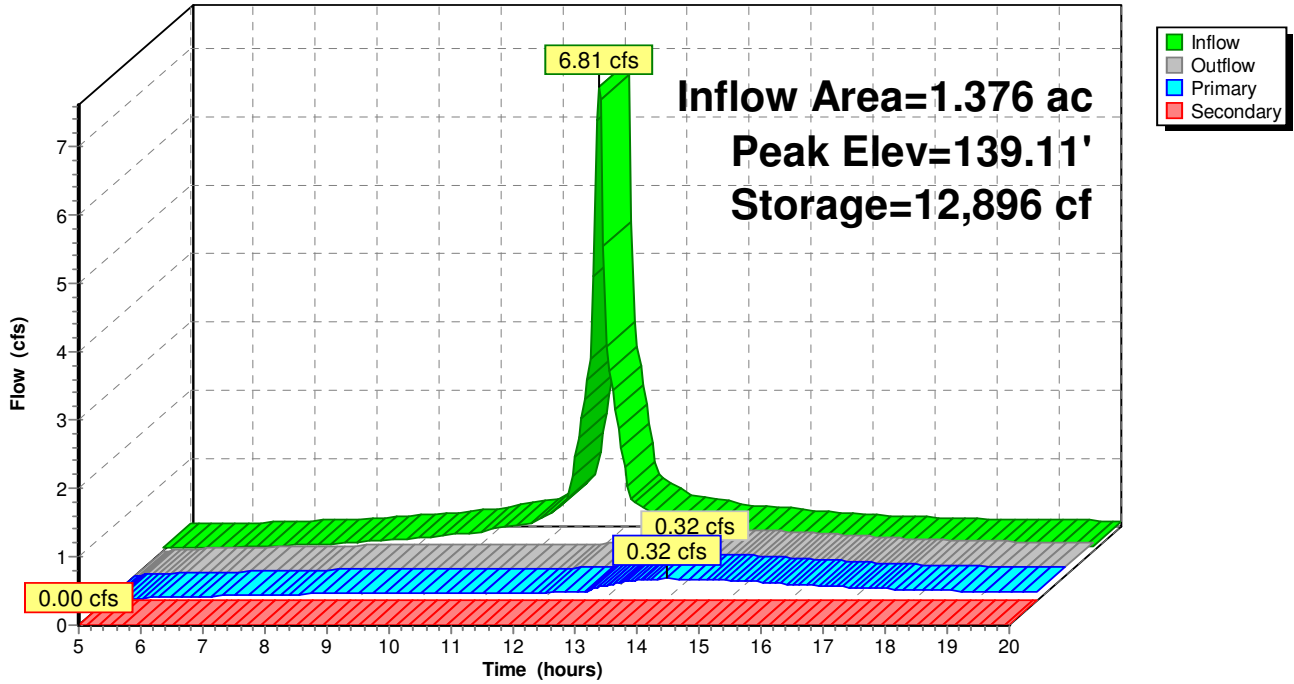
- ↑ **1=Culvert** (Passes 0.32 cfs of 6.50 cfs potential flow)
- ↑ **2=Exfiltration** (Exfiltration Controls 0.12 cfs)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.20 cfs @ 1.07 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=137.45' (Free Discharge)

- ↑ **4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

### Pond 2P: 2P

Hydrograph



**Summary for Pond 3P: 3P**

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 3.47" for 25 Year event  
 Inflow = 8.12 cfs @ 12.17 hrs, Volume= 0.696 af  
 Outflow = 5.12 cfs @ 12.35 hrs, Volume= 0.513 af, Atten= 37%, Lag= 10.7 min  
 Primary = 5.12 cfs @ 12.35 hrs, Volume= 0.513 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 139.42' @ 12.35 hrs Surf.Area= 8,884 sf Storage= 11,427 cf

Plug-Flow detention time= 105.1 min calculated for 0.511 af (73% of inflow)  
 Center-of-Mass det. time= 44.3 min ( 811.5 - 767.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	137.95'	12,139 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.95	3,791	0	0
138.00	7,013	270	270
139.00	8,142	7,578	7,848
139.50	9,024	4,292	12,139

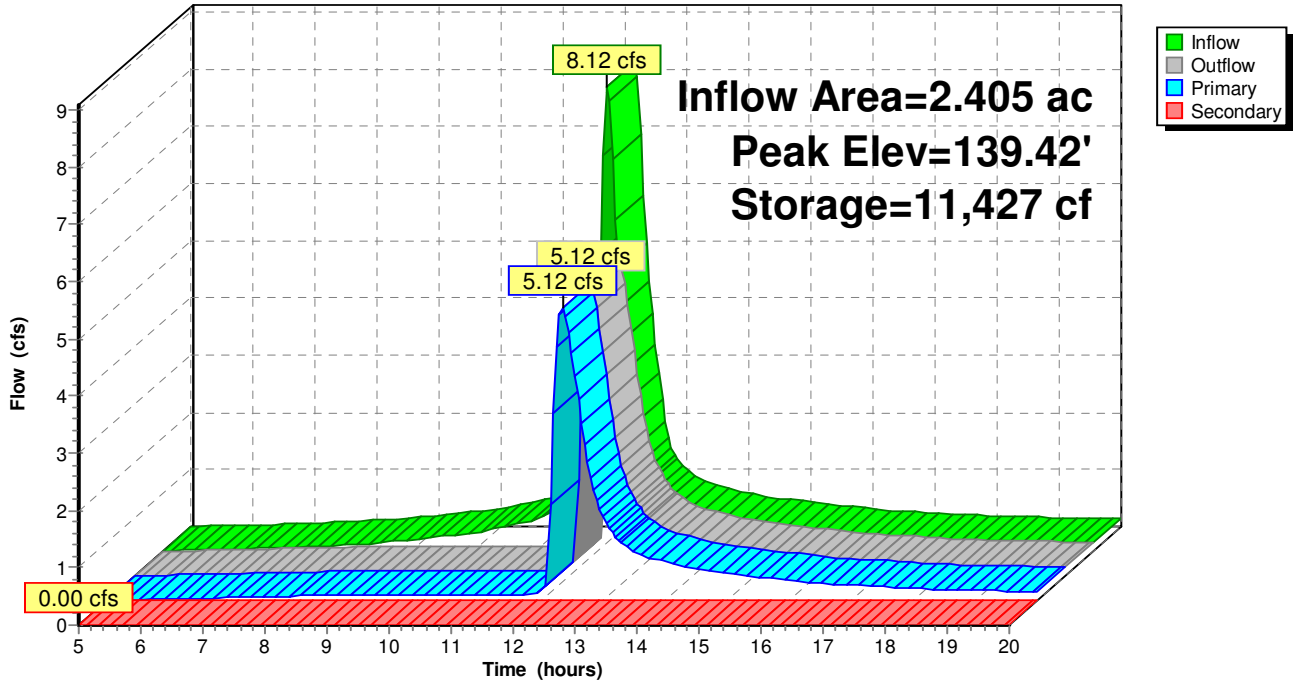
Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	<b>12.0" Round Culvert</b> L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0100 ' /' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.95'	<b>0.598 in/hr Exfiltration over Surface area</b>
#3	Device 1	139.00'	<b>21.4" Horiz. Orifice/Grate-NFCO R-4342 Beehive Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	139.45'	<b>15.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

**Primary OutFlow** Max=5.11 cfs @ 12.35 hrs HW=139.42' (Free Discharge)  
 ↑ **1=Culvert** (Passes 5.11 cfs of 6.36 cfs potential flow)  
 ↑ **2=Exfiltration** (Exfiltration Controls 0.12 cfs)  
 ↑ **3=Orifice/Grate-NFCO R-4342 Beehive Grate** (Weir Controls 4.99 cfs @ 2.12 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=137.95' (Free Discharge)  
 ↑ **4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

### Pond 3P: 3P

Hydrograph



**Summary for Pond 4aP: RD**

Inflow Area = 0.882 ac, 95.86% Impervious, Inflow Depth > 4.16" for 25 Year event  
 Inflow = 4.66 cfs @ 12.01 hrs, Volume= 0.306 af  
 Outflow = 1.73 cfs @ 12.21 hrs, Volume= 0.304 af, Atten= 63%, Lag= 11.9 min  
 Primary = 1.23 cfs @ 12.20 hrs, Volume= 0.300 af  
 Secondary = 0.50 cfs @ 12.21 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 144.00' @ 12.20 hrs Surf.Area= 1,557 sf Storage= 3,114 cf

Plug-Flow detention time= 24.5 min calculated for 0.303 af (99% of inflow)  
 Center-of-Mass det. time= 21.2 min ( 755.9 - 734.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	3,114 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 7,785 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,557	0	0
140.00	1,557	1,557	1,557
141.00	1,557	1,557	3,114
142.00	1,557	1,557	4,671
143.00	1,557	1,557	6,228
144.00	1,557	1,557	7,785

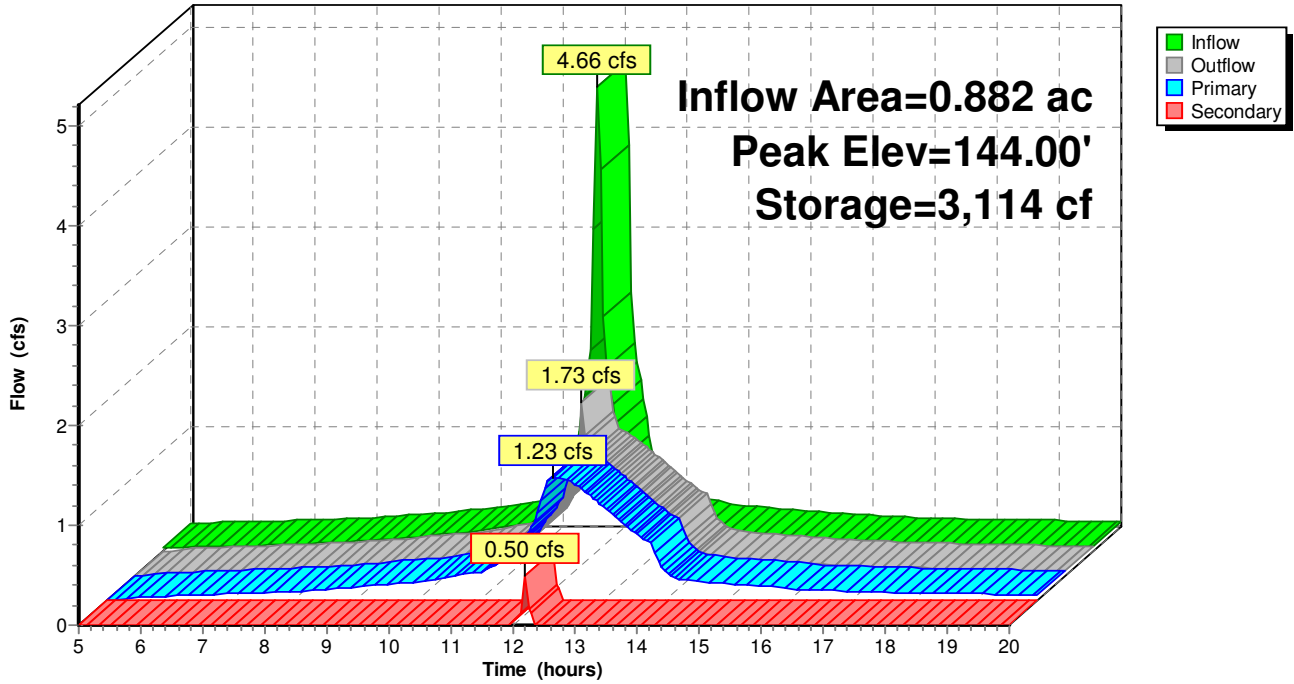
Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	<b>6.0" Round Culvert</b> L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	<b>503.0' long x 5.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

**Primary OutFlow** Max=1.23 cfs @ 12.20 hrs HW=144.00' (Free Discharge)  
 ↑1=Culvert (Barrel Controls 1.23 cfs @ 6.27 fps)

**Secondary OutFlow** Max=0.09 cfs @ 12.21 hrs HW=144.00' (Free Discharge)  
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 0.09 cfs @ 0.10 fps)

### Pond 4aP: RD

Hydrograph





**Summary for Pond 4bP: RD**

Inflow Area = 0.685 ac, 95.86% Impervious, Inflow Depth > 4.16" for 25 Year event  
 Inflow = 3.62 cfs @ 12.01 hrs, Volume= 0.237 af  
 Outflow = 1.16 cfs @ 12.24 hrs, Volume= 0.236 af, Atten= 68%, Lag= 14.2 min  
 Primary = 1.16 cfs @ 12.24 hrs, Volume= 0.236 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 143.39' @ 12.24 hrs Surf.Area= 1,210 sf Storage= 2,123 cf

Plug-Flow detention time= 18.7 min calculated for 0.235 af (99% of inflow)  
 Center-of-Mass det. time= 15.8 min ( 750.4 - 734.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	2,420 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 6,050 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,210	0	0
140.00	1,210	1,210	1,210
141.00	1,210	1,210	2,420
142.00	1,210	1,210	3,630
143.00	1,210	1,210	4,840
144.00	1,210	1,210	6,050

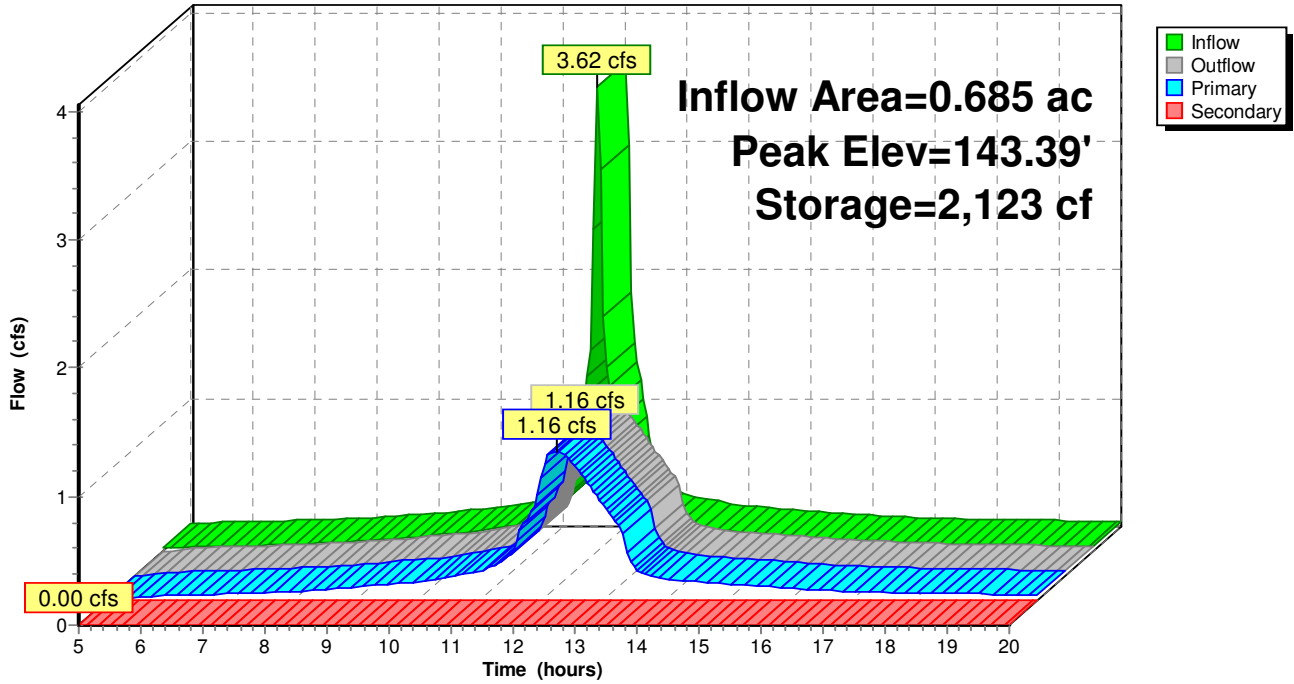
Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	<b>6.0" Round Culvert</b> L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	<b>503.0' long x 5.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

**Primary OutFlow** Max=1.16 cfs @ 12.24 hrs HW=143.38' (Free Discharge)  
 ↑1=Culvert (Barrel Controls 1.16 cfs @ 5.91 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=139.01' (Free Discharge)  
 ↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

### Pond 4bP: RD

Hydrograph



**Summary for Pond 6P: 6P**

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 2.42" for 25 Year event  
 Inflow = 13.69 cfs @ 12.58 hrs, Volume= 1.865 af  
 Outflow = 10.69 cfs @ 12.85 hrs, Volume= 1.865 af, Atten= 22%, Lag= 15.8 min  
 Primary = 10.69 cfs @ 12.85 hrs, Volume= 1.865 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 144.88' @ 12.85 hrs Surf.Area= 5,349 sf Storage= 4,099 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 1.7 min ( 820.6 - 818.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	7,720 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

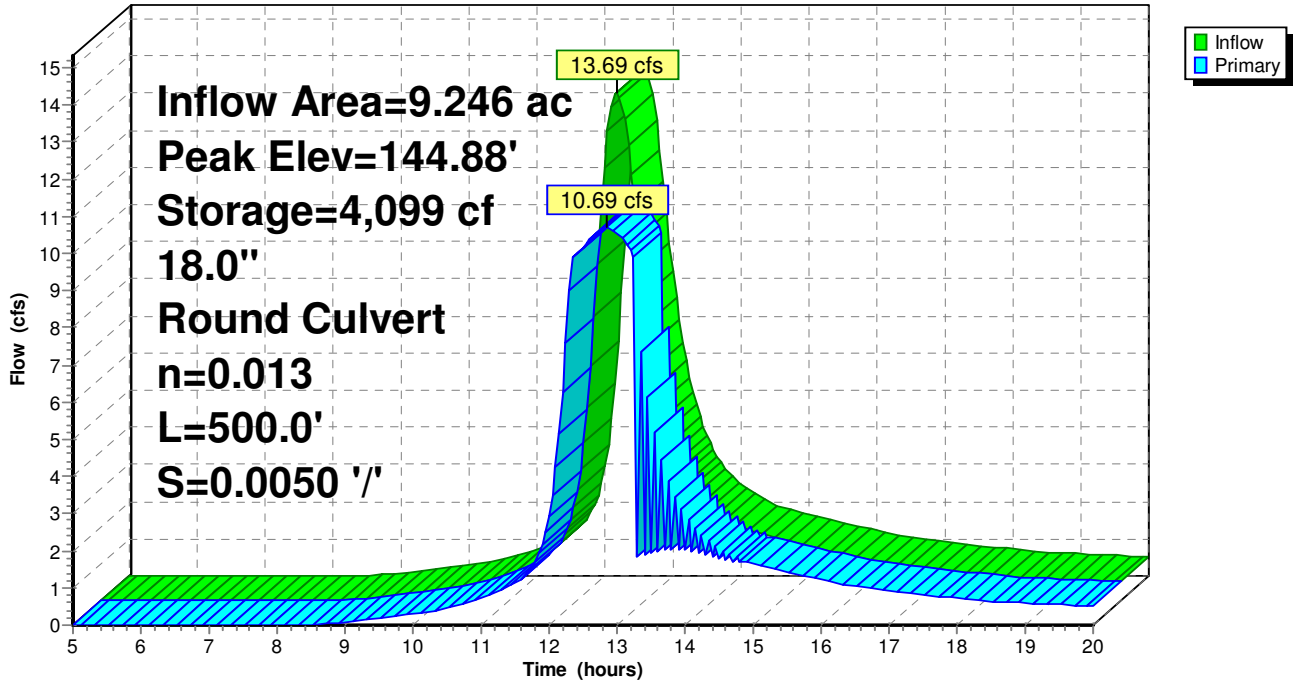
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	3,972	0	0
145.50	6,321	7,720	7,720

Device	Routing	Invert	Outlet Devices
#1	Primary	140.00'	<b>18.0" Round Culvert</b> L= 500.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 140.00' / 137.50' S= 0.0050 ' / Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

**Primary OutFlow** Max=10.69 cfs @ 12.85 hrs HW=144.88' (Free Discharge)  
 ↑**1=Culvert** (Barrel Controls 10.69 cfs @ 6.05 fps)

### Pond 6P: 6P

Hydrograph



**Summary for Pond TP: Tank Pond**

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 3.78" for 25 Year event  
 Inflow = 8.16 cfs @ 12.02 hrs, Volume= 0.534 af  
 Outflow = 0.71 cfs @ 12.85 hrs, Volume= 0.417 af, Atten= 91%, Lag= 49.5 min  
 Primary = 0.71 cfs @ 12.85 hrs, Volume= 0.417 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 145.14' @ 12.85 hrs Surf.Area= 12,867 sf Storage= 13,175 cf

Plug-Flow detention time= 217.8 min calculated for 0.417 af (78% of inflow)  
 Center-of-Mass det. time= 160.9 min ( 909.7 - 748.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	25,049 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	10,153	0	0
146.00	14,896	25,049	25,049

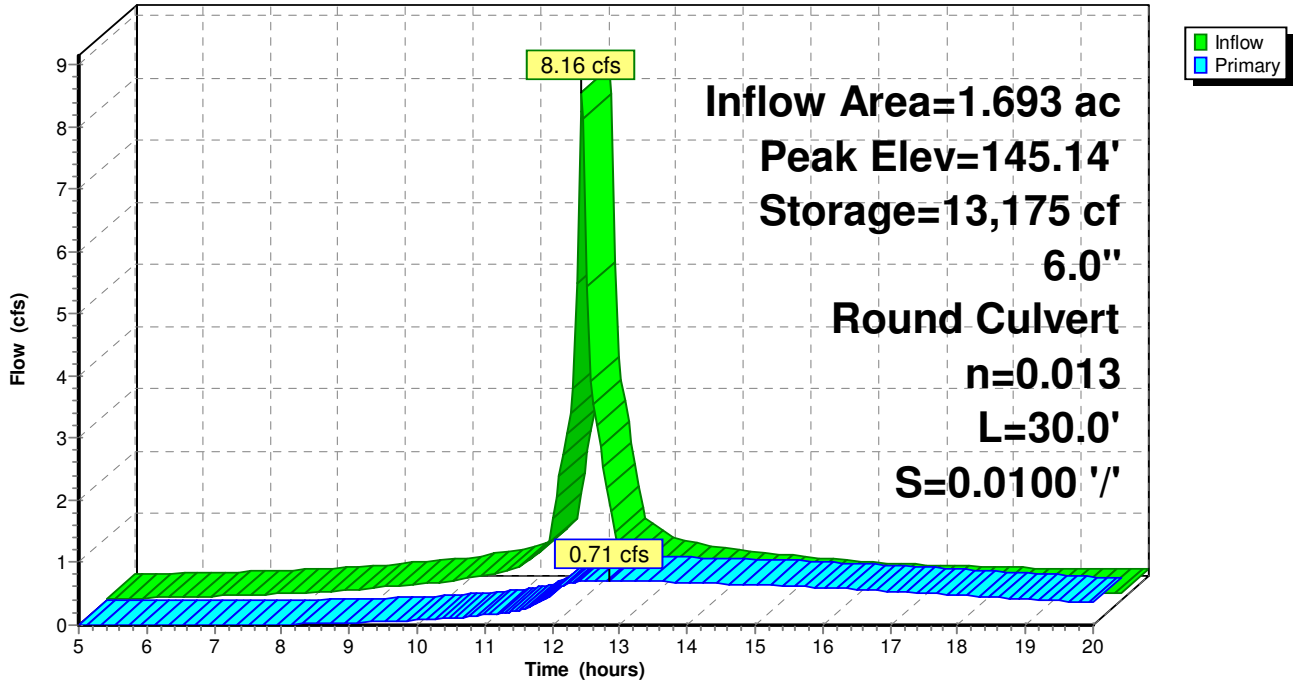
Device	Routing	Invert	Outlet Devices
#1	Primary	144.00'	<b>6.0" Round Culvert</b> L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 144.00' / 143.70' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

**Primary OutFlow** Max=0.71 cfs @ 12.85 hrs HW=145.14' (Free Discharge)

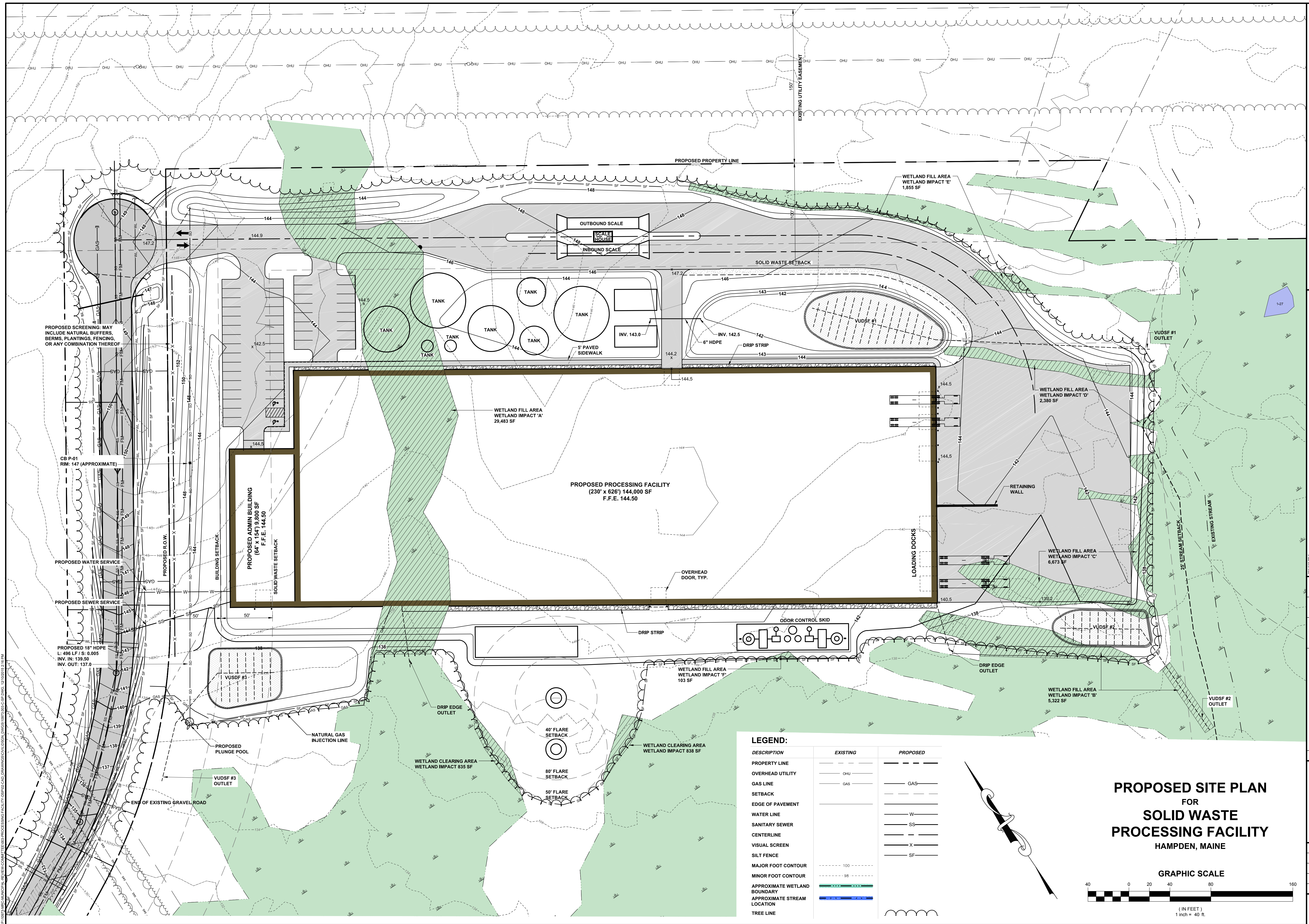
↑**1=Culvert** (Inlet Controls 0.71 cfs @ 3.60 fps)

### Pond TP: Tank Pond

Hydrograph



**SITE PLAN  
PRE DEVELOPMENT HYDROLOGY PLAN  
POST DEVELOPMENT HYDROLOGY PLAN**



PROPOSED SCREENING: MAY INCLUDE NATURAL BUFFERS, BERMS, PLANTINGS, FENCING, OR ANY COMBINATION THEREOF

CB P-01  
RIM: 147 (APPROXIMATE)

PROPOSED WATER SERVICE

PROPOSED SEWER SERVICE

PROPOSED 18" HDPE  
L: 496 LF / S: 0.005  
INV. IN: 139.50  
INV. OUT: 137.0

PROPOSED ADMIN BUILDING  
(64' x 154') 9,800 SF  
F.F.E. 144.50

PROPOSED PROCESSING FACILITY  
(230' x 626') 144,000 SF  
F.F.E. 144.50

WETLAND FILL AREA  
WETLAND IMPACT 'E'  
1,855 SF

WETLAND FILL AREA  
WETLAND IMPACT 'A'  
29,483 SF

WETLAND FILL AREA  
WETLAND IMPACT 'D'  
2,380 SF

WETLAND FILL AREA  
WETLAND IMPACT 'C'  
6,673 SF

WETLAND FILL AREA  
WETLAND IMPACT 'F'  
103 SF

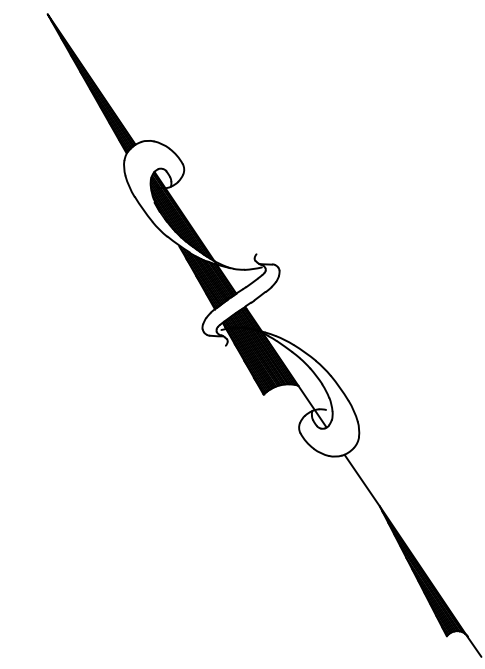
WETLAND FILL AREA  
WETLAND IMPACT 'B'  
5,322 SF

WETLAND CLEARING AREA  
WETLAND IMPACT 835 SF

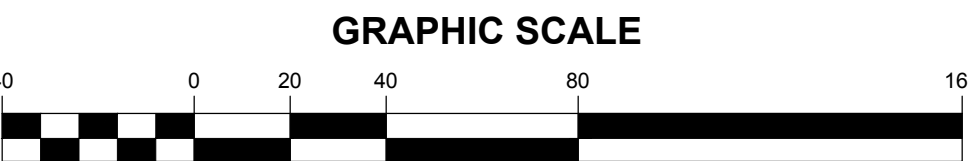
WETLAND CLEARING AREA  
WETLAND IMPACT 838 SF

**LEGEND:**

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE	---	---
OVERHEAD UTILITY	OHU	---
GAS LINE	GAS	GAS
SETBACK	---	---
EDGE OF PAVEMENT	---	---
WATER LINE	---	W
SANITARY SEWER	---	SS
CENTERLINE	---	---
VISUAL SCREEN	---	X
SILT FENCE	---	SF
MAJOR FOOT CONTOUR	100	---
MINOR FOOT CONTOUR	98	---
APPROXIMATE WETLAND BOUNDARY	---	---
APPROXIMATE STREAM LOCATION	---	---
TREE LINE	---	---



**PROPOSED SITE PLAN**  
FOR  
**SOLID WASTE PROCESSING FACILITY**  
HAMPDEN, MAINE

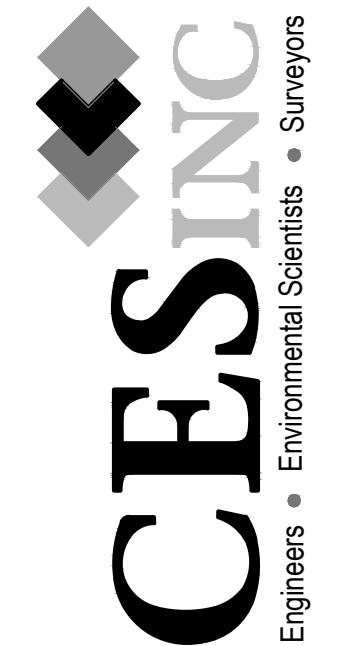


Waterbury  
44 Main Street  
Waterbury, ME  
F. 207-860-2202  
F. 207-759-8412  
F. 207-866-8414  
F. 207-866-8414

Brewer  
465 South Main Street  
Brewer, ME  
F. 207-589-4824  
F. 207-589-4824  
F. 207-589-4824

Levonis  
1365 State Hwy 102  
Levonis, ME  
F. 207-255-3270  
F. 207-255-3270

Bar Harbor  
811 Dublin Street  
PO Box 987  
Bar Harbor, ME  
F. 207-288-0588  
F. 207-255-8587



MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY  
HAMPDEN, MAINE

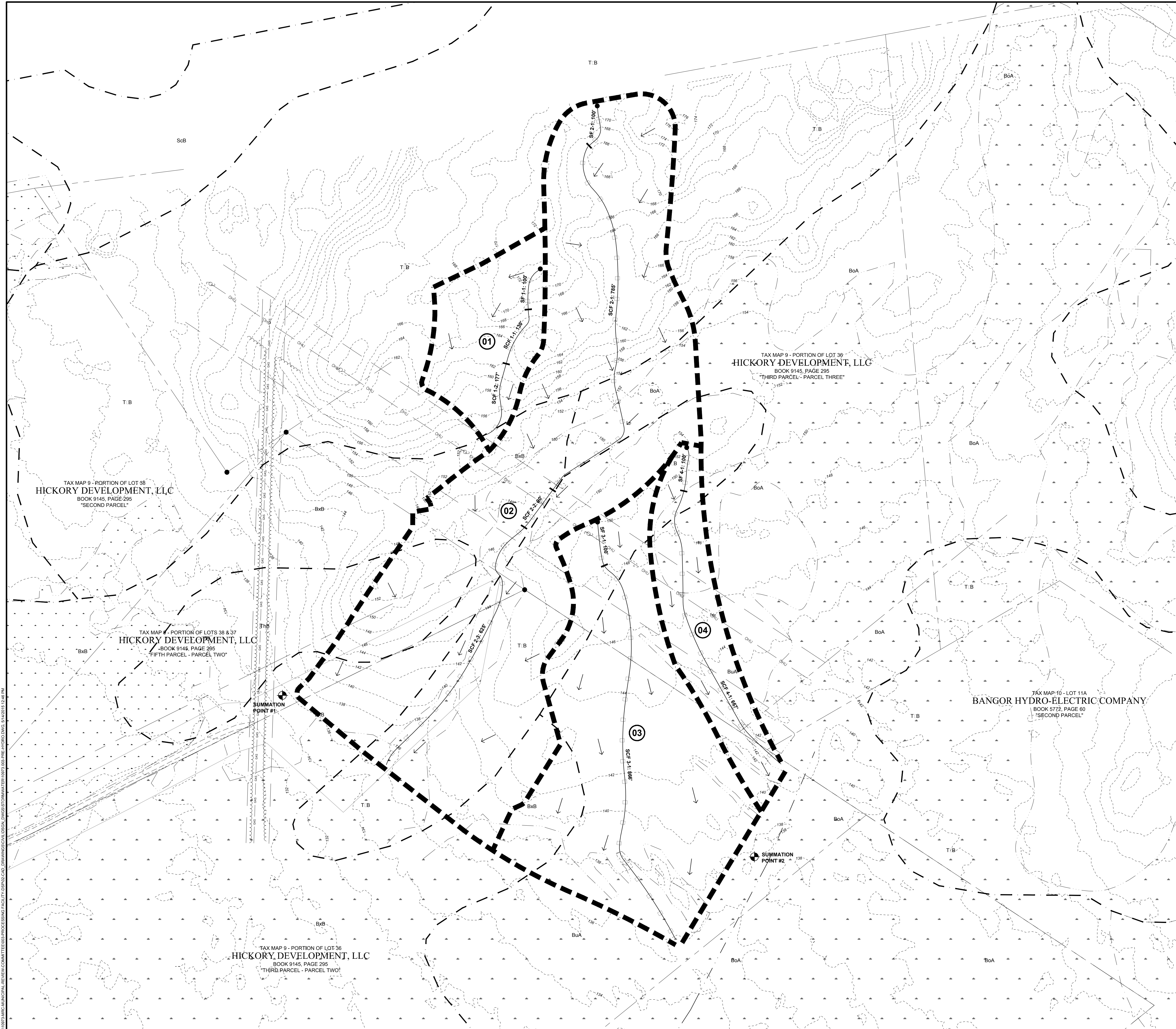
**PROPOSED SITE PLAN**

NO.	DATE	DESCRIPTION

STATE OF MAINE  
SEAN M. THIES  
No. 10139  
12/10/2015  
LICENSED PROFESSIONAL ENGINEER

SCALE: 1"=40'  
DATE: 2015-12-10  
DRAWN BY: BLO/WAB CHECKED BY: SMT  
DESIGNED BY: BLO/SMI APPROVED BY: SMT  
JOB NUMBER: 10673 003  
DRAWING NUMBER: C101





**LEGEND:**

- FLOW DIRECTION
- FLOW PATH
- WATERSHED I.D.
- WATERSHED BOUNDARY
- SOILS BOUNDARY
- EDGE OF PAVEMENT
- PROPERTY LINE
- 1 FOOT CONTOUR
- 5 FOOT CONTOUR
- TREELINE
- WETLAND

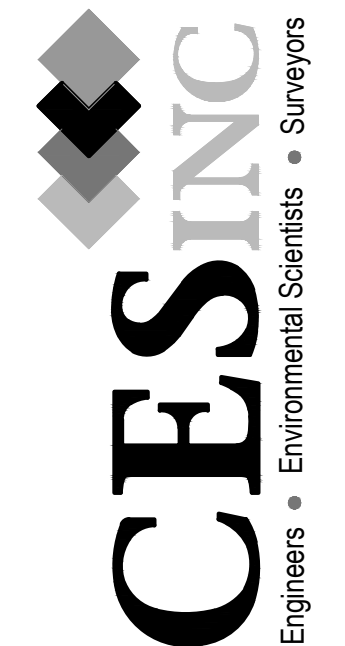
**ABBREVIATIONS:**

- SF SHEET FLOW
- SCF SHALLOW CONCENTRATED FLOW
- BoA BIDDEFORD MUCKY PEAT, 3-1: SLOPES
- BxA BUXTON SILT LOAM, 0-2: SLOPES
- BxB BUXTON, SCANTIC, AND BIDDEFORD STONY SILT LOAMS, 0-8: SLOPES
- T.B THORNDIKE VERY ROCKY SILT, 1: SLOPES
- T.B THORNDIKE VERY ROCKY LOAM, 2-8: SLOPES

Waterville  
44 Main Street  
Waterville, ME  
F. 207-980-2302  
F. 207-754-9412  
F. 207-754-9414  
F. 207-626-6204

Brewer  
405 South Main Street  
Brewer, ME  
F. 207-589-4824  
F. 207-589-4681  
F. 207-589-4681

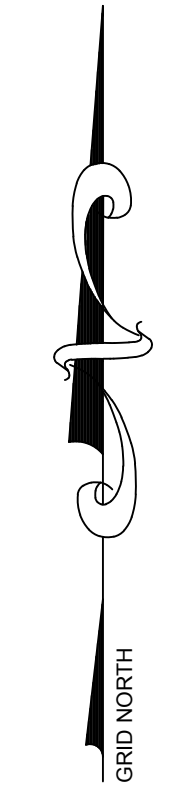
Lebanon  
81 Dublin Street  
PO Box 897  
Bar Harbor, ME  
Lebanon, ME  
F. 207-252-3270  
F. 207-252-3270  
F. 207-252-8387  
F. 207-252-8387



PROJECT TITLE  
**MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY**  
HAMPDEN, MAINE

SHEET TITLE  
**PRE-DEVELOPMENT**  
**HYDROLOGY PLAN**

NO.	REV.	DATE	DESCRIPTION



**PRE-DEVELOPMENT**  
**HYDROLOGY PLAN**  
FOR  
**SOLID WASTE**  
**PROCESSING FACILITY**  
HAMPDEN, MAINE

**GRAPHIC SCALE**

(IN FEET)  
1 inch = 100 ft.

STATE OF MAINE  
SEAN M. THIES  
No. 10139  
5-13-2013  
LICENSED PROFESSIONAL ENGINEER  
ISSUED FOR PERMITTING

SCALE 1"=100'

DATE 2015-05-11

DRAWN BY BLO CHECKED BY ACH/SM

DESIGNED BY CTM APPROVED BY SMT

XBR NUMBER 10973.003

DRAWING NUMBER

**C701**

P:\10973\MRC-MUNICIPAL REVIEW COMMITTEE\1000-PROCESSING FACILITY\03-15-15\15-0515-12-24-PM.dwg



**LEGEND:**

- FLOW DIRECTION
- FLOW PATH
- WATERSHED I.D.
- WATERSHED BOUNDARY
- UTILITY POLE
- EDGE OF GRAVEL
- EDGE OF PAVEMENT
- PROPERTY LINE
- 1 FOOT CONTOUR
- 5 FOOT CONTOUR
- TREELINE
- GRAVEL SURFACE
- PAVED SURFACE
- WETLAND
- SOIL FILTER AREA

**ABBREVIATIONS:**

- SF SHEET FLOW
- SCF SHALLOW CONCENTRATED FLOW
- CF CHANNEL FLOW
- PF PIPE FLOW
- BoA BIDDEFORD MUCKY PEAT, 3% SLOPES
- BuA BUXTON SILT LOAM, 0-2% SLOPES
- BxB BUXTON, SCANTIC, AND BIDDEFORD STONY SILT LOAMS, 0-8% SLOPES
- TkB THORNDIKE VERY ROCKY SILT 8% SLOPES
- TbB THORNDIKE VERY ROCKY LOAM, 2-8% SLOPES

Waterbury  
44 Main Street  
Waterbury, ME  
F. 207-980-2302

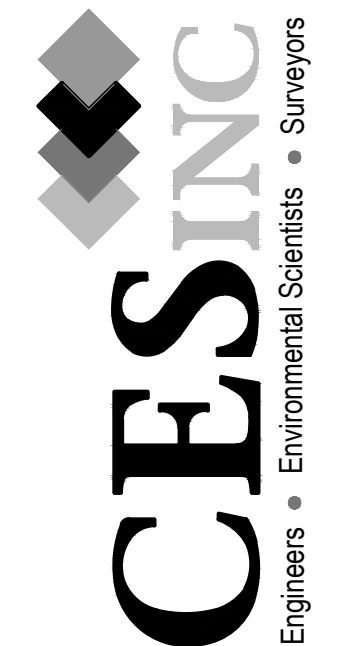
Presque Isle  
569 Main Street  
Presque Isle, ME  
F. 207-794-8412

Brewer  
465 South Main Street  
Brewer, ME  
F. 207-588-4824

Lebanon  
1565 State Hwy 102  
Lebanon, ME  
F. 207-626-6262

Bar Harbor  
60 Doble Street  
PO Box 887  
Bar Harbor, ME  
T. 207-256-3270  
F. 207-288-0588

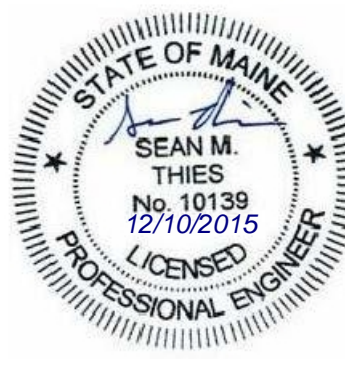
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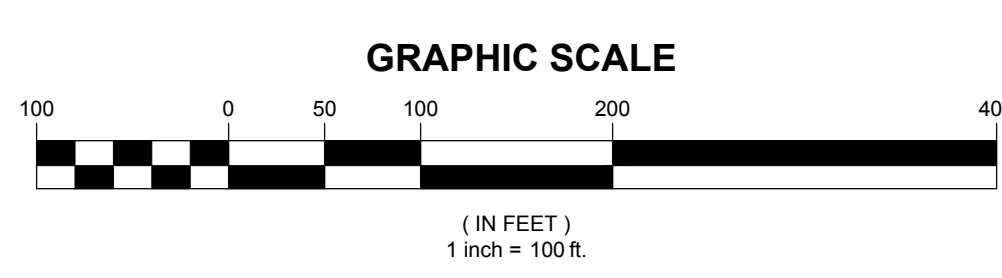
PROJECT TITLE  
**MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY  
HAMPDEN, MAINE**

SHEET TITLE  
**POST-DEVELOPMENT  
HYDROLOGY PLAN**

NO.	REV.	DATE	DESCRIPTION



**POST-DEVELOPMENT  
HYDROLOGY PLAN  
FOR  
SOLID WASTE  
PROCESSING FACILITY  
HAMPDEN, MAINE**



SCALE 1"=100'

DATE 2015-12-10

DRAWN BY BLOWAB CHECKED BY ACH/SM

DESIGNED BY CTM APPROVED BY

XBR NUMBER 10973.003

DRAWING NUMBER

**C702**